DEVELOPER RESPONSE TO EIRB

As requested by the Environmental Impact Review Board (EIRB) on October 25, 2011, the Developer is pleased to provide further information on upcoming and completed studies (EIRB Request #2(b)), and mitigation measures, residual effects, Developer commitments, and monitoring (EIRB Request #2(c)).

EIRB Request #2(b):

A consolidated list of any new information that will be provided for this review, the planned studies that have begun or are planned for a future data, and a discussion of how this new information will address information requirements found in the EIS Terms of Reference (sections 9.1, 10.1, 10.2, 13.1). The Developer should also provide a schedule for when these studies will be undertaken and completed, and when the new information will be submitted. Also, clearly identify whether any of the new information is planned to be provided for the review phase or for the regulatory phase.

Developer's Response #2(b):

INUVIK TO TUKTOYAKTUK HIGHWAY
BASELINE DATA COLLECTION PROGRAMS SCHEDULE & STATUS

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/Design/Planning/Regulatory Applications
Aerial Photography	1:10,000 scale photos Final Digital prints	August 31, 2011	DOT	**Completed**	Used in LSA mapping for vegetation and design
	Ortho-Photo Mosaic	September 2011	DOT	**Completed**	Used in engineering design and a variety of field surveys
LiDAR	LiDAR Survey	August 2011		**Completed**	n/a
	LiDAR Analysis	November 2011	DOT	Underway	Used in detailed engineering and terrain baseline mapping Used in field survey planning for wildlife and wildlife habitat

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/Design/Planning/Regulatory Applications
Fisheries	Fish Habitat Assessment	August 22 – September 23, 2011	IMG-Golder	**Completed**	Used in report preparation
	Draft Report	October 28, 2011	IMG-Golder	**Under Review by DOT. DFO**	
	Final Report	Mid – December 2011	IMG-Golder		Provides, in conjunction with 2010 surveys, site specific baseline for refined effects assessment Supports development of Fish and Fish Habitat Protection Plan Supports HADD application if necessary Supports TC Navigable Waters application Supports Water Licence application
Archaeology Impact Assessment	Field Survey	August 22 – September 23, 2011	IMG-Golder	**Completed**	Provides adequate baseline for Project EA assessment including site specific mitigation
	Draft Report	October 28, 2011	IMG-Golder	**Under Review by DOT, PWNHC**	Provides, in conjunction with 2009 surveys, site specific baseline for refined effects assessment
	Final Report	Mid - December	IMG-Golder		Supports Archaeological Impact Assessment including defining site-specific mitigations Supports Archaeological Protection Plan development
Potential Borrow Source Reconnaissance	On ground reconnaissance of suitability of potential borrow sources	July – August 2011	**Kavik-Stantec**	**Partially Completed**	Supports 2011 and 2012 winter geotechnical investigation contracts

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/Design/Planning/Regulatory Applications
Terrain and Geotechnical	Draft Surficial Geology Map of LSA and borrow sites at 1:20,000 including delineation and classification of surficial geology Mapping from digital imagery and High Definition and Mapping and APPlications system	March 1, 2012	KAVIK-STANTEC	*Underway*	Supports detailed route alignment and costing Supports design of geotechnical program for site investigations of landforms, terrain stability, permafrost conditions, presence of waterbodies, identification of winter access road stream crossings, and hydrological factors affecting access or borrow extraction activities Supports planning of borrow source geotechnical investigations Supports vegetation landcover mapping Supports identification of potential wildlife habitat. Supports mitigation design and planning
	Draft Terrain Constraints Map of LSA and potential borrow sites at 1:20,000 including delineation and classification of ice-rich deposits and terrain related geohazards	March 1, 2012	KAVIK-STANTEC	*Underway*	Supports detailed route alignment and engineering Supports planning of borrow source geotechnical investigations Supports mitigation planning
	Final Terrain and Geotechnical Constraints report including identification, delineation and classification of surficial geology, ice-rich deposits and terrain constraints at a representative scale of 1:7,500; to be reproduced at 1:20,000	March 31, 2012	KAVIK-STANTEC	Underway	Assists with detailed engineering and design Supports wildlife habitat mapping and field survey planning Supports Sediment and Erosion Plan development Supports LUP and WL applications
	Winter geotechnical drilling, sampling and lab testing of portions of 9 borrow sources to confirm the extent, quantity and quality of materials.	March - October 2012	TBD		Supports project planning and design, costing. Supports Pit Development Plans for Quarry Permits

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/Design/Planning/Regulatory Applications
Traditional Knowledge/ Traditional Land Use	Literature Review	September 2011	KAVIK-STANTEC	**Completed**	Used in TK Workshop preparation
	TK/TLU workshop material preparations	November 31, 2011	KAVIK-STANTEC	**Revised Schedule**	Used in conducting workshops
	Workshop - Inuvik	December 12, 2011	KAVIK-STANTEC	**Confirmed Date**	Confirms understanding of site specific traditional knowledge and site specific traditional land use activities Provides adequate baseline for Project EA assessment including site specific mitigation Supports planning of geotechnical investigations
	Workshop - Tuktoyaktuk	December 13, 2011	KAVIK-STANTEC lead	**Confirmed Date**	Confirms understanding of site specific traditional knowledge and site specific traditional land use activities Provides adequate baseline for Project EA assessment including site specific mitigation Supports planning of geotechnical investigations
	Analysis and community review	January/ February 2012	KAVIK-STANTEC		Used in mitigation confirmation and construction phase Wildlife Mitigation and Monitoring Plan
	Final Report	April 30, 2012	KAVIK-STANTEC		Assists with detailed engineering and design Used in mitigation confirmation and construction phase Wildlife Mitigation and Monitoring Plan Supports TC Navigable Waters application

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/Design/Planning/Regulatory Applications
Vegetation Baseline	Preliminary LSA vegetation cover map	March 31, 2012	KAVIK-STANTEC		Used in field survey planning Used to confirm impact predictions Informs habitat potential mapping and wildlife field surveys
	Rare Plant literature review				
	Vegetation cover and Rare Plant Field Surveys and Sampling	June 2012	KAVIK-STANTEC		Used in vegetation mapping and to confirm EIS vegetation typing Used in final design and mitigation determination
	Draft Report including vegetation cover map at 1:20,000 and rare plant occurrences	August 15, 2012	KAVIK-STANTEC	*Revised Schedule*	Used in final design and mitigation implementation Used in wildlife habitat mapping
	Final Baseline Report including vegetation cover map at 1:20,000	August 31, 2012			Used in final design and mitigation implementation Used in mitigation / compliance monitoring
Wildlife and Wildlife Habitat	LSA Features Relevant to Wildlife	March 31, 2012	KAVIK-STANTEC	*Revised Schedule*	Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in design and implementation of habitat mitigations
	Spring Waterfowl Staging Survey	May 2012	KAVIK-STANTEC in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in design and implementation of habitat mitigations
	Breeding Waterfowl Survey	June 2012	KAVIK-STANTEC in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in design and implementation of species mitigations
	Breeding Passerines/ Shorebirds Survey	June / July 2012	KAVIK-STANTEC in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in design and implementation of species mitigations
	Draft Report including wildlife, key wildlife habitat features and observations map at 1:20,000	August 15, 2012	KAVIK-STANTEC	*Revised Schedule*	Used in design and implementation of species mitigations Used in refining Construction Wildlife Mitigation and Monitoring Plan

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/Design/Planning/Regulatory Applications
	Final Baseline Report	August 31, 2012	KAVIK-STANTEC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in mitigation / compliance monitoring
	Grizzly Bear Den Survey	October 12, 2011 October 2012	ENR - Inuvik	Conducted October 12	Used in implementation of den mitigations prior to subsequent winter geotechnical investigations and construction
	Raptor Nest Survey	June 2012	ENR - Inuvik		Used in design and implementation of habitat mitigations
Engineering	Right-of-Way Surveys	July – August 2012	DOT		Used in implementation of mitigations
	Bridge Design	July 2012	DOT		Design and implementation of habitat mitigations
Hydrological Assessments	Determine span widths and abutment placement	June 2012	TBD		Support bridge crossing design and engineering Supports Water Licence application Support Navigable Water permit applications
Water Source Studies	Bathymetric Mapping of proposed water sources	June 2012	TBD		Supports Water Licence application Supports construction planning
	Assessment of allowable withdrawal quantities per source	July 2012	TBD		Supports Water Licence application Supports construction planning

EIRB Request #2(c):

A detailed description and discussion of their views on other ways they propose to use to make impact predictions and develop appropriate mitigation measures (Sections 9.1, 10.1, 10.2, 13.1).

Developer's Response #2(c):

The Developer prepared the mitigation measures for the Highway based on previous northern experience and accepted practices, including those practices outlined in Section 6.0 (Guidance on Mitigative and Remedial Measures) of the EIRB's *Environmental Impact Review Guidelines* (2011, referred to as the "Guidelines"). In particular, Section 6.2 (What a Developer Should Consider) of the EIRB Guidelines provides guidance on the preparation of mitigation measures and examples of appropriate mitigation measures, which are comparable to those provided by the Developer in the EIS and Addendum. Portions of Section 6.2 are provided as follows.

6.2 What a Developer Should Consider (EIRB 2011)

To properly address the requirement for mitigative and remedial measures, a development proposal submission should include:

- A description of any potential impacts to the biophysical and human environment, wildlife, wildlife habitat, and wildlife harvesting activities.
- A description of the proposed mitigation to reduce or eliminate potential impacts.
- An outline of emergency response plans and any management and monitoring plans proposed and/or required for the development to proceed.

Mitigation measures to be used to reduce the potential negative effects of a development should be identified as part of the EIS. Measures that are built into the design of the development can be included in the discussion of development activities. For example, all land users shall avoid harm to wildlife and wildlife habitat and damage to community travel routes through the timing of their operations, through careful selection of the location of their main camps and travel routes and through other mitigative measures. Descriptions of mitigative measures should be specific (i.e., mitigative measures that require actions or responses by the Developer should be explicitly identified and explained).

Such measures may include:

- Mandatory restrictions imposed by laws of general application, regulations and guidelines. Laws of general application include territorial or federal statutes which are justified for conservation or public safety reasons such as the NWT's Wildlife Act or the Fisheries Act.
- Voluntary measures taken by the Developer (e.g., to use a different technology, to change the timing of activity or to commit to suspending activities in certain circumstances).
- Attachment of terms and conditions to specific authorizations that are required and that can be enforced, such as authorizations under the National Parks Act, or Species At Risk Act.

- Regional mitigation measures (e.g., Beaufort Sea Beluga Management Plan, NWT Guidance for the Protection of Land, Forest and Wildlife – Oil and Gas Seismic Exploration, Yukon North Slope Wildlife and Conservation Plan, Community Conservation Plans,) that were considered and will be implemented by the Developer.

Furthermore, the Developer believes that it has complied with the goal oriented approach established by the EIRB under Section 8.1 of the *Environmental Impact Review Guidelines* (EIRB 2011). Section 8.1 is provided as follows.

8.1 Goal Oriented Approach to Environmental Impact Review (EIRB 2011)

The EIRB encourages a Developer to use a goal oriented approach to achieve sustainable human and biophysical environmental protection in the design, construction, operation and decommissioning of proposed developments. The Review Board has adopted a goal oriented approach to environmental impact review to encourage a more sustainable approach to development, by:

- Establishing performance goals for sustainable human environment and environmental protection.
- Allowing flexibility for a Developer to apply their own knowledge and experience to achieve these human environment and environmental protection goals and to demonstrate how their proposed development contributes to sustainable development.
- Encouraging innovation and performance beyond a prescriptive minimum.
- Assigning responsibility to a Developer for demonstrating sustainable human environment and environmental protection for all phases of a proposed development.

The Review Board will use the human environment and environmental protection goals as a measure against which the Developer's Final EIS will be evaluated.

The Developer remains confident that the goals identified by the EIRB in the *Environmental Impact Review Guidelines* (Table 1, EIRB 2011) and repeated in the Terms of Reference (EIRB 2010), can be met by using the well-established mitigation measures, guidelines and best management practices identified throughout the EIS and in the Addendum. Table 4-1, extracted from the EIRB (2010) Terms of Reference for this Project, identifies the goal statements which the Developer is working towards in the design of this Project.

TABLE 4-1: BIOLOGICAL, PHYSICAL, AND HUMAN ELEMENTS AND GOAL STATEMENTS

Element	Goal Statements
Migratory Birds and Habitat	Protect and avoid disturbance or destruction to migratory birds and their habitat throughout all phases of the proposed development.
Species at Risk	Avoid the loss, damage or destruction of species at risk and their critical habitat throughout all phases of the proposed development.
Wildlife and Wildlife Habitat	Protect all wildlife and wildlife habitat and minimize habitat losses throughout all phases of the proposed development.

TABLE 4-1: BIOLOGICAL, PHYSICAL, AND HUMAN ELEMENTS AND GOAL STATEMENTS	
Element	**Goal Statements**
Fish and Fish Habitat	Protect all fish and fish habitat and establish a "no-net-loss" of fish habitat throughout all phases of the proposed development.
Vegetation	Maintain the diversity of all vegetation communities throughout all phases of the proposed development.
Waterbodies and Wetlands	Conserve and minimize or avoid negative impacts to all waterbodies and wetlands throughout all phases of the proposed development.
Soil	Protect and sustain soils and minimize losses through erosion throughout all phases of the proposed development
Surface water and Groundwater	Protect or minimize impacts to all ground and surface water throughout all phases of the proposed development.
Permafrost	Protect and minimize impacts to permafrost throughout all phases of the proposed development.
Noise	Minimize anthropogenic noises throughout the duration of the proposed development.
Climate Change	Minimize contributions to climate change throughout all phases of the proposed development.
Air Quality	Minimize air pollution throughout all phases of the proposed development.
Navigation	Avoid impeding navigation throughout all phases of development.
Wildlife Harvesting	Conserve species used for wildlife harvesting throughout all phases of the proposed development.
Culture, Heritage and Archaeology	Preserve culture, heritage and archaeology throughout all phases of development.
Communities	Minimize or avoid negative impacts to local communities throughout all phases of the proposed development
Economy	Pursue economic development opportunities that do not adversely impact environmental, social, and cultural conditions/wellness
Human Health and Safety	Avoid negative impacts to human health and safety throughout all phases of development
Land Use	Protect important land use areas.
Participation Agreement (IBA) if required	Commitment from the Developer to participate (section 10 of the IFA.)
Migratory Birds and Habitat	Protect and avoid disturbance or destruction to migratory birds and their habitat throughout all phases of the proposed development.
Species at Risk	Avoid the loss, damage or destruction of species at risk and their critical habitat throughout all phases of the proposed development.
Wildlife and Wildlife Habitat	Protect all wildlife and wildlife habitat and minimize habitat losses throughout all phases of the proposed development.
Fish and Fish Habitat	Protect all fish and fish habitat and establish a "no-net-loss" of fish habitat throughout all phases of the proposed development.
Vegetation	Maintain the diversity of all vegetation communities throughout all phases of the proposed development.
Waterbodies and Wetlands	Conserve and minimize or avoid negative impacts to all waterbodies and wetlands throughout all phases of the proposed development.

In the Addendum provided to the Environmental Impact Review Board (EIRB) in response to the EIRB's letter dated July 15, 2011: *Conformity Statement and Board Direction Regarding the Draft Environmental Impact Statement for the Hamlet of Tuktoyaktuk, Town of Inuvik and GNWT – Construction of the Inuvik to Tuktoyaktuk Highway, Northwest Territories* [02/10-05], the Developer provided detailed information on the use of best management practices and guidelines that were and will be used throughout the planning, construction, and operations phases of the Highway development and the pit development, operation and closure phases. The response provided to the EIRB in the August 2011 Addendum is as follows.

The Developer has reviewed the EIS and prepared a consolidation of the list of guidelines and best practice documents cited throughout the EIS (Table 1). To assist reviewers, the table provides the page reference of each time that a document is cited. In addition, the Developer has provided more specific details on a best practices manual identified in the EIS that is in preparation. The list (provided in Table 1 of the Addendum, and reproduced below) will be maintained to ensure new guidelines and best practices are incorporated throughout the EA and regulatory phase.

It is important to note that the guidelines and best management practices cited in the EIS and the Addendum are typically created by the responsible regulatory authority on the subject. These guidelines were prepared based on lessons learned and provide the current and foremost expertise and accepted practices in that discipline. These guidelines should be considered evidence for the success of the proposed mitigation measures discussed therein.

The Developer has also provided additional source documents that are currently under development. For example, GNWT DOT contracted Dillon Consulting Ltd. (Dillon) to prepare an erosion and sediment control best practices / mitigation techniques document, entitled *Environmental Best Practices for Erosion and Sediment Control: A Manual for Transportation Maintenance and Construction,* for the specific environmental requirements of typical GNWT DOT earthwork-type projects. The resource material provided to Dillon included DFO's best practices from various "working near water" documents and a nationally accepted guide authored by the Transportation Association of Canada (TAC 2005) entitled *National Guide to Erosion and Sediment Control on Roadway Projects.* Once completed, this document will become a standard guidance document for application in GNWT DOT contracts including this Project. The new guidance document is referenced in Table F and pages 469 and 507 of the EIS.

Furthermore, guidelines corresponding to specific mitigation measures for the Valued Components are identified in Table 6-1 of the EIS, which has been reproduced in Section 18.0 of this document.

TABLE 1: CONSOLIDATED LIST OF GUIDELINES AND BEST PRACTICES FOR CONSTRUCTION AND OPERATIONS

Title	Source	EIS References	Changes?
Environmental Policy (Draft)	GNWT DOT 2010 (to be finalized 2011)		New guidance
Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions	Transportation Association of Canada. 2010	Table 6.1, Table F, 63, 85, 644	No change
Environmental Guidelines for the Construction, Maintenance, and Closure of Winter Roads in the Northwest Territories.	GNWT DOT 1993 (Stanley Associates Engineering Ltd. and Sentar Consultants Ltd.)	Table F, 492	No change

TABLE 1: CONSOLIDATED LIST OF GUIDELINES AND BEST PRACTICES FOR CONSTRUCTION AND OPERATIONS			
Title	**Source**	**EIS References**	**Changes?**
Highway Maintenance Manual	GNWT DOT 1993	Table F, 492	No changes
Environmental Best Practices for Erosion and Sediment Control: A Manual for Transportation Maintenance and Construction (DRAFT)	GNWT DOT 2011 (Dillon Consulting Limited)	Table F, 469, 507	New guidance
Guideline for Dust Suppression	GNWT 1998	Table 6.1, T Table F, 91, 474, 481, 482, 491, 492, 503, 516, 522, 524, 541, 644	No changes
Land Development Guidelines for the Protection of Aquatic Habitat.	DFO 1993	Table 6.1, Table F, 488, 490, 492, 493, 495, 500, 507	DOT approach to culvert installation gives consideration to permafrost specific considerations.
Northern Land Use Guidelines - Access: Roads and Trails.	INAC 2010	Table 6.1, 488, 490, 500	Special consideration will be given to culvert installation techniques that are appropriate for permafrost areas.
Northern Land Use Guidelines: Camp and Support Facilities.	INAC 2011	89, 609, 610	No changes
Northern Land Use Guidelines Access: Pits and Quarries.	INAC 2010	Table 6.1, 63, 85, 501	No changes
ISR Granular Resources Management Plan Section 3: Pits and Quarries Guidelines	ILA and INAC 2010	63, 85, 501	No changes
Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Table.	CCME 2007	Table 6.1	No changes
Freshwater Intake End-of-Pipe Fish Screen Guidelines	DFO 1995	502	No changes
Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut	DFO 2005 (revised June 21, 2010)	Table 6.1, Table F, 88, 491, 493, 497, 502	No changes
Temporary Stream Crossing. NWT Operational Statement. Version 1.0	DFO 2008	Table 6.1 Table F, 492	No changes
In-Water Construction Timing Windows for the Protection of Fish Habitat. NWT Operational Statement. Version 3.0	DFO 2009	Table F	No changes
Clear Span Bridges. NWT Operational Statement. Version 3.0	DFO 2009	Table F, 489, 493, 497, 498, 507	No changes
Culvert Maintenance. Operational Statement. Version 3.0.	DFO 2010	Table 6.1, Table F?, 490, 493, 497, 498, 499, 500, 507	No changes
A Guide to Spill Contingency Planning and Reporting Regulations	GNWT ENR 2011	674	No changes
Guidelines for Spill Contingency Planning	INAC 2007	Table F (says 1987), 458, 610	No changes

TABLE 1: CONSOLIDATED LIST OF GUIDELINES AND BEST PRACTICES FOR CONSTRUCTION AND OPERATIONS			
Title	**Source**	**EIS References**	**Changes?**
Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.	CCME 2003	90, 609	No changes
Guideline for the General Management of Hazardous Waste in the NWT	GNWT RWED 1998	612	No changes
Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters	DFO 1998 (Wright, and. Hopky)	Table 6.1, Table F, 486, 497, 501	Standards for explosives have been updated with regards to the NWT. All operations involving explosives near waterbodies will be reviewed by DFO
Monitoring Explosive-Based Winter Seismic Exploration in Water Bodies NWT 2000 - 2002.	Cott and Hanna 2005		Activities involving explosives near waterbodies will be reviewed by DFO.
Discussion on Seismic Exploration in the Northwest Territories 2000–2003	Cott, Hanna and Dahl 2003		Activities involving explosives near waterbodies will be reviewed by DFO.
Guidelines for Developers for the Protection of Archaeological Sites in the Northwest Territories.	PWNHC ND	Not in Table 6-1	No changes
A Field Guide to Ice Construction Safety	GNWT DOT 2007	86	No changes
Bear Safety Guidelines	GNWT RWED 1998	Table F, 534	No changes

The EIRB, through its technical advisors, have stated that they would like evidence for how well the proposed mitigation works and how they will be measured in the future (Dr. Petr Komers, pers. comm., 2011), based on a comparative analysis from other projects or from a literature review. As discussed previously, many of the mitigation measures presented in the EIS are based on the guidelines prepared for the specific activities and valued components by the regulatory agencies or responsible authorities; therefore, it is unclear what statistical or quantitative evidence is required to prove that the mitigation measures produced by these authorities are accurate.

Furthermore, the EIRB Terms of Reference (Section 13.1) state that "the [monitoring] targets shall be used in defining the expected success of mitigation" (EIRB 2010, p. 51). According to the *Canadian Environmental Effects Act*, a "follow-up program", by definition, will provide that information as it is a program for "verifying the accuracy of an environmental assessment of a project, and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of a project". The results of a follow-up program may be used for implementing adaptive management measures and improving the quality of future environmental assessments.

This method for measuring the effectiveness of mitigation measures is reflected in the document entitled *Guidelines for Environmental Impact Assessment (EIA) in the Arctic: Arctic Environmental Protection Strategy,* which was prepared by agency representatives from several countries including Canada (represented by Indian and Northern Affairs Canada), Finland, Greenland/Denmark, Iceland, Norway, Russia, Sweden, and the United States. These guidelines state that the effectiveness of mitigation is determined through monitoring the activity once the project is implemented. Monitoring can measure actual environmental effects and assess the extent to which mitigation measures are reducing impacts, and may result in the implementation of new or revised mitigation measures.

As requested by the Environmental Impact Review Board (EIRB) on October 25, 2011, the Developer is pleased to provide further information on the mitigation measures, residual effects, Developer commitments, and monitoring. The following sections re-present the Project Design and Mitigation Measures and Residual Effects sections for each biophysical and human environment component, as originally provided in Section 4.2 (Biophysical Components) and Section 4.3 (Human Environment Components) of the EIS. Following these sections, the related Developer Commitments originally provided in Table F (Summary of Developer Commitments) of the EIS are re-stated. The Proposed Effects Monitoring sections are re-presented from the Addendum and/or the EIS. Where possible, additional information is provided to support the impact predictions and mitigation measures, and describe how the success of the mitigation measures will be measured in the future.

In addition, a letter prepared by the GNWT discussing the various roles of their departments in administering socio-economic programs and monitoring changes over time is provided as Attachment 1.

For clarity, the guidelines referenced in the EIS text and mitigation measures are highlighted in bold and underlined.

BIOPHYSICAL ENVIRONMENT

1.0 Terrain, Geology, Soils and Permafrost (Section 4.2.1 of the EIS)

1.1 Project Design and Mitigation Measures (Section 4.2.1.3 of the EIS)

To mitigate the effects described above (in EIS Section 4.2.1), Project design elements and measures will be initiated in the design and construction of the Highway to address possible issues or concerns. The current approach to highway design and construction in permafrost regions is documented in the national guidelines entitled ***Development and Management of Transportation Infrastructure in Permafrost Regions*** published by the Transportation Association of Canada (TAC) in May 2010. The design parameters and construction techniques presented as mitigative measures in this section are based on previous experience in the north and case studies and lessons learned as presented in the TAC guideline.

TABLE 4.2.1-1: SUMMARY OF MITIGATION MEASURES		
Cause	**Potential Effects**	**Mitigation Measures**
Travel across the ground along the alignment or to borrow sources with tract or wheeled vehicles.	Change in drainage and surface hydrology, thaw slumps, melting of ice-rich ground, slope and soil instability, erosion and subsidence in the permafrost.	Access to and hauling from borrow sources during winter months using winter roads. Construction of highway embankment during winter months. Summer activities such as grading and compaction of the embankment, and placing of surfacing materials only where the Highway can be accessed over embankment constructed the previous winter. Stockpiling surfacing material along the previously constructed embankment during the winter for use in the summer.
Cutting into the ground and removing material.	Exposes the permafrost and ice-rich materials to thaw resulting in similar effects to those noted above.	Avoid or minimize the surface area of open cut. Grade slopes to minimize slumping. Grade material storage and working areas to promote drainage and avoid standing water. Restore the borrow source when construction is completed by grading slopes to match the natural ground and drainage of the surrounding area, and replacing overburden.
Introduction of the granular material embankment.	Alters the air/surface temperature balance such that heat is gained, the active layer becomes deeper and there is thawing of ice-rich soils and subsidence due to permafrost loss.	Design and construct embankments with thickness or height based on terrain type. Thicker embankments on more thaw-sensitive ground to provide an insulative layer and promote the development of a frozen embankment core. Use and place frozen fill on the frozen right-of-way. Design the alignment to avoid unfavorable thick organic and ice-rich polygonal terrain.
Accumulation of snow on the sideslope and along the natural ground beyond the toe of the slope.	Insulates the permafrost, the air/surface temperature regime is impacted and the result is permafrost thaw and differential settlement, resulting in areas of standing water that will further result in thaw.	Use of geotextile fabric to maintain embankment integrity The installation of culverts to balance seasonal overland surface flows; Install sufficient cross drainage to prevent or minimize potential water ponding; and spring and fall inspections of drainage.
Introduction of the granular material embankment	Forms a barrier to movement of unchannelized surface water. Surface water can accumulate or pond along the toe of the embankment creating negative effects similar to those described above.	

1.2 Residual Effects (Section 4.2.1.4 of the EIS)

There will be residual effects of the Highway construction that are not likely to be fully mitigated. A borrow source will leave some mark on the land even with the best and most well thought out management practices during the material extraction. The construction practices noted above are, therefore, intended to minimize the footprint of a single borrow source and minimize the number of borrow sources that are opened for the construction phase.

1.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
PLANNING AND DESIGN	
The Developer commits to using, as a guideline, the design parameters and construction techniques in the Transportation Association of Canada (TAC 2010) ***Development and Management of Transportation Infrastructure in Permafrost Regions.***	Design, Construction
This will include mitigation strategies such as: -Accessing and hauling from borrow sources during the winter months; -Constructing embankments during the winter months; -Installing geotextile fabric beneath highway embankment; -Conducting summer construction activities (such as grading and compacting the embankment, and placing of surfacing materials) only when the Highway can be accessed over the embankment; -Stockpiling surfacing material along the embankment during the winter for use in the summer; -Minimizing the surface area of open cut; -Grading slopes to minimize slumping; -Grading material storage and working areas to promote drainage ; -Reclaiming borrow sources when construction is complete by grading slopes to blend with the natural topography and drainage of the surrounding area; -Designing and constructing thick or high embankments to create an insulative layer that promotes the development of a frozen embankment core; -Designing the alignment to avoid unfavorable terrain, such as areas with thick organic deposits and ice-rich polygonal or patterned ground; -Installing culverts to manage seasonal overland flows; -Installing sufficient cross drainage during construction to prevent or minimize potential water ponding; and -Inspecting and maintaining culverts, as needed, in the spring and fall.	Design, Construction
CONSTRUCTION	
The Developer and its contractors will adhere to all applicable legislation, regulations, guidelines, and terms and conditions.	Construction
The Developer and on-site Project contractors will implement the mitigation measures identified in this EIS.	Construction
The Developer is committed to constructing the proposed Inuvik to Tuktoyaktuk Highway, borrow sources, and associated winter access roads in a safe and environmentally responsible manner.	Design, Construction
The Developer commits to working towards achieving the Environmental Impact Review Board's goal statements for all phases of the proposed development.	Design, Construction, Operations
The Developer will use winter roads to access borrow sources; permanent all-weather access roads will not be required.	Construction
The Developer is committed to performing the majority of the construction activities during the winter months.	Construction
BORROW SOURCES	

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer is committed to limiting the footprint of each borrow source and minimizing the number of borrow sources developed.	Construction.
Borrow pits will be closed as soon as they are no longer required and reclaimed in a progressive manner, as described in the Pit Development Plan.	Construction, Operations, Reclamation
Pit Development Plans will conform to the approving authority's regulations and permitting requirements.	Design, Construction, Operations
Pit Development Plans will include mitigation measures to address potential environmental concerns, and operational and reclamation plans. Mitigation measures include: -Developing borrow sources only during winter periods; -Maintaining an appropriate amount of undisturbed land between borrow source locations and any waterbody; and -Applying appropriate erosion and sediment control BMPs for the construction of ditches and cross drainage channels.	Construction
The Developer commits to ensuring that borrow source development is monitored by environmental monitors.	Construction
OPERATIONS	
The Developer will construct and operate the Highway to GNWT DOT standards and guidelines for public highways.	Construction, Operations
MANAGEMENT PLANS	
An Environmental Management Plan (EMP) will be prepared prior to construction, and will be submitted for regulatory approval prior to use. The EMP will clearly define expectations for compliance monitoring, responsibilities, requirements for training, and reporting.	Construction
The EMP will contain the following types of plans: -Environmental management; -Erosion and sediment control; -Pit development for borrow sources; [*items not relevant to terrain, geology, soils and permafrost have been removed for brevity*] Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction
MONITORING	
The Developer requires that Project contractors employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of construction.	Construction
The Developer is committed to hiring environmental monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater, and prevent erosion and subsequent sedimentation.	Construction
Environmental and wildlife monitoring will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTC (wildlife monitors), and will be funded by the Developer and/or Developer's contractor(s).	Construction
The Developer will conduct post-construction monitoring according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.	Operations

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer will require that Project contractors work closely with the environmental and wildlife monitors during construction.	Construction
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

1.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS

Valued Component	Monitoring Program	Indicators	Measurement Parameters
Terrain, Geology, Soil and Permafrost	• Environmental monitoring	• Soil disturbance • Changes in permafrost • Intensity of use of granular materials	• Evidence of rilling • Ground cover disturbance by construction • Mean annual ground temperature • Mean annual air temperature • Volume of material taken from borrow sources • Permafrost aggradation

Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted. Environmental and wildlife monitoring will be done by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring is conducted on a part-time basis unless activities are occurring in a sensitive area. Monitoring frequency will be determined once the EMP is finalized.

A comparable monitoring program was used for the Tuktoyaktuk to Source 177 Access Road. In June 2011, the Network of Expertise in Northern Transportation Infrastructure Research in Permafrost Regions (NoENTIR) conducted a site visit of the Access Road to solicit comments to inform the monitoring program. The group reviewed several features of the Access Road, including road integrity and stability, fill, side slopes, drainage, surface materials, and borrow source stability and material. In particular, the group observed the difference in a historic road that had been constructed using different design and the current Access Road. The group made recommendations for performance monitoring options, design and construction considerations, and comments related to terrain. Many of

the comments were also directed towards design, and will be considered in the Inuvik to Tuktoyaktuk Highway detailed design process.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Aboriginal Affairs and Northern Development Canada (AANDC) (formerly INAC)
  - Responsible for Granular Management Planning and pit and quarry management strategy processes in cooperation with the Inuvialuit Regional Corporation (IRC)
  - Administers *Territorial Lands Act* and regulations including Territorial Land Use Regulations and Territorial Quarry Regulations and ensures compliance with authorizations
  - Responsible for Cumulative Impact Monitoring Program (CIMP) in the ISR under MOU with IRC
  - Responsible for cumulative effects assessments
  - Administers funding for Beaufort Regional Environmental Assessment (BREA)
- Natural Resources Canada
  - Provides expert advice and monitoring on permafrost and climate change
  - Maintains national database on permafrost
- GNWT Department of Transportation
  - Plans, designs, constructs or reconstructs, acquires, operates and maintains public transportation infrastructure in the Northwest Territories, including community airports, docks and the highway system, pursuant to devolved authorities and/or MOU between the Government of the Northwest Territories and the federal government
  - Responsible for setting contracts related to maintenance of the public roads

2.0 Air Quality (Section 4.2.2 of the EIS)

2.1 Project Design and Mitigation Measures (Section 4.2.2.6 of the EIS)

The schedule of the construction phase, Highway design and application of mitigation measures will help to minimize potential air quality effects. Earth moving construction activities are scheduled to occur primarily during the winter months, when frozen ground conditions naturally minimize the amount of fugitive dust that would otherwise be created, although some grading and compaction are scheduled during summer.

The Developer will conform to applicable ambient air quality objectives, such as those stated in Section 4.2.2.1 of the EIS, by using pollution prevention measures and best management practices (CCME 2007).

Mitigation measures to be implemented during the construction phase will include:

- The application of water as per the GNWT's ***Guideline for Dust Suppression*** (GNWT 1998) during summer months. Water will be effective in controlling dust

created by grading and compaction activities, loading and unloading materials, stockpiling and wind erosion;

- To the extent possible, aggregate stockpiling activities will be conducted well downwind of potentially sensitive receptors (based on prevailing winds);
- Effective logistics planning such as the use of buses to haul workers to minimize vehicle movements;
- Closing and progressively reclaiming borrow pits as soon as they are no longer required to reduce potential fugitive dust;
- Ensure proper maintenance of heavy equipment to minimize air emissions;
- Restrict speed limits along the access roads and Highway during construction; and
- Temporarily avoid areas with sensitive wildlife activity or migration (based on recommendations from wildlife monitors).

The GNWT Department of Transportation will be responsible for the ongoing maintenance of the Highway during the operations phase. Specific mitigation measures during the operations phase include conforming to the GNWT's ***Guideline for Dust Suppression*** (GNWT 1998).

2.2 Residual Effects (Section 4.2.2.7 of the EIS)

Construction and operations phase traffic are expected to have temporary and intermittent effects in the immediate vicinity of the proposed Highway. Following the application of mitigation measures during construction and operation of the Highway, no residual effects in terms of air emissions products are anticipated. Potential residual effects on wildlife, vegetation and humans are discussed in the corresponding effects sections of this document.

2.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
AIR QUALITY	
The Developer will conform with applicable ambient air quality objectives by using pollution prevention measures and best management practices.	Construction
Mitigation measures for air quality during the construction phase will include: -Applying water as per the GNWT's ***Guideline for Dust Suppression*** (GNWT 1998) during summer months; -To the extent possible, aggregate stockpiling activities will be conducted well downwind of potentially sensitive receptors (based on prevailing winds); -Closing and progressively reclaiming borrow pits as soon as they are no longer required to reduce potential fugitive dust; -Ensuring proper maintenance of heavy equipment to minimize air emissions; and -Restricting speed limits along the access roads and Highway during construction to minimize dust production.	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer will be responsible for the ongoing maintenance of the Highway during the operations phase and will conform to the GNWT's ***Guideline for Dust Suppression*** (GNWT 1998).	Operations
MONITORING	
The Developer requires that Project contractors employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of construction.	Construction
The Developer is committed to hiring environmental monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater, and prevent erosion and subsequent sedimentation.	Construction
Environmental and wildlife monitoring will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTC (wildlife monitors), and will be funded by the Developer and/or Developer's contractor(s).	Construction
The Developer will conduct post-construction monitoring according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.	Operations
The Developer will require that Project contractors work closely with the environmental and wildlife monitors during construction.	Construction
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations
SOCIO-ECONOMIC	
The Developer will require that its Project contractor(s) ensure that all heavy equipment operators are suitably trained in proper machinery maintenance and operation; that equipment is regularly inspected and serviced; and that contractor staff obey posted Highway rules (e.g., speed limits, hunting/fishing restrictions).	Construction

2.4 Proposed Effects Monitoring

Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring will be conducted on a part-time basis unless activities are occurring in a sensitive area.

During the operations phase, the contractors hired to manage dust generated by vehicles driving on the Highway will be expected to monitor prevailing and forecasted weather conditions during the snow-free period and the condition of the road (dryness) to ensure that water is applied to the Highway to control dust as necessary.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Health Canada
  - Administers Canada *Health Act*
  - Develops, implements, and enforces legislation, regulations, policies, programs, services, and initiatives and works with the provinces and territories, and other partners
  - Provides contribution funding to GNWT to support Non-Insured Health Benefits for First Nation and Inuit residents and health promotion/disease prevention programs
  - With Statistics Canada, is responsible for generating, managing, and reporting health information. Statistics Canada is mandated to provide accurate, timely, and relevant information about the health of Canadians and the health care system
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee
  - Conducts health risk assessments and provides human health warning on contaminants in country foods to GNWT
- Environment Canada
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee.
  - Coordinates the National Air Pollution Surveillance Network to monitor pollutants and other chemicals in the atmosphere from a series of measuring stations. Data are used to support the reporting of Canadian Environmental Sustainability Indicators (CESI), which provides Canadians information on key environmental issues.
- Natural Resources Canada
  - Provides expert advice and monitoring on climate change
- Environment & Natural Resources – Environment Division
  - Generally regulates air quality activities on commissioner's land, under the *Environmental Protection Act*.
  - Operates an air quality monitoring program, consisting of four (4) state-of-the-art, continuous ambient air quality monitoring stations across the NWT.
  - Provides advice and recommendations on air quality to federal regulatory agencies, industry, and other parties.

3.0 Noise (Section 4.2.3 of the EIS)

3.1 Applicable Standards and Guidelines (Section 4.2.3.3 of the EIS)

Occupational noise guidelines, as indicated in Section 3.1.4.2, are applicable during all phases of the Project.

Because of the proximity of the potential borrow sources to waterbodies, some blasting activities may occur near waterbodies that provide fish habitat. The Developer and its

contractors will be required to adhere to the DFO's ***Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters*** (Wright and Hopky 1998). Highlights of the Guidelines include:

- No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e., overpressure) greater than 100 kPa (14.5 psi) in the swim bladder of a fish.
- No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 m/s in a spawning stream bed during the period of egg incubation. For confined explosives, setback distances from the land-water interface (e.g., the shoreline) or burial depths from fish habitat (e.g., from under the riverbed) that will ensure that explosive charges meet the 100 kPa overpressure guideline are identified in the guidelines.

3.2 Project Design and Mitigation Measures (Section 4.2.3.4 of the EIS)

The schedule of the construction phase, Highway design and application of mitigation measures and best management practices are intended to minimize the potential effects of noise, including the following practices:

- Limit construction activity during sensitive periods (based on recommendations from wildlife experts) to minimize effects on wildlife, particularly blasting activities;
- Effective logistics planning such as the use of buses to haul workers to minimize vehicle movements; and,
- Maintenance of equipment in good repair and provision of appropriate mufflers for all internal combustion engines.

3.3 Residual Effects (Section 4.2.3.5 of the EIS)

Noises produced by construction and operation activities are anticipated to have a localized, temporary, and intermittent effect in the immediate vicinity of the Highway.

During construction, noise contributions will be of low to moderate magnitude and will be continuous during work hours, but of temporary duration overall. That is, at the end of construction all noise contributions from these activities will cease. It is anticipated that wildlife and birds may temporarily avoid areas with construction or excavation due to human activity and/or noise. However, no residual effects, following completion of construction activates, are anticipated for noise emissions generated during construction.

Noise contributions during the operations phase will be highly limited in duration because of the mobile and temporary nature of noise emission sources (i.e., vehicles moving along the Highway will not contribute noise to any one area for a long period of time). Due to the limited amount of traffic (150-200 vehicles per day) anticipated for the Highway, the average noise levels associated with vehicles being (72 to 86 dBA), and the diminishing nature of sound levels with increased distance from the source, it is anticipated that noise contributions during the operations phase will be negligible within the LSA and RSA and no residual effects are anticipated during this phase.

3.4 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
NOISE	
The Developer will consult with wildlife experts to minimize noise effects on wildlife, particularly blasting activities.	Construction
The Developer will use appropriate design, scheduling, logistics, and maintenance measures to reduce the effects of noise.	Design, Construction
Project contractors will be directed to apply reasonable mitigation measures to reduce possible effects associated with construction noise, including adequate maintenance of construction equipment and provision of appropriate mufflers for all internal combustion engines.	Construction
Blasting activities, if required, will be timed to avoid periods when sensitive wildlife species are in the area.	Construction
MONITORING	
The Developer requires that Project contractors employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of construction.	Construction
The Developer is committed to hiring environmental monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater, and prevent erosion and subsequent sedimentation.	Construction
Environmental and wildlife monitoring will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTC (wildlife monitors), and will be funded by the Developer and/or Developer's contractor(s).	Construction
The Developer will conduct post-construction monitoring according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.	Operations
The Developer will require that Project contractors work closely with the environmental and wildlife monitors during construction.	Construction
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations
SOCIO-ECONOMIC	
The Developer commits to ensuring that its contractor(s) have Health, Safety and Environment (HSE) manuals; work procedures documents; and site-specific health and safety plans.	Design, Construction
The Developer will require that its Project contractor(s) ensure that all heavy equipment operators are suitably trained in proper machinery maintenance and operation; that equipment is regularly inspected and serviced; and that contractor staff obey posted Highway rules (e.g., speed limits, hunting/fishing restrictions).	Construction
CONSTRUCTION	
The Developer and its contractors will adhere to all applicable legislation, regulations, guidelines, and terms and conditions.	Construction
The Developer and on-site Project contractors will implement the mitigation measures identified in this EIS.	Construction
The Developers and their contractors will meet the standards required for a safe work environment.	Design

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
Blasting, if required, will occur only during winter borrow source development.	Construction

3.5 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS

Valued Component	Monitoring Program	Indicators	Measurement Parameters
Noise	• Noise monitoring, if required	• Population exposed to noise from construction activities • Wildlife disturbance	• Population exposed to noise >65 dB • Liaise with local co-management agencies and identify complaints

Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring will be conducted on a part-time basis unless activities are occurring in a sensitive area.

4.0 Water Quality and Quantity (Section 4.2.4 of the EIS)

4.1 Project Design and Mitigation Measures (Section 4.2.4.2 of the EIS)

Table 4.2.4-1 provides a summary of the expected activities, potential effects and mitigation measures that will apply to the design, construction and operation of the Highway. The potential for erosion and sedimentation effects exists at all phases of the Project due to the nature of Highway construction activities. In recognition of the potential adverse effects of sediment, an environmental management plan (EMP) will be prepared prior to construction and submitted to regulators for approval, to provide specific and detailed guidance to avoid sediment releases to the aquatic environment. The EMP will refer to appropriate erosion and sediment control guidelines, GNWT erosion and sediment control best management practices (currently being prepared in coordination with DFO), and measures outlined in the DFO (1993) ***Land Development Guidelines for the Protection of Aquatic Habitat***.

Some of the important measures to be followed include:

- Limiting the use of construction equipment to the immediate footprint of the Highway or borrow source;
- Minimizing vegetation removal and conducting progressive reclamation at the clear-span abutments, culvert installations and borrow sources;
- Keeping ice bridge and ice road surfaces free from soils and fine gravel that may be tracked out by vehicles;
- Avoiding the use of heavy equipment in streams or on stream banks during summer months, and adherence to the ***DFO Operational Statement for Temporary Stream Crossings*** (DFO 2008), where this is deemed necessary;
- Installing silt fencing and/or check dams, and cross drainage culverts as necessary to minimize siltation in runoff near waterbodies; and,
- Appropriate sizing and installation of culverts, based on hydrological assessments and local experience, to avoid backwatering and washouts.

TABLE 4.2.4-1: POTENTIAL EFFECTS OF CONSTRUCTION AND OPERATION OF THE PROPOSED HIGHWAY ON WATER QUALITY AND QUANTITY

Activity	Potential Effect	Avoidance or Mitigation
Highway Construction	Erosion and sedimentation	Complete Highway embankment construction during winter months Implement erosion and sediment control plan and best management practices, as appropriate
	Surface drainage pattern changes due to stream constriction	Abutments to be placed in accordance with DFO's ***Operational Statement for Clear-Span Bridges*** Appropriate sizing of culverts based on hydrological assessments and local experience
	Temporarily reduce lake levels due to water extraction	Follow DFO (2010) ***Protocol for Winter Water Withdrawal in the Northwest Territories***
Clear-span Bridge Construction	Sediment release during construction of abutments	Employ erosion and sediment control best management practices and guidelines, as appropriate; adhere to DFO ***Clear-span Bridge Operational Statement*** Complete abutment construction during winter period
	Flow changes due to stream constriction	Abutments to be placed at a sufficient distance from active stream channel
Culvert Installation	Sediment release during culvert installation	Implement erosion and sediment control best management practices, and culvert installation guidelines, as appropriate (e.g. DFO ***Land Development Guidelines***, Dane 1978)
	Changes in surface drainage patterns	Appropriate sizing of culverts based on hydrological assessments and local experience
Use of Heavy Equipment	Soil erosion and sedimentation	Apply erosion and sediment control best management practices

TABLE 4.2.4-1: POTENTIAL EFFECTS OF CONSTRUCTION AND OPERATION OF THE PROPOSED HIGHWAY ON WATER QUALITY AND QUANTITY		
Activity	**Potential Effect**	**Avoidance or Mitigation**
Highway Operation and Maintenance	Increased dust generation and fine particle settlement into adjacent waterbodies	Effective dust suppression (water trucks) during dry season
	Sediment release during maintenance	Implement erosion and sediment control best management practices as appropriate
	Temporarily reduced surface water quantity	Water withdrawal to occur from appropriately sized lakes in accordance with Water Licence and DFO (2010) ***Protocol for Winter Water Withdrawal in the Northwest Territories***.
Road Drainage	Sediment discharge to watercourses	Filtration by natural vegetation Silt fences installed at each road-stream intersection Regular spacing of cross-drainage culverts
Culvert Maintenance	Sediment release during maintenance	Apply erosion and sediment control best management practices Inspect and maintain culverts, as needed, in the spring and fall Follow the DFO ***Operational Statement for Culvert Maintenance*** (DFO 2010) as appropriate

4.2 Residual Effects (Section 4.2.4.3 of the EIS)

Based on the previously discussed assessments of the various components of Highway construction, operation, and maintenance, the Project is not expected to result in residual effects on water quality, water quantity and flow patterns, following the implementation of mitigation.

4.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
WATER QUALITY AND QUANTITY	
The Developer will ensure that the DFO water withdrawal protocol criteria are followed.	Construction
The Developer is committed to carrying out bathymetric surveys on all lakes proposed for water extraction.	Construction
The Developer will minimize effects to water quality and quantity as a result of Highway design through the design and use of crossing structures that are appropriate for site-specific flow conditions; by employing erosion and sediment control best management practices and DFO ***Operational Statements*** (where possible) as per approved Environmental Management Plans; installing appropriately sized culverts to divert and manage Highway and surface drainage flows; and undertaking primary Highway embankment construction activities during the winter months.	Design, Construction
The Developer is committed to completing hydrological assessments prior to bridge design to determine suitable span widths and abutment placement.	Design, Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
During the bridge design of the Project, should individual site-specific circumstances preclude complete adherence to the DFO ***Operational Statements***, the Developer will consult with DFO in advance to discuss and approve of proposed plans.	Design
Some of the mitigation measures for water quality and quantity effects the Developer will follow include: -Limiting the use of construction equipment to the immediate footprint of the Highway or borrow source; -Minimizing vegetation removal and conducting progressive reclamation at the clear-span abutments, culvert installations, and borrow sources; -Keeping ice bridge and ice road surfaces free from soils and fine gravel that may be tracked out by vehicles; -Avoiding the use of heavy equipment in streams or on stream banks during summer months, and the adherence to the DFO ***Operational Statement for Temporary Stream Crossing****s* (DFO 2008), where this is deemed necessary; -Implementing the erosion and sediment control plan to be developed as part of the overall EMP; -Appropriately sizing and installing culverts based on hydrological assessments and local experience, to avoid backwatering and washouts.	Construction
-Completing Highway embankment construction during winter months; -Adhering to the DFO ***Operational Statement for Clear-Span Bridges*** for all applicable activities; -Implementing appropriate dust control measures to minimize effects to waterbodies and aquatic habitat; -Following the DFO ***Operational Statement for Culvert Maintenance*** (DFO 2010) where necessary; -Maintaining equipment away from waterbodies; and -Adhering to spill contingency plans, as required, in a timely manner	Construction
STREAM CROSSINGS	
The Developer (under appropriate seasonal conditions), will conduct further assessments of the proposed water crossing locations and will provide information about watercourse characteristics and proposed crossing structure designs sufficient to meet the requirements of the Northwest Territories Waters Regulations.	Design, Construction
The Developer is committed to working closely with DFO to design appropriate crossing structures for each stream and to obtain Fisheries Authorizations, if determined to be required.	Design, Construction
The Developer will install culverts according to established guidelines and will follow culvert installation guidelines such as those contained within the DFO ***Land Development Guidelines*** (1993) and the INAC ***Northern Land Use Guidelines for Roads and Trails*** (INAC 2010).	Construction
The Developer will install appropriately sized culverts to minimize changes in water flow pattern and timing.	Construction
The Developer will carry out routine monitoring and inspections as appropriate at watercourse crossings and culverts, including reporting on culvert performance and maintenance requirements.	Construction, Operations
The Developer will ensure that maintenance requirements for culverts will adhere to the DFO ***Operational Statement for Culvert Maintenance*** (DFO 2010)	Operations

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer will ensure that when crossings are completed, disturbed materials will be replaced with similar-sized substrates and the bed and banks of the watercourse are stabilized and restored.	Construction
FUEL MANAGEMENT	
The Developer commits to storing fuel used for borrow source and Highway construction activities in double-walled fuel storage tanks, and in accordance with CCME **guidelines**.	Construction
All vehicles and equipment will be refueled at least 100 m from water bodies following INAC (AANDC/DIAND) **fuel storage guidelines**.	Construction
SPILL CONTINGENCY PLAN	
The Developer will require that Project contractors prepare spill contingency plans, outlining spill reporting, containment, and clean-up, in accordance with INAC's ***Guidelines for Spill Contingency Planning*** (2007).	Design, Construction
The Developer will ensure that the Project contractor has appropriate spill response equipment on-site.	Construction
The Developer's contractors will report all spills greater than 5 litres to the GNWT Spill Line and other appropriate agencies.	Construction
In the event of a spill, the Developer's contractors will respond according to the site-specific spill contingency plan and the contractor's HSE manual and procedures.	Construction
The Developer will develop and implement an erosion and sedimentation control plan as part of the EMP. The plan will comply with appropriate erosion and sediment control guidelines, GNWT best management practices (currently being prepared in coordination with DFO), and measures outlined in the DFO (1993) ***Land Development Guidelines for the Protection of Aquatic Habitat***. Some measures that will be followed include: -Limiting the use of construction equipment to the immediate footprint of the Highway or borrow source; -Minimizing vegetation removal and conducting progressive reclamation at the clear-span abutments, culvert installations and borrow sources; -Keeping ice bridge and ice road surfaces free from soils and fine gravel that may be tracked out by vehicles; -Avoiding the use of heavy equipment in streams or on stream banks during summer months, and the adherence to the ***DFO Operational Statement for Temporary Stream Crossings*** (DFO 2008), where this is deemed necessary; -Installing silt fencing and/or checking dams, and cross drainage culverts as necessary to minimize siltation in runoff near waterbodies; and -Appropriately sizing and installing culverts, based on hydrological assessments and local experience, to avoid backwatering and washouts.	Design, Construction
The Developer commits to ensuring that any exposed areas will be suitably stabilized prior to the spring thaw period.	Construction
BORROW SOURCES	
The Developer is committed to limiting the footprint of each borrow source and minimizing the number of borrow sources developed.	Construction.
Borrow pits will be closed as soon as they are no longer required and reclaimed in a progressive manner, as described in the Pit Development Plan.	Construction, Operations, Reclamation

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
Pit Development Plans will conform to the approving authority's regulations and permitting requirements.	Design, Construction, Operations
Pit Development Plans will include mitigation measures to address potential environmental concerns, and operational and reclamation plans. Mitigation measures include: -Developing borrow sources only during winter periods; -Maintaining an appropriate amount of undisturbed land between borrow source locations and any waterbody; and -Applying appropriate erosion and sediment control BMPs for the construction of ditches and cross drainage channels.	Construction
The Developer commits to ensuring that borrow source development is monitored by environmental monitors.	Construction
MONITORING	
The Developer requires that Project contractors employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of construction.	Construction
The Developer is committed to hiring environmental monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater, and prevent erosion and subsequent sedimentation.	Construction
Environmental and wildlife monitoring will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTC (wildlife monitors), and will be funded by the Developer and/or Developer's contractor(s).	Construction
The Developer will conduct post-construction monitoring according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.	Operations
The Developer will require that Project contractors work closely with the environmental and wildlife monitors during construction.	Construction
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

4.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring programs were proposed to monitor the effectiveness of proposed mitigation measures on water quality and quantity in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS

Valued Component	Monitoring Program	Indicators	Measurement Parameters
Water Quality and Quantity	• Erosion and sediment control monitoring • Environmental monitoring	• Intensity of use of water resources • Changes in surface water quality	• Frequency, duration and extent of water use • Chemical and physical assessment (dissolved oxygen, pH, temperature, conductivity, total suspended solids, turbidity, total dissolved solids, total/ dissolved organic carbon, total/ dissolved metals, poly-aromatic hydrocarbons)
Changes to Hydrological Regime	• Environmental monitoring • Fish habitat monitoring • Erosion and sediment control monitoring	• Intensity of use of water resources • Infrastructure design and effectiveness	• Frequency, duration and extent of water use • Areas with disrupted, increased, reduced or eliminated flow • Ice plugs/ blocked flow in culverts

In addition, Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring is conducted on a part-time basis unless activities are occurring in a sensitive area.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Health Canada
  - Administers Canada *Health Act*
  - Develops, implements, and enforces legislation, regulations, policies, programs, services, and initiatives and works with the provinces and territories, and other partners
  - Provides contribution funding to GNWT to support Non-Insured Health Benefits for First Nation and Inuit residents and health promotion/disease prevention programs
  - With Statistics Canada, is responsible for generating, managing, and reporting health information. Statistics Canada is mandated to provide accurate, timely, and relevant information about the health of Canadians and the health care system
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee
  - Conducts health risk assessments and provides human health warning on contaminants in country foods to GNWT
- Aboriginal Affairs and Northern Development Canada (AANDC) (formerly INAC)
  - Administers legislation concerning use of Crown lands and non-renewable resources within the ISR
  - Signatory to *Northwest Territories/Nunavut Spills Working Agreement* and responsible for implementation as defined in the agreement as modified from time to time
  - Responsible for Granular Management Planning and pit and quarry management strategy processes in cooperation with the Inuvialuit Regional Corporation (IRC)
  - Administers *Territorial Lands Act* and regulations including Territorial Land Use Regulations and Territorial Quarry Regulations and ensures compliance with authorizations
  - Administers *NWT Waters Act* and regulations and ensures compliance with authorizations
  - Responsible for Cumulative Impact Monitoring Program (CIMP) in the ISR under MOU with IRC
  - Responsible for cumulative effects assessments
  - Administers *Northern Contaminants Program* to address human exposure to contaminants in wildlife, fish and marine mammal species important to the traditional diet of northern Aboriginal peoples. Chairs Northern Contaminants Program Management Committee and allocates funds for research and related activities in four main areas: Human Health Research, Environmental Monitoring and Research, Education and Communications, National/Regional coordination and Aboriginal Partnerships
  - Administers funding for Beaufort Regional Environmental Assessment (BREA)
- NWT Water Board
  - Administers *NWT Waters Act* and regulations
- Transport Canada
  - The Navigable Waters Protection Program (NWPP) ensures the public's right to navigate Canada's waters without obstruction through the administration of the

Navigable Waters Protection Act (NWPA), a federal law designed to protect the public right of navigation.

- In order to minimize the impact to navigation, the NWPP ensures that works constructed in navigable waterways are reviewed and regulated for works built in, on, over, under, through or across navigable water in Canada prior to construction of work(s).

- GNWT Department of Transportation
  - Plans, designs, constructs or reconstructs, acquires, operates and maintains public transportation infrastructure in the Northwest Territories, including community airports, docks and the highway system, pursuant to devolved authorities and/or MOU between the Government of the Northwest Territories and the federal government
  - Commercial vehicle inspections including enforcement of *Transportation of Dangerous Goods Act*
  - Responsible for setting contracts related to maintenance of the public roads

5.0 Fish and Fish Habitat (Section 4.2.5 of the EIS)

5.1 Potential Effects and Mitigation Measures (Section 4.2.5.1 of the EIS)

The principal fish habitat issues and mitigation measures that should be considered as part of the regulatory approval process are discussed below and summarized in Table 4.2.5-1. The appropriate crossing structures and avoidance or mitigation measures designed to achieve no net loss (NNL) of productive capacity of fish habitat will be guided in part by the designated category of stream for each site (as stated previously).

Road embankment construction activities will primarily be conducted during the winter months when all of the watercourse crossings will be frozen. Summer-related work will be on a smaller scale and will include compaction and grading of the embankment (Highway surface), installation of certain culverts, or adjustments to culverts installed in the previous winter.

The installation of culverts in fish-bearing streams in summer is necessary due to the requirement that culverts be buried into the stream bottom to prevent downstream erosion and culvert perching. This latter effect can occur when culverts are set on (rather than into) the stream bottom, resulting in undercutting of the stream bottom, leaving the downstream end of the culvert raised (or perched) above the water surface. This can creates a barrier to upstream fish passage, particularly for small fish. Frozen channel and stream bed conditions preclude the partial burial of culverts in winter.

In accordance with DFO (2009a), the installation of culverts in fish-bearing streams is not permitted between April 1 and July 15 for watercourses that provide habitat for spring/summer spawners (i.e. grayling, which is the only species potentially spawning in Project area streams). These installations will adhere to appropriate guidelines, such as those contained in the DFO ***Land Development Guidelines for the Protection of Aquatic Habitat*** (DFO 1993) and in Dane (1978), to avoid or minimize the potential for

erosion, sedimentation or channel effects. Various methods are available for installing culverts in flowing streams. Appropriate techniques will be determined on a site specific basis by qualified biologists working in conjunction with fluvial geomorphologists and road construction engineers, and in consultation with DFO habitat biologists.

Cross drainage culverts or those installed in non-fish bearing streams will be installed under frozen conditions in winter and as such, construction of these watercourse crossings will not result in effects to downstream fish habitat. No instream work will occur in fish-bearing streams during critical time periods.

Construction-related effects with respect to fish and fish habitat are all considered to be local effects, as they are confined to the local study area, of short-term duration and are infrequent, since effects occur in isolation spatially and temporally from one another. Operational effects of the Highway with respect to fish and fish habitat are similarly considered to be local effects but will vary in duration and frequency.

For construction activities taking place in summer, potential erosion and sedimentation effects will be minimized or avoided through approved design and the application of appropriate guidelines and BMPs, as described previously. An erosion and sediment control plan will be developed to integrate existing guidelines and to provide site-specific erosion and sediment control guidance.

TABLE 4.2.5-1: POTENTIAL EFFECTS OF CONSTRUCTION AND OPERATION OF THE PROPOSED HIGHWAY ON FISH AND FISH HABITAT

Activity	Potential Effect	Avoidance or Mitigation
Highway Construction	Direct loss of habitat	Avoid critical habitats Design appropriate crossing structures based on site conditions
	Erosion and sedimentation	Complete Highway embankment construction activities during winter months Apply erosion and sediment control plan and best practices
Clear-span Bridge Construction	Direct loss of riparian habitat within abutment footprints	Minimize riparian disturbance (footprint) Follow the DFO ***Operational Statement for Clear-span Bridges*** (DFO 2009b) where appropriate
	Sediment release during construction of abutments	Apply erosion and sediment control plan and best practices Complete primary construction activities during winter period
	Flow changes due to stream constriction	Abutments to be placed at a sufficient distance from active stream channel
Culvert Installation	Direct loss of habitat	Avoid critical habitats
	Barrier to migration	Employ best management practices for culvert installation Annual monitoring to detect culvert subsidence or lifting
	Sediment release during construction	Construction during winter in non-fish bearing streams Apply appropriate design and erosion and sediment control plan and best practices
	Changes in stream flow patterns	Appropriate sizing of culverts based on hydrological assessments and local experience

TABLE 4.2.5-1: POTENTIAL EFFECTS OF CONSTRUCTION AND OPERATION OF THE PROPOSED HIGHWAY ON FISH AND FISH HABITAT		
Activity	**Potential Effect**	**Avoidance or Mitigation**
Use of Heavy Equipment	Soil erosion and sedimentation	Apply erosion and sediment control plan and best practices
Borrow Source Development	Erosion and sedimentation	Maintain sufficient buffer of undisturbed land between borrow sources and waterbodies Apply erosion and sediment control measures and best management practices
	Fish mortality due to blasting	Follow DFO ***Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters*** **(Wright and Hopky 1998).**
Water Extraction	Oxygen level depression Exposure of eggs and larvae Reduction of available habitat for spring spawners	Follow DFO (2010) ***Protocol for Winter Water Withdrawal in the Northwest Territories***
Road Drainage	Sediment discharge to watercourses	Filtration by natural vegetation Silt fences installed at each road-stream intersection Regular spacing of cross-drainage culverts
Culvert Maintenance	Sediment release during maintenance	Employ erosion and sediment control measures as per an Approved erosion and sediment control plan Follow the DFO ***Operational Statement for Culvert Maintenance*** (DFO 2009b) where applicable
Highway Operation and Maintenance	Sediment release during maintenance	Implement erosion and sediment control best management practices as appropriate Follow the DFO ***Operational Statement for Culvert Maintenance*** (DFO 2009b) where applicable
	Dust generation and fine particle settlement into adjacent waterbodies	Effective dust suppression (water trucks) during dry season Water Licence and DFO protocol to be followed.
Increased Access to Fish Resources	Increased harvest pressure due to improved access to remote fishing areas	Creation and enforcement of Regulations or guidelines on fish harvest by FJMC with input from DFO, local fisherman and Hunters and Trappers Committees Signage posted at regular intervals on Highway

Highway Design (Pre-construction)

The mitigation of potential effects to fish and fish habitat is most effectively accomplished during Highway routing and design. Appropriate planning will avoid or minimize potential effects due to:

- Loss of instream and riparian habitat at crossing footprints;
- Reduced habitat quality due to erosion and sedimentation from construction activities; and,
- Alteration of surface drainage pattern due to stream constriction.

Effects to fish and fish habitat as a result of Highway construction will be minimized by the planned avoidance of critical fish and fish habitat areas, where possible. Where critical fish habitat cannot be avoided, mitigation will be incorporated into the design, including:

- Sizing and design of appropriate crossing structures based on site conditions present at each crossing;
- Employing erosion and sediment control best management practices according to an approved EMP;
- Undertaking Highway embankment construction during the winter months; and
- Constructing or installing stream crossing structures to avoid the impingement of the active stream channel.

Clear-span Bridge Construction (Construction)

As noted in Section 4.2.4.1, the siting and construction of bridges will be consistent with the DFO ***Operational Statement (OS) for Clear Span Bridges*** (DFO 2009b). Adherence to the conditions of this OS will result in avoidance of adverse effects on water quality and water flow that can occur when structures are placed within the flowing portion of a stream or due to excessive soil disturbance or removal of riparian vegetation. Hydrological analysis will be completed prior to bridge design to determine suitable span widths and abutment placement.

During the bridge design stage of the Project, it is possible that individual site-specific circumstances might preclude complete adherence to the OS. In particular, there may be cases where abutments, for engineering or practical reasons, must impinge on the floodplain. In such cases, DFO will be consulted in advance to discuss and approve of proposed plans, which will include mitigation measures necessary to prevent or minimize sedimentation or flow constriction.

Erosion during site preparation and bridge construction will largely be avoided due to restriction of construction to the winter period. However, any exposed areas will be suitably stabilized prior to the spring thaw period. As a result, erosion and sedimentation can be avoided or minimized and residual adverse effects are anticipated to be minor.

Culvert Installation and Maintenance (Construction and Operations)

As discussed in Section 4.2.4.1, appropriate culvert sizing, the application of recognized installation guidelines and adherence to erosion and sediment control measures will reduce the magnitude, frequency, and duration of potential effects related to ground disturbance and culvert installation. In addition, since Highway embankment construction is to occur primarily during winter months, to the extent possible, the potential for erosion and sedimentation effects will be minimized or avoided.

Culverts in fish-bearing streams will be installed during the fish window and will be sized and carried out using methods determined on a site specific basis to minimize erosion and sedimentation, and to ensure that flow is maintained during installation. Generally, summer flows in such streams are low and fish movements are limited. As a result, it is anticipated that effects on water quality, fish habitat, and fish behaviour will be minor.

Routine monitoring and inspections at watercourse crossings will be carried out to confirm the correct performance of each culvert. This will involve examination for debris buildup, culvert subsidence or lifting, and stream bank or bed erosion. Where applicable, maintenance activities will be carried out in adherence to the DFO Culvert Maintenance OS (DFO 2010), which includes the removal of accumulated debris (e.g., debris, boulders, garbage, ice build-up) that prevents the efficient passage of water and fish through the structure and may also include the reinforcement of eroding inlets and outlets.

The measures outlined above are proposed to mitigate potential adverse effects to fish and fish habitat that can result from culvert installation, which include:

- Loss of instream habitat to culvert footprints;
- Creation of migration barriers;
- Reduced habitat quality due to erosion and sedimentation; and
- Changes in surface drainage patterns.

Culverts will be designed and installed according to established guidelines (TAC 2010; DFO 1993; INAC 2010c) to avoid the creation of migration barriers, which can occur when culverts are embedded too deeply into the substrate, or more likely, when they are perched above the substrate. Periodic monitoring during the operations phase of the Highway will be carried out routinely to identify culvert maintenance requirements, which will adhere to the DFO Culvert Maintenance OS (DFO 2010).

In summary, no residual effects on fish and fish habitat are anticipated from culvert installation and maintenance due to application of the mitigation measures prescribed.

Use of Heavy Equipment (Construction)

Heavy equipment will be on-site throughout the Highway construction process and during isolated events for Highway maintenance. Effects on fish habitat due to the operation of heavy equipment relate primarily to the potential for ground disturbance, soil exposure, rutting, and the consequent mobilization and flow of suspended particulates to streams during snowmelt and rainfall events. The effects of sedimentation on fish and fish habitat were discussed earlier in this section.

The use of heavy equipment during Highway embankment construction will occur through the winter months when all watercourse crossing locations will be frozen. Therefore, the potential for erosion and sedimentation from this activity is very low.

Potential effects resulting from erosion and sedimentation during the summer months will be mitigated by the implementation of approved erosion and sediment control plans contained in the construction EMP. In addition, monitoring of construction works by environmental and wildlife monitors will: ensure the application of prescribed mitigation; identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater; and, prevent erosion and subsequent sedimentation.

Based on adherence of approved guidelines and BMPs, and the EMP developed for this Project, residual effects on water quality from the use of heavy equipment during construction are not anticipated.

Borrow Source Development (Construction)

Borrow source locations between Inuvik and Tuktoyaktuk are identified in Figure 1.5-2 (in the EIS). This figure identifies the general location of borrow sources, some of which are in the vicinity of streams or lakes. However, borrow sources will not be developed immediately in or adjacent to any watercourse. A minimum 50 m vegetated setback will be retained between borrow sites and watercourses.

Drill-and-blast methods may be used to break up and excavate the required volumes of material for construction from frozen borrow sources; therefore, borrow source development near waterbodies has the potential to affect fish and fish habitat. Potential direct effects include reduced habitat quality while indirect effects include the potential for erosion and sedimentation into fish-bearing waterbodies.

Borrow pits will be developed, operated and decommissioned in full compliance with all regulatory requirements (e.g. ILA Land Use Permit and Quarry Permit, INAC Quarry Permits, ILA's ISR ***Pits and Quarries Guidelines***, INAC's ***Northern Land Use Guidelines: Pits and Quarries*** and according to pit development plans (PDPs). PDPs will include mitigation measures to address potential environmental concerns, and operational and reclamation plans. Mitigation includes developing borrow sources primarily during winter periods, maintaining sufficient distance of undisturbed land between borrow source locations and any waterbody, and application of appropriate erosion and sediment control BMPs for the borrow source activities.

Monitoring of borrow source development will be undertaken by environmental and wildlife monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to watercourses and prevent erosion and subsequent sedimentation by stopping specific activities causing or likely to cause erosion and off-site discharges of turbid water. If blasting is required, it will be conducted according to DFO's ***Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters*** (Wright and Hopky 1998).

Highlights of the Guidelines include:

- No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e., overpressure) greater than 100 kPa (14.5 psi) in the swim bladder of a fish.
- No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 m/s in a spawning stream bed during the period of egg incubation. For confined explosives, setback distances from the land-water interface (e.g., the shoreline) or burial depths from fish habitat (e.g., from under the riverbed) that will ensure that explosive charges meet the 100 kPa overpressure guideline are identified in the guidelines.

Care will be taken when using explosives in borrow sources located near a stream or lake as the pressure from blasting may harm fish and fish habitat in the proximity of the blasting area. Potential effects include loss of fish and fish habitat and the contamination of waters by blasting residues. Blasting, if required, will occur primarily during winter borrow source development when streams within the Project footprint area are frozen and fish are absent.

DFO blasting guidelines (Wright and Hopky 1998) will be followed to preclude the possibility of adverse effects.

Through implementation of mitigation measures during borrow source development, significant adverse residual effects are not expected.

Water Extraction (Construction)

Considerable amounts of water will be required for annual winter access road construction. It is proposed that water for this purpose will be extracted from lakes of suitable size in proximity to the Highway corridor. It is anticipated that water requirements will exceed 300 m^3/day, which will trigger the need for a NWT Water Board Type A Water Licence.

Excessive water withdrawal from small ice covered lakes can potentially result in: the depression of dissolved oxygen concentrations, leading to lethal and sub-lethal effects on fish; exposure or freezing of littoral spawning beds due to falling water levels; and, loss of important habitats for spring spawning fish (e.g., northern pike) if water levels do not sufficiently rebound to flood critical spawning habitats (Cott et al. 2008a and 2008b).

To mitigate these effects, DFO, in conjunction with other regulators and industry, developed the ***Protocol for Winter Water Withdrawal in the Northwest Territories*** (DFO 2010), for projects where a water withdrawal of greater than 100 m^3 is required from any individual waterbody that has the potential to provide fish habitat. Based on recent research in NWT lakes, this protocol sets limits to water withdrawal as a percentage of available under ice water volume, with consideration given to latitude and maximum lake water depth (Cott et al. 2008b). Water withdrawal thresholds for the region encompassing the Inuvik to Tuktoyaktuk Highway are:

- 0% for lakes with less than 1.5 m of free water below the maximum ice thickness (i.e., 2 m);
- 10% of available under ice water volume for lakes with a minimum depth of ≥ 3.5 m; and
- 100% if the maximum depth of the waterbody is less than the predicted maximum ice thickness (implying no available overwintering fish habitat).

In addition, the protocol directs that water be withdrawn from depths greater than 2 m below the ice surface to avoid removing the more highly oxygenated water that tends to collect at the water-ice interface. Water intake screening with mesh of 2.5 mm should be used to avoid entrainment of fish (DFO 1995).

To conform to the thresholds set out in the ***Protocol for Winter Water Withdrawal in the Northwest Territories*** (DFO 2010), it will be necessary to carry out bathymetric surveys on all lakes proposed for water extraction. Minimum requirements for the collection and submission of bathymetric survey information are provided in the Protocol, and are further detailed in Cott et al. (2005).

Following criteria set out in the water withdrawal protocol (2010) and any criteria included within a Type A Water Licence, residual effects on fish and fish habitat are not anticipated.

Road Drainage (Construction)

The potential exists for sediment releases to ephemeral and permanent streams due to drainage in summer months from the newly constructed road embankment, and localized slumpage of road slopes prior to compaction and stabilization. However, since vegetation will not be disrupted at the toe of the road slopes, it is expected that sediment flow will be limited and filtered by this vegetation to reduce this potential risk. In addition, silt fences will be installed at each road-channel intersection to prevent sediment releases to streams. Silt fences will be left in place until roadways are compacted and stable, and will be routinely monitored and maintained. Cross drainage culverts, which will be installed at regular intervals, will channel road drainage away from streams and allow filtration by natural vegetation. Because of these measures, no residual effects on fish habitat due to road drainage are anticipated.

Highway Maintenance (Operations)

During the operations phase of the Highway, it is anticipated that the Highway surface will require routine maintenance (e.g., grading, resurfacing, and dust suppression). The frequency of Highway maintenance is dependent on factors such as Highway safety and condition, the effects of periodic severe weather, and the extent of required maintenance. Highway maintenance and the application of dust suppression techniques can result in the release of fine or granular material directly into streams, and the creation of fine dust, which can settle in nearby watercourses. When discharged or settled in fish-bearing waters, these particulates can potentially affect fish habitat, as described at the beginning of Section 4.2.5.1.

Potential effects to water quality from dust generation and settlement are anticipated to be minor and of short-duration due to mitigation by the application of non-toxic dust suppression techniques (water trucks) that conform to the GNWT's ***Guideline for Dust Suppression*** (GNWT 1998). Based on adherence to the dust suppression guidelines, no adverse residual effects are anticipated from maintenance activities.

Increased Access to Fisheries Resources (Operations)

Rescan (1999a) concluded that the greatest potential indirect impact from Highway construction is the potential increase in fish harvest pressure through domestic and sport fishing. This would be due to the improved access that will be afforded by the Highway to important, but currently remote fish harvest areas in some of the lakes along the proposed Highway, as well as the numerous watercourse crossings. Potential effects of increased harvest pressure include:

- Reduced levels of fish available for subsistence fishing; and
- Increased potential for anthropogenic disturbances to remote fishing areas (i.e., garbage and/or disruption of fish habitat, and increased use of waterbodies for recreational purposes, such as boating).

Potential effects can be avoided or minimized through consultation with and involvement of stakeholders, such as the FJMC and the HTCs in identifying issues of concern and jointly developing strategies and guidelines, in conjunction with regulatory bodies, to manage sensitive fisheries resources. For example, appropriate signage posted at regular intervals on

the Highway, and public education can assist with the minimization of effects due to habitat damage and overexploitation of resources.

However, while it is likely that effects will be minimized, it is unlikely that these measures will entirely mitigate the potential for increased harvest pressure during operation of the Highway and residual effects are, therefore, expected. With public involvement and coordination of efforts, adverse residual effects to fish and fish habitat are anticipated to be low and not significant.

5.2 Monitoring (Section 4.2.5.2 of the EIS)

Monitoring of the Highway construction will be carried out by ILA environmental monitors and HTC wildlife monitors who will be on-site throughout construction. Construction monitoring will be carried out as required to ensure that prescribed mitigation measures and BMPs are implemented and to detect and correct unanticipated problems.

Post-construction monitoring will be carried out according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance. Since the Highway construction will proceed over successive years, there is an opportunity to apply adaptive management procedures to this Project. Adaptive management includes learning from experience and applied practices so that modifications can be applied to improve results, if necessary. Methods and procedures applied during a construction season can therefore be evaluated and modified, if necessary, to improve environmental protection in the following construction period.

5.3 Residual Effects (Section 4.2.5.3 of the EIS)

Based on the previously discussed assessments of the various components of Highway construction, operation, and maintenance, and following the implementation of mitigation measures, the Project may result in residual effects on fish or fish habitat. However, these effects are expected to be minor and will not significantly reduce the productive capacity of fish habitat within the area.

5.4 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
FISH AND FISH HABITAT	
No instream work will occur in fish bearing streams during critical time periods.	Construction
Where critical fish habitat cannot be avoided, mitigation will be incorporated into the design.	Construction
Individual site-specific circumstances might preclude complete adherence to DFO ***Operational statements***. In such cases, DFO will be consulted in advance to discuss and approve of proposed plans, which will include mitigation measures necessary to prevent or minimize effects.	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
In accordance with DFO (2009a), the installation of culverts in fish bearing streams will not be permitted between April 1 and July 15 for watercourses that provide habitat for spring/summer spawners.	Construction
The Developer will develop and implement a fish and fish habitat protection plan in consultation with DFO that will include mitigation measures such as: -Designing appropriate crossing structures based on site conditions; -Completing primary construction activities during winter months; -Applying erosion and sediment control measures and best practices -Minimizing riparian disturbance (footprint); -Following the DFO ***Operational Statement for Clear-span Bridges*** (DFO 2009b) where appropriate; -Placing abutments at a sufficient distance from active stream channels; -Employing best management practices for culvert installation; -Annually monitoring for culvert subsidence or lifting; -Sizing culverts appropriately based on hydrological assessments and local experience; -Maintaining equipment away from waterbodies; -Having on-site spill containment equipment and operators trained to handle spills; -Reported spills will be contained by trained maintenance crews; -Maintaining a sufficient buffer of undisturbed land between borrow sources and waterbodies; -Following DFO ***Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters*** (Wright and Hopky 1998); -Following DFO (2010) ***Protocol for Winter Water Withdrawal in the Northwest Territories***; -Allowing filtration by natural vegetation; -Installing silt fences at each road-stream intersection; -Building regularly spaced cross-drainage culverts; -Following the DFO ***Operational Statement for Culvert Maintenance*** (DFO 2009b) where applicable; -Creating and enforcing Regulations or guidelines on fish harvest by FJMC with input from DFO, local fisherman and Hunters and Trappers Committees; -Posting signage at regular, visible intervals on Highway; -Constructing or installing stream crossing structures to avoid the impingement of active stream channels; -Effectively suppressing dust (i.e., through the use of water trucks) during the dry season; and -Following the recommendations of the Water License (once approved)	Design, Construction, Operation
STREAM CROSSINGS	
The Developer (under appropriate seasonal conditions), will conduct further assessments of the proposed water crossing locations and will provide information about watercourse characteristics and proposed crossing structure designs sufficient to meet the requirements of the Northwest Territories Waters Regulations.	Design, Construction
The Developer is committed to working closely with DFO to design appropriate crossing structures for each stream and to obtain Fisheries Authorizations, if determined to be required.	Design, Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer will install culverts according to established guidelines and will follow culvert installation guidelines such as those contained within the DFO ***Land Development Guidelines*** (1993), TAC ***Development and Management of Transportation Infrastructure in Permafrost Regions*** (2010), and the INAC ***Northern Land Use Guidelines for Roads and Trails*** (INAC 2010).	Construction
The Developer will install appropriately sized culverts to minimize changes in water flow pattern and timing.	Construction
The Developer will not install culverts in critical aquatic habitats.	Construction
The Developer will carry out routine monitoring and inspections at watercourse crossings and culverts, including reporting on culvert performance and maintenance requirements.	Construction, Operations
The Developer will ensure that maintenance requirements for culverts will adhere to the DFO ***Operational Statement for Culvert Maintenance*** (DFO 2010).	Operations
The Developer will ensure that when crossings are completed, disturbed materials will be replaced with similar-sized substrates and the bed and banks of the watercourse are stabilized and restored.	Construction
MANAGEMENT PLANS	
An Environmental Management Plan (EMP) will be prepared prior to construction, and will be submitted for regulatory approval prior to use. The EMP will clearly define expectations for compliance monitoring, responsibilities, requirements for training, and reporting.	Construction
The EMP will contain the following types of plans: -Environmental management; -Spill contingency; -Erosion and sediment control; -Pit development for borrow sources; -Fish and fish habitat protection; -Wildlife management; -Health and safety; -Waste management; -Hazardous waste management; and -Archaeological site(s) protection. Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction
SPILL CONTINGENCY PLAN	
The Developer will require that Project contractors prepare spill contingency plans, outlining spill reporting, containment, and clean-up, in accordance with INAC's ***Guidelines for Spill Contingency Planning*** (2007).	Design, Construction
The Developer will ensure that the Project contractor has appropriate spill response equipment on-site.	Construction
The Developer's contractors will report all spills greater than 5 litres to the GNWT Spill Line and other appropriate agencies.	Construction
In the event of a spill, the Developer's contractors will respond according to the site-specific spill contingency plan and the contractor's HSE manual and procedures.	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer will develop and implement an erosion and sedimentation control plan as part of the EMP. The plan will comply with appropriate erosion and sediment control guidelines, GNWT best management practices (currently being prepared in coordination with DFO), and measures outlined in the DFO (1993) ***Land Development Guidelines for the Protection of Aquatic Habitat***. Some measures that will be followed include: -Limiting the use of construction equipment to the immediate footprint of the Highway or borrow source; -Minimizing vegetation removal and conducting progressive reclamation at the clear-span abutments, culvert installations and borrow sources; -Keeping ice bridge and ice road surfaces free from soils and fine gravel that may be tracked out by vehicles; -Avoiding the use of heavy equipment in streams or on stream banks during summer months, and the adherence to the DFO ***Operational Statement for Temporary Stream Crossings*** (DFO 2008), where this is deemed necessary; -Installing silt fencing and/or checking dams, and cross drainage culverts as necessary to minimize siltation in runoff near waterbodies; and -Appropriately sizing and installing culverts, based on hydrological assessments and local experience, to avoid backwatering and washouts.	Design, Construction
The Developer commits to ensuring that any exposed areas will be suitably stabilized prior to the spring thaw period.	Construction
The Developer is committed to using heavy equipment during Highway embankment construction through the winter months when all watercourse crossing locations are frozen.	Construction
BORROW SOURCES	
The Developer is committed to limiting the footprint of each borrow source and minimizing the number of borrow sources developed.	Construction.
Borrow pits will be closed as soon as they are no longer required and reclaimed in a progressive manner, as described in the Pit Development Plan.	Construction, Operations, Reclamation
Pit Development Plans will conform to the approving authority's regulations and permitting requirements.	Design, Construction, Operations
Pit Development Plans will include mitigation measures to address potential environmental concerns, and operational and reclamation plans. Mitigation measures include: -Developing borrow sources only during winter periods; -Maintaining an appropriate amount of undisturbed land between borrow source locations and any waterbody; and -Applying appropriate erosion and sediment control BMPs for the construction of ditches and cross drainage channels.	Construction
The Developer commits to ensuring that borrow source development is monitored by environmental monitors.	Construction
MONITORING	
The Developer requires that Project contractors employ an adaptive management approach to ensuring sensitive species are adequately protected during all phases of construction.	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer is committed to hiring environmental monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater, and prevent erosion and subsequent sedimentation.	Construction
Environmental and wildlife monitoring will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTC (wildlife monitors), and will be funded by the Developer and/or Developer's contractor(s).	Construction
The Developer will conduct post-construction monitoring according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.	Operations
The Developer will require that Project contractors work closely with the environmental and wildlife monitors during construction.	Construction
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

5.5 Proposed Effects Monitoring

Water quality and quantity, and changes to the hydrological regime may affect fish and fish habitat. As such, the proposed effects monitoring programs are discussed in Section 4.4 of this document.

In addition, Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring related to fish and fish habitat issues will be carried out to the extent, frequency and duration required by regulators (primarily the ILA, DFO and the NWT Water Board) and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring is expected to be focussed on specific stream crossings of concern.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Health Canada
  - Administers Canada *Health Act*
  - Develops, implements, and enforces legislation, regulations, policies, programs, services, and initiatives and works with the provinces and territories, and other partners
  - Provides contribution funding to GNWT to support Non-Insured Health Benefits for First Nation and Inuit residents and health promotion/disease prevention programs
  - With Statistics Canada, is responsible for generating, managing, and reporting health information. Statistics Canada is mandated to provide accurate, timely, and relevant information about the health of Canadians and the health care system
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee
  - Conducts health risk assessments and provides human health warning on contaminants in country foods to GNWT
- Aboriginal Affairs and Northern Development Canada (AANDC) (formerly INAC)
  - Signatory to *Northwest Territories/Nunavut Spills Working Agreement* and responsible for implementation as defined in the agreement as modified from time to time
  - Responsible for Granular Management Planning and pit and quarry management strategy processes in cooperation with the Inuvialuit Regional Corporation (IRC)
  - Administers *Territorial Lands Act* and regulations including Territorial Land Use Regulations and Territorial Quarry Regulations and ensures compliance with authorizations
  - Administers *NWT Waters Act* and regulations and ensures compliance with authorizations
  - Responsible for Cumulative Impact Monitoring Program (CIMP) in the ISR under Memorandum of Understanding with IRC
  - Responsible for cumulative effects assessments
  - Administers *Northern Contaminants Program* to address human exposure to contaminants in wildlife, fish and marine mammal species important to the traditional diet of northern Aboriginal peoples. Chairs Northern Contaminants Program Management Committee and allocates funds for research and related activities in four main areas: Human Health Research, Environmental Monitoring and Research, Education and Communications, National/Regional coordination and Aboriginal Partnerships
  - Administers funding for Beaufort Regional Environmental Assessment (BREA)
- Department of Fisheries and Oceans (DFO)
  - Responsible for implementing the *Fisheries Act* including annually establishing *Northwest Territories Fishery Regulations*
  - Promotes cooperative management of ISR fisheries resources including support to the Fisheries Joint Management Committee (FJMC)
  - Funds research on fish and fish habitat
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee

- GNWT Department of Transportation
  - Plans, designs, constructs or reconstructs, acquires, operates and maintains public transportation infrastructure in the Northwest Territories
  - Commercial vehicle inspections including enforcement of *Transportation of Dangerous Goods Act*
  - Responsible for setting contracts related to maintenance of the public roads
- GNWT Environment & Natural Resources - Wildlife Division
  - Promotes and supports sustainable use and development of natural resources in the NWT
  - Regulates wildlife harvest in ISR through *Wildlife Act* and Regulations in conjunction with Wildlife Management Advisory Council (WMAC) and other co-management boards
  - Develops wildlife management plans in conjunction with co-management boards
  - Conducts wildlife research and provide wildlife population information through Inuvialuit funding
  - Administration of sport fishery in the NWT (delegated by DFO in 1976) including implementing Sport Fishery Regulations for NWT and enforcing sport fishing regulations
  - Prepares jurisdictional recovery strategies and management plans for federally listed species
  - Leads implementation of the *Species at Risk (NWT) Act*, in cooperation with the Conference of Management Authorities
  - Establishes status ranks for NWT species in cooperation with federal resource departments and others
  - Maintains wildlife management information system (WMIS) and rare plants information system
  - Participates on Northern Contaminant Program Management Committee and NWT Territorial Contaminants Committee
- Joint Secretariat
  - Funds Inuvialuit Game Council Wildlife Management Advisory Council, Fisheries Joint Management Committee, Environmental Impact Screening Committee and Environmental Impact Review Board
  - Provides administrative and technical support to co-management bodies
- Inuvialuit Game Council
  - Allocates Inuvialuit quotas among the six ISR communities and appoints members for any co-management body dealing with Inuvialuit fish and wildlife harvesting and environment
  - Provides implementation funding for wildlife research to GNWT and Environment Canada
  - Responsible for harvest monitoring
  - Participates in NWT Environmental Contaminants Committee
- Fisheries Joint Management Committee
  - Makes recommendations to the Minister of Fisheries and Oceans on subsistence quotas for fish, Inuvialuit commercial fishing, allocation of the preferential fishing

licences to be granted under subsections (29) to 932), regulations regarding sport and commercial fishing in waters on 7(1)(a) and (b) lands and the identification of waters where such fishing may be prohibited
- Restricts and regulates the public fishing on 7(1)(b) lands where a management is required to: conserve a stock, prevent serious conflict or interference with Inuvialuit activities or enjoyment of the land
- Register Sport Fishing Licence holders intending to fish lakes or rivers on Inuvialuit Private Lands

- Hunters and Trappers Committee
  - Represents the collective Inuvialuit interest in wildlife and upholds harvest rights
  - Sub-allocate the subsistence quota for animals referred to in paragraph (6)(a) within its area of responsibility
  - Sub-allocate any Inuvialuit quota set for fish and the animals referred to in paragraphs (6)(a), (b) and (c)
  - Make by-laws, subject to the laws of general application, governing the exercise of the Inuvialuit rights to harvest referred to in paragraphs (6)(a), (b), (c) and (d) which are enforceable under the NWT Wildlife Act
  - Register Sport Fishing Licence holders intending to fish lakes or rivers on Inuvialuit Private Lands

6.0 Vegetation (Section 4.2.6 of the EIS)

6.1 Project Design and Mitigation Measures (Section 4.2.6.6 of the EIS)

The primary mitigation measure for reducing potential effects to vegetation and vegetation cover will be to minimize the size of the overall Highway footprint, where possible, and to carefully plan the overall route, which includes avoiding sensitive and unique vegetation types and rare plant species (Table 4.2.6-2). The route options considered limit effects to Bryoids and Shrub Lowland cover types by avoiding more sensitive areas such as wetlands and riparian areas.

The most effective mitigation strategy for rare plant species that may be present within the Project footprint will be avoidance. Additional surveys will be conducted throughout the construction phase in areas with a higher potential for supporting rare plants, such as in borrow source areas that are characterized as the Dry Saxifrage Tundra vegetation type. Should rare plants be identified, they will be avoided where possible. If avoidance is not an option, specimens will be collected, transferred to another suitable location, and/or donated to local herbaria for educational purposes.

Areas in the vicinity of Holmes Creek and Hans Creek that are characterized as the Riparian Black Spruce/Shrub vegetation type will also be avoided to the extent possible. If disturbance to this vegetation type is unavoidable, efforts will be made to maintain as much of this vegetation type intact and minimize potential fragmentation.

Borrow source areas will be recontoured progressively once activities are completed. The principal means of revegetation associated with abandoned borrow sources will be by natural revegetation. Those areas that could support artificial (manmade), accelerated revegetation efforts will be scarified and seeded with appropriate northern, native plant species.

Even with the application of reclamation measures, areas used for borrow material will not necessarily be completely restored to their previous state due in part to the alteration of local surface topography resulting from excavation. Revegetation efforts, combined with slow natural revegetation processes, will lead to the slow re-establishment of vegetation characteristic of naturally granular upland areas.

The primary mitigation measure to control the effect of dust during construction and operation of the Highway will include applying water as needed, as per the GNWT ***Guideline for Dust Suppression*** (GNWT 1998).

Potential strategies for mitigating potential effects on the vegetation types in the vicinity of the Highway and associated borrow operations are provided in Table 4.2.6-2. With the application of the proposed mitigation measures, effects on vegetation are generally expected to be limited to the physical footprint and are considered to be minor in the context of the overall Project area.

There is a potential for contaminant spills to occur during the construction phase of the Highway. In the event of a spill, clean-up measures will be implemented immediately in accordance with the applicable spill contingency plan. All spills greater than 5 litres will be reported to the GNWT Spill Line and other appropriate agencies.

TABLE 4.2.6-2: POTENTIAL EFFECTS AND MITIGATION STRATEGIES FOR VEGETATION ALONG THE HIGHWAY

Potential Effect	Potential Consequence	Mitigation Measures
Vegetation – Removal and Burial	Removal of vegetation; reduction of vegetation types with restricted distribution	Minimize footprint; Minimize development on vegetation types with restricted distribution; Avoid sensitive or rare plant vegetation types; Restrict off-site activities (e.g., ATV use) to footprint area; Reclaim to viable and self-sustaining vegetation types.
Dust	Potential reduction in vegetation health and productivity	Application of dust suppressants, as per the GNWT ***Guideline for Dust Suppression*** (GNWT 1998).
Potential Introduction and Spread of Invasive Plants	Displacement of native species and alteration of plant species composition of adjacent vegetation types	Minimize footprint; Ensure machinery and equipment is clean prior to use on site; Periodic monitoring of roadsides for invasive species establishment

TABLE 4.2.6-2: POTENTIAL EFFECTS AND MITIGATION STRATEGIES FOR VEGETATION ALONG THE HIGHWAY		
Potential Effect	**Potential Consequence**	**Mitigation Measures**
Alteration of Surface Hydrology	Change in water flow patterns and quantity; possible nutrient and sedimentation loading in receiving areas	Design and engineering of roadbed and drainage structures tailored appropriately to accommodate unique environmental conditions; Adequate drainage in wet lowland areas through the installation of culverts as necessary.
Contaminant Spills	Reduction in vegetation health and productivity due to spills	Contain and clean-up spills immediately. Contact authorities immediately to determine appropriate course of action. Respond according to site-specific spill contingency plan and the contractor's HSE manual and procedures.

6.2 Residual Effects (Section 4.2.6.7 of the EIS)

Within the LSA, the removal or burial of vegetation types and plant species/groups will occur during construction and the effects will remain for the life of the Highway. The effect is considered a high magnitude and of moderate consequence overall.

The effects of borrow source development on vegetation types and plant species/groups will also occur during construction however the duration is short-term. The effect is still of high magnitude, however, due to the reversibility of the effect over the long-term, the consequence is low. The structure and species composition of reclaimed borrow source areas may be different than what was originally present; however, efforts will be made to establish a self-sustaining vegetative cover that is appropriate for the surrounding environment.

The potential degradation of vegetation types and plant species resulting from dust deposition, the introduction of invasive plant species, and the alteration of local hydrology has been assessed as a low magnitude, local effect that will persist over the long-term. Effects will be periodic throughout the life of the Project and are reversible over the long-term. As such the effect has been rated as being of low consequence.

Residual effects to vegetation types and plant species are anticipated to be negligible in the context of the RSA, and as such have not been assessed further.

6.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
VEGETATION	
The Developer commits to surveying borrow sources prior to construction for the presence of Yukon stitchwort and other rare plant species. Should rare plants be identified, they will be avoided where possible. If avoidance is not an option specimens will be collected, transferred to another suitable location, and/or donated to local herbaria for educational purposes.	Design, Construction
The Developer commits to minimize direct effects to vegetation cover by limiting construction activities, to the extent possible, to the planned footprint of the Highway.	Construction
Surveys prior to construction in the vicinity of Holmes Creek and Hans Creek will be carried out to verify the location of the road alignment and stream crossings with respect to the unique Riparian Black Spruce/Shrub vegetation type.	Construction
Controlling the effects of dust during construction and operation of the Highway will include applying water as needed, as per the GNWT ***Guideline for Dust Suppression*** (GNWT 1998).	Construction
The Developer commits to using appropriate northern, native plant species for any deliberate revegetation efforts of borrow sources.	Construction, Operations
The Developer or contractor(s) will apply strategies for mitigating potential effects to the vegetation types in the vicinity of the Highway and associated borrow operations such as: -Restricting off-site activities (e.g., ATV use) to the footprint area; -Ensuring machinery and equipment is clean prior to use on site; -Periodically monitoring roadsides for invasive species establishment; -Designing and engineering roadbed and drainage structures appropriately to accommodate unique environmental conditions; and -Containing and cleaning-up spills immediately in accordance with the spill contingency plans.	Design, Construction
LAND USE	
The Developer will implement mitigation measures to minimize potential land use effects such as: -Ensuring that construction vehicles stay on access roads or the construction site at all times; and -Prohibiting the recreational use of the Highway by Project staff during construction, including the use of ATVs and snowmachines.	Construction
During the operations phase, the Developer will work with appropriate parties to install signage and/or develop educational materials to encourage users to stay on the Highway and not adjacent areas.	Operations
MANAGEMENT PLANS	
An Environmental Management Plan (EMP) will be prepared prior to construction, and will be submitted for regulatory approval prior to use. The EMP will clearly define expectations for compliance monitoring, responsibilities, requirements for training, and reporting.	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The EMP will contain the following types of plans: -Environmental management; -Spill contingency; -Erosion and sediment control; -Pit development for borrow sources; -Fish and fish habitat protection; -Wildlife management; -Health and safety; -Waste management; -Hazardous waste management; and -Archaeological site(s) protection. Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction
MONITORING	
The Developer requires that Project contractors employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of construction.	Construction
The Developer is committed to hiring environmental monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater, and prevent erosion and subsequent sedimentation.	Construction
Environmental and wildlife monitoring will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTC (wildlife monitors), and will be funded by the Developer and/or Developer's contractor(s).	Construction
The Developer will conduct post-construction monitoring according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.	Operations
The Developer will require that Project contractors work closely with the environmental and wildlife monitors during construction.	Construction
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

6.4 Proposed Effects Monitoring

Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental (including footprint) and wildlife monitoring (during construction) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring will be conducted on a part-time basis unless activities are occurring in a sensitive area.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Natural Resources Canada
  - Maintains EOSD inventory
- GNWT Environment & Natural Resources - Forest Management
  - Provides wild fire protection services including prevention education
  - Manages forest resources through the following program functions - forest inventory; resource analysis; forest management planning and practices; and forest education
- GNWT Environment & Natural Resources - Wildlife Division
  - Promotes and supports sustainable use and development of natural resources in the NWT
  - Prepares jurisdictional recovery strategies and management plans for federally listed species
  - Maintains wildlife management information system (WMIS) and rare plants information system
  - Participates on Northern Contaminant Program Management Committee and NWT Territorial Contaminants Committee

7.0 Wildlife and Wildlife Habitat (Section 4.2.7 of the EIS)

7.1 Species at Risk (Section 4.2.7.1 of the EIS)

Three wildlife species were identified as at risk within the study area, grizzly bears, wolverines, and Boreal Woodland Caribou. Grizzly bears and wolverines are ranked by COSEWIC as Special Concern and by NWT General Status Ranking as Sensitive. Boreal Woodland Caribou are currently listed under SARA as Threatened (COSEWIC 2009).

Potential effects and mitigation measures for grizzly bears are described in the grizzly bears section (Section 4.2.7.3). Potential effects to wolverines are discussed in the Furbearers section (Section 4.2.7.5). Boreal caribou have been shown to be affected by linear development (GNWT ENR NDg); however, the density of linear development in the RSA is less than the threshold predicted to impact populations (Canadian Boreal Initiative 2007). Potential effects to caribou are discussed in Section 4.2.7.2.

7.1.1 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
WILDLIFE AND WILDLIFE HABITAT	
General	
The Developer will develop and implement species specific Wildlife Management Plans (WMP) that will include specific mitigation measures for Species at Risk, caribou, moose, furbearers, and birds.	Design, Construction
The Developer or its contractor(s) will follow established ***Bear Safety Guidelines*** and will educate staff accordingly.	Design, Construction
The Developer's contractor(s) will be responsible for educating and training staff on applicable practices contained within the Wildlife Management Plans and the ***Bear Safety Guidelines***, including the proper use of non-lethal wildlife deterrent materials (e.g., bear spray).	Construction
Camps and associated infrastructure will be designed to incorporate features that ensure safety for both personnel and wildlife, including installing adequate lighting, implementing proper waste management, cleaning and maintaining the kitchen and dining area, and implementing appropriate wildlife detection and deterrent strategies.	Design, Construction
Pre-disturbance surveys for critical habitat features (e.g., dens, nests) will be conducted prior to construction, in cooperation with GNWT ENR, as required.	Design, Construction
All wildlife encounters and mortalities will be reported to the environmental monitor, Safety Advisor, and GNWT ENR	Design, Construction, Operations
The Developer will implement general wildlife protection measures along the proposed Highway as follows: -Minimizing loss of habitat and the reduction of habitat effectiveness through Project design; -Educating users of the Highway that wildlife have the right-of-way at all times; -Posting signage along the Highway, emphasizing areas of high wildlife use; -Implementing a policy whereby Project personnel and contractors will not disturb any wildlife or critical habitat features such as dens or nests; -Implementing a system during the construction phase that serves to notify workers of wildlife presence in or near construction areas; -Hiring environmental monitors to during construction to watch for wildlife; -Adhering to spill contingency plans, as required, in a timely manner; -Conducting follow-up monitoring of spill sites to verify effectiveness; -Utilizing clean equipment, particularly when deployed in or near water; -Implementing appropriate dust control measures to minimize effects to habitat and forage quality; -Adhering to waste management plans and procedures to avoid attracting wildlife; -Timing construction activities to avoid critical periods; -Applying and conforming with pre-determined setback distances from key wildlife habitat features; -Implementing a "no hunting" policy for Highway construction and maintenance workers; and -Working with agencies such as the HTCs, WMAC and GNWT ENR to develop guidelines and conditions for Highway usage and follow-up with monitoring of harvesting activities.	Design, Construction, Operations

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
Types of Mitigation Measures for Bird Species At Risk	
The Developer will incorporate additional mitigation measures for bird Species at Risk including: -Immediately contacting appropriate federal (CWS) and territorial (GNWT ENR) authorities if a nest of a key bird species is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).	Construction

7.1.2 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS

Valued Component	Monitoring Program	Indicators	Measurement Parameters
Species at Risk and Species of Special Status or Management Concern	• Wildlife monitoring • Environmental monitoring	• Effects predictions • Common indicators used by existing fish and wildlife monitoring programs	• Verify effects predictions and confirm the effectiveness of mitigation measures • Number observations of species at risk or species with special status/ management concern • Common parameters used by existing fish and wildlife monitoring programs
Land and Resource Use by Inuvialuit	• Wildlife monitoring • Socio-economic monitoring	• Intensity of land and resource use by Inuvialuit • Change in land use by transport infrastructure • Common indicators used by existing fish and wildlife monitoring programs	• Fish, wildlife and berry harvest levels • Frequency, duration and location of fish, wildlife and berry harvest • Highway traffic trends • Number of complaints from local co-management agencies • Common parameters used by existing fish and wildlife monitoring programs

Furthermore, Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans.

Generally, compliance monitoring will be conducted on a part-time basis unless activities are occurring in a sensitive area.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities (for all wildlife and birds, not just species at risk), is provided as follows:

- Aboriginal Affairs and Northern Development Canada (AANDC) (formerly INAC)
  - Responsible for Cumulative Impact Monitoring Program (CIMP) in the ISR under MOU with IRC
  - Responsible for cumulative effects assessments
  - Administers *Northern Contaminants Program* to address human exposure to contaminants in wildlife, fish and marine mammal species important to the traditional diet of northern Aboriginal peoples. Chairs Northern Contaminants Program Management Committee and allocates funds for research and related activities in four main areas: Human Health Research, Environmental Monitoring and Research, Education and Communications, National/Regional coordination and Aboriginal Partnerships
  - Administers funding for Beaufort Regional Environmental Assessment (BREA)
- Environment Canada
  - Sets waterfowl harvest regulations annually
  - Funds and carries out inventory and monitoring studies for migratory birds
  - Canadian Wildlife Service (CWS) is represented on Wildlife Management Advisory Councils (WMAC)
  - Funds migratory bird wildlife studies
  - Administers *Species at Risk Act (SARA)* and coordinates national recovery strategies and management plans for endangered, threatened and special concern species
  - Co-chairs *Northwest Territories/Nunavut Spills Working Agreement*
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee
- GNWT Environment & Natural Resources - Wildlife Division
  - Promotes and supports sustainable use and development of natural resources in the NWT
  - Regulates wildlife harvest in ISR through *Wildlife Act* and Regulations in conjunction with Wildlife Management Advisory Council (WMAC) and other co-management boards
  - Develops wildlife management plans in conjunction with co-management boards
  - Conducts wildlife research and provide wildlife population information through Inuvialuit funding
  - Provides bear response and mitigation advice
  - Administration of sport fishery in the NWT including implementing Sport Fishery Regulations for NWT and enforcing sport fishing regulations
  - Prepares jurisdictional recovery strategies and management plans for federally listed species

- Leads implementation of the *Species at Risk (NWT) Act*, in cooperation with the Conference of Management Authorities
- Establishes status ranks for NWT species in cooperation with federal resource departments and others
- Maintains wildlife management information system (WMIS) and rare plants information system
- Participates on Northern Contaminant Program Management Committee and NWT Territorial Contaminants Committee

- GNWT Industry, Tourism & Investment
  - Funds local wildlife committees, Take a Kid Hunting/Trapping programs, and entrepreneurial pursuits
- Joint Secretariat
  - Funds Inuvialuit Game Council Wildlife Management Advisory Council, Fisheries Joint Management Committee, Environmental Impact Screening Committee and Environmental Impact Review Board
  - Provides administrative and technical support to co-management bodies
- Inuvialuit Game Council
  - Allocates Inuvialuit quotas among the six ISR communities and appoints members for any co-management body dealing with Inuvialuit fish and wildlife harvesting and environment
  - Provides implementation funding for wildlife research to GNWT and Environment Canada
  - Responsible for harvest monitoring
  - Participates in NWT Environmental Contaminants Committee
- Wildlife Management Advisory Council (NWT)
  - Provides wildlife management advice
  - Prepares wildlife conservation and management plans
  - Recommends appropriate wildlife harvest quotas in conjunction with Hunter Trapper Committees
- Hunters and Trappers Committee
  - Represents the collective Inuvialuit interest in wildlife and upholds harvest rights
  - Sub-allocate the subsistence quota for animals referred to in paragraph (6)(a) within its area of responsibility
  - Sub-allocate any Inuvialuit quota set for fish and the animals referred to in paragraphs (6)(a), (b) and (c)
  - Make by-laws, subject to the laws of general application, governing the exercise of the Inuvialuit rights to harvest referred to in paragraphs (6)(a), (b), (c) and (d) which are enforceable under the NWT Wildlife Act
  - Register Sport Fishing Licence holders intending to fish lakes or rivers on Inuvialuit Private Lands

7.2 Caribou and Caribou Habitat (Section 4.2.7.2 of the EIS)

7.2.1 Project Design and Mitigation Measures

The objectives of wildlife protection activities along the proposed Highway will be to mitigate potentially negative effects on caribou in the following general ways:

- Minimize loss of habitat and reductions of habitat effectiveness via Project design;
- A wildlife protection plan will be implemented for the construction phase;
- Minimize disruption of migration patterns due to vehicle traffic; particularly when barren-ground caribou arrive within the study area for the fall rut and their departure to the calving grounds in the spring;
- Minimize direct mortality due to collisions with vehicles;
- Minimize the volume, duration, and frequency of noise producing activities;
- Selective timing of Project activities to avoid critical periods for wildlife;
- Conform with pre-determined setback distances from key wildlife habitat features;
- Ensure proper storage, transportation and disposal of wastes;
- Ensure Project personnel have appropriate levels of wildlife training and awareness; and
- Encourage agencies such as the HTCs, WMAC and GNWT ENR to work together with DOT to develop guidelines and conditions for Highway usage and follow-up with monitoring of harvesting activities.

Table 4.2.7-1 presents the mitigation measures that will be integrated into the Project design, construction and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on caribou.

TABLE 4.2.7-1: MITIGATION MEASURES FOR CARIBOU AND CARIBOU HABITAT

Project Activity	Potential Effect	Mitigation Measures
All Activities	Habitat Disturbance/ Degradation	• Project footprint will be minimized and previously disturbed areas will be used, wherever. • A wildlife protection plan will be implemented for the construction phase. • Waste will be trucked out, rather than using a sump. • Application of dust suppressants (water) during the summer, as per the GNWT ***Guideline for Dust Suppression*** (GNWT 1998), to limit potential reduction in caribou winter forage quality and productivity.

TABLE 4.2.7-1: MITIGATION MEASURES FOR CARIBOU AND CARIBOU HABITAT		
Project Activity	**Potential Effect**	**Mitigation Measures**
All Activities	Sensory and other Disturbances	• Highway access will be restricted during peak barren-ground caribou migration periods (i.e. arrival during fall rut and departure to calving grounds in the spring). • Wherever possible, technologies to minimize sound disturbance have been incorporated into Project design. • Blasting activities, if required, will be limited to borrow sites and will only occur when caribou are > 500 m from the blast site.
All Activities	Caribou Incidents	• Provide field workers with education and awareness of the wildlife protection plan guidelines and programs. • The Field Supervisor and Safety Advisor will educate all field workers on the applicable practices contained within the wildlife protection plan. • All sightings of caribou will be reported to environmental staff on-site. • Maintain a minimum distance of 500 m between field operations and caribou for the duration of the Project. • Workers must avoid all interactions with caribou unless crew safety is at risk. • Field workers will not feed, harass or approach caribou. • Any caribou encountered will have the right-of-way. • All human/caribou conflicts and incidents will be reported to the Wildlife Monitor, Field Supervisor and Safety Advisor and documented. • Access to the surface facilities will be limited to authorized personnel during construction. • No hunting by Highway construction and maintenance workers. • Caribou sightings will be recorded (including location data, GPS if possible) to be submitted to the GNWT DOT Planning, Policy and Environmental Division and GNWT ENR's Inuvik office upon completion of the Project.
Vehicle/ Equipment Use and Refueling	Spills or leaks may harm caribou.	• Spill contingency plans will be implemented to prevent and address leaks and spills. • In the event of a spill, all efforts will be made to properly contain and manage the spill. • All spills greater than 5 litres will be reported to the GNWT Spill Line and other appropriate agencies. • The spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage caribou from entering the affected area.

TABLE 4.2.7-1: MITIGATION MEASURES FOR CARIBOU AND CARIBOU HABITAT		
Project Activity	**Potential Effect**	**Mitigation Measures**
Mortality	Vehicular impacts and hunting.	• Caribou will have the right-of-way at all times. • During construction, the presence of caribou in the areas of construction and access roads will be communicated to other drivers. • Construction and maintenance vehicles will stop or reduce speeds when caribou are on the road or near the road, respectively. • Vehicle speeds during construction and post construction will be regulated to reduce the potential of caribou mortality due to collisions. • Caribou advisory signs will be placed along the Highway, as needed. • Highway closures will be required during periods of high caribou presence. • No hunting by Highway construction and maintenance workers. • Any caribou mortalities will be reported to ENR.

Source: Adapted from GNWT DOT (2009)

According to a draft document entitled *Taking Care of Caribou: Cape Bathurst, Bluenose-West, and Bluenose-East Barren Ground Caribou Herds Management Plan* prepared by the Advisory Committee for the Cooperation on Wildlife Management (May 2011), "impacts of development can be reduced by working closely with developers and regulatory agencies… to avoid low-level flights and reduce operations when caribou are near project sites" (Advisory Committee for the Cooperation on Wildlife Management 2011, p. 17).

A copy of this report is provided as Attachment 2 to this response document.

7.2.2 Residual Effects

The amount of habitat lost to the Highway is estimated to be 383 ha, approximately 0.002% (217 ha) of the Bluenose-West Herd core winter range, approximately 0.019% (212 ha) of the Cape Bathurst Herd core winter range and approximately 0.0008% (32 ha) of suitable Boreal caribou habitat. In the context of both the LSA and RSA, this amount of habitat loss is considered low in magnitude, local in extent and lasting for the life of the Project resulting in a consequence rating of low.

Effects of habitat degradation, which is primarily related to reduction in food availability, is considered low in magnitude, local in extent and lasting the life of the Project resulting in a consequence rating of low for both the LSA and RSA.

It is expected that caribou will generally avoid the proposed Highway due to sensory disturbance, though some degree of habituation may occur. In the LSA, the effect is considered moderate in magnitude, local in extent and lasting the life of the Project, resulting in a consequence rating of moderate. In the context of the RSA, the magnitude changes to low, resulting in a consequence rating of low.

With the application of mitigation measures, increased mortality as a result of the Highway is expected to be low in magnitude and local in extent, with isolated occurrences over the life of the Project for a consequence rating of low for both the LSA and RSA.

7.2.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
WILDLIFE AND WILDLIFE HABITAT	
General	
[previously presented in Section 7.1.1]	
Types of Mitigation for Caribou	
Types of mitigation measures that the Developer will integrate into the Project design, construction, and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on caribou are: -Limiting blasting activities, if required, to borrow sites and will only occur when caribou are >500 m from the blast site; -Working with agencies such as the HTCs, WMAC, and GNWT ENR to develop guidelines for periodic Highway closures, if required, as a way of minimizing the disruption of migration patterns to barren-ground caribou; -All sightings of caribou will be reported to environmental staff on-site; -Maintaining a minimum distance of 500 m between field operations and caribou for the duration of construction; -Caribou sightings will be recorded (including a GPS location if possible) and be submitted to the GNWT DOT Planning, Policy and Environmental Division and GNWT ENR upon completion of construction; and -Caribou crossing signs will be placed along the Highway, as needed.	Design, Construction, Operation

7.2.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS			
Valued Component	**Monitoring Program**	**Indicators**	**Measurement Parameters**
Species at Risk and Species of Special Status or Management Concern	• Wildlife monitoring • Environmental monitoring	• Effects predictions • Common indicators used by existing wildlife monitoring programs	• Verify effects predictions and confirm the effectiveness of mitigation measures • Number observations of species at risk or species with special status/ management concern • Common parameters used by existing fish and wildlife monitoring programs

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS			
Valued Component	**Monitoring Program**	**Indicators**	**Measurement Parameters**
Land and Resource Use by Inuvialuit	• Wildlife monitoring • Socio-economic monitoring	• Intensity of land and resource use by Inuvialuit • Change in land use by transport infrastructure • Common indicators used by existing fish and wildlife monitoring programs	• Wildlife and berry harvest levels • Frequency, duration and location of wildlife and berry harvest • Highway traffic trends • Number of complaints from local co-management agencies • Common parameters used by existing wildlife monitoring programs

The draft caribou management plan prepared by the Advisory Committee for the Cooperation on Wildlife Management (ACCWM, May 2011). The Plan states that "certain monitoring will take place regardless of whether the herd status is green [caribou population is high], yellow [caribou population is increasing], orange [caribou population is decreasing] or red [caribou population is low]. However, the frequency and intensity of monitoring will vary in response to herd status" (ACCWM 2011, p. 21).

The Developer looks forward to cooperating with the members of the ACCWM, including the Wildlife Management Advisory Council (NWT) and the local HTCs to ensure that appropriate monitoring for caribou in the area will be conducted to address caribou management issues over the longer term.

In addition, Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted primarily during the construction phase.

Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring is conducted on a part-time basis unless activities are occurring in a sensitive area.

For related agencies and organizations involved in monitoring, see Section 7.1.2.

7.3 Grizzly Bear and Grizzly Bear Habitat (Section 4.2.7.3 of the EIS)

7.3.1 Project Design and Mitigation Measures

The objectives of wildlife protection activities along the proposed Highway will be to mitigate potentially negative effects on grizzly bear in the following general ways:

- Minimize loss of habitat and reductions of habitat effectiveness via Project design;
- A wildlife protection plan will be implemented for the construction phase.
- Identification of active grizzly bear dens in the fall prior to each construction season in order to avoid or minimize possible effects on denning bears;
- Minimize direct mortality due to collisions with vehicles;
- Minimize the volume, duration, and frequency of noise producing activities;
- Selective timing of Project activities to avoid critical periods for wildlife;
- Conform with pre-determined setback distances from key wildlife habitat features;
- Ensure proper storage, transportation and disposal of wastes;
- Ensure Project personnel have appropriate levels of wildlife training and awareness; and
- Encourage agencies such as the HTCs, WMAC and GNWT ENR to work together with DOT to develop guidelines and conditions for Highway usage and follow-up with monitoring of harvesting activities.

Table 4.2.7-4 presents the types of mitigation measures that will be integrated into the Project design, construction and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on grizzly bears.

TABLE 4.2.7-4 MITIGATION MEASURES FOR GRIZZLY BEAR

Project Activity	Potential Effect	Mitigation Measures
All Activities	Disturbance or injury to bears and their habitat.	• Project personnel will be provided with wildlife awareness training. • Wildlife monitors will be on-site during construction to monitor wildlife and manage risks.

TABLE 4.2.7-4 MITIGATION MEASURES FOR GRIZZLY BEAR		
Project Activity	**Potential Effect**	**Mitigation Measures**
All Activities	Denning bears could be disturbed and could abandon den sites	• Den surveys will be conducted in the fall prior to construction and excavation activities. Freshly dug dens will be mapped such that construction activities will avoid active dens during the hibernation period. • If possible, no activities will occur within 500 m of an active den during the denning period, between October and April. • If active dens or if a grizzly bear are observed within 500 m of the construction site after the pre-construction survey, GNWT ENR will be contacted immediately to determine a course of action. • No blasting will occur if active bear dens are confirmed within 500 m of proposed blasting areas. • Wildlife monitors will be on-site during construction to monitor wildlife and manage risks.
All Activities	Disturbance of denning bears by workers walking off-site during the winter months.	• Workers will not walk off-site onto land at any time of year, unless there is a specific requirement (i.e., waste recovery), and these activities will be scheduled to avoid sensitive wildlife periods. • All workers will receive, at minimum, a basic wildlife orientation and GNWT bear safety training, and will be instructed not to disturb any wildlife. • Personnel are to maintain a minimum distance of 500 m between sighted and/or known bear den sites for the duration of the Project.
All Activities	Grizzly bears may approach construction sites, potentially resulting in an incident or mortality.	• Grizzly bears have the right-of-way at all times. • ENR will be contacted if an active grizzly bear den is identified within 500 m of Project activities to determine appropriate course of action. • The wildlife monitor and designated, trained staff will have access to bear deterrent materials including bear spray, cracker shells, and a 12 gauge shotgun with plastic slugs and slugs. The use of any deterrent method will be reported to ENR.
All Activities	Grizzly bear may approach camp, potentially resulting in an incident or mortality.	• Snow will be removed around buildings and work areas as necessary to increase visibility. • Adequate lighting will be installed in areas where it is essential to detect bears that may be in the vicinity. • Camps and associated infrastructure will be designed to incorporate bear safety, including installing adequate lighting, incorporating proper waste management, cleaning and maintaining the kitchen and dining area, and wildlife detection.

TABLE 4.2.7-4 MITIGATION MEASURES FOR GRIZZLY BEAR		
Project Activity	**Potential Effect**	**Mitigation Measures**
Waste Storage	Wildlife Attraction to Site and Waste Management	• Waste Management that minimizes and disposes of attractants to wildlife such as garbage, food wastes and other edible and aromatic substances will include the following measures: - Minimize and dispose of attractants to wildlife such as garbage, food wastes and other edible and aromatic substances. - Store all food and garbage in either: airtight sealed container, bear proof containers or in an enclosed bear proof area. - Store on-site grease, oils, fuels in bear-proof areas or containers. - No waste will be incinerated on- or off-site. Waste will be transported and disposed of at the Tuktoyaktuk and/or Inuvik municipal solid waste facilities in accordance with the municipalities' terms and conditions for usage of the facilities. The following will be identified: • List of hazardous, non-hazardous waste and any wastes of special concern, if any. • Waste types and volumes expected to be produced • List of storage and transport methods and disposal locations for these wastes. • List of odorous wastes that may attract wildlife, and the identification of its storage and method of transport to prevent wildlife attraction. • Indicate whether odorous waste is stored for the purpose of on- or off-site disposal (i.e. road or air transport).
Waste Storage	Poorly secured waste can blow off site and pose risk of injury or mortality to bears.	• All waste products will be properly secured, stored and transported. This includes the use of bear-proof storage containers that reduce odours at all times. • Waste removal crews will be sent out to areas surrounding each construction site to collect and properly dispose of any waste material that have blown off site.
Vehicle/ Equipment Use and Refueling	Spills or leaks may harm grizzly bears.	• Spill contingency plans will be implemented to prevent and address leaks and spills. • In the event of a spill, all efforts will be made to properly contain and manage the spill. • All spills greater than 5 litres will be reported to the GNWT Spill Line and other appropriate agencies. • The spill area will be monitored closely and appropriate deterrents (e.g., warning sounds, flagging) employed to discourage grizzly bears from entering the affected area.

TABLE 4.2.7-4 MITIGATION MEASURES FOR GRIZZLY BEAR		
Project Activity	**Potential Effect**	**Mitigation Measures**
Vehicle/ Equipment Use	Vehicular impacts may cause mortality.	• Grizzly bears will have the right-of-way at all times. • During construction, the presence of grizzly bears in the areas of construction and access roads will be communicated to other drivers. • Construction and maintenance vehicles will stop or reduce speeds when grizzly bears are on the road or near the road, respectively. • Vehicle speeds during construction and post construction will be regulated to reduce the potential of grizzly bear mortality due to collisions. • Grizzly bear advisory signs will be placed along the Highway, as needed. • Any grizzly bear mortalities will be reported to ENR.
Hunting	Hunting may cause grizzly bear mortalities.	• No hunting by Highway construction and maintenance workers. • Any grizzly bear mortalities will be reported to ENR.

Source: Adapted from GNWT DOT (2009).

7.3.2 Residual Effects

The loss of habitat due to the development of the proposed Highway will be approximately 236.6 ha of high rated bear feeding habitat. This will result in a loss of 0.20% of available high-rated bear feeding habitat within the RSA.

In the context of both the LSA and the RSA, this amount of habitat loss is considered low in magnitude, local in extent and lasting the life of the Project resulting in a consequence rating of low. At this time the amount of suitable grizzly denning habitat (south-facing slopes $\geq$ 25% grade; McLoughlin et al. 2002) cannot be calculated as digital elevation model (DEM) data at the resolution required are not available. It is anticipated that these data (LiDAR) will be available prior to the detailed design phase of the Project.

Effects of habitat degradation, which is primarily related to reduction in food availability, is considered low in magnitude, local in extent and lasting the life of the Project, resulting in a consequence rating of low for both the LSA and RSA.

It is expected that grizzly bear will avoid the proposed Highway due to sensory disturbance, though some degree of habituation may occur. In the LSA, the effect is considered moderate in magnitude, local in extent and lasting the life of the Project, resulting in a consequence rating of moderate. In the context of the RSA, the magnitude changes to low, resulting in a consequence rating of low. Since den surveys will be completed in fall prior to each winter construction season, no effects on denning bears are anticipated.

With the application of mitigation measures, increased mortality as a result of the Highway is expected to be low in magnitude and local in extent, with isolated occurrences over the life of the Project, for a consequence rating of low for both the LSA and RSA.

7.3.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
WILDLIFE AND WILDLIFE HABITAT	
General	
[previously presented in Section 7.1.1]	
Types of Mitigation Measures for Grizzly Bears and Furbearers	
Types of mitigation measures that the Developer will integrate into the Project design, construction, and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on grizzly bears and furbearers include: -Freshly dug dens will be mapped such that construction activities will avoid active dens during the hibernation period; -If possible, no activities will occur within 500 m of an active den during the denning period (October to April); and -No blasting will occur if active bear dens are confirmed within 500 m of a proposed blasting area.	Construction
-Maintaining a minimum distance of 500 m between identified grizzly bear/wolverine den sites and personnel during construction; -Dens (grizzly bear, wolverine) discovered within 500 m of the Highway after the pre-construction survey will be reported immediately to GNWT ENR to determine the appropriate course of action; -Providing the wildlife monitor and designated, trained staff access to non-lethal deterrent materials (e.g., bear spray). The use of any deterrent method on wildlife will be reported to GNWT ENR;	Construction
-Minimizing and properly disposing of wildlife attractants such as garbage, food wastes, and other edible and aromatic substances; -Storing all food, grease, oils, fuels, and garbage in bear/wolverine-proof containers and/or areas; -No waste will be incinerated on- or off-site; and -Transporting waste to Tuktoyaktuk and/or Inuvik municipal solid waste facilities for disposal. Disposal of wastes at these facilities will follow the specified terms and conditions for use.	Construction

7.3.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS			
Valued Component	**Monitoring Program**	**Indicators**	**Measurement Parameters**
Species at Risk and Species of Special Status or Management Concern	• Wildlife monitoring • Environmental monitoring	• Effects predictions • Common indicators used by existing wildlife monitoring programs	• Verify effects predictions and confirm the effectiveness of mitigation measures • Number observations of species at risk or species with special status/ management concern • Common parameters used by existing wildlife monitoring programs
Land and Resource Use by Inuvialuit	• Wildlife monitoring • Socio-economic monitoring	• Intensity of land and resource use by Inuvialuit • Change in land use by transport infrastructure • Common indicators used by existing wildlife monitoring programs	• Fish, wildlife and berry harvest levels • Frequency, duration and location of wildlife and berry harvest • Highway traffic trends • Number of complaints from local co-management agencies • Common parameters used by existing wildlife monitoring programs

In addition, Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring will be conducted on a part-time basis unless activities are occurring in a sensitive area.

For related agencies and organizations involved in monitoring, see Section 7.1.2.

7.4 Moose and Moose Habitat (Section 4.2.7.4 of the EIS)

7.4.1 Project Design and Mitigation Measures

The objectives of wildlife protection activities along the proposed Highway will be to mitigate potentially negative effects on moose in the following general ways:

- Minimize loss of habitat and reductions of habitat effectiveness via Project design;
- A wildlife protection plan will be implemented for the construction phase;
- Minimize direct mortality due to collisions with vehicles;
- Minimize the volume, duration, and frequency of noise producing activities;
- Selective timing of Project activities to avoid critical periods for wildlife;
- Conform with pre-determined setback distances from key wildlife habitat features;
- Ensure proper storage, transportation and disposal of wastes;
- Ensure Project personnel have appropriate levels of wildlife training and awareness; and
- Encourage agencies such as the HTCs, WMAC and GNWT Department of Environment and Natural Resources to work together with DOT to develop guidelines and conditions for Highway usage and follow-up with monitoring of harvesting activities.

Table 4.2.7-7 presents the mitigation measures that will be integrated into the Project design, construction and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on moose.

In addition to Project mitigation measures, ENR in consultation with the HTAs and communities should consider the establishment of a no-hunting zone along the proposed Highway. A no-hunting corridor would not only protect moose, as well as other wildlife, but also for human safety concerns that arise from hunting from roadways.

TABLE 4.2.7-7: MITIGATION MEASURES FOR MOOSE

Project Activity	Potential Effect	Mitigation Measures
Off-site Activities	Workers walking off-site may disturb moose.	• Workers will not walk off-site onto the land at any time of year, unless there is a specific need (e.g., waste clean-up, emergency). • All workers will be instructed not to disturb any moose observed. • Wildlife monitors will be on-site during construction to monitor potential wildlife issues and manage risks.

TABLE 4.2.7-7: MITIGATION MEASURES FOR MOOSE		
Project Activity	**Potential Effect**	**Mitigation Measures**
Waste Storage	Poorly secured waste can attract predators, which may increase predation pressure on moose in the area.	• All waste products will be properly secured, stored and transported. • Waste removal crews will be sent to areas surrounding each construction site to collect and properly dispose of any waste material that has blown off site.
Vehicle/ Equipment Use and Refueling	Spills or leaks may harm moose.	• Spill contingency plans will be implemented to prevent and address leaks and spills. • In the event of a spill, all efforts will be made to properly contain and manage the spill. • All spills greater than 5 litres will be reported to the GNWT Spill Line and other appropriate agencies. • The spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage moose from entering the affected area.
Vehicle/ Equipment Use	Vehicular impacts may cause mortality.	• Moose will have the right-of-way at all times. • During construction, the presence of moose in the areas of construction and access roads will be communicated to other drivers. • Construction and maintenance vehicles will stop or reduce speeds when moose are on the road or near the road, respectively. • Vehicle speeds during construction and post construction will be regulated to reduce the potential of moose mortality due to collisions. • Moose advisory signs will be placed along the Highway, as needed. • Any moose mortalities will be reported to ENR.
Hunting	Hunting may cause moose mortalities	• No hunting by Highway construction and maintenance workers. • Any moose mortalities will be reported to ENR.

Source: Adapted from GNWT DOT (2009).

7.4.2 Residual Effects

The amount of lost moose habitat from the proposed Highway and the proposed gravel borrow sources is small. In the context of both the LSA and RSA, this amount of habitat loss is considered low in magnitude, local in extent and lasting the life of the Project resulting in a consequence rating of low.

Effects of habitat degradation, which is primarily related to reduction in food availability, is considered low in magnitude, local in extent and lasting the life of the Project resulting in a consequence rating of low for both the LSA and RSA.

7.4.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
WILDLIFE AND WILDLIFE HABITAT	
General	
[previously presented in Section 7.1.1]	

7.4.4 Proposed Effects Monitoring

Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental and wildlife monitoring (during the construction phase) will be done carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring is will be conducted on a part-time basis unless activities are occurring in a sensitive area. Monitoring frequency will be determined once the EMP is finalized.

For related agencies and organizations involved in monitoring, see Section 7.1.2.

7.5 Furbearers (including wolverine) and Furbearer Habitat (Section 4.2.7.5 of the EIS)

7.5.1 Project Design and Mitigation Measures

The objectives of furbearer protection activities along the proposed Highway will be to mitigate potentially negative effects on furbearers (including wolverine) in the following general ways:

- Minimize loss of habitat and reductions of habitat effectiveness via Project design;
- A wildlife protection plan will be implemented for the construction phase.
- Identification of active dens in the fall prior to each construction season in order to avoid active areas;
- Minimize direct mortality due to collisions with vehicles;
- Minimize the volume, duration, and frequency of noise producing activities;
- Selective timing of Project activities to avoid critical periods for wildlife;
- Conform with pre-determined setback distances from key wildlife habitat features;
- Ensure proper storage, transportation and disposal of wastes;

- Ensure Project personnel have appropriate levels of wildlife training and awareness; and,
- Encourage agencies such as the HTCs, WMAC and GNWT ENR to work together with DOT to develop guidelines and conditions for Highway usage and follow-up with monitoring of harvesting activities.

Table 4.2.7-10 presents the types of mitigation measures that will be integrated into the Project design, construction and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on furbearers and furbearer habitat.

TABLE 4.2.7-10: MITIGATION MEASURES FOR FURBEARERS AND FURBEARER HABITAT

Project Activity	Potential Effect	Mitigation Measures
All Activities	Disturbance or injury to furbearers and their habitat.	• Project personnel will be provided with wildlife awareness training.
All Activities	Disturbance of denning furbearers:	• If active wolverine dens are discovered within 500 m of Project sites, ENR will be contacted immediately to determine the appropriate course of action. Activities may be temporarily suspended pending consultation with ENR. • Wildlife monitors will be on-site during construction to monitor wildlife and manage risks. • Personnel are to maintain a minimum distance of 500 m between sighted and/or known wolverine den sites for the duration of the Project and to contact ENR to determine an appropriate course of action. • Workers will not walk off-site onto land at any time of year, unless there is a specific requirement (i.e., waste recovery), and these activities will be scheduled to avoid sensitive furbearer periods. • All workers will receive, at minimum, orientation to the wildlife management plan, and will be instructed not to disturb any furbearers.
All Activities	Wildlife incident or mortality: furbearers may approach sites while workers are present potentially resulting in an incident or mortality.	• Furbearers will have the right-of-way at all times. • The wildlife monitor and designated, trained staff will have access to wildlife deterrent materials including bear spray, cracker shells, and a 12 gauge shotgun with plastic slugs. The use of any deterrent method will be reported to ENR. • Snow will be removed around buildings and work areas as necessary to increase visibility. • Adequate lighting will be installed in areas where it is essential to detect a wolverine and other wildlife that may be in the vicinity. • Camps and associated infrastructure will be designed to incorporate proper wildlife safety, including installing adequate lighting, incorporating proper waste management, cleaning and maintaining the kitchen and dining area, and wildlife detection. • No hunting by Highway construction and maintenance workers

TABLE 4.2.7-10: MITIGATION MEASURES FOR FURBEARERS AND FURBEARER HABITAT		
Project Activity	**Potential Effect**	**Mitigation Measures**
Waste Storage	Wildlife Attraction to Site and Waste Management	• Waste Management that minimizes and disposes of attractants to wildlife such as garbage, food wastes and other edible and aromatic substances will include the following measures: - Minimize and dispose of attractants to wildlife such as garbage, food wastes and other edible and aromatic substances. - Store all food and garbage in either: airtight sealed container, bear proof containers or in an enclosed bear proof area. - Store on-site grease, oils, fuels in bear-proof areas or containers. - No waste will be incinerated on- or off-site. Waste will be transported and disposed of at the Tuktoyaktuk and/or Inuvik municipal solid waste facilities in accordance with the municipalities' terms and conditions for usage of the facilities. The following will be identified: • List of hazardous, non-hazardous waste and any wastes of special concern, if any. • Waste types and volumes expected to be produced • List of storage and transport methods and disposal locations for these wastes. • List of odorous wastes that may attract wildlife, and the identification of its storage and method of transport to prevent wildlife attraction. • Indicate whether odorous waste is stored for the purpose of on- or off-site disposal (i.e. road or air transport).
Waste Storage	Wildlife incident or mortality: poorly secured waste can blow off site and pose risk of mortality to furbearers.	• All waste products will be properly secured, stored and transported. This includes the use of wildlife-proof storage containers that reduce odours at all times. • Waste removal crews will be sent out to areas surrounding each construction site to collect and properly dispose of any waste material that have blown off site.
Vehicle/ Equipment Use and Refueling	Spills or leaks may harm furbearers.	• Spill contingency plans will be implemented to prevent and address leaks and spills. • All vehicles and equipment will be refueled at least 100 m from waterbodies. • Equipment used in or near water will be clean and free of oil, grease or other deleterious substances. • In the event of a spill, all efforts will be made to properly contain and manage the spill. • All spills greater than 5 litres will be reported to the GNWT Spill Line and other appropriate agencies. • The spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage furbearers from entering the affected area.

TABLE 4.2.7-10: MITIGATION MEASURES FOR FURBEARERS AND FURBEARER HABITAT		
Project Activity	**Potential Effect**	**Mitigation Measures**
Mortality	Vehicular impacts and hunting.	• Furbearers will have the right-of-way at all times. • During construction, the presence of furbearers in the areas of construction and access roads will be communicated to other drivers. • Construction and maintenance vehicles will stop or reduce speeds when furbearers are on the road or near the road, respectively. • Vehicle speeds during construction and post construction will be regulated to reduce the potential of furbearer mortality due to collisions. • Furbearer advisory signs will be placed along the Highway, as needed. • No hunting by Highway construction and maintenance workers. • Any furbearer mortalities will be reported to ENR.

Source: Adapted from GNWT DOT (2009).

7.5.2 Residual Effects

The EIS provides a summary of residual effects for furbearers, including wolverines, and furbearer habitat in the LSA and RSA respectively. The loss of habitat due to the development of the proposed Highway is small (less than 0.1% of the RSA). In the context of both the LSA and the RSA, this amount of habitat loss is considered low in magnitude, local in extent and lasting the life of the Project resulting in a consequence rating of low. At this time the amount of suitable wolverine and fox denning habitat (slopes with well drained soils) cannot be calculated as digital elevation model (DEM) data at the resolution required are not available. It is anticipated that these data (LiDAR) will be available prior to the detailed design phase of the Project.

Effects of habitat degradation, which is primarily related to reduction in food availability, is considered low in magnitude, local in extent and lasting the life of the Project resulting in a consequence rating of low for both the LSA and RSA.

Disturbance from operational activities will be variable depending upon time of year but may influence individual furbearers in proximity to the proposed Highway. Disturbance will reduce habitat effectiveness adjacent to the proposed Highway. This is expected to affect wolverines more than foxes; regardless, the magnitude of habitat disruption is unknown. Disturbance will be limited only to those furbearers with territories adjacent to the construction activity and, to a lesser degree, the proposed Highway during operation.

With the application of mitigation measures, increased mortality as a result of the Highway is expected to be low in magnitude and local in extent, with isolated occurrences over the life of the Project for a consequence rating of low for both the LSA and RSA.

7.5.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
WILDLIFE AND WILDLIFE HABITAT	
General	
[previously presented in Section 7.1.1]	

7.5.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS

Valued Component	Monitoring Program	Indicators	Measurement Parameters
Species at Risk and Species of Special Status or Management Concern	• Wildlife monitoring • Environmental monitoring	• Effects predictions • Common indicators used by existing wildlife monitoring programs	• Verify effects predictions and confirm the effectiveness of mitigation measures • Number observations of species at risk or species with special status/ management concern • Common parameters used by existing wildlife monitoring programs
Land and Resource Use by Inuvialuit	• Wildlife monitoring • Socio-economic monitoring	• Intensity of land and resource use by Inuvialuit • Change in land use by transport infrastructure • Common indicators used by existing wildlife monitoring programs	• Fish, wildlife and berry harvest levels • Frequency, duration and location of wildlife and berry harvest • Highway traffic trends • Number of complaints from local co-management agencies • Common parameters used by existing wildlife monitoring programs

In addition, Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted.

Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring will be conducted on a part-time basis unless activities are occurring in a sensitive area.

For related agencies and organizations involved in monitoring, see Section 7.1.2.

7.6 Birds and Bird Habitat (Section 4.2.7.6 of the EIS)

7.6.1 Project Design and Mitigation Measures

The objectives of bird protection activities along the proposed Highway will be to mitigate potentially negative effects on birds in the following general ways:

- Minimize loss of habitat and reductions of habitat effectiveness via Project design;
- Survey material deposits in the summer (June-July) to document use by nesting birds, if any, occurring within the LSA and protect any active nest sites from excavation during periods of construction.
- Minimize direct mortality due to collisions with vehicles;
- Minimize attractants at camps through responsible waste management and effective environmental awareness programs;
- Minimize the volume, duration, and frequency of noise producing activities;
- Selective timing of Project activities to avoid critical periods for nesting birds;
- Conform with pre-determined setback distances from key wildlife habitat features;
- Ensure proper storage, transportation and disposal of wastes;
- Ensure Project personnel have appropriate levels of wildlife training and awareness; and
- Encourage agencies such as the HTCs, WMAC and GNWT ENR to work together to develop guidelines and conditions for Highway usage and follow-up with monitoring of harvesting activities.

Table 4.2.7-13 presents the types of mitigation measures that will be integrated into the Project design, construction and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on birds.

In addition to Project mitigation measures, the WMAC, IGC and HTCs, could consider the establishment of a no-hunting zone along the proposed Highway as a public safety consideration to address human safety concerns that arise from hunting from roadways.

TABLE 4.2.7-13: MITIGATION MEASURES FOR BIRDS AND BIRD HABITAT		
Project Activity	**Potential Effect**	**Mitigation Measures**
Off-site Activities	Workers walking off-site may disturb nesting songbirds, shorebirds and waterfowl during the breeding season and cause nest abandonment and chick/egg mortality.	• Workers will not walk off-site onto the land at any time of year, unless there is a specific need (e.g., waste clean-up, emergency). • Planned activities will be scheduled to occur outside of peak breeding times. • All workers will be instructed not to disturb any birds or nests observed. • Workers will avoid conducting Project activities within 500 m of an active raptor nest during nesting season. • • Wildlife monitors will be on-site during construction to monitor bird and manage risks. • If a key nesting feature of a Species at Risk is discovered, both ENR and CWS will be contacted. Activities will be temporarily suspended pending consultation with these agencies.
Waste Storage	Poorly secured waste can blow off site and pose risk of mortality to nearby nesting or foraging songbirds, shorebirds and waterfowl.	• All waste products will be properly secured, stored and transported. • Waste removal crews will be sent to areas surrounding each construction site before the arrival of breeding birds in the spring to collect and properly dispose of any waste material that has blown off site.
Workers/ Vehicle/ Equipment Use	Interactions between birds and workers/equipment may cause incidents or mortality.	• During construction, the presence of birds on the proposed Highway is to be communicated to other drivers. • Construction and maintenance vehicles will stop or reduce speeds when birds are on the road or near the road, respectively. • Vehicle speeds during construction and post construction in strategic areas will be regulated to reduce the potential of bird mortality due to collisions. • Bird advisory signs will be placed along the Highway, as needed. • No hunting by Highway construction and maintenance workers.
Vehicle/ Equipment Use and Refueling	Spills or leaks may harm birds.	• Spill contingency plans will be implemented to prevent and address leaks and spills. • All vehicles and equipment will be refueled at least 100 m from waterbodies. • Equipment used in or near water will be clean and free of oil, grease or other deleterious substances. • In the event of a spill, all efforts will be made to properly contain and manage the spill. • All spills greater than 5 litres will be reported to the GNWT Spill Line and other appropriate agencies. • The spill area will be monitored closely and appropriate deterrents (e.g., warning noises, flagging) employed to discourage birds from entering the affected area.

TABLE 4.2.7-13: MITIGATION MEASURES FOR BIRDS AND BIRD HABITAT		
Project Activity	**Potential Effect**	**Mitigation Measures**
Construction	Structures erected during the nesting period could become potential habitat.	• Structures will be designed to minimize or prevent potential to be utilized as nesting structures. If nesting occurs they would not be disturbed until after the birds have left the area.
Construction	Active birds nests may be destroyed during borrow pit excavation in summer.	• Conduct pre-disturbance bird nest surveys June-July to document use by nesting birds in areas proposed for summer construction work.

Source: Adapted from GNWT DOT (2009).

Table 4.2.7-14 outlines mitigation measures for bird Species at Risk. Species that may occur within the Project corridor that are protected by SARA include the Eskimo curlew (listed as Endangered November 2009) (Government of Canada 2009). The Rusty Blackbird is listed by SARA as Special Concern (Schedule 1) (Government of Canada 2009). Species listed as Special Concern under Schedule 1 do not benefit from full legal protection under the Act. However a management plan for the conservation of the species of Special Concern and its habitat must be prepared within three years. The Short-eared Owl and Peregrine Falcon (*Falco peregrinus tundrius*) are listed by SARA as Special Concern (Schedule 3) and are not afforded protection under SARA (Government of Canada 2009).

Project activities have the potential to adversely affect these species through direct habitat loss, sensory disturbance and accidental mortality. The contractors will be required to employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of Highway construction and borrow source work. The mitigation measures outlined in Table 4.2.7-14 will be implemented in addition to Table 4.2.7-13 (Mitigation Measures for Birds) to mitigate potential effects on bird Species at Risk.

TABLE 4.2.7-14: SUMMARY OF MITIGATION MEASURES FOR BIRD SPECIES AT RISK		
Bird Species	**Activity/Potential Effect**	**Mitigation Measure**
Eskimo Curlew **Rusty Blackbird** **Short-eared Owl**	Birds may be at risk of mortality from leaks and spills.	• In the event of a spill, all efforts will be made to properly contain and manage the spill, including bird recovery and treatment if necessary.
	Nests may be abandoned due to disturbance from Project activities.	• Appropriate federal (CWS) and territorial (ENR) authorities will be contacted immediately before continuing work if a nest is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).

TABLE 4.2.7-14: SUMMARY OF MITIGATION MEASURES FOR BIRD SPECIES AT RISK		
Bird Species	**Activity/Potential Effect**	**Mitigation Measure**
Peregrine Falcon	Birds can collide with wires, especially during the migration period.	• Guy wires will not be used.
	Lights can attract birds at night, especially during the migration period, resulting in injury or mortality.	• Lights will be positioned to shine down or fixed with shielding to direct light downward on buildings and other infrastructure sites, wherever possible. Lights will be turned off, whenever possible (e.g., when personnel are not at camps or other facilities).
	Disturbance to Peregrine Falcon nesting during construction or borrow source activities.	• An aerial survey will be conducted along the final route and proposed borrow sources to determine if nests are present. • Appropriate federal (CWS) and territorial (ENR) authorities will be contacted immediately before continuing work if a Peregrine Falcon nest is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).

7.6.2 Residual Effects

The loss of bird habitat due to the development of the proposed Highway is small (less than 0.10% of the RSA). In the context of both the LSA and the RSA, this amount of habitat loss is considered low in magnitude, local in extent and lasting the life of the Project resulting in a consequence rating of low. Careful planning and design of the Highway corridor to avoid habitats such as wetlands where waterfowl and other wildlife are known to congregate will mitigate impacts on waterfowl populations.

Effects of habitat degradation, which is primarily related to reduction in food and nest site availability, is considered low in magnitude, local in extent and lasting the life of the Project resulting in a consequence rating of low for both the LSA and RSA.

Disturbance from operational activities will be variable depending upon species and time of year but will, regardless, influence bird behaviour and energy budgets. Disturbance will be limited to only those birds immediately adjacent to the proposed Highway and thus a very small fraction of the surrounding population. The net habitat and disturbance effects from the proposed development are expected to apply only to the local individuals and are therefore low in consequence at the local population level with no residual effects.

The majority of construction for the proposed Highway and excavation of the associated borrow sources will occur during the winter period, a time when few birds, are present. Consequently, impacts from construction activities will be mainly temporary and limited.

With the application of mitigation measures, increased mortality as a result of the Highway is expected to be low in magnitude and local in extent, with isolated occurrences over the life of the Project for a consequence rating of low for both the LSA and RSA.

7.6.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
WILDLIFE AND WILDLIFE HABITAT	
General	
[previously presented in Section 7.1.1]	
Types of Mitigation Measures for Birds	
Types of mitigation measures that the Developer will integrate into the Project design, construction, and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on birds include: -Conducting pre-disturbance bird nest surveys in June-July to document use by nesting birds; -Avoiding conducting Project activities within 500 m of an active raptor nest during nesting season; -Designing structures in a way that limits or prevents their potential use as nesting structures; and -Allowing nesting birds who have utilized structures to remain in place.	Design, Construction
Types of Mitigation Measures for Peregrine Falcons	
The Developer will incorporate the following mitigation measures for Peregrine Falcons including: -Lights will be positioned to shine down or will be fixed with shielding to direct light downward on buildings and other infrastructure sites, wherever possible; -Lighting will be switched off, whenever possible (i.e., when camps and facilities are not in use); -Conducting an aerial survey of the final alignment and borrow sources to identify areas where Peregrine Falcons could be nesting that may require mitigation; and -Appropriate federal (CWS) and territorial (GNWT ENR) authorities will be contacted immediately before continuing work if a Peregrine Falcon nest is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).	Design, Construction
Types of Mitigation Measures for Bird Species At Risk	
The Developer will incorporate additional mitigation measures for bird Species at Risk including: -Immediately contacting appropriate federal (CWS) and territorial (GNWT ENR) authorities if a nest of a key bird species is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).	Construction

7.6.4 Proposed Effects Monitoring

Monitoring related to harvesting of wildlife (including birds) is identified in Table 4 of the Addendum, reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS

Valued Component	Monitoring Program	Indicators	Measurement Parameters
Land and Resource Use by Inuvialuit	• Wildlife monitoring • Socio-economic monitoring	• Intensity of land and resource use by Inuvialuit • Change in land use by transport infrastructure • Common indicators used by existing wildlife monitoring programs	• Fish, wildlife and berry harvest levels • Frequency, duration and location of wildlife and berry harvest • Highway traffic trends • Number of complaints from local co-management agencies • Common parameters used by existing wildlife monitoring programs

Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring and compliance monitoring that will be conducted. Environmental and wildlife monitoring (during the construction phase) will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Compliance monitoring will be carried out to the extent, frequency and duration required by regulators and according to the results of baseline surveys and specific management plans. Generally, compliance monitoring will be conducted on a part-time basis unless activities are occurring in a sensitive area.

For related agencies and organizations involved in monitoring, see Section 7.1.2.

HUMAN ENVIRONMENT

8.0 Demographics (Section 4.3.1 of the EIS)

8.1 Project Design and Mitigation Measures

The community populations in the Project area are not anticipated to increase to any great extent as a result of the Highway construction and operation. The Developer is committed to hiring local, regional, and NWT residents, where possible, to fill construction and operations positions, and anticipates that the majority of the labour supply will come from the communities of Tuktoyaktuk and Inuvik. In past years, many Inuvialuit have moved away from the ISR to other regions for employment opportunities. During the Tuktoyaktuk to Source 177 Access Road construction, approximately 70% of the workers were from local communities. It is estimated that with additional training, a similar percentage may be achieved for the Inuvik to Tuktoyaktuk Highway.

Government agencies and Inuvialuit organizations responsible for education, housing and other infrastructure regularly assess and document demographic trends in ISR communities, and are discussed further in Section 8.4 (Proposed Effects Monitoring) of this document.

The Developer and/or its contractors will publicize employment opportunities and hiring procedures through the Inuvialuit Regional Corporation and the local community corporations.

8.2 Residual Effects

Negligible changes regarding in/out migration are anticipated. During construction, the Developer is committed to hiring local and regional residents and businesses, which should alleviate the potential for in-migration into the communities.

During the operations phase, the completed Highway will increase accessibility to the Hamlet of Tuktoyaktuk. Although the population of Tuktoyaktuk has been slowly decreasing since 1996, it is possible that once the Highway is established, Tuktoyaktuk could maintain or increase its population (GNWT Bureau of Statistics 2009a).

In Inuvik, the population has steadily increased since 1996, and is projected to continue to increase in the future (GNWT Bureau of Statistics 2009b). The Highway is not likely to significantly affect Inuvik's projected growth rate. A minimal increase may occur as a result of in-migration of Tuktoyaktuk residents seeking employment, or from a potential increase in attendance at Aurora College by Tuktoyaktuk residents taking advantage of the improved accessibility.

8.3 Relevant Developer Commitments

The Developer is committed to hiring local, regional, and NWT residents, where possible, to fill construction and operations positions, and anticipates that the majority of the labour supply will come from the communities of Tuktoyaktuk or Inuvik.

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
SOCIO-ECONOMIC	
The Developer is committed to conforming to the relevant economic measures of the Inuvialuit Final Agreement (IFA).	Design, Construction, Operations
The Developer is committed to preferential employment opportunities for qualified local residents and contractors.	Construction, Operations
The IRC's ***Inuvialuit Business List Policy*** will apply to this Project, giving priority hiring to companies included on the Inuvialuit Business List.	Construction, Operations
The Developer and Project contractors will be responsible for the implementation of focused socio-economic measures, including recruitment and skills training.	Construction
MONITORING	
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

8.4 Proposed Effects Monitoring

The following monitoring program was proposed by the Developer in Section 7.2.1 (Socio-economic Monitoring) of the EIS for the construction phase. The relevant components of Section 7.2.1 are restated as follows.

The Developer will require the contractor(s) to report on various parameters related to their activities. Parameters include:

- ISR hiring/contract preferences;
- Employment:
  - Number of workers employed;
  - Employee gender;
  - Location of employee residence; and
  - Wages paid.
- Training:
  - Types of training provided;
  - Number of employees trained;
  - Employee gender; and
  - Location of employee residence.

The Developer is willing to provide this information to related monitoring programs, upon request.

Demographics are monitored at the federal level by Statistics Canada, the territorial level by the GNWT Bureau of Statistics, and the regional level by the Inuvialuit Regional Corporation:

- Statistics Canada
  - Legislated to provide statistics for the whole of Canada and each of the provinces and territories
  - Conducts a census every five years
- NWT Bureau of Statistics
  - Develops, interprets and disseminates those economic, social and demographic statistics required by the territorial government
  - Implements statistical programs for territorial government purposes and provides statistical advice and assistance to departments, regional offices and central agencies
  - Coordinates statistical activities within the government
  - Provides for the continuing and effective representation of territorial statistical interests within the national statistical system
  - Provides a limited statistical service to the general public, to the private sector, and to other governments
- Inuvialuit Regional Corporation
  - Maintains socio-economic indicators reporting [http://inuvialuitindicators.com/] in conjunction with NWT Bureau of Statistics

9.0 Regional and Local Economies (Section 4.3.2 of the EIS)

9.1 Contribution to Gross Domestic Product and Direct Taxes (Section 4.3.2.1 of the EIS)

9.1.1 Project Design and Mitigation Measures

It is anticipated that local and regional suppliers, contractors and residents will be able to provide the majority of construction related services. However, as necessary, some of the services may be sourced from outside the region. The Developer is committed to preferential employment opportunities for qualified local residents and contractors. The implementation of focused socio-economic measures will be the responsibility of the Developer and on-site contractors.

The Developer and/or its contractors will publicize employment opportunities and hiring procedures through the Inuvialuit Regional Corporation and the local community corporations.

9.1.2 Residual Effects

The effects of the Highway are anticipated to occur during both the construction and operations phases and to have both direct and indirect significant beneficial effects. *Direct effects* include the employment created and the goods and services required by the Highway's construction. These effects are associated with supplying major Project components and direct capital outlays by construction contractors. *Indirect effects* are the "ripple effect" of secondary employment and purchases. These effects are associated with the companies that supply goods and services to construction contractors. *Induced effects* are tertiary in nature (e.g., the Developer/contractors will pay construction employees' salaries, which are re-spent in the economy generating further economic activity in sectors such as retail, restaurants etc.).

The construction and operation of the Highway is expected to have a net positive economic impact in the region. Residual effects of the Project are anticipated throughout the construction phase when labour demand, capital expenditure and economic stimulus will be greatest. The increased positive economic effects during construction will be significant over the short term (i.e., primarily limited to the estimated four-year construction period and greatest during the winter construction months).

During the operations phase there will be more limited continued employment opportunities and labour benefits as well as maintenance expenditures. Residual effects of increased tourism and increased standard of living are also likely. These effects will be long term but of lesser magnitude than those of the construction phase.

Although the initial construction of the Highway is expected to cost the Federal and Territorial government about $230 million, after subtracting the increase in government revenues (approximately $47 million) resulting from the existence of the Highway, the net cost to the Federal and Territorial government will be in the order of $183 million ($230 million minus total tax revenues of $47 million). When all of the economic spin-offs (direct, indirect and induced impacts) are accounted for over the 45-year life of the Highway, this capital investment is expected to create about $248 million in net purchases of goods and

services (e.g., material inputs) in the NWT and an additional $97 million in the rest of Canada (GNWT DOT 2010a).

The revenues generated from Highway construction will translate into a net increase in gross domestic product (GDP) in the NWT of about $186 million and an increase in GDP in the rest of Canada of about $84 million. Highway construction is projected to create 1,086 one-time jobs in the NWT and another 860 one-time jobs in the rest of Canada. In addition, Highway construction is expected to create 42 long-term jobs in the NWT and another nine in the rest of Canada. Building the Highway is predicted to earn the Federal and Territorial governments almost $36 million from activities in the NWT and an additional $11 million accruing to governments in the rest of Canada (GNWT DOT 2010a).

Furthermore, GNWT DOT (2010) estimates that the total number of tourists to visit the Inuvik-Beaufort-Delta region would increase by about 10% to 5,500 tourists per year with the completion of the Highway. These additional visitors are anticipated to spend an additional $1,467,500 in the region.

The Highway is expected to contribute to a reduction in the cost of shipping goods to Tuktoyaktuk. Lower prices mean residents will be able to buy more goods with the same amount of income, thereby effectively increasing their standard of living. GNWT DOT (2010a) calculated an overall savings of $1.0 million to local residents as a result of the Highway being constructed (excluding extra vehicle costs), including savings from the Food Mail Program.

When the GNWT DOT (2010a) conducted an analysis of the proposed Mackenzie Gas Project, they concluded that constructing the Highway would not significantly affect the overall cost of the pipeline but that some savings could be realized in future exploration and development.

Building the Highway will eliminate the need to construct the winter road to Tuktoyaktuk each year. There will be cost savings and a reduction in economic activity associated with the purchase of goods, services, and the hiring of labour for the annual construction and maintenance of the winter road. Furthermore, the air transport industry may see a loss of revenue since goods would be increasingly transported by truck once the Highway is constructed.

Overall, no significant net adverse economic effects are anticipated because of this Project. Economic effects will generally increase to the benefit of the region with large magnitude and short duration during construction and with smaller magnitude and longer duration benefits continuing to occur during the long term operation of the Highway.

9.1.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
SOCIO-ECONOMIC	
The Developer is committed to conforming to the relevant economic measures of the Inuvialuit Final Agreement (IFA).	Design, Construction, Operations
The Developer is committed to preferential employment opportunities for qualified local residents and contractors.	Construction, Operations
The IRC's ***Inuvialuit Business List Policy*** will apply to this Project, giving priority hiring to companies included on the Inuvialuit Business List.	Construction, Operations
The Developer and Project contractors will be responsible for the implementation of focused socio-economic measures, including recruitment and skills training.	Construction
MONITORING	
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

9.1.4 Proposed Effects Monitoring

Contribution to GDP and Direct Taxes is related to aspects of the Tourism, Commercial and Public Recreational Use Valued Component. The following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS			
Valued Component	**Monitoring Program**	**Indicators**	**Measurement Parameters**
Tourism, Commercial and Public Recreational Use	• Socio-economic monitoring	• Change in tourism, commercial and recreational businesses and revenues	• Number of tourists • Amount spent by tourists • Number and types of businesses operating in Inuvik and Tuktoyaktuk • Household consumption expenditure for commercial and recreational use • Land used for recreation • Highway traffic trends • Number of complaints from local co-management agencies

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Canadian Northern Economic Development Agency (CanNor)
  - Administers funding for northern development (e.g., funded early feasibility studies related to the Inuvik to Tuktoyaktuk Highway)
  - Funds capacity building, planning, and business development in the communities
- GNWT Transportation
  - Plans, designs, constructs or reconstructs, acquires, operates and maintains public transportation infrastructure in the Northwest Territories, including community airports, docks and the highway system
  - Regulates and licenses individuals and vehicles operating in the Northwest Territories
  - Responsible for setting contracts related to maintenance of the public roads
- GNWT Industry, Tourism & Investment
  - Partners with local government and the IRC to provide programs and services that promote and support NWT economic prosperity and community self-reliance
  - Funds entrepreneurial pursuits
- GNWT Public Works & Services
  - Meets economic measures provisions in IFA to issue preferential contracting policies and procedures intended to maximize, local, regional and northern employment and business opportunities in the ISR
- NWT Bureau of Statistics
  - Develops, interprets and disseminates those economic, social and demographic statistics required by the territorial government
  - Implements statistical programs for territorial government purposes and provides statistical advice and assistance to departments, regional offices and central agencies
  - Coordinates statistical activities within the government
  - Provides for the continuing and effective representation of territorial statistical interests within the national statistical system
- Municipal Governments - Town of Inuvik & Hamlet of Tuktoyaktuk
  - Responsible for the delivery and operation of public services
- Inuvialuit Regional Corporation
  - Receives and manages IFA benefits and revenues
  - Funds Inuvialuit programs delivered through the various corporations
  - Maintains socio-economic indicators reporting [http://inuvialuitindicators.com/] in conjunction with NWT Bureau of Statistics
- Inuvialuit Development Corporation
  - Invests in over 20 Inuvialuit companies with complementary industries and visions
  - For business purposes, each Community Corporation [including Inuvik and Tuktoyaktuk] owns a Development Corporation

9.2 Available Labour Supply, Participation, and Income Assistance (Section 4.3.2.2 of the EIS)

9.2.1 Project Design and Mitigation Measures

The Developer is committed to ensuring that the people of Tuktoyaktuk and Inuvik have preferential employment opportunities to provide employment benefits to the region. The IRC's ***Inuvialuit Business List Policy*** will apply to this Project, giving priority hiring to companies included on the Inuvialuit Business List. This will help to provide economic stimulus to the Inuvialuit community. Furthermore, employment opportunities will be available to all residents, male or female, and will result in increased seasonal employment during construction.

The Developer will work with local academic institutions in the design of short-duration, skill-based training courses for Inuvialuit beneficiaries and other northern residents to improve job readiness, expand the available labour pool and enhance local skill capacity.

The Developer and/or its contractors will publicize employment opportunities and hiring procedures through the Inuvialuit Regional Corporation and the local community corporations.

9.2.2 Residual Effects

During the Tuktoyaktuk to Source 177 Access Road construction, approximately 70% of the workers were from local communities. With additional training, a similar hiring percentage may be achieved for the Inuvik to Tuktoyaktuk Highway based on the available labour pool. According to GNWT DOT (2010a), approximately 670 direct NWT jobs will be created during the construction phase and a further 33 direct NWT jobs will be needed during the operations phase. The indirect and induced jobs created in NWT and the rest of Canada are approximately 1,300 during construction and approximately 19 during operations.

The construction-related effects of direct and indirect employment for the Highway Project include reduced unemployment in the region, increased participation, decreased number of people on income assistance and decreased available labour supply.

The outlook for the development of the proposed Mackenzie Gas Project is yet unknown, and since there are no other potential projects in the region, a decreased available labour supply is not anticipated to affect any other developments or create competition during the proposed construction timeframe (2012-2016).

Employment opportunities associated with Highway construction and operation will provide greater social stability in the region, new skills, and more construction-related experience, likely resulting in increased incomes and less reliance on income assistance.

9.2.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
SOCIO-ECONOMIC	
The Developer is committed to conforming to the relevant economic measures of the Inuvialuit Final Agreement (IFA).	Design, Construction, Operations
The Developer is committed to preferential employment opportunities for qualified local residents and contractors.	Construction, Operations
The IRC's ***Inuvialuit Business List Policy*** will apply to this Project, giving priority hiring to companies included on the Inuvialuit Business List.	Construction, Operations
The Developer and its Project contractors will be responsible for the implementation of focused socio-economic measures, including recruitment and skills training.	Construction
MONITORING	
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

9.2.4 Proposed Effects Monitoring

The following monitoring program was proposed in Section 7.2.1 (Socio-economic Monitoring) of the EIS for the construction phase. The relevant components of Section 7.2.1 are restated as follows.

The Developer will require the contractor(s) to report on various parameters related to their activities. Parameters include:

- ISR hiring/contract preferences;
- Employment:
  - Number of workers employed;
  - Employee gender;
  - Location of employee residence; and
  - Wages paid.
- Training:
  - Types of training provided;
  - Number of employees trained;
  - Employee gender; and
  - Location of employee residence.

The Developer is willing to provide this information to related monitoring programs, upon request.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Canadian Northern Economic Development Agency (CanNor)
  - Funds capacity building, planning, and business development in the communities
- Human Resources and Skills Development Canada (Service Canada)
  - Supports Aboriginal career training and human resource capacity building under the Aboriginal Human Resources Development Agreement (AHRDA)
- GNWT Education, Culture & Employment
  - Provides income security programs including Child Care User Subsidy (CCUS), Income Assistance (IA), NWT Child Benefit/ Territorial Workers' Supplement (NCB/TWS), NWT Senior Citizen Supplementary Benefit (SCSB), Senior Home Heating Subsidy (SHHS), and Student Financial Assistance (SFA)
  - Provides career development services that enhance employability of the local workforce
  - Partners with local organizations and the IRC to deliver programs and services that meet identified labour market needs
- GNWT Industry, Tourism & Investment
  - Partners with local government and the IRC to provide programs and services that promote and support NWT economic prosperity and community self-reliance
  - Funds local wildlife committees, Take a Kid Hunting/Trapping programs, and entrepreneurial pursuits
- GNWT Public Works & Services
  - Meets economic measures provisions in IFA to issue preferential contracting policies and procedures intended to maximize, local, regional and northern employment and business opportunities in the ISR
- NWT Bureau of Statistics
  - Develops, interprets and disseminates those economic, social and demographic statistics required by the territorial government
  - Implements statistical programs for territorial government purposes and provides statistical advice and assistance to departments, regional offices and central agencies
  - Coordinates statistical activities within the government
  - Provides for the continuing and effective representation of territorial statistical interests within the national statistical system
- Inuvialuit Regional Corporation
  - Receives and manages Inuvialuit Final Agreement (IFA) benefits and revenues
  - Funds Inuvialuit programs delivered through the various corporations
  - Maintains socio-economic indicators reporting [http://inuvialuitindicators.com/] in conjunction with NWT Bureau of Statistics
- Inuvialuit Development Corporation
  - Invests in over 20 Inuvialuit companies with complementary industries and visions
  - For business purposes, each Community Corporation [including Inuvik and Tuktoyaktuk] owns a Development Corporation

10.0 Education, Training and Skills (Section 4.3.3 of the EIS)

10.1 Education and Training Participation Levels (Section 4.3.3.1 of the EIS)

10.1.1 Project Design and Mitigation Measures

The Developer is committed to hiring workers from Tuktoyaktuk and Inuvik, where possible, which may provide an incentive for local residents to participate in training programs.

In anticipation of upcoming construction work, residents seeking employment may enrol in applicable training programs at Aurora College. As well, several training programs were set up specifically for the construction of the Tuktoyaktuk to Source 177 Access Road and similar training programs will be made available in association with this Project. For example, the contractor conducted a successful heavy equipment operator course while the ILA sponsored an environmental monitor training program. Training local residents will benefit the region since it will contribute to an overall improvement in the skills and capabilities of the local workforce. Enrolment in training and employment programs would depend on the level of interest generated from community members.

The Developer and its contractors will work with local academic institutions in the design of short-duration, skill-based courses for Inuvialuit beneficiaries and other northern residents to improve job readiness, expand the available labour pool and enhance local skill capacity.

10.1.2 Residual Effects

Project-related training programs will benefit local residents and the region since they will contribute to an overall improvement in the skills and capabilities of the local workforce.

Furthermore, the proposed Highway will create year-round access for Tuktoyaktuk residents to access and attend Aurora College and other institutions offering training and educational opportunities, which may contribute to a future increase in the level of education for some Tuktoyaktuk residents.

10.1.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
SOCIO-ECONOMIC	
The Developer and its Project contractors will be responsible for the implementation of focused socio-economic measures, including recruitment and skills training.	Construction
The Developer will require that its Project contractor(s) ensure that all heavy equipment operators are suitably trained in proper machinery maintenance and operation; that equipment is regularly inspected and serviced; and that contractor staff obey posted Highway rules (e.g., speed limits, hunting/fishing restrictions).	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer will require that its contractor(s) educate their staff on the prevention of accidents and malfunctions. The training received will be outlined for the Developer, including emergency spill response.	Construction
MONITORING	
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

10.1.4 Proposed Effects Monitoring

The following monitoring program was proposed in Section 7.2.1 (Socio-economic Monitoring) of the EIS for the construction phase. The relevant components of Section 7.2.1 are restated as follows.

The Developer will require the contractor(s) to report on various parameters related to their activities. Parameters include:

- Training:
  - Types of training provided;
  - Number of employees trained;
  - Employee gender; and
  - Location of employee residence.

The Developer is willing to provide this information to related monitoring programs, upon request.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Canadian Northern Economic Development Agency (CanNor)
  - Funds capacity building, planning, and business development in the communities
- Human Resources and Skills Development Canada (Service Canada)
  - Supports Aboriginal career training and human resource capacity building under the Aboriginal Human Resources Development Agreement (AHRDA)
- GNWT Education, Culture & Employment
  - Develops programs for cultural, heritage and language education, early childhood through to post-secondary education, and career development
  - Supports the territorial literacy strategy, including community-based literacy projects
  - Aboriginal Languages Plan with the goal to increase the number of Aboriginal language speakers by 20 per cent
  - Funds educational, cultural, language, career development and industry training programs

- Provides transfer of federal funds to IRC for programs, such as Brighter Futures
- Provides career development services that enhance employability of the local workforce
- Partners with local organizations and the IRC to deliver programs and services that meet identified labour market needs

- GNWT Education, Culture & Employment – Prince of Wales Northern Heritage Centre
  - Provides programs that promote the protection and management of archaeological sites in the Northwest Territories, including participating in regulatory processes that control land use activities that threaten archaeological sites, and regulating archaeological investigations
- Beaufort-Delta Divisional Education Council
  - Responsible for the operation and administration of schools within the division, implementing curriculum, managing personnel, enrolling students, and initiating proposals for new construction or other major capital expenditures
- Aurora College
  - Offers literacy outreach, college-level education and upgrading services in the ISR, such as Adult Literacy and Basic Education, Aboriginal language instructor training, business administration and other certificate, diploma and degree programs
  - Provides an Inuvik regional campus and Community Learning Centres in Tuktoyaktuk and other communities in the region
- Aurora Research Institute – Inuvik Research Centre
  - Supports and tracks social and environmental research
  - Provides laboratory including laboratory and logistical support
  - Maintains a library to support research
  - Issues research licences
  - Participates in NWT Environmental Contaminants Committee
- GNWT Industry, Tourism & Investment
  - Partners with local government and the IRC to provide programs and services that promote and support NWT economic prosperity and community self-reliance
  - Funds local wildlife committees, Take a Kid Hunting/Trapping programs, and entrepreneurial pursuits
- NWT Bureau of Statistics
  - Develops, interprets and disseminates those economic, social and demographic statistics required by the territorial government
  - Implements statistical programs for territorial government purposes and provides statistical advice and assistance to departments, regional offices and central agencies
  - Coordinates statistical activities within the government
  - Provides for the continuing and effective representation of territorial statistical interests within the national statistical system
- Inuvialuit Regional Corporation
  - Receives and manages Inuvialuit Final Agreement (IFA) benefits and revenues
  - Funds Inuvialuit programs delivered through the various corporations

- Maintains socio-economic indicators reporting [http://inuvialuitindicators.com/] in conjunction with NWT Bureau of Statistics

10.2 Language and Literacy Levels (Section 4.3.3.2 of the EIS)

10.2.1 Project Design and Mitigation Measures

The Developer is committed to hiring workers from Tuktoyaktuk and Inuvik, where possible. Therefore, the construction of the Highway is not expected to affect the use of indigenous languages and dialects spoken in the ISR (Inuvialuktun, Siglitun and Uummarmiutun).

Several programs are currently offered in the region to improve literacy. In January 2001, the Government of the Northwest Territories (GNWT) approved Towards Literacy: A Strategy Framework (2001-2005), to fund several literacy initiatives in the NWT. Aurora College, offers Adult Basic Education (ABE) or Adult Literacy and Basic Education (ALBE) programs in Tuktoyaktuk and Inuvik (Aurora College 2009). The Northwest Territories Literacy Council works with individuals and families to promote literacy in all of the official languages of the NWT (NWTLC ND).

The Highway will provide Tuktoyaktuk residents with better access to language and literacy classes, higher levels of education, and cultural events taking place in the region.

10.2.2 Residual Effects

The proposed Highway will make it easier for interested residents of Tuktoyaktuk to access and attend classes at Aurora College and other institutions offering language and literacy skills.

10.2.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
SOCIO-ECONOMIC	
The Developer is committed to preferential employment opportunities for qualified local residents and contractors.	Construction, Operations
The IRC's ***Inuvialuit Business List Policy*** will apply to this Project, giving priority hiring to companies included on the Inuvialuit Business List.	Construction, Operations
The Developer and Project contractors will be responsible for the implementation of focused socio-economic measures, including recruitment and skills training.	Construction
MONITORING	
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

10.2.4 Proposed Effects Monitoring

Several agencies and/or organizations have existing responsibilities related to language and literacy, identified as follows:

- GNWT Education, Culture & Employment
  - Develops programs for cultural, heritage and language education, early childhood through to post-secondary education, and career development
  - Supports the territorial literacy strategy, including community-based literacy projects
  - Aboriginal Languages Plan with the goal to increase the number of Aboriginal language speakers by 20 per cent
  - Funds educational, cultural, language, career development and industry training programs
  - Provides career development services that enhance employability of the local workforce
  - Partners with local organizations and the IRC to deliver programs and services that meet identified labour market needs
- Beaufort-Delta Divisional Education Council
  - Responsible for the operation and administration of schools within the division, implementing curriculum, managing personnel, enrolling students, and initiating proposals for new construction or other major capital expenditures
- Aurora College
  - Offers literacy outreach, college-level education and upgrading services in the ISR, such as Adult Literacy and Basic Education, Aboriginal language instructor training, business administration and other certificate, diploma and degree programs
  - Provides an Inuvik regional campus and Community Learning Centres in Tuktoyaktuk and other communities in the region
- NWT Bureau of Statistics
  - Develops, interprets and disseminates those economic, social and demographic statistics required by the territorial government
  - Implements statistical programs for territorial government purposes and provides statistical advice and assistance to departments, regional offices and central agencies
  - Coordinates statistical activities within the government
  - Provides for the continuing and effective representation of territorial statistical interests within the national statistical system
- Inuvialuit Regional Corporation
  - Receives and manages Inuvialuit Final Agreement (IFA) benefits and revenues
  - Funds Inuvialuit programs delivered through the various corporations
  - Maintains socio-economic indicators reporting [http://inuvialuitindicators.com/] in conjunction with NWT Bureau of Statistics

11.0 Infrastructure and Institutional Capacity (Section 4.3.4 of the EIS)

11.1 Transportation Infrastructure (Section 4.3.4.1 of the EIS)

11.1.1 Project Design and Mitigation Measures

The Project will significantly improve ground transportation infrastructure between Inuvik and Tuktoyaktuk enabling easier year-round transportation of goods, services, and people between communities and throughout the region, and improving access to health and social services. The Highway will also facilitate commercial and recreational access to the region and will link the Dempster Highway to the Beaufort Sea coast, thereby enabling travellers to drive between Canada's west, east and north coasts. Additional positive effects are anticipated related to increased tourism, cheaper goods and services, and less need for inventory storage.

Negative effects are anticipated for the airline and barge service industry once the Highway is operational; however, additional business opportunities will likely be created over the long term in these sectors through increased tourism and/or industry opportunities.

The proposed Highway will not affect navigable waters.

Mitigation measures primarily relate to educating and training workers to transfer skills into new industries, if needed. Government agencies and Inuvialuit organizations responsible for education and training are discussed in Section 10.1.4 (Proposed Effects Monitoring) of this document.

11.1.2 Residual Effects

The proposed Highway is anticipated to positively affect the communities of Tuktoyaktuk and Inuvik by creating year-round access between these communities, which ultimately provides long-term cost-savings and other benefits.

11.1.3 Relevant Developer Commitments

The Developer has not made specific commitments for this component, other than conducting annual traffic counts of the Highway's use.

11.1.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS			
Valued Component	**Monitoring Program**	**Indicators**	**Measurement Parameters**
Land and Resource Use by Inuvialuit	• Wildlife monitoring • Socio-economic monitoring	• Intensity of land and resource use by Inuvialuit • Change in land use by transport infrastructure • Common indicators used by existing fish and wildlife monitoring programs	• Fish, wildlife and berry harvest levels • Frequency, duration and location of fish, wildlife and berry harvest • Highway traffic trends • Number of complaints from local co-management agencies • Common parameters used by existing fish and wildlife monitoring programs

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Infrastructure Canada
  - Manages infrastructure programs including funding of the federal capital expenditures for the project
- Canadian Northern Economic Development Agency (CanNor)
  - Administers funding for northern development (e.g., funded early feasibility studies related to the Inuvik to Tuktoyaktuk Highway)
  - Funds capacity building, planning, and business development in the communities
- Transport Canada
  - The Navigable Waters Protection Program (NWPP) ensures the public's right to navigate Canada's waters without obstruction through the administration of the *Navigable Waters Protection Act* (NWPA), a federal law designed to protect the public right of navigation.
  - In order to minimize impacts to navigation, the NWPP ensures that works constructed in navigable waterways are reviewed and regulated for works built in, on, over, under, through or across navigable water in Canada prior to construction of work(s).
- GNWT Transportation
  - Plans, designs, constructs or reconstructs, acquires, operates and maintains public transportation infrastructure in the Northwest Territories, Regulates and licenses individuals and vehicles operating in the Northwest Territories
  - Commercial vehicle inspections including enforcement of *Transportation of Dangerous Goods Act*
  - Responsible for setting contracts related to maintenance of the public roads
- GNWT Public Works & Services

- Meets economic measures provisions in IFA to issue preferential contracting policies and procedures intended to maximize, local, regional and northern employment and business opportunities in the ISR
- Responsible for community re-supply (fuel, social housing packages, community infrastructure)

11.2 Emergency Response and Local Law Enforcement Services (Section 4.3.4.2 of the EIS)

11.2.1 Project Design and Mitigation Measures

During construction, seasonal camps and associated camp infrastructure will be designed to incorporate bear safety considerations, including installing adequate lighting, incorporating proper waste management, cleaning and maintaining the kitchen and dining area, and wildlife detection. The Developer is committed to ensuring that appropriate health and safety measures are in place to minimize the need for emergency response.

During the operations phase, the Highway will be a public, all-weather highway under the management and operation of the Government of Northwest Territories Department of Transportation. This will allow year-round use by haul trucks and passenger vehicles according to the size and weight limitations as defined in the Northwest Territories Public Highways Act. The posted speed limit on the Highway will be 80 km/hr. The Highway will be a two lane gravel roadway (8 to 9 m wide with 3:1 sideslopes) with short-span, single-lane bridges at major stream crossings.

The potential adverse effects on public safety are specifically defined by the risk of collision. The design incorporates minimum requirements for vertical and horizontal curvature (i.e., how steep the grades can be, how tight the curves can be and how far ahead a driver must be able to see, etc.). All three routes initially considered meet or exceed the minimum design criteria or requirements established based on the future operation of the Highway. However, a designer's job is to balance risk with economics and, where economically practical, the designer will provide a highway that is better than the minimum requirements to reduce the risk of collisions in the future.

No issues were identified with the level of emergency and law enforcement services available during the winter road operation; however, emergency response levels should be monitored and assessed by GNWT Health and Social Services during the operational phase of the Highway. Emergency response is currently offered through the Inuvik and Tuktoyaktuk Fire Departments and the RCMP.

The Inuvik Fire Department is in the process of purchasing a new heavy rescue vehicle specifically for highway response. In Tuktoyaktuk, there is a volunteer Fire Department but no trained emergency technicians or ambulance service.

The RCMP will patrol the Highway, similar to their responsibilities in other jurisdictions in Canada. The effects on RCMP staffing levels are anticipated to be minimal.

11.2.2 Residual Effects

The Highway is not anticipated to materially affect emergency response and local law enforcement capabilities.

11.2.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
SOCIO-ECONOMIC	
The Developer will require that its Project contractor(s) ensure that all heavy equipment operators are suitably trained in proper machinery maintenance and operation; that equipment is regularly inspected and serviced; and that contractor staff obey posted Highway rules (e.g., speed limits, hunting/fishing restrictions).	Construction
The Developer commits to ensuring that its contractor(s) have Health, Safety and Environment (HSE) manuals; work procedures documents; and site-specific health and safety plans.	Design, Construction
OPERATIONS	
The Developer, using local contractors, will be responsible for ongoing operation, maintenance, and safety of the Highway.	Operations
MANAGEMENT PLANS	
An Environmental Management Plan (EMP) will be prepared prior to construction, and will be submitted for regulatory approval prior to use. The EMP will clearly define expectations for compliance monitoring, responsibilities, requirements for training, and reporting.	Construction
The EMP will contain the following types of plans: -Health and safety; [*items not relevant to medical and health care infrastructure have been removed for brevity*] Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction
WILDLIFE AND WILDLIFE HABITAT	
General	
The Developer or its contractor(s) will follow established ***Bear Safety Guidelines*** and will educate staff accordingly.	Design, Construction
The Developer's contractor(s) will be responsible for educating and training staff on applicable practices contained within the Wildlife Management Plans and the ***Bear Safety Guidelines***, including the proper use of non-lethal wildlife deterrent materials (e.g., bear spray).	Construction
Camps and associated infrastructure will be designed to incorporate features that ensure safety for both personnel and wildlife, including installing adequate lighting, implementing proper waste management, cleaning and maintaining the kitchen and dining area, and implementing appropriate wildlife detection and deterrent strategies.	Design, Construction
All wildlife encounters and mortalities will be reported to the environmental monitor, Safety Advisor, and GNWT ENR	Design, Construction, Operations

11.2.4 Proposed Effects Monitoring

Although the emergency response anticipated for the Highway is limited to potential collisions or spills, several agencies and/or organizations have responsibilities related to emergency response, ranging from wildlife management to domestic violence. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Environment Canada
  - Co-chairs *Northwest Territories/Nunavut Spills Working Agreement*
- Public Safety Canada - Royal Canadian Mounted Police (RCMP)
  - Provides a full range of law enforcement and community policing services in communities of Tuktoyaktuk and Inuvik under *Territorial Police Service Agreement* between Canada and GNWT
  - Has the authority to enforce measures under the *Northwest Territories Liquor Act* and the *Criminal Code of Canada*
  - Provides enforcement of *Public Highway Act* and emergency response coordination
  - Work in concert with the Government of the Northwest Territories in the areas of alcohol and drug education, such as, the NWT Drug Strategy Program and the Drug and Alcohol Resistance Education Program
- GNWT Education, Culture & Employment
  - Delivers and/or supports a range of services through the shelter network, including victims' services and family violence services and supports from Health and Social Services and Justice
- GNWT Environment & Natural Resources – Environment Division
  - Co-chairs Northwest Territories/Nunavut Spills Working Agreement
  - Lead agency responsible for ensuring that a spill is investigated, and that adequate follow-up and monitoring takes place by the polluter for Spills on Commissioner's Land, Territorial Highways, GNWT Communities in NWT, with exceptions explained in the Agreement
- GNWT Environment & Natural Resources - Forest Management
  - Provides wild fire protection services including prevention education
- GNWT Health & Social Services
  - Plans and funds the delivery of health and social services under an Integrated Service Delivery Model.
  - Protects children and vulnerable individuals from abuse, neglect, and distress; and
- Justice
  - Overall responsibility for administration of justice and public safety including courts, corrections and community justice
  - Provides policing services through *Territorial Police Service Agreement* between Canada and GNWT. The contract has specific provisions relating to standards of policing services and a process for adjusting resources within detachments
  - Works closely with the RCMP "G" Division to identify appropriate resources and services required
  - Collaborates with other social programming departments on key initiatives such as drug and alcohol use prevention

- Municipal & Community Affairs
  - Services offered include land administration, office of the fire marshal, emergency management, consumer affairs, licensing, legislation, sport, recreation, youth, volunteerism, and community governance support and advice
  - Provides funding to community governments for core municipal services such as water, sewage, garbage, municipal roads and by-law enforcement.
- Municipal Governments - Town of Inuvik & Hamlet of Tuktoyaktuk
  - Responsible for the delivery and operation of public services
  - Create and enforce community by-laws

11.3 Medical and Health Care Infrastructure and Services (Section 4.3.4.3 of the EIS)

11.3.1 Project Design and Mitigation Measures

Similar to Emergency Response and Local Law Enforcement Services, the Developer is committed to implementing several health and safety features during the construction and operations phase to minimize any potential effects on the medical and health care infrastructure.

During construction, camps and associated infrastructure will be designed to incorporate bear safety considerations, including installing adequate lighting, incorporating proper waste management, cleaning and maintaining the kitchen and dining area, and wildlife detection. The Developer is committed to ensuring that several health and safety measures are in place to avoid the need for emergency response.

During the operations phase, the Highway will be a public, all-weather highway under the management and operation of the Government of Northwest Territories Department of Transportation. This will allow year-round use by haul trucks and passenger vehicles according to the size and weight limitations as defined in the Northwest Territories Public Highways Act. The posted speed limit on the Highway will be 80 km/hr. The Highway will be a two lane gravel roadway (8 to 9 m wide with 3:1 sideslopes) with short span single lane bridges at major stream crossings.

The potential adverse effects on public safety are specifically defined by the risk of collision. The design incorporates minimum requirements for vertical and horizontal curvature (i.e., how steep the grades can be, how tight the curves can be and how far ahead a driver must be able to see, etc.). All three routes initially considered meet or exceed the minimum design criteria or requirements established based on the future operation of the Highway. However, a designer's job is to balance risk with economics and, where economically practical, the designer will provide a highway that is better than the minimum requirements to reduce the risk of collisions in the future.

Comprehensive medical and health programs are provided through Beaufort-Delta Health and Social Services programs in cooperation with Medic North and GNWT programs. The opening of the Highway may cause an initial rise in health care demand in Inuvik, with Tuktoyaktuk residents accessing health care services on a regular basis, but since it is already a regional medical care hub, it is unlikely to require a significant increase in permanent staff to meet the demand.

11.3.2 Residual Effects

Long term, the health conditions for Tuktoyaktuk residents are likely to improve with year-round access to medical and health care services in Inuvik.

11.3.3 Relevant Developer Commitments

The Developer has made several commitments regarding the health and safety of the workers during the construction phase and the general safety of the Highway during operations to minimize any potential effects on the medical and health care infrastructure and services.

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
SOCIO-ECONOMIC	
The Developer will require that its Project contractor(s) ensure that all heavy equipment operators are suitably trained in proper machinery maintenance and operation; that equipment is regularly inspected and serviced; and that contractor staff obey posted Highway rules (e.g., speed limits, hunting/fishing restrictions).	Construction
The Developer commits to ensuring that its contractor(s) have Health, Safety and Environment (HSE) manuals; work procedures documents; and site-specific health and safety plans.	Design, Construction
OPERATIONS	
The Developer, using local contractors, will be responsible for ongoing operation, maintenance, and safety of the Highway.	Operations
MANAGEMENT PLANS	
An Environmental Management Plan (EMP) will be prepared prior to construction, and will be submitted for regulatory approval prior to use. The EMP will clearly define expectations for compliance monitoring, responsibilities, requirements for training, and reporting.	Construction
The EMP will contain the following types of plans: -Health and safety; [*items not relevant to medical and health care infrastructure have been removed for brevity*] Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction
WILDLIFE AND WILDLIFE HABITAT	
General	
The Developer or its contractor(s) will follow established ***Bear Safety Guidelines*** and will educate staff accordingly.	Design, Construction
The Developer's contractor(s) will be responsible for educating and training staff on applicable practices contained within the Wildlife Management Plans and the ***Bear Safety Guidelines***, including the proper use of non-lethal wildlife deterrent materials (e.g., bear spray).	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
Camps and associated infrastructure will be designed to incorporate features that ensure safety for both personnel and wildlife, including installing adequate lighting, implementing proper waste management, cleaning and maintaining the kitchen and dining area, and implementing appropriate wildlife detection and deterrent strategies.	Design, Construction
All wildlife encounters and mortalities will be reported to the environmental monitor, Safety Advisor, and GNWT ENR	Design, Construction, Operations

11.3.4 Proposed Effects Monitoring

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Health Canada
  - Administers Canada *Health Act*
  - Develops, implements, and enforces legislation, regulations, policies, programs, services, and initiatives and works with the provinces and territories, and other partners
  - Provides contribution funding to GNWT to support Non-Insured Health Benefits for First Nation and Inuit residents and health promotion/disease prevention programs
  - With Statistics Canada, is responsible for generating, managing, and reporting health information. Statistics Canada is mandated to provide accurate, timely, and relevant information about the health of Canadians and the health care system
- GNWT Health & Social Services
  - Plans and funds the delivery of health and social services under an Integrated Service Delivery Model.
  - Provides integrated, responsive, and effective health services and social programs for those who need them
  - Issues public advisories as determined by the Chief Medical Health Officer and/or recommended by Health Canada
- Beaufort-Delta Health & Social Services Authority
  - Plans, manages and delivers regional health services through a hospital in Inuvik, a health centre in Tuktoyaktuk and other social programs and services through an Integrated Service Delivery Model (ISDM) composed of six core services: Mental Health and Addiction Services, Promotion and Prevention Programs, Protection Services, Diagnostic and Curative Services, Rehabilitation Services and Continuing Care Services

11.4 Social and Community Support Services (Section 4.3.4.4 of the EIS)

Social and community support services are discussed in Section 4.3.5 of the EIS and Section 13.0 of this document (Human Health and Community Wellness).

11.5 Education and Recreational Infrastructure and Services (Section 4.3.4.5 of the EIS)

11.5.1 Project Design and Mitigation Measures

Educational attainment in the region is anticipated to be positively affected by the Project due to improved, year-round access to post-secondary education services in Inuvik, which could result in a minor increase in the demand for educational facilities and services.

Year-round travel between the two communities will provide access to recreational opportunities for all residents, and in particular, for regional school and youth teams to meet for tournaments, access recreational facilities, and reduce travel costs. Improved access may affect the existing recreational facilities by having more people use them, but this can be seen as a positive benefit associated with promoting family and community health and well-being, along with increased employment in the recreational services industry.

Anticipated Project effects include increased access to post-secondary education facilities and recreational facilities. No mitigation measures are anticipated.

11.5.2 Residual Effects

The residual effect on recreation will likely be increased interactions across the ISR which are expected to strengthen communities and increase participation in recreational activities.

11.5.3 Relevant Developer Commitments

The Developer's commitments related to education are specific towards ensuring the construction workers have adequate health and safety training for the job, and/or installing educational signage regarding harvesting and responsible use of the Highway.

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
SOCIO-ECONOMIC	
The Developer and its Project contractors will be responsible for the implementation of focused socio-economic measures, including recruitment and skills training.	Construction
The Developer will install educational signage related to harvesting, fishing, hunting, and responsible use of the Highway at appropriate and highly visible locations.	Operations
The Developer will require that its contractor(s) educate their staff on the prevention of accidents and malfunctions. The training received will be outlined for the Developer, including emergency spill response.	Construction

11.5.4 Proposed Effects Monitoring

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- GNWT Education, Culture & Employment
  - Funds educational, cultural, language, career development and industry training programs
  - Provides transfer of federal funds to IRC for programs, such as Brighter Futures
  - Partners with local organizations and the IRC to deliver programs and services that meet identified labour market needs
- Beaufort-Delta Divisional Education Council
  - Responsible for the operation and administration of schools within the division, implementing curriculum, managing personnel, enrolling students, and initiating proposals for new construction or other major capital expenditures
- Aurora College
  - Provides an Inuvik regional campus and Community Learning Centres in Tuktoyaktuk and other communities in the region
- GNWT Public Works & Services
  - Responsible for community re-supply (fuel, social housing packages, community infrastructure)
- GNWT Municipal & Community Affairs
  - Services offered include land administration, office of the fire marshal, emergency management, consumer affairs, licensing, legislation, sport, recreation, youth, volunteerism, and community governance support and advice
  - Provides funding to community governments for core municipal services such as water, sewage, garbage, municipal roads and by-law enforcement
- Municipal Governments - Town of Inuvik & Hamlet of Tuktoyaktuk
  - Responsible for the delivery and operation of public services

11.6 Water, Sewage and Waste Disposal Infrastructure (Section 4.3.4.6 of the EIS)

11.6.1 Project Design and Mitigation Measures

Water withdrawal will conform to the applicable regulatory guidelines and water licence conditions. During the construction phase of the Project, water from local lakes will be used to construct the ice roads during winter months. A minimal amount of potable water may be trucked from Inuvik and/or Tuktoyaktuk for the construction camps during the winter construction stages. Water for dust management will be drawn from local lakes and streams during the construction and operations phases during summer months.

Sewage generated at the construction camps will be trucked to the community sewage lagoons in Tuktoyaktuk or Inuvik. All other camp-related wastes (i.e., garbage, construction debris, etc.) will be transported and disposed of at the Tuktoyaktuk and/or Inuvik municipal solid waste facilities in accordance with the municipalities' terms and conditions.

For wastewater and solid waste, the Developer will:

- Prior to disposal of waste, provide an estimate of the amount and type of domestic waste to the Town of Inuvik and Hamlet of Tuktoyaktuk; and
- Seek approval from the Town of Inuvik and Hamlet of Tuktoyaktuk to use their sewage lagoons and solid waste disposal facilities.

11.6.2 Residual Effects

No residual effects are anticipated as water withdrawal will conform to the applicable regulatory guidelines and water licence conditions and Inuvik and Tuktoyaktuk wastewater facilities and solid waste facilities currently have capacity for additional wastewater and solid waste during the construction phase.

11.6.3 Relevant Developer Commitments

The Developer's commitments generally pertain to avoiding effects on waste disposal and water infrastructure.

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
MANAGEMENT PLANS	
The EMP will contain the following types of plans: -Waste management; and -Hazardous waste management. [*items not relevant to water, sewage and waste disposal infrastructure have been removed for brevity*] Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction
WASTE MANAGEMENT	
The Developer will develop a waste management plan for all wastes associated with pre-construction and construction activities. The waste management plan will apply to the Developer and all associated Project contractors involved in the generation, treatment, transferring, receiving, and disposal of waste materials for the Project.	Design, Construction
The Developer commits to the following steps prior to disposal of waste: -Obtaining approval from the Town of Inuvik and Hamlet of Tuktoyaktuk to use their sewage lagoons and solid waste disposal facilities; -Providing an estimate of the amount and type of domestic waste generated by the Project compared to the facility's available capacity; -Following all applicable Licence, Permits, and/or municipal bylaws regarding the use of the facilities in Inuvik and Tuktoyaktuk; and -Recording the amount of domestic waste shipped to the landfills.	Construction
The Developer will develop and implement a hazardous waste management plan (HWMP). The HWMP will encompass all pre-construction and construction phases of the Project and will apply to the Developer and all Project contractors involved in receiving, transferring, and transporting hazardous waste for the Developer's activities on land, water, and air.	Construction
WATER QUALITY AND QUANTITY	
The Developer will ensure that the DFO water withdrawal protocol criteria are followed.	Construction

11.6.4 Proposed Effects Monitoring

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- GNWT Health & Social Services
  - Plans and funds the delivery of health and social services under an Integrated Service Delivery Model.
  - Protects public health and prevents illness and disease;
  - Enforces Camp Sanitation Regulations
  - Issues public advisories as determined by the Chief Medical Health Officer and/or recommended by Health Canada
  - Participates in NWT Environmental Contaminants Committee
- GNWT Public Works & Services
  - Responsible for community re-supply (fuel, social housing packages, community infrastructure)
- GNWT Municipal & Community Affairs
  - Provides funding to community governments for core municipal services such as water, sewage, garbage, municipal roads and by-law enforcement

11.7 Quarries and Quarry Materials (Section 4.3.4.7 of the EIS)

11.7.1 Project Design and Mitigation Measures

As discussed in Section 2.6 of the EIS, construction of the proposed Highway requires granular materials from select borrow sources in the region. Once operational, the Highway will facilitate future access to these material resources for community use and future development, while not conflicting with future community or development demands.

The ISR Granular Management Plan (2010), prepared by the ILA and INAC, includes a discussion on supply and demand of granular resources, which are based on several demand forecast reports (EBA Engineering Consultants Ltd. 1987; Hardy BBT Limited 1991; North of 60 Engineering Ltd. 1995 and 2001). Gravel demands for each community in the ISR are based on community maintenance and development, including operation and maintenance, road resurfacing and protection, Community Capital Plan Projects, housing construction and maintenance, and runway expansion and maintenance projects, on both Crown and Inuvialuit Lands. Demands for individual, private use are also calculated.

The *Inuvialuit Final Agreement* has stipulated priorities for access to granular resources within the ISR on private lands. First priority is given to public community needs, second priority for private and corporate needs of the Inuvialuit, and third priority for any project approved by an appropriate government agency.

Additional materials have been identified for potential use by the Mackenzie Gas Project. The borrow source at Parsons Lake (2.028P) is identified for use by the Mackenzie Gas Project and the Highway.

Based on the supply of granular materials, as identified in previous studies, and the demand forecasted for community and individual use, as identified in the ISR Granular Management Plan, the amount of materials required for the Highway and the borrow sources selected for use will not conflict with the forecasted demand. (Note: A detailed discussion, including figures, is provided in the Response to Aboriginal Affairs and Northern Development Canada, submitted to the EIRB in August 2011).

Section 2.6.8.6 (Pit Development Plans) of the EIS states that pit development plans, also referred to as pit management plans, will be developed and will conform to the approving authority's regulations and permitting requirements. For borrow sources on Inuvialuit-owned land, the pit development plan will conform to the ILA's *Granular Management Plan* and requirements for a Quarry Permit. For borrow sources on Crown-lands, the pit development plan will conform to INAC's (2010d) *Northern Land Use Guidelines Access: Pits and Quarries,* TAC's (2010) guide for *Development and Management of Transportation Infrastructure in Permafrost Regions,* and the pit/quarry development plan requirements.

Each of these guidelines provide direction on the expectations of reclamation planning, which will need to be outlined in each of the pit development plans produced for construction of the Highway.

Borrow pits will be closed as soon as they are no longer required and reclaimed according to regulatory standards. Specifically:

- Borrow pits will be closed as soon as they are no longer required and reclaimed in a progressive manner, as described in the Pit Development Plan;
- Pit Development Plans will include mitigation measures to address potential environmental concerns, and operational and reclamation plans; and
- Minimizing vegetation removal and conducting progressive reclamation at the clear-span abutments, culvert installations and borrow sources.

11.7.2 Residual Effects

Once operational, the Highway will facilitate future access to these material resources for community use and future development.

Biophysical residual effects related to quarries are discussed in Section 1.2 of this document.

11.7.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
PLANNING AND DESIGN	
The Developer commits to using, as a guideline, the design parameters and construction techniques in the Transportation Association of Canada (TAC 2010) *Development and Management of Transportation Infrastructure in Permafrost Regions*. This will include mitigation strategies such as: -Accessing and hauling from borrow sources during the winter months; -Reclaiming borrow sources when construction is complete by grading slopes to blend with the natural topography and drainage of the surrounding area. [*items not relevant to quarries and quarry material have been removed for brevity*]	Design, Construction
CONSTRUCTION	
The Developer is committed to constructing the proposed Inuvik to Tuktoyaktuk Highway, borrow sources, and associated winter access roads in a safe and environmentally responsible manner.	Design, Construction
Blasting, if required, will occur only during winter borrow source development.	Construction
The Developer will use winter roads to access borrow sources; permanent all-weather access roads will not be required.	Construction
BORROW SOURCES	
The Developer is committed to limiting the footprint of each borrow source and minimizing the number of borrow sources developed.	Construction.
Borrow pits will be closed as soon as they are no longer required and reclaimed in a progressive manner, as described in the Pit Development Plan.	Construction, Operations, Reclamation
Pit Development Plans will conform to the approving authority's regulations and permitting requirements.	Design, Construction, Operations
Pit Development Plans will include mitigation measures to address potential environmental concerns, and operational and reclamation plans. Mitigation measures include: -Developing borrow sources only during winter periods; -Maintaining an appropriate amount of undisturbed land between borrow source locations and any waterbody; and -Applying appropriate erosion and sediment control BMPs for the construction of ditches and cross drainage channels.	Construction
The Developer commits to ensuring that borrow source development is monitored by environmental monitors.	Construction
MANAGEMENT PLANS	
The EMP will contain the following types of plans: -Pit development for borrow sources; [*items not relevant to quarries and quarry material have been removed for brevity*] Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction

11.7.4 Proposed Effects Monitoring

Compliance monitoring will be conducted during the permitting process and royalty payment process. The monitoring program will be determined in the Pit Development Plan and ILA and AANDC permitting processes.

Furthermore, AANDC and ILA have responsibilities related to permitting and monitoring quarries and quarry material, as follows:

- Aboriginal Affairs and Northern Development Canada (AANDC) (formerly INAC)
  - Administers legislation concerning use of Crown lands and non-renewable resources within the ISR
  - Responsible for administering the Inuvialuit Final Agreement
  - Responsible for Granular Management Planning and pit and quarry management strategy processes in cooperation with the Inuvialuit Regional Corporation (IRC)
  - Administers *Territorial Lands Act* and regulations including Territorial Land Use Regulations and Territorial Quarry Regulations and ensures compliance with authorizations
  - Responsible for Cumulative Impact Monitoring Program (CIMP) in the ISR under MOU with IRC
  - Responsible for cumulative effects assessments
  - Administers funding for Beaufort Regional Environmental Assessment (BREA)
- Inuvialuit Land Administration
  - Responsible for managing and administering Inuvialuit-owned lands in the ISR, including reviewing applications for land and water permits
  - Granular Management Planning and pit and quarry management strategy processes in cooperation with AANDC
  - Responsible for monitoring gravel use and collecting royalty payments

11.8 Management of Renewable Resources (Section 4.3.4.8 of the EIS)

Renewable resources, such as wildlife, fish, plants and land, are very important for Tuktoyaktuk and Inuvik residents. Sections 4.3.7 (Harvesting) and 4.3.8 (Land Use) of the EIS (or Sections 15.0 and 16.0 of this document, respectively) discuss potential effects and mitigation measures related to the management of these resources.

11.9 Service Industry Capacity (Section 4.3.4.9 of the EIS)

11.9.1 Project Design and Mitigation Measures

GNWT DOT (2010) estimates that the total number of tourists to visit the Inuvik-Beaufort-Delta region could increase by about 10% to 5,500 tourists per year with the construction of the Highway. Direct employment related to tourism is anticipated to increase by 18 people in the NWT, and an additional indirect and induced employment across NWT and the rest of Canada will increase by approximately 10 positions.

The proposed Highway will create year-round access from Tuktoyaktuk to Inuvik. In anticipation of upcoming tourism and service industry employment, residents may seek employment or training opportunities at existing hotels or restaurant facilities.

New business opportunities may arise in the private sector, from trucking and fuel service stations to tourism and bus transportation services. New businesses could be expected to create employment opportunities, which are recognized as critical for young people in the ISR (ICC et al. 2006).

Furthermore, the Highway will permit Inuvik, Tuktoyaktuk and other regionally-based businesses to compete more effectively for resource-related and government business opportunities. Contract work in Tuktoyaktuk may become more competitive, since more companies in the region will have access to Project work (B. Buckle, Senior Administrative Officer, Hamlet of Tuktoyaktuk, pers. comm., February 2, 2011).

11.9.2 Residual Effects

The residual effects are enhanced availability of goods and services, particularly in Tuktoyaktuk, and potential increases in service industry positions as a result of the Highway.

11.9.3 Relevant Developer Commitments

The Developer has not made commitments for this component.

12.0 Proposed Effects Monitoring

The following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS

Valued Component	Monitoring Program	Indicators	Measurement Parameters
Tourism, Commercial and Public Recreational Use	• Socio-economic monitoring	• Change in tourism, commercial and recreational businesses and revenues	• Number of tourists • Amount spent by tourists • Number and types of businesses operating in Inuvik and Tuktoyaktuk • Household consumption expenditure for commercial and recreational use • Land used for recreation • Highway traffic trends • Number of complaints from local co-management agencies

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Canadian Northern Economic Development Agency (CanNor)
  - Funds capacity building, planning, and business development in the communities
- Human Resources and Skills Development Canada (Service Canada)
  - Supports Aboriginal career training and human resource capacity building under the Aboriginal Human Resources Development Agreement (AHRDA)
- GNWT Education, Culture & Employment
  - Develops programs for cultural, heritage and language education, early childhood through to post-secondary education, and career development
  - Supports the territorial literacy strategy, including community-based literacy projects
  - Funds educational, cultural, language, career development and industry training programs
  - Provides transfer of federal funds to IRC for programs, such as Brighter Futures
  - Provides career development services that enhance employability of the local workforce
  - Partners with local organizations and the IRC to deliver programs and services that meet identified labour market needs
- Aurora College
  - Offers literacy outreach, college-level education and upgrading services in the ISR, such as Adult Literacy and Basic Education, Aboriginal language instructor training, business administration and other certificate, diploma and degree programs
  - Provides an Inuvik regional campus and Community Learning Centres in Tuktoyaktuk and other communities in the region
- GNWT Industry, Tourism & Investment
  - Partners with local government and the IRC to provide programs and services that promote and support NWT economic prosperity and community self-reliance
  - Funds entrepreneurial pursuits
- NWT Bureau of Statistics
  - Develops, interprets and disseminates those economic, social and demographic statistics required by the territorial government
  - Implements statistical programs for territorial government purposes and provides statistical advice and assistance to departments, regional offices and central agencies
  - Coordinates statistical activities within the government
  - Provides for the continuing and effective representation of territorial statistical interests within the national statistical system
- Inuvialuit Development Corporation
  - Invests in over 20 Inuvialuit companies with complementary industries and visions
  - For business purposes, each Community Corporation [including Inuvik and Tuktoyaktuk] owns a Development Corporation

12.1 Housing (Section 4.3.4.10 of the EIS)

12.1.1 Project Design and Mitigation Measures

During the Highway construction period, local workers from Tuktoyaktuk and Inuvik will continue to live in their own houses and will be accommodated at the construction camps during their work schedules. By hiring local workers, the Developer will reduce the potential housing pressures that could otherwise be caused by hiring workers from outside the region.

Furthermore, the development of the Highway will facilitate the year-round delivery of house construction materials to the community of Tuktoyaktuk.

12.1.2 Residual Effects

The development of the Highway will facilitate the year-round delivery of house construction materials to the community of Tuktoyaktuk.

12.1.3 Relevant Developer Commitments

The Developer has not made commitments for this component.

12.1.4 Proposed Effects Monitoring

The following agencies have responsibilities related to administering and monitoring housing, as follows:

- GNWT Public Works & Services
  - Responsible for community re-supply (fuel, social housing packages, community infrastructure)
- NWT Housing Corporation
  - Provides financial, administrative, maintenance, construction and repair support to Local Housing Organizations (LHOs) located in communities delivering public housing on behalf of the NWTHC
  - Operates 'Providing Assistance for Territorial Homeownership' program (PATH) to qualified northern residents

13.0 Human Health and Community Wellness (Section 4.3.5 of the EIS)

13.1 Project Design and Mitigation Measures

In general, it is predicted that the Highway will improve the Tuktoyaktuk residents' access to medical and dental health care facilities in Inuvik.

During the construction phase, when economic activity is higher, violence and criminal behaviour is expected to decrease. Over the long term, the primary concern of stakeholders is that the Highway may increase Tuktoyaktuk residents' access to alcohol. Effects related to alcohol and substance abuse may cause spin-off effects such as increased crime and

abuse issues, which in turn may affect social workers and RCMP services in the community. The Hamlet of Tuktoyaktuk, with support from community members, is aware of the issues related to alcohol and substance abuse and has taken steps to reduce this.

In Tuktoyaktuk, the community wellness worker and community support workers provide programs for the prevention of alcohol addiction and abuse (M. Heffel, Head Nurse, Rosie Ovayouk Health Centre, pers. comm., January 18, 2011).

The GNWT HSS has existing programs and strategies (i.e., the NWT Sexually Transmitted Infections Strategic Directions) to prevent and control sexually transmitted infections in the NWT.

13.2 Residual Effects

The Highway will create long-term, year-round access between Inuvik and Tuktoyaktuk. The benefits include increased access to medical and dental facilities; while the potential risk is increased access to alcohol. Several programs are currently in place to prevent or treat substance abuse issues. Increased interaction between residents of the two communities, youth groups and schools is expected to positively benefit the communities.

Over time, the decrease in the cost of living may positively affect those most vulnerable to poverty and poverty-influenced illness.

According to a document submitted to the EIRB October 22, 2010 by the GNWT in response to the draft Terms of Reference, the "GNWT's Department of Health and Social Services does not have specific concerns about the Project given that a road currently exists during the winter months between Inuvik and Tuktoyaktuk, furthermore it is not expected that the Project will have a significant impact on the communities" (GNWT 2010, p. 10).

13.3 Relevant Developer Commitments

The Developer has not made community-wide commitments for this component. However, the Developer has made several commitments regarding the health and safety of the workers during the construction phase and the general safety of the Highway during operations to minimize any potential effects on human and community wellness.

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
SOCIO-ECONOMIC	
The Developer will require that its Project contractor(s) ensure that all heavy equipment operators are suitably trained in proper machinery maintenance and operation; that equipment is regularly inspected and serviced; and that contractor staff obey posted Highway rules (e.g., speed limits, hunting/fishing restrictions).	Construction
The Developer commits to ensuring that its contractor(s) have Health, Safety and Environment (HSE) manuals; work procedures documents; and site-specific health and safety plans.	Design, Construction
OPERATIONS	
The Developer, using local contractors, will be responsible for ongoing operation, maintenance, and safety of the Highway.	Operations
MANAGEMENT PLANS	
An Environmental Management Plan (EMP) will be prepared prior to construction, and will be submitted for regulatory approval prior to use. The EMP will clearly define expectations for compliance monitoring, responsibilities, requirements for training, and reporting.	Construction
The EMP will contain the following types of plans: -Health and safety; [*items not relevant to medical and health care infrastructure have been removed for brevity*] Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction
WILDLIFE AND WILDLIFE HABITAT	
General	
The Developer or its contractor(s) will follow established ***Bear Safety Guidelines*** and will educate staff accordingly.	Design, Construction
The Developer's contractor(s) will be responsible for educating and training staff on applicable practices contained within the Wildlife Management Plans and the ***Bear Safety Guidelines***, including the proper use of non-lethal wildlife deterrent materials (e.g., bear spray).	Construction
Camps and associated infrastructure will be designed to incorporate features that ensure safety for both personnel and wildlife, including installing adequate lighting, implementing proper waste management, cleaning and maintaining the kitchen and dining area, and implementing appropriate wildlife detection and deterrent strategies.	Design, Construction
All wildlife encounters and mortalities will be reported to the environmental monitor, Safety Advisor, and GNWT ENR	Design, Construction, Operations

13.4 Proposed Effects Monitoring

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Health Canada
  - Administers Canada *Health Act*
  - Develops, implements, and enforces legislation, regulations, policies, programs, services, and initiatives and works with the provinces and territories, and other partners
  - With Statistics Canada, is responsible for generating, managing, and reporting health information. Statistics Canada is mandated to provide accurate, timely, and relevant information about the health of Canadians and the health care system
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee
  - Conducts health risk assessments and provides human health warning on contaminants in country foods to GNWT
- Environment Canada
  - Co-chairs *Northwest Territories/Nunavut Spills Working Agreement*
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee
- Public Safety Canada - Royal Canadian Mounted Police (RCMP)
  - Provides a full range of law enforcement and community policing services in communities of Tuktoyaktuk and Inuvik under *Territorial Police Service Agreement* between Canada and GNWT
  - Has the authority to enforce measures under the *Northwest Territories Liquor Act* and the *Criminal Code of Canada*
  - Provides enforcement of *Public Highway Act* and emergency response coordination
  - Work in concert with the Government of the Northwest Territories in the areas of alcohol and drug education, such as, the NWT Drug Strategy Program and the Drug and Alcohol Resistance Education Program
- GNWT Health & Social Services
  - Plans and funds the delivery of health and social services under an Integrated Service Delivery Model. More specifically, the Department
    - promotes healthy choices and responsible self-care;
    - protects public health and prevent illness and disease;
    - protects children and vulnerable individuals from abuse, neglect, and distress; and
    - provides integrated, responsive, and effective health services and social programs for those who need them
  - Enforces Camp Sanitation Regulations
  - Issues public advisories as determined by the Chief Medical Health Officer and/or recommended by Health Canada
  - Participates in NWT Environmental Contaminants Committee
- Beaufort-Delta Health & Social Services Authority
  - Plans, manages and delivers regional health services through a hospital in Inuvik, a health centre in Tuktoyaktuk and other social programs and services through an Integrated Service Delivery Model (ISDM) composed of six core services: Mental Health and Addiction Services, Promotion and Prevention Programs, Protection

Services, Diagnostic and Curative Services, Rehabilitation Services and Continuing Care Services

- GNWT Justice
  - Overall responsibility for administration of justice and public safety including courts, corrections and community justice
  - Provides policing services through *Territorial Police Service Agreement* between Canada and GNWT. The contract has specific provisions relating to standards of policing services and a process for adjusting resources within detachments
  - Works closely with the RCMP "G" Division to identify appropriate resources and services required
  - Collaborates with other social programming departments on key initiatives such as drug and alcohol use prevention
- GNWT Finance
  - Provides resources to enforce the *Northwest Territories Liquor Act*
- Inuvialuit Regional Corporation
  - Receives and manages Inuvialuit Final Agreement (IFA) benefits and revenues
  - Funds Inuvialuit programs delivered through the various corporations
  - Maintains socio-economic indicators reporting [http://inuvialuitindicators.com/] in conjunction with NWT Bureau of Statistics
- Inuvialuit Trust
  - Manages financial distribution of benefits to Inuvialuit beneficiaries

14.0 Socio-cultural Patterns (Section 4.3.6 of the EIS)

14.1 Project Design and Mitigation Measures

The Project will significantly improve ground transportation infrastructure between Inuvik and Tuktoyaktuk enabling easier year-round transportation of goods, services, and people between communities and throughout the region, and improving access to health and social services. The Highway will also facilitate commercial and recreational access to the region and will link the Dempster Highway to the Beaufort Sea coast, thereby enabling travellers to drive between Canada's west, east and north coasts. Additional positive effects are anticipated related to increased tourism, cheaper goods and services, and less need for inventory storage.

The Developer is committed to ensuring that the people of Tuktoyaktuk and Inuvik have preferential employment opportunities to provide employment benefits to the region. The IRC's Inuvialuit Business List Policy will apply to this Project, giving priority hiring to companies included on the Inuvialuit Business List. This will help to provide economic stimulus to the Inuvialuit community. Furthermore, employment opportunities will be available to all residents, male or female, and will result in increased seasonal employment during construction.

14.2 Residual Effects

Residents are anticipated to have better year-round access to cultural and family activities once the Highway is constructed, as well as cultural support systems and programs. The Highway will allow the residents of Tuktoyaktuk to have more contact with residents in other ISR communities and, by extension, from the rest of Canada. There will be more opportunities to participate in cultural events and celebrations, and more opportunities to facilitate sharing and mutual aid among family and community members. The proposed Highway is expected to strengthen family ties by providing year-round access between the communities.

The Highway will serve to increase tourism, which in turn could promote cultural awareness of the Inuvialuit and Gwich'in peoples among tourists from other regions, provinces and territories.

According to a document submitted to the EIRB October 22, 2010 by the GNWT in response to the draft Terms of Reference, the "GNWT's Department of Health and Social Services does not have specific concerns about the Project given that a road currently exists during the winter months between Inuvik and Tuktoyaktuk, furthermore it is not expected that the Project will have a significant impact on the communities" (GNWT 2010, p. 10).

14.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
SOCIO-ECONOMIC	
The Developer is committed to preferential employment opportunities for qualified local residents and contractors.	Construction, Operations
The IRC's ***Inuvialuit Business List Policy*** will apply to this Project, giving priority hiring to companies included on the Inuvialuit Business List.	Construction, Operations

14.4 Proposed Effects Monitoring

Several agencies and/or organizations have existing responsibilities related to monitoring socio-cultural patterns. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- GNWT Education, Culture & Employment
  - Develops programs for cultural, heritage and language education, early childhood through to post-secondary education, and career development
  - Delivers and/or supports a range of services through the shelter network, including victims' services and family violence services and supports from Health and Social Services and Justice
  - Aboriginal Languages Plan with the goal to increase the number of Aboriginal language speakers by 20 per cent
  - Funds educational, cultural, language, career development and industry training programs

- Provides transfer of federal funds to IRC for programs, such as Brighter Futures

- Aurora Research Institute – Inuvik Research Centre
  - Supports and tracks social and environmental research
  - Maintains a library to support research
  - Issues research licences

- Inuvialuit Regional Corporation
  - Receives and manages Inuvialuit Final Agreement (IFA) benefits and revenues
  - Funds Inuvialuit programs delivered through the various corporations
  - Maintains socio-economic indicators reporting [http://inuvialuitindicators.com/] in conjunction with NWT Bureau of Statistics

15.0 Harvesting (Section 4.3.7 of the EIS)

15.1 Project Design and Mitigation Measures

To protect the environmentally and culturally sensitive Husky Lakes area, the Developer, with input from Inuvialuit interests has identified a preferred route option that maintains a 1 km setback between the Highway and the Husky Lakes.

The objectives of wildlife protection activities along the proposed Highway will be to mitigate potentially negative effects on caribou and other wildlife in the following general ways:

- Minimize loss of habitat and reductions of habitat effectiveness via Project design;
- A wildlife protection plan will be implemented for the construction phase;
- Minimize disruption of migration patterns due to vehicle traffic; particularly when barren-ground caribou arrive within the study area for the fall rut and their departure to the calving grounds in the spring;
- Minimize direct mortality due to collisions with vehicles;
- Minimize the volume, duration, and frequency of noise producing activities;
- Selective timing of Project activities to avoid critical periods for wildlife;
- Conform with pre-determined setback distances from key wildlife habitat features;
- Ensure proper storage, transportation and disposal of wastes;
- Ensure Project personnel have appropriate levels of wildlife training and awareness; and
- Prohibit GNWT employees and contractors from hunting while working on the Highway.

HTC wildlife monitors will be hired by the Developer/ construction contractor during the construction phase, to monitor potential wildlife issues, including harvesting.

Section 7.0 of this document presents the various, wildlife-specific mitigation measures that will be integrated into the Project design, construction and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on wildlife.

Residents of Tuktoyaktuk have expressed concern that hunting pressure on caribou and other wildlife may increase as a direct result of the Highway. Responsible management organizations and government agencies will continue to work together to develop strategies for sustainable harvesting in the region, after the Highway is constructed. The success of this approach will require a high level of voluntary compliance from the users of the proposed Highway.

A public education program and signage related to harvesting, fishing, hunting, and responsible use of the Highway will be installed at appropriate and highly visible locations. Educational material is currently provided for the Dempster Highway and includes information on:

- Harvesting rights for Aboriginal harvesters, and resident and non-resident hunters and fishers;
- Potential restrictions, including areas with restrictions or seasonal closures;
- Hunter responsibilities;
- Minimum safety distance from the highway before shooting may occur; and
- Snowmachine use near the highway.

Under the *IFA*, harvested resources are managed through a variety of organizations including:

- Wildlife Management Advisory Council (WMAC) - Northwest Territories (NWT) and North Slope (NS) are responsible for advising government ministers and Inuvialuit agencies on all matters relating to wildlife.
- Fisheries Joint Management Committee (FJMC) is responsible for managing marine mammals and marine and freshwater fisheries in the ISR.
- Inuvialuit Game Council (IGC) is responsible for representing the collective Inuvialuit interest in wildlife and also advising the government.
- Hunters and Trappers Committees (HTC) is responsible for resource allocation and promotion of Inuvialuit involvement in conservation, research, management, enforcement and utilization.
- Inuvialuit Land Administration (ILA) is responsible for the management and administration of access to Inuvialuit private lands. The ILA is also responsible for screening the development proposals on private lands.

Harvesting licenses and restrictions are management tools implemented by co-management boards and the GNWT ENR. Harvesting restrictions are currently in place for certain wildlife species in the NWT including barren-ground caribou and grizzly bears.

During the construction and operation of the Highway, wildlife and fish populations will continue to be managed by GNWT ENR and the regional organizations previously mentioned.

15.2 Residual Effects

The Highway will create year-round access to Tuktoyaktuk, and will increase access to harvesting areas. Harvesting activities are managed by the Wildlife Management Advisory Council and Fisheries Joint Management Committee, with input from the Inuvialuit Game Council and the HTCs.

Although harvesting patterns may be temporarily disturbed due to Highway construction, harvesting patterns should return to normal upon Project completion, except in the vicinity of the Highway, where hunting may be discouraged. With effective Highway user practices, residual indirect effects related to harvesting wildlife and fish populations are expected to be minimal.

15.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
WILDLIFE AND WILDLIFE HABITAT	
General	
[previously presented in Section 7.1.1]	
The Developer will implement general wildlife protection measures along the proposed Highway as follows: -Implementing a policy whereby Project personnel and contractors will not disturb any wildlife or critical habitat features such as dens or nests; -Implementing a "no hunting" policy for Highway construction and maintenance workers; and -Working with agencies such as the HTCs, WMAC and GNWT ENR to develop guidelines and conditions for Highway usage and follow-up with monitoring of harvesting activities. [*items not relevant to harvesting have been removed for brevity*]	Design, Construction, Operations
Types of Mitigation Measures for Grizzly Bears and Furbearers	
Types of mitigation measures that the Developer will integrate into the Project design, construction, and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on grizzly bears and furbearers include: -Freshly dug dens will be mapped such that construction activities will avoid active dens during the hibernation period; -If possible, no activities will occur within 500 m of an active den during the denning period (October to April); and -No blasting will occur if active bear dens are confirmed within 500 m of a proposed blasting area.	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
-Maintaining a minimum distance of 500 m between identified grizzly bear/wolverine den sites and personnel during construction; -Dens (grizzly bear, wolverine) discovered within 500 m of the Highway after the pre-construction survey will be reported immediately to GNWT ENR to determine the appropriate course of action; -Providing the wildlife monitor and designated, trained staff access to non-lethal deterrent materials (e.g., bear spray). The use of any deterrent method on wildlife will be reported to GNWT ENR;	Construction
-Minimizing and properly disposing of wildlife attractants such as garbage, food wastes, and other edible and aromatic substances; -Storing all food, grease, oils, fuels, and garbage in bear/wolverine-proof containers and/or areas; -No waste will be incinerated on- or off-site; and -Transporting waste to Tuktoyaktuk and/or Inuvik municipal solid waste facilities for disposal. Disposal of wastes at these facilities will follow the specified terms and conditions for use.	Construction
SOCIO-ECONOMIC	
The Developer will install educational signage related to harvesting, fishing, hunting, and responsible use of the Highway at appropriate and highly visible locations.	Operations
LAND USE	
During the operations phase, the Developer will work with appropriate parties to install signage and/or develop educational materials to encourage users to stay on the Highway and not adjacent areas.	Operations
MONITORING	
The Developer requires that Project contractors employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of construction.	Construction
The Developer is committed to hiring environmental monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater, and prevent erosion and subsequent sedimentation.	Construction
Environmental and wildlife monitoring will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTC (wildlife monitors), and will be funded by the Developer and/or Developer's contractor(s).	Construction
The Developer will conduct post-construction monitoring according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.	Operations
The Developer will require that Project contractors work closely with the environmental and wildlife monitors during construction.	Construction
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations

15.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS

Valued Component	Monitoring Program	Indicators	Measurement Parameters
Land and Resource Use by Inuvialuit	• Wildlife monitoring • Socio-economic monitoring	• Intensity of land and resource use by Inuvialuit • Change in land use by transport infrastructure • Common indicators used by existing fish and wildlife monitoring programs	• Fish, wildlife and berry harvest levels • Frequency, duration and location of fish, wildlife and berry harvest • Highway traffic trends • Number of complaints from local co-management agencies • Common parameters used by existing fish and wildlife monitoring programs
Areas of Special Ecological and Cultural Importance	• Socio-economic monitoring	• Effects predictions • Intensity of use of Husky Lakes area • Change in land use	• Verify effects predictions and confirm the effectiveness of mitigation measures • Frequency and duration of Husky Lake use • Land use patterns and/or conversions • Number of complaints from local co-management agencies

Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring that will be conducted. Environmental and wildlife monitoring will be done by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Under the IFA, harvested resources are managed through a variety of organizations including:

- Wildlife Management Advisory Council (WMAC) - Northwest Territories (NWT) and North Slope (NS) are responsible for advising government ministers and Inuvialuit agencies on all matters relating to wildlife.
- Fisheries Joint Management Committee (FJMC) is responsible for managing marine mammals and marine and freshwater fisheries in the ISR.
- Inuvialuit Game Council (IGC) is responsible for representing the collective Inuvialuit interest in wildlife and also advising the government.
- Hunters and Trappers Committees (HTC) is responsible for resource allocation and promotion of Inuvialuit involvement in conservation, research, management, enforcement and utilization.

- Inuvialuit Land Administration (ILA) is responsible for the management and administration of access to Inuvialuit private lands. The ILA is also responsible for screening the development proposals on private lands.
- GNWT ENR regulates wildlife harvest in ISR through *Wildlife Act* and Regulations in conjunction with Wildlife Management Advisory Council (WMAC) and other co-management boards

During the construction and operation of the Highway, the above mentioned parties will continue to manage resources within the ISR.

Taking Care of Caribou: Cape Bathurst, Bluenose-West, and Bluenose-East Barren Ground Caribou Herds Management Plan is a draft caribou management plan (see Attachment 2) prepared by the Advisory Committee for the Cooperation on Wildlife Management (ACCWM 2011). The Plan states that "certain monitoring will take place regardless of whether the herd status is green [caribou population is high], yellow [caribou population is increasing], orange [caribou population is decreasing] or red [caribou population is low]. However, the frequency and intensity of monitoring will vary in response to herd status" (ACCWM 2011, p. 21).

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Health Canada
  - Administers Canada *Health Act*
  - Develops, implements, and enforces legislation, regulations, policies, programs, services, and initiatives and works with the provinces and territories, and other partners
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee
  - Conducts health risk assessments and provides human health warning on contaminants in country foods to GNWT
- Department of Fisheries and Oceans (DFO)
  - Responsible for implementing the *Fisheries Act* including annually establishing *Northwest Territories Fishery Regulations*
  - Promotes cooperative management of ISR fisheries resources including support to the Fisheries Joint Management Committee (FJMC)
  - Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee
- Environment Canada
  - Sets waterfowl harvest regulations annually
  - Funds and carries out inventory and monitoring studies for migratory birds
  - Canadian Wildlife Service (CWS) is represented on Wildlife Management Advisory Councils (WMAC)

- Administers *Species at Risk Act (SARA)* and coordinates national recovery strategies and management plans for endangered, threatened and special concern species
- Co-chairs *Northwest Territories/Nunavut Spills Working Agreement*
- Participates on Northern Contaminant Program Management Committee and NWT Environmental Contaminants Committee

- GNWT Environment & Natural Resources - Wildlife Division
  - Promotes and supports sustainable use and development of natural resources in the NWT
  - Regulates wildlife harvest in ISR through *Wildlife Act* and Regulations in conjunction with Wildlife Management Advisory Council (WMAC) and other co-management boards
  - Develops wildlife management plans in conjunction with co-management boards
  - Conducts wildlife research and provides wildlife population information through Inuvialuit funding
  - Administration of sport fishery in the NWT (delegated by DFO in 1976) including implementing Sport Fishery Regulations for NWT and enforcing sport fishing regulations
  - Prepares jurisdictional recovery strategies and management plans for federally listed species
  - Leads implementation of the *Species at Risk (NWT) Act*, in cooperation with the Conference of Management Authorities
  - Establishes status ranks for NWT species in cooperation with federal resource departments and others
  - Maintains wildlife management information system (WMIS) and rare plants information system
  - Participates on Northern Contaminant Program Management Committee and NWT Territorial Contaminants Committee

- GNWT Industry, Tourism & Investment
  - Partners with local government and the IRC to provide programs and services that promote and support NWT economic prosperity and community self-reliance
  - Funds local wildlife committees and Take a Kid Hunting/Trapping programs

- Joint Secretariat
  - Funds Inuvialuit Game Council Wildlife Management Advisory Council, Fisheries Joint Management Committee, Environmental Impact Screening Committee and Environmental Impact Review Board
  - Provides administrative and technical support to co-management bodies

- Inuvialuit Game Council
  - Allocates Inuvialuit quotas among the six ISR communities and appoints members for any co-management body dealing with Inuvialuit fish and wildlife harvesting and environment
  - Provides implementation funding for wildlife research to GNWT and Environment Canada
  - Responsible for harvest monitoring
  - Participates in NWT Environmental Contaminants Committee

- Wildlife Management Advisory Council (NWT)
  - Provides wildlife management advice
  - Prepares wildlife conservation and management plans
  - Recommends appropriate wildlife harvest quotas in conjunction with Hunter Trapper Committees.

- Fisheries Joint Management Committee
  - Makes recommendations to the Minister of Fisheries and Oceans on subsistence quotas for fish, Inuvialuit commercial fishing, allocation of the preferential fishing licences to be granted under subsections (29) to 932), regulations regarding sport and commercial fishing in waters on 7(1)(a) and (b) lands and the identification of waters where such fishing may be prohibited
  - Restricts and regulates the public fishing on 7(1)(b) lands where a management is required to: conserve a stock, prevent serious conflict or interference with Inuvialuit activities or enjoyment of the land
  - Register Sport Fishing Licence holders intending to fish lakes or rivers on Inuvialuit Private Lands

- Hunters and Trappers Committee
  - Represents the collective Inuvialuit interest in wildlife and upholds harvest rights
  - Sub-allocate the subsistence quota for animals referred to in paragraph (6)(a) within its area of responsibility
  - Sub-allocate any Inuvialuit quota set for fish and the animals referred to in paragraphs (6)(a), (b) and (c)
  - Make by-laws, subject to the laws of general application, governing the exercise of the Inuvialuit rights to harvest referred to in paragraphs (6)(a), (b), (c) and (d) which are enforceable under the NWT Wildlife Act
  - Register Sport Fishing Licence holders intending to fish lakes or rivers on Inuvialuit Private Lands

16.0 Land Use (Section 4.3.8 of the EIS)

16.1 Project Design and Mitigation Measures (Section 4.3.8.2 of the EIS)

The construction timing, Highway design, and mitigation measures are intended to minimize potential land use effects. For example, one of the reasons that Alternative 3 (2010 Minor Realignment) was selected as the preferred route was that it minimized potential effects to the Husky Lakes, an area known for its wildlife and cultural values

Other mitigation measures that will be implemented include:

- Ensuring that construction vehicles stay on access roads or the construction site at all times;

- Prohibiting the recreational use of all-terrain vehicles and snowmachines by construction personnel while working on the Highway; and

- Prohibiting the recreational use of the Highway by Project staff during construction.

The Northwest Territories Protected Area Strategy has been reviewed and considered in the assessment of potential Project effects. The proposed Highway avoids all protected areas identified in the Protected Areas Strategy.

16.2 Residual Effects (Section 4.3.8.3 of the EIS)

The residual effect on land use that will remain after implementation of mitigation measures is the footprint of the all-weather Highway across the landscape. The Highway routing has been designed to avoid or minimize affecting particularly special cultural areas. Access to traditional or special locations will not be restricted by the Highway. The proposed Highway is a linear development that potentially influences land use at a regional level.

16.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
LAND USE	
The Developer will implement mitigation measures to minimize potential land use effects such as: -Ensuring that construction vehicles stay on access roads or the construction site at all times; and -Prohibiting the recreational use of the Highway by Project staff during construction, including the use of ATVs and snowmachines.	Construction
During the operations phase, the Developer will work with appropriate parties to install signage and/or develop educational materials to encourage users to stay on the Highway and not adjacent areas.	Operations
PLANNING AND DESIGN	
The Developer will conform to the IFA and the Tuktoyaktuk and Inuvik Inuvialuit Community Conservation Plans (CCPs) and will integrate the goals of these documents into the Project's environmental management.	Design, Construction
The Developer is committed to addressing the performance criteria and management goals identified in the ILA's draft Husky Lakes Special Cultural Area Criteria, pending approval.	Design
CONSTRUCTION	
The Developer commits to working towards achieving the Environmental Impact Review Board's goal statements for all phases of the proposed development.	Design, Construction, Operations
The Developer will use winter roads to access borrow sources; permanent all-weather access roads will not be required.	Construction
The Developer and its contractors will adhere to all applicable legislation, regulations, guidelines, and terms and conditions.	Construction

16.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS			
Valued Component	**Monitoring Program**	**Indicators**	**Measurement Parameters**
Land and Resource Use by Inuvialuit	• Wildlife monitoring • Socio-economic monitoring	• Intensity of land and resource use by Inuvialuit • Change in land use by transport infrastructure • Common indicators used by existing fish and wildlife monitoring programs	• Fish, wildlife and berry harvest levels • Frequency, duration and location of fish, wildlife and berry harvest • Highway traffic trends • Number of complaints from local co-management agencies • Common parameters used by existing fish and wildlife monitoring programs
Areas of Special Ecological and Cultural Importance	• Socio-economic monitoring	• Effects predictions • Intensity of use of Husky Lakes area • Change in land use	• Verify effects predictions and confirm the effectiveness of mitigation measures • Frequency and duration of Husky Lake use • Land use patterns and/or conversions • Number of complaints from local co-management agencies
Land Designation Areas (per IFA/ CCPs)	• Socio-economic monitoring	• Effects predictions • Intensity of use of special management areas, as identified in the CCPs	• Verify effects predictions and confirm the effectiveness of mitigation measures • Frequency, duration and location of use by residents and non-residents • Land use patterns and conversions in sensitive areas
Tourism, Commercial and Public Recreational Use	• Socio-economic monitoring	• Change in tourism, commercial and recreational businesses and revenues	• Number of tourists • Amount spent by tourists • Number and types of businesses operating in Inuvik and Tuktoyaktuk • Household consumption expenditure for commercial and recreational use • Land used for recreation • Highway traffic trends • Number of complaints from local co-management agencies

Furthermore, Section 7.1 (Biophysical Monitoring) of the EIS, reproduced as follows, describes the third-party monitoring that will be conducted. Environmental and wildlife monitoring will be done by third party monitors supplied by the ILA (environmental monitors) and the HTCs (wildlife monitors). The cost of supplying these monitors will be paid by the Developer/ construction contractor, as was done for the Tuktoyaktuk to Source 177 Access Road.

Several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. A list of relevant agencies and organizations, and their related responsibilities, is provided as follows:

- Aboriginal Affairs and Northern Development Canada (AANDC) (formerly INAC)
  - Administers legislation concerning use of Crown lands and non-renewable resources within the ISR
  - Responsible for administering the Inuvialuit Final Agreement
  - Responsible for Granular Management Planning and pit and quarry management strategy processes in cooperation with the Inuvialuit Regional Corporation (IRC)
  - Administers *Territorial Lands Act* and regulations including Territorial Land Use Regulations and Territorial Quarry Regulations and ensures compliance with authorizations
  - Administers *NWT Waters Act* and regulations and ensures compliance with authorizations
  - Responsible for Cumulative Impact Monitoring Program (CIMP) in the ISR under MOU with IRC
  - Responsible for cumulative effects assessments
  - Administers funding for Beaufort Regional Environmental Assessment (BREA)
- GNWT Transportation
  - Plans, designs, constructs or reconstructs, acquires, operates and maintains public transportation infrastructure in the Northwest Territories
- GNWT Education, Culture & Employment – Prince of Wales Northern Heritage Centre
  - Provides programs that promote the protection and management of archaeological sites in the Northwest Territories, including participating in regulatory processes that control land use activities that threaten archaeological sites, and regulating archaeological investigations
- GNWT Environment & Natural Resources - Forest Management
  - Manages forest resources through the following program functions - forest inventory; resource analysis; forest management planning and practices; and forest education
- Joint Secretariat
  - Funds Inuvialuit Game Council Wildlife Management Advisory Council, Fisheries Joint Management Committee, Environmental Impact Screening Committee and Environmental Impact Review Board
  - Provides administrative and technical support to co-management bodies
- Inuvialuit Land Administration
  - Responsible for managing and administering Inuvialuit-owned lands in the ISR, including reviewing applications for land and water permits
  - Granular Management Planning and pit and quarry management strategy processes in cooperation with INAC

17.0 Archaeological Resources (Section 4.3.9 of the EIS)

17.1 Project Design and Mitigation Measures (Section 4.3.9.2 of the EIS)

Further archaeological impact assessments are required prior to Highway construction, once the Highway centre-line has been finalized. To adequately complete intensive archaeological inventory survey, the Highway route must be finalized within a 100 m wide corridor and boundaries of all associated components such as borrow sources, work staging areas, construction camps must be identified prior to field work.

Initial archaeological reconnaissance identified that no known archaeological sites occur along the proposed Highway alignments. Of the known sites within 5 km of the proposed alignment, only two are located in areas that may be proposed as borrow sources. In assessing these potential borrow sites, mitigation measures would be implemented to resolve any potential effects to these sites. Furthermore, since much of the proposed alignment is located within areas with potential archaeological resources, appropriate mitigation measures will be implemented throughout the duration of the construction process to ensure compliance with heritage resource protection legislation and regulations.

The combination of background documentary data and overview terrain assessment has resulted in the identification of specific areas with sufficient potential for archaeological resources that ground reconnaissance is recommended.

In 2011, IMG-Golder Corp. (IMG-Golder) conducted an Archaeological Impact Assessment (AIA) of the proposed Inuvik to Tuktoyaktuk Highway including two potential realignments (Alternative 1 and Alternative 3) and several proposed borrow source locations.

The objectives of the AIA were to identify, record and assess heritage resources that might be impacted by the proposed Highway project and to devise appropriate mitigation strategies should any be found in conflict with the proposed Highway. Heritage resources typically identified in the area include: lithic scatters and quarry / workshops; stone features such as tent rings, caches and cairns; hearths and fire cracked rock concentrations; cabin remains and semi-subterranean house remains; cache pits; middens; graves; various types of wood features; and cut/ worked wood remains (Kiggiak-EBA 2011).

The field investigation focused on areas that were previously identified as having moderate to high potential for heritage resources that may be impacted by proposed Highway construction activities (Kiggiak-EBA 2011). Several potential borrow sources for granular material resources (e.g., gravel and sand; referred to hereafter as borrow sources) that are within close proximity to the proposed Highway right-of-way (ROW) were also included in the investigation.

No new archaeological sites were recorded as a result of the investigations and no sites will be directly impacted by the proposed Highway ROW and alternate routes.

Previously recorded archaeological sites in the area of the Highway ROW, borrow sources work staging areas, and construction camp locations will be avoided or additional studies be conducted, as necessary. On the recommendation of the contract archaeologist in the field the Developer shall implement avoidance or mitigation measures to protect archaeological

sites or to salvage the information they contain through excavation, analysis, and report writing, subject to the approval by the PNWHC.

An archaeological site(s) protection plan will be prepared that will facilitate the continued protection and management of archaeological resources during the construction phase of the Project. A typical plan includes detailed procedures for information flow between relevant agencies, how minor route realignments during construction will be assessed for archaeological impacts, and how this information will be communicated in a timely manner.

Mitigation measures will be designed on an individual basis, and require prior approval by the Prince of Wales Northern Heritage Centre. Mitigation measures may include avoidance (the preferred mitigation), temporary site protection, or systematic data recovery. It is expected that most archaeological sites found will be small and could be readily avoided with a minor Project realignment or footprint adjustment. GNWT Department of Transportation and the Hamlet of Tuktoyaktuk, along with the selected contractor, will make every effort to avoid and protect recorded and unrecorded archaeological and heritage resources during the conduct of this Project.

In the unlikely event that Project relocation is not feasible and a site will be impacted, recommended site mitigation will likely comprise detailed mapping, recording and excavation of a sufficient number of units to ensure a representative sample of the site contents is obtained. This ensures that knowledge of that site is available for future generations.

17.2 Residual Effects (Section 4.3.9.3 of the EIS)

No new archaeological sites were recorded as a result of the investigations and no sites will be directly impacted by the proposed Highway ROW and alternate routes. Several previously recorded sites are associated with potential borrow sources that were not investigated as part of the current study. If present, mitigation measures will be designed in collaboration with the Prince of Wales Northern Heritage Centre, to avoid Project effects on archaeological resources.

17.3 Relevant Developer Commitments

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

COMMITMENTS	PROJECT PHASE
ARCHAEOLOGY	
The Developer will hire a qualified archaeologist to perform a final Archaeological Impact Assessment within a 100 m wide corridor along the alignment and all associated components such as borrow sources, work staging areas, and construction camps. All types of terrain will be sampled, including those with limited archaeological potential.	Design, Construction
Mitigation measures will be designed on an individual basis, and require prior approval by the Prince of Wales Northern Heritage Centre.	Construction
The Developer will, on recommendation from the contract archaeologist or Prince of Wales Northern Heritage Centre, implement avoidance or mitigation measures to protect archaeological sites or to salvage the information they contain through excavation, analysis, and report writing.	Construction

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS	
COMMITMENTS	**PROJECT PHASE**
The Developer will prepare an archaeological site(s) protection plan to facilitate the continued protection and management of archaeological resources during the construction phase of the Project.	Construction
The Developer and its Project contractors will make every effort to avoid and protect recorded and unrecorded archaeological and heritage resources in accordance with the terms and conditions of the Northwest Territories archaeological regulations during the Project.	Construction
PLANNING AND DESIGN	
The Developer will conform to the IFA and the Tuktoyaktuk and Inuvik Inuvialuit Community Conservation Plans (CCPs) and will integrate the goals of these documents into the Project's environmental management.	Design, Construction
CONSTRUCTION	
The Developer and its contractors will adhere to all applicable legislation, regulations, guidelines, and terms and conditions.	Construction

17.4 Proposed Effects Monitoring

As an identified Valued Component, the following monitoring program was proposed in Table 4 of the Addendum, submitted to the EIRB in August 2011. Relevant sections of Table 4 are reproduced as follows.

TABLE 4: PROPOSED BIOPHYSICAL AND SOCIO-ECONOMIC EFFECTS MONITORING PROGRAMS			
Valued Component	**Monitoring Program**	**Indicators**	**Measurement Parameters**
Heritage and Archaeological Sites	• Environmental monitoring • Socio-economic monitoring	• Heritage and archaeological sites conservation	• Number of heritage and archaeological sites identified, disturbed, and/or relocated.

The Prince of Wales Northern Heritage Centre (PNWHC) is responsible for administering legislation and monitoring heritage resource protection. PNWHC provides programs that promote the protection and management of archaeological sites in the Northwest Territories, including participating in regulatory processes that control land use activities that threaten archaeological sites, and regulating archaeological investigations

18.0 MITIGATION AND REMEDIATION SUMMARY (Section 6.0 of the EIS)

A goal of the EIRB, as set out in the IFA, is to determine whether potential negative effects to wildlife, wildlife habitat, and wildlife harvesting can be minimized to acceptable levels using mitigative and remedial measures (EIRB 2010). This section of the EIS summarizes mitigative and remedial strategies that will be implemented to avoid or minimize potential effects to the Valued Components (VCs) identified through the environmental assessment process, to ultimately avoid affecting wildlife, wildlife habitat and wildlife harvesting.

Table 6-1 provides a summary description of the proposed mitigation strategies that will be implemented to avoid or minimize potential effects to the Valued Components (VCs) identified for this Project. VCs were selected for this EIS based on a combination of the directions provided in the EIRB Terms of Reference (2010), the Developer's understanding of the biophysical and socio-economic components, traditional knowledge as specified in the CCPs, the *Inuvialuit Final Agreement* and information gathered through consultation. Potential effects have been predicted for each VC, particularly related to the role of the VC in the ecosystem and to the Inuvialuit community. Table 6-1 summarizes the mitigation measures and strategies described in the effects assessment (Sections 4.2 and 4.3) of the EIS. Mitigation strategies for this Project include: Highway design, route location options, construction timing, additional field studies and monitoring, adaptive management, and contingency plans.

TABLE 6-1: SUMMARY OF MITIGATION STRATEGIES FOR IDENTIFIED VALUED COMPONENTS

Valued Component	Project Phase or Component	Potential Effect	Key Mitigation Measures[1]	Implementation Methods	Rationale for Use	Guidelines/ BMPs	Management and/or Contingency Plan(s) Required	Responsible Party
Noise	Construction and Operations: • Blasting • Heavy equipment • Vehicle traffic	Wildlife Effects: • Sensory disturbance • Behaviour alteration / avoidance	• Construction timing to avoid sensitive periods • Follow noise guidelines • Noise reduction planning, and implementation • Equipment will be properly maintained to ensure noise is minimized	• Based on advice from wildlife experts, the proximity of construction activities may be limited during sensitive periods, in accordance with relevant guidelines • Vehicle movements will be managed to minimize construction traffic • Machinery will be maintained to minimize resulting noise • Borrow sources will be selected to minimize haul distance • Operations will be adaptively managed, in consideration of potential noise effects to VCs	• Project location is remote and construction noise effects will be temporary • Potential effects during construction and operation are expected to be minimal	• DFO (1998) *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters* • INAC (2010d) *Northern Land Use Guidelines: Pits and Quarries, and Access Roads and Trails*	• Noise monitoring plan if required	Developer / Contractor
Terrain, Geology, Soil and Permafrost	Construction: • Blasting • Heavy equipment • Borrow source activity • Highway construction Operation: • Borrow pit activity • Highway operation	• Change in drainage and surface hydrology • Thaw slumps • Melting of ice-rich ground • Slope and soil instability • Erosion • Subsidence in permafrost • Permafrost thaw and Differential Settlement	• Winter construction, hauling, and stockpiling • Summer access via embankment • Protect permafrost by Highway alignment, embankment, and borrow pit design • Ensure proper drainage • Use appropriate materials for embankment • Borrow pits will be reclaimed upon decommissioning • Adaptive management	• Construct embankment during winter • Access and haul from borrow sources in winter • Conduct summer activities only where accessible by existing embankment • Stockpile materials on existing embankment • Minimize surface area of open cut • Grade slopes to minimize slumping • Grade storage and work areas to promote drainage • Grade slopes and replace overburden during borrow source reclamation • Design and construct embankments based on terrain type • Design Highway alignment to avoid unfavourable terrain • Install sufficient cross-drainage • Conduct spring and fall drainage inspections	• Similar techniques were used successfully on other road construction projects in the ISR • Vegetation and soil remain intact during construction with ground temperatures maintained; avoiding permafrost melting • Maintain drainage and surface hydrology	• INAC (2010d) *Northern Land Use Guidelines: Pits and Quarries, and Access Roads and Trails* • Transportation Association of Canada (2010) *Guidelines for Development and Management of Transportation Infrastructure in Permafrost Regions*	• Pit development plans • Environmental monitoring plan	Developer / Contractor
Water Quality and Quantity	Construction: • Borrow source construction • Highway construction Operation: • Borrow pit operation • Highway operation	• Reduced water quality or quantity • Contamination of surface water due to spills, erosion, sedimentation • Reduced water quantity • Changes to surface water flow regimes • Effects to fish and/or fish habitat • Effects on human health	• Construction timing • Highway, and in particular stream crossing, design • Erosion and sediment control strategies • Environmental Management and Spill Contingency Planning • Consultation and direction from DFO regarding fish habitat protection and/or compensation • Environmental monitors during construction • Adaptive management	• Erosion and sediment control measures • Primarily winter construction timing • Dust suppression during construction and operation • Adequate emergency spill planning and personnel training will be implemented • Activities that disturb soil and vegetation will be limited and monitored • Designate areas for refuelling and servicing vehicles and equipment • Environmental monitoring will occur throughout Project construction • Equip all vehicles and equipment with spill kits during construction • Minimize clearing and vegetation removal	• Similar techniques were used successfully on other road construction projects in the ISR	• DFO *Operational Statement for Culvert Maintenance* • DFO *Operations Statement for Temporary Stream Crossings* • DFO (2005) *Protocol for Winter Water Withdrawal in the Northwest Territories* • Conditions of Water License • DFO (1993) *Land Development Guidelines for the Protection of Aquatic Habitat* • CCME (2007) *Canadian Water Quality Guidelines for the Protection of Aquatic Life: Summary Table* • GNWT (1993) *Guideline for Dust Suppression*	• Erosion and sediment control plan • Environmental management plan • Spill contingency plan	Developer / Contractor

TABLE 6-1: SUMMARY OF MITIGATION STRATEGIES FOR IDENTIFIED VALUED COMPONENTS

Valued Component	Project Phase or Component	Potential Effect	Key Mitigation Measures[1]	Implementation Methods	Rationale for Use	Guidelines/ BMPs	Management and/or Contingency Plan(s) Required	Responsible Party
Changes to Hydrological Regime	Construction: • Culvert installation • Temporary and permanent stream crossings	• Effects on fish and fish habitat • Effects to downstream users • Flooding of habitat • Disrupted, reduced or eliminated flow • Wetland backfilling	• Construction timing • Highway routing and design • Infrastructure design and effectiveness • Monitoring for effects during and after construction • Consultation and direction from DFO regarding fish habitat protection and/or compensation • Environmental monitors during construction • Adaptive management • Regular culvert maintenance during operations, as required	• Design Project to accommodate site hydrology • Avoid sensitive areas during construction • Install and maintain crossing structures • Manage site drainage properly • Select culvert sizes appropriate to conditions, including maximum flow conditions • Monitor culverts after installation, to ensure flow • Select infrastructure to allow fish passage where necessary	• Similar techniques were used successfully on other road construction projects in the ISR	• DFO (1993) *Land Development Guidelines for the Protection of Aquatic Habitat* • DFO *Operational Statement for Culvert Maintenance* • INAC *Northern Land Use Guidelines for Roads and Trails* (2010c)	• Construction environmental management plan • Post-construction monitoring plan • Habitat monitoring program for fish • Erosion and sediment control plan	Developer / Contractor
Species at Risk and Species of Special Status or Management Concern	Construction: • Highway • Borrow pit • Blasting • Heavy equipment Operation: • Highway • Borrow pit	• Mortality or injury • Sensory disturbance • Displacement • Habituation and attraction • Interference with migration • Population effects • Increased harvest pressure • Habitat loss or degradation	• Project design and planning • Construction timing • Wildlife management plan • Construction environmental management plan • Spill Contingency Plan • Waste management plan • Progressive reclamation of borrow sources • Consultation and direction from regulatory agencies • Adaptive management • Public education • Wildlife monitors during construction	• Conduct field studies prior to construction, as necessary • Monitor for wildlife and birds during construction • Project routing will avoid sensitive locations and periods, where possible • Construction personnel will receive wildlife training • Encourage public education through signage for wildlife crossings and regarding hunting restrictions during operations • Regulation, monitoring and enforcement of harvest will be implemented • Wildlife deterrent mechanisms • Document, report and avoid wildlife and wildlife dens and bird nests during construction • Setbacks will be used to protect sensitive wildlife features • Lighting will be installed and managed, to reduce harm	• Current harvesting restrictions in place • No-hunting corridors have been successfully established along the Liard and Mackenzie Highways and the Ingraham Trail (Highway 4).	• *Species At Risk Act*	• Spill contingency plan • Wildlife management plan • Construction environmental management plan	• Developer/ Contractor • Stakeholders • ILA, HTC, ITC, WMAC, and GNWT ENR

TABLE 6-1: SUMMARY OF MITIGATION STRATEGIES FOR IDENTIFIED VALUED COMPONENTS

Valued Component	Project Phase or Component	Potential Effect	Key Mitigation Measures[1]	Implementation Methods	Rationale for Use	Guidelines/ BMPs	Management and/or Contingency Plan(s) Required	Responsible Party
Land and Resource Use by Inuvialuit	Construction: • Highway • Borrow source Operation: • Highway • Borrow source	• Improved access to areas used for hunting and fishing • Potential increased hunting pressure on wildlife • Potential alteration to wildlife distribution patterns	• Cooperation with regulatory agencies • Public education	• Construction crews will be required to stay on authorized access roads and within the construction area at all times • During the operations phase, install signage and educational materials to encourage Highway users to stay on the designated Highway • Minimum 1 km setback from Husky Lakes area	• Results of community consultations • Land and resource use is a valued part of the Inuvialuit identity • Special management areas must be managed according to various Inuvialuit legislation, plans, and guidelines. • Similar adaptive management techniques were used successfully on other road construction projects in the ISR	• Draft *Husky Lakes Special Cultural Area Criteria: ILM Special Area Plan* (ILA 2010) • EIRB (2002) *Husky Lakes Criteria* • *Husky Lakes Integrated Management Planning Study* (2001) • Tuktoyaktuk CCP • Inuvik Inuvialuit CCP • *Inuvialuit Final Agreement*	• Wildlife monitoring during construction	• Developer/ Contractor • GNWT ENR, FJMC, IGC, HTC, ILA • Highway Users
Areas of Special Ecological and Cultural Importance	Construction: • Highway • Borrow source Operation: • Highway • Borrow source	• Improved access to or near areas of ecological and cultural importance • Potential construction-related effects • Potential effects from Highway users	• Project planning and route selection to avoid areas of importance • Setbacks from areas of importance • Public education • Consultation and guidance from ILA	• Highway is located a minimum of 1 km from the Husky Lakes • Construction vehicles will stay on access roads or the construction site at all times • Recreational use of all-terrain vehicles and snowmachines by construction personnel while working on the Highway will not be permitted • Recreational use of the Highway by Project staff during construction will not be permitted • Signage will be installed encouraging Highway users to stay on the Highway	• Results of community consultations • Special management areas must be managed according to various Inuvialuit legislation, plans, and guidelines. • Similar adaptive management techniques were used successfully on other road construction projects in the ISR	• Draft *Husky Lakes Special Cultural Area Criteria: ILM Special Area Plan* (ILA 2010) • EIRB's *Husky Lakes Criteria* (EIRB 2002) • *Husky Lakes Integrated Management Planning Study* (2001) • Tuktoyaktuk CCP • Inuvik Inuvialuit CCP • *Inuvialuit Final Agreement*	• Environmental management plan	• Developer/ contractor • ILA • Highway Users

TABLE 6-1: SUMMARY OF MITIGATION STRATEGIES FOR IDENTIFIED VALUED COMPONENTS

Valued Component	Project Phase or Component	Potential Effect	Key Mitigation Measures[1]	Implementation Methods	Rationale for Use	Guidelines/ BMPs	Management and/or Contingency Plan(s) Required	Responsible Party
Land Designation Areas (as per IFA and CCPs)	Construction: • Highway • Borrow source Operation: • Highway • Borrow source	• Improved access to special management areas • Potential construction-related effects • Potential effects from Highway users	• Project planning and route selection to avoid areas of importance • Setbacks from areas of importance • Public education • Consultation and guidance from ILA	• Construction vehicles will stay on access roads or the construction site at all times • Recreational use of all-terrain vehicles and snowmachines by construction personnel while working on the Highway will not be permitted • Recreational use of the Highway by Project staff during construction will not be permitted • Signage will be installed encouraging Highway users to stay on the Highway	• Results of community consultations • Special management areas must be managed according to various Inuvialuit legislation, plans, and guidelines. • Similar adaptive management techniques were used successfully on other road construction projects in the ISR	• Tuktoyaktuk CCP • Inuvik Inuvialuit CCP • *Inuvialuit Final Agreement*	• Environmental management plan	• Developer/ contractor • Highway Users
Tourism, Commercial and Public Recreational Use	Construction: • Highway • Borrow source Operation: • Highway • Borrow source	• Improved tourism and recreational use • Increased opportunities for commercial ventures • Potential effects to tourist attractions during construction	• Project planning and route selection • Setbacks from areas of ecological and cultural importance • Construction timing	• Primarily winter construction • Accommodating winter construction crews in camps and not in tourist accommodations • Hiring northern workers and contractors to support the local economy, without displacing tourists • Develop infrastructure for increased access to Tuktoyaktuk for tourists and other uses • Develop infrastructure between Tuktoyaktuk and Inuvik for personal and recreational use	• Results of community consultations			• Developer/ contractor • Local Communities
Heritage and Archaeological Sites	Construction: • Highway • Borrow source Operation: • Highway • Borrow source	• Increased access to heritage sites • Potential effects to archaeological resources and sites	• Archaeological impact assessment prior to construction • Archaeological sites protection plan • Approved site-specific mitigation measures, as required, by the PNWHC • Route selection and final design • Worker education • Adaptive management plan • Construction environmental management plan	• Identify all known heritage and archaeological sites to be avoided during construction • PNWHC-approved mitigation measures will be implemented throughout the duration of the construction process • Comply with the heritage resource protection legislation and regulations	• Archaeological resources are protected through various federal, territorial and Inuvialuit legislation and regulations.	• The *Northwest Territories Archaeological Sites Regulations*, pursuant to the *Northwest Territories Act* • NWT Archaeologists Permit	• Archaeological site(s) protection plan • Construction environment management plan • Site-specific mitigation plans, as necessary	• Developer/ Contractor • Qualified archaeologist • Prince of Wales Northern Heritage Centre

ATTACHMENT 1

Northwest Territories Environment and Natural Resources

November 18, 2011

Mr. Jim Stevens
Director, Mackenzie Valley Highway
Department of Transportation
Government of the Northwest Territories
Box 1320
Yellowknife, NT
X1A 2L9

Dear Mr. Stevens

Please accept this document as a description of territory-wide programming conducted by the Government of the Northwest Territories (GNWT) Departments of Justice, Education Culture and Employment, Health and Social Services, NWT Housing Corporation, and NWT Bureau of Statistics. It is intended to assist the Inuvik to Tuktoyaktuk Highway Project Partners respond to the recent request from the Environmental Impact Review Board (EIRB) for additional information on this topic. Much of the information is supplementary to the Environmental Impact Statement (EIS) and Conformity Responses provided by the Project Partnership to the EIRB in May and August 2011.

As you are aware, several of these Departments assisted the Project Partnership by providing baseline information, where available, for the EIS as listed in the Project Terms of Reference (TOR) 9.2 and Appendix B). The NWT Bureau of Statistics subsequently contributed to the April 2011 draft Human Environment baseline chapter by providing detailed comments to the Partnership consultants. No attempt was made by social program departments to review the chapters pertaining to socio-economic effects assessment (TOR 10.2) or socio-economic effects monitoring (TOR 13.1).

During conformity discussions with the EIRB consultant advisors, it was clear that information on GNWT Departmental mandates would be useful to clarify or expand the statement "*The Developer has no plans to monitor the possible socio-economic and cultural effects of the project, as these are within the mandate of territorial, Inuvialuit and federal responsibilities and programs*" provided in the Developer's Response to Conformity Request #13. This overview provides clarification of the most significant programs and activities conducted by GNWT Departments. We also provide additional information on a collaborative socio-economic

monitoring activity led by the Inuvialuit Regional Corporation (IRC). However, we recommend that the EIRB seek additional information from other parties responsible for aspects of socio-economic programming or funding to supplement this submission.

Vision, Goals and Priorities of the Legislative Assembly

All GNWT Departments have departmental mandates assigned to them by the Legislative Assembly. Each new Legislative Assembly sets its vision, specific goals and priorities for its four-year term. Each Department then determines its programming requirements to attain the goals and priorities set out in the Government's strategic plan. Each Department develops and implements a departmental strategic plan and plan of action related to its mandate. A new Vision will soon be released by the 17th Legislative Assembly to guide the next four years of departmental planning.

Departmental Business Planning

As mentioned, the provision of public services is planned and organized through departmental business planning. As part of this approach, Departments undertake an environmental scan to determine specific pressures or issues, including resource development, that may require additional services or staff to address future impacts. In addition, Departments undertake strategic planning to develop approaches to make the most effective use of the financial resources of the GNWT. While Departmental strategic plan horizons vary in length of time, each Department develops an annual Business Plan which is reviewed and included in annual budget submissions or Main Estimates to be approved by the Legislative Assembly. Most Departments and Authorities collect data for the purpose of "monitoring" their programs for effectiveness and to identify resource requirements or new activities. Some of these statistics are required under coordinated national monitoring (for example, ensuring GNWT accountability under the Canada Health Act). This allows GNWT Departments to modify or change program activities over time in response to impacts or other changes. Some data collected also allows federal departments to modify or change their programs and activities.

The following section briefly highlights key social programming carried out across the NWT.

<u>Department of Justice</u>

The GNWT has overarching responsibility for the administration of justice and public safety. This mandate includes many services such as policing, courts, corrections, and community justice. It is carried out in a manner that respects community and Aboriginal values and encourages communities to assume increasing responsibilities.

To aid in the administration of justice, the GNWT has a '*Territorial Police Service Agreement*' with the Public Safety Canada. Under this agreement, the Royal Canadian Mounted Police (RCMP) provides a full spectrum of law enforcement and community policing services which

must meet, or often exceed, the safety needs and expectations of the people in the NWT. The RCMP enforces territorial and federal laws; assists with unexpected major events such as multiple fatality incidents or natural disasters; and, provides protection for visiting dignitaries.

For the purposes of the NWT Policing Agreement, the Commanding Officer of the RCMP in the NWT implements objectives, priorities and goals as determined by the federal Minister of Justice to reflect territorial priorities, including the deployment of the territorial Police Service personnel and equipment. Key public safety areas include: drug, alcohol and substance abuse and trafficking; family violence; and, safe travel on and off roads.

The Governments, in collaboration with the RCMP, have the authority to enforce measures under the *Northwest Territories Liquor Act* and the *Criminal Code of Canada.* The RCMP work in concert with certain GNWT departments, typically the Departments of Health and Social Services and Education, Culture and Employment, in the areas of alcohol and drug education. This includes the NWT Drug Strategy Program and the Drug and Alcohol Resistance Education Program (D.A.R.E.) which are active in most NWT communities. The D.A.R.E. program is designed to equip school children with the skills to recognize and resist social pressures to experiment with tobacco, alcohol, and other drugs. The program uses uniformed officers to teach a formal curriculum to students in a classroom setting.

The RCMP also enforces federal, territorial and municipal statutes relating to motor vehicles. Although every regular member of the RCMP is trained in traffic enforcement and investigations, the RCMP also has a NWT Traffic Services Unit dedicated to traffic education and enforcement. Local RCMP Detachments and the Department of Transportation communicate on highway safety and enforcement of the *Motor Vehicles Act* and *Public Highways Act*.

Department of Education Culture and Employment

The mandate of the Department of Education, Culture and Employment is to provide residents of the NWT with access to quality programs, services and support to assist them in making informed and productive choices for themselves and their families with regard to education, training, careers, employment and labour, child development, languages, culture and heritage. The Department is also responsible for assisting individuals to meet their basic financial needs. The "*Building on Our Success – Strategic Plan 2005 – 2015*" and companion Progress Report (as of March 31, 2009) provide a very detailed review of the Department's responsibilities. The following material covers some key highlights.

The Department develops programs for cultural, heritage and language education, early childhood through to post-secondary education, and career development. Divisional Education Councils, including the Beaufort-Delta Council, are responsible for the operation and administration of schools within their division, implementing curriculum, managing personnel, enrolling students and initiating proposals for new construction or other major capital expenditures.

Aurora College has a campus in Inuvik and offers college-level education and upgrading services, Aboriginal language and Cultural Instructor programs, and the Teacher Education Program Diploma and Adult Literacy and Basic Education (ABLE). In addition, the College also delivers other certificate, diploma and degree programs, and supports literacy outreach through the Caribou Literacy Outreach Centre in Inuvik. The College supports the delivery of ALBE and literacy through Community Learning Centres in Tuktoyaktuk and other communities in the ISR. The EIS discusses these institutions in more detail.

The Department provides a variety of career, employment and labour programs and services intended to ensure NWT residents have the skills, knowledge and opportunities to participate fully in the Northern economy. The Department works closely with industry, labour organizations and Aurora College in the areas of apprenticeship training, trades, and occupational certification, and offers programs such as Schools North Apprenticeship Program (SNAP) and Apprenticeship Training-on-the-Job. . The Department also works in partnership with other GNWT Departments, Aboriginal organizations, the federal government, private sector trainers and employers to encourage the development of a Northern workforce. As an example, the Government of Canada has entered into bilateral Labour Market Agreements (LMAs) with provinces and territories in order to increase labour market participation and enhance the employability and skills across groups that are under-represented in the labour force.

The Department has a number of programs that apply to low income persons across the territory. The basic level of benefits provides assistance for food, shelter, fuel and utilities. The enhanced level of benefits provides assistance with clothing, disabled/aged, education, furnishings, security deposits, emergency, and day care subsidies. All benefits have eligibility criteria. The social assistance program is intended as a last resort and provides assistance after recipients have exhausted most other resources such as pension income, employment income and cash on hand.

The current income security programs include:

- Student Financial Assistance (SFA) program - provides financial assistance to eligible WNT residents to help with post-secondary education-related expenses.

- Child Care User Subsidy - provides financial assistance to help parents pay for child care costs while they work or go to school.

- Income Assistance - provides a set amount for food, shelter, and utilities, and enhanced needs such as incidentals, clothing, allowances for seniors and persons with disabilities, furniture, and educational assistance, depending on household income, size of family community of residence, and the individual's ability to provide his/her own financial resources.

- NWT Child Benefit/ Territorial Workers Supplement - provides low-income families with monthly cash payments under the NWT Child Benefit (NWTCB) program to assist with the costs of raising children. This also includes a benefit called the Territorial Workers Supplement (TWS).

- NWT Senior Citizen Supplementary Benefit - provides financial assistance to help NWT Seniors to pay for living costs.

- Senior Home Heating Subsidy -provides financial assistance to seniors 60 and older to help them offset the cost of heating their homes during the winter.

These programs, including housing, utilities and food, are intended to assist low income persons regardless of local or regional inflation changes. These programs are based on income and some have a process to adjust the income support factor in response to annual inflation.

NWT Housing Corporation

The Northwest Territories Housing Corporation's (NWTHC) mandate is to provide affordable housing to those in core need. The NWTHC works in partnership with communities and aboriginal organizations throughout the NWT. The NWTHC delivers programs and services through local housing organizations. The goals of the partnership approach are to: assist communities to assume a greater role in providing housing for their residents; identify need; and, stimulate development in communities. The NWTHC maintains 5 district offices, including one located in Inuvik, to support the work of its community-based partners.

The NWTHC conducts its business planning on an annual basis. This exercise includes a capital planning component (i.e. construction/repair). In addition to the annual business plan, the NWTHC also prepares a three-year capital plan and a longer range 10 year capital plan. This allows the NWTHC to monitor community demand and to plan its construction and repair activities. By planning in advance for construction in subsequent construction years, the NWTHC hopes to minimize the impact from inflationary forces that may result from increased economic activity.

The challenge for the GNWT, along with its community partners, is to adapt to changes in individual needs by promoting the availability of adequate, suitable and affordable housing for residents of the NWT. The NWTHC addresses this challenge through a number of programs and initiatives. Programs and initiatives pertinent to low income persons include:

- Public Housing Program provides subsidized rental housing to individuals, families and senior citizens in need based on their household income. This program is available to residents of the NWT who are unable to find adequate or suitable housing without spending more than 30% of their gross household income on housing, therefore providing a measure of protection for community residents seeking subsidized rental units. Public housing programs are subject to availability and residency requirements.

- Providing Assistance for Territorial Homeownership (PATH) allows clients the opportunity to become homeowners by assiting in the construction or purchase of a modest home. Assistance is provided in the form of a forgivable loan. Clients obtain additional funding from an approved financial institution or other verifable sources. Contributing Assitance for Repairs and Enhancements (CARE) assists existing homeowners in making necessary repairs to their home to ensure a safe and healthy residence and to increae the useful economic life of their home. Assistance is provided in the form of a forgivable loan to subsidize the cost of preventative maintenance checks, repairs and renovations for their exsing home.
- Homeownership Entry Level Program (HELP) provides assistance to prospective first-time homebuers. Clients who are not able to secure mortgage financing or are unsure or their responsibilities as homeowners are provided the opportunity of experiencing homeownership commitments before purchasing a home. Asssitance is provided through a lease on a NWTHC home to the eligible applicant(s). The applicants pay 20% of their gross income toward the lease (rent) payment and hselter costs (power, water delivery, etc).
- Solutions to Educate People (STEP) provides education and counselling assistance consisting of four courses designed to prepare participants for the requirements of homwownership. STEP aims to increase homeownership applicants' financial skills, as well as their knowledge of the home purchase process and basic home maintenance repairs.

In partnership with Canada Mortgage and Housing Corporation (CMHC), the NWTHC also delivers the following programs.

- Homeowner Residential Rehabilitation Assistance Program (RRAP) provides financial assistance to low-income homeowners for manadatory repairs that will preserve the quality of affordable housing.
- Residential Rehabilitation Assistance Program – RRAP for Persons with Disabilities provides financial assistance to allow homeowners and landlords to pay for modifications to make their property more accessible to persons with disabilities.
- Home Adaptations for Seniors' Independence (HASI) provides financial assistance for minor home adaptations that will help low-income seniors to continue to perform daily activities in their home independently and safely.
- Emergency Repair Program (ERP) provides financial assistance to help low-income households in rural areas, for emergency repairs required for the continued safe occupancy of their home.

The NWTHC, the NWT Bureau of Statistics, Local Housing Organizations and communities collaborate to undertake conduct periodic housing needs surveys. The NWTHC uses the results to monitor changes in housing conditions and needs, as well as to assist in the targeting of housing resources to communities. The survey findings provide communities with the information needed to make decisions on where funding should be directed to address specific housing problems and needs identified. The latest survey was conducted in 2008. Information

from the 2008 survey will enhance the NWTHC's ability to respond to specific community needs.

Department of Health and Social Services

The Department of Health and Social Services' (DHSS) mandate is to protect, promote and provide for the health and well being of the people of the NWT. The delivery of health and social services is accomplished through the collaborative efforts of the DHSS and eight regional health and social service authorities including the Beaufort – Delta HSS Authority. The Department is primarily responsible for legislation, policy, standards, funding and strategic planning across the Territory while the Authorities plan, manage and deliver programs and services in the regions and communities. Some services are provided by non-government organizations through contribution agreements with the Department and/or the Authorities.

The health and social services system has the following goals and priorities:

Goals:

- Wellness - Communities, families and individuals make health choices; children are raised in safe environments and are protected from injury and disease.
- Access - The right service at the right time by the right provider
- Sustainability - Living within our means
- Accountability - Reporting to the public and Legislative Assembly

Priorities:

- Enhance services for children and families
- Improve the health status of the population
- Deliver core community health and social services through innovative service delivery
- Ensure one territorial integrated system with local delivery
- Ensure patient/client safety and system quality
- Outcomes of health and social services are measured, assessed and publicly reported

These are achieved through the implementation of the Integrated Service Delivery Model (ISDM) for the NWT Heath and Social Services System. The Department and Authorities developed the ISDM as their framework for the future delivery of health care services in the NWT. The ISDM is a team based, client-centered approach to providing health and social services that focuses on collaboration between caregivers to achieve quality health care service. Within the ISDM, there are three levels of care that may be accessed by all NWT residents. Appendix A provides details for the Inuvik and Tuktoyaktuk communities.

Primary Care is the level of care provided at the first point of contact with the health and social services system. Every community will have access to at least a basic team of primary health and social services care providers and to some diagnostic services. All communities will have access to clinical assessment and treatment, front line counseling, first aid, emergency care, after care, and monitoring of a plan of care. In very small communities, some of these services will have to be offered through visiting staff (a team of providers) with a system of referral/consultation for advanced assessment, care, and treatment.

Primary care is most often provided through a combination of primary community care teams and regional support teams. Primary community care teams operate at the community level and make referrals to regional support services, as required and according to established referral protocols. Regional support teams normally operate in those centres that function as the base for Authorities and may include intra-disciplinary and multi-disciplinary teams of professionals that provide on-site services, along with some itinerant services to the communities in the regions. These teams have some form of "surge" capacity to address extraordinary situations. Members of these teams also make appropriate referrals to territorial support services and to services available outside the NWT.

Secondary Care are the referred services located within hospital or other facilities in the NWT that respond to advanced and/or specialized needs. Secondary care services include internal medicine and surgery, alcohol and drug treatment (see also Addictions and Mental Health Services), psychiatry, pediatrics, obstetrics, and more advanced diagnostic services such as laboratory or more specialized radiology services.

Secondary care is most often provided by territorial support teams, comprised of professionals located in the larger communities who have a mandate to service the entire NWT. These teams can be multi-disciplinary or members of the same profession. These teams provide specialized on-site and itinerant support services to the regions and communities through appropriate referral protocols and also provide referrals to services available outside the NWT.

Tertiary Care are the more specialized diagnostic and treatment services that normally must be accessed outside the NWT, with some limited tertiary services being provided at Stanton Territorial Health Authority through visiting specialists.

Core Services

Within the ISDM model there are six core services, four of which are typically considered relevant for development activities in the NWT:

i) Mental Health and Addictions Services provide care and support to people who have a mental illness or addiction, and these services work to restore mental well being and help people to receive the care and support they need to live in optimal health.

ii) Promotion and Prevention Services help to improve health status and overall quality of life for persons in the NWT. Health promotion includes life skills, healthy choices, education and other factors that influence health and well being. Prevention efforts focus on human, environmental, social, cultural and other factors to prevent illness or injury.

iii) Protection Services help to protect communities and to take care of vulnerable people. Through regulatory oversight and enforcement of legislation such as the *Public Health Act*, these services manage and control public health issues such as safe food handling practices and the outbreak of diseases.

iv) Diagnostic and Curative Services are directed toward the assessment, diagnosis and treatment of illness, disability and disease. This is the public face of the health care system as seen in hospitals, health centres and clinics across the NWT.

Health and Social Service System Description

The health and social services system in the NWT operates on a budget of $344 million, with a workforce of 1,296 active positions.

The two hospitals in the NWT are located in Yellowknife and Inuvik.

Stanton Territorial Hospital in Yellowknife had 80 beds and 30 ambulatory beds in operation in 2010/11. Stanton's 21 full-time specialists provide services in radiology, general surgery, anesthesiology, internal medicine, orthopedics, ophthalmology, ear, nose and throat, obstetrics and gynecology, and psychiatry. Other medical specialty services may be available on a visiting basis. Diagnostic services include radiography, fluoroscopy and ultrasound. CT scans may be available. Emergency and acute care services are provided by physicians, nurse practitioners and registered nurses. Stanton offers advanced life support and emergency surgical services, with an intensive care unit. Stanton also has inpatient beds for surgical, medical, maternity, pediatric and psychiatric patients.

Inuvik General Hospital has 51 beds in operation and provides emergency, acute care, pharmacy, operating room, long term care, rehabilitation, nutrition and laboratory services. Diagnostic services include basic radiography, fluoroscopy and ultrasound. Inuvik offers advanced life support.

Public health and environmental health programs in the NWT operate under the direction of the Chief Medical Health Officer, who is assisted by two Medical Health Officers, one located in Yellowknife and the other located in Inuvik (part-time). They are responsible for a wide range of health promotion and disease prevention activities, including the enforcement of the *Public Health Act* and the *Disease Registries Act*.

Public health programs include immunization, communicable disease prevention, contact tracing for sexually transmitted infections, maternal and infant health programs and school

health programs. These services are provided by registered nurses working in public health units located in Yellowknife, Inuvik, and other communities. Two communicable disease specialists also work in the Office of the Chief Medical Health Officer, located in Yellowknife.

Environmental health programs include dealing with issues around safe water, safe food, air quality, environmental contaminants, waste and sewage disposal, infectious disease outbreak control and emergency preparedness. There are seven environmental health officers located in Yellowknife (4), Hay River (1) and Inuvik (2).

Mental health and addiction services are provided in most communities, delivered either directly by the Health and Social Service Authorities or by way of contribution agreements with non-government organizations. Services include awareness and education programs, assessment and referral services, community-based counseling and aftercare services. There is one alcohol and drug treatment center in the NWT located on the Hay River Reserve. Withdrawal management programs are offered at Stanton Territorial Hospital, Inuvik General Hospital and at the Fort Smith Health Center on an inpatient basis. The Salvation Army in Yellowknife provides a social withdrawal inpatient unit. Alcohol and drug treatment services are also provided in southern settings, when the needs exceed NWT capacity.

Stanton Territorial Hospital has a psychiatric unit with a consulting psychiatrist, addiction specialist, psychiatric nurses and a psychologist. Placements on this unit are normally made on a voluntary basis. The *NWT Mental Health Act* provides for involuntary treatment in some circumstances but in such situations, placements are usually made in Alberta psychiatric hospitals.

Child and family protection services are provided by community social service workers and social workers under the authority of the *Family and Children's Services Act*. This Act provides for the apprehension and taking into care of child and youth who are at risk of neglect or abuse, and includes the provision of a range of voluntary services to children and their families. Children receiving services under this Act have access to foster homes, group homes and residential treatment centers, both in the NWT (Yellowknife and Fort Smith) and in Alberta.

Family violence shelters, proving a safe environment for women and children at risk of abuse, are located in Tuktoyaktuk, Inuvik, Yellowknife and Hay River.

NWT Bureau of Statistics

The NWT Bureau of Statistics (the Bureau) has overall responsibility for the GNWT's statistical program. To fulfill this role, the Bureau:

- develops, interprets and disseminates those economic, social and demographic statistics required by the government;
- implements statistical programs for territorial government purposes and provides statistical advice and assistance to departments, regional offices and central agencies;

- coordinates statistical activities within the government to minimize the duplication of statistical effort and to help ensure that the statistics used by the government are current, consistent and accurate; and,
- provides for the continuing and effective representation of territorial statistical interests within the national statistical system.

The EIS provides a significant representation of socio-economic data that is housed by the Bureau. This includes periodic survey data that is collected by the Bureau with other Departments and administrative data provided by other Departments. The Bureau also has access to many data sets collected by Statistics Canada. The data housed at the Bureau is often available at a Canadian or Territorial level, and in many cases, also available for individual NWT communities. Many of these data sources are used to produce baseline indicators for montoring the socio-economic impacts of resource development projects.

Inuvialuit Regional Corporation – Indicators Project

The Inuvialuit Regional Corporation (IRC) has actively advanced its preparation for the potential impacts of expanded oil and gas activities in the ISR. In 2006, Canada passed the *Mackenzie Gas Project Impacts Act* which established a $500 million mitigation commitment to mitigate the socio-economic effects of the Mackenzie Gas Project. As part of the pre-planning process, Canada provided funds to the IRC to develop a "*Mackenzie Gas Project Impact Fund Investment Plan*". This plan recognized the importance of the development a set of indicators to measure impacts from resource development as a way of monitoring mitigation measures to determine the extent of impacts and to adapt those measures to ensure effectiveness.

The IRC has over the past four years developed a data base and website (http://inuvialuitindicators.com) to monitor social, cultural and economic conditions within ISR. The "Indicators Project" has received funding over this period through IRC's internal resources, and contributions from Aboriginal Affairs and Northern Development Canada (AANDC) for the Beaufort Sea Strategic Regional Plan of Action (BSStRPA), Mackenzie Gas Project Impact Fund planning funds and, currently, the Beaufort Regional Environmental Assessment (BREA). The Department of Fisheries and Oceans (DFO) with the Social Cultural and Economic Working Group of the Beaufort Sea Integrated Ocean Management Plan has also contributed to the identification of indicators and data gathering and design.

The IRC has worked with the Bureau to populate the current website. The Bureau was contracted to prepare an inventory of administrative data including descriptions so that indicators and tabulations can be requested from this administration data to further build base line data. Table 1 provides the current indicators for the primary valued socio-economic components available on the website (http://inuvialuitindicators.com).

Table 1. Current Indicators for Socio-economics in the Inuvialuit Settlement Region.

Population	Education
• Birthrate Per 100 Persons • Population Mobility (1-Year) • Population Mobility (5-Year) • Teen Births • Total Births • Total Population	• K-12 Enrollment • Population 15 Years Or Older With High School Or More • Population Aged 20-24 Years With High School Or More • Population Aged 20-29 Years With High School Or More
Culture	**Labour Force**
• Households Where Half Or More Of Meat And Fish Consumed Is Country Food • Population 15 Years Or Older Who Hunt And Fish • Population 15 Years Or Older Who Speak An Aboriginal Language • Population 15 Years Or Older Who Spent Time Trapping • Population 15-24 Years Who Speak An Aboriginal Language	• Distribution Of Skill Types In Employed Population (2004) • Distribution Of Skill Types In Employed Population (2009) • Employment Rate • Number of persons employed in the service sector per 1,000 employed (excluding government) • Participation Rate • Population Working 26 Or More Weeks In Previous Year • Unemployment Rate
Wellbeing	**Income**
• Accidental Death Rate Per 1,000 Persons • Alcohol Sales By Outlet Location In Thousand Litres • Charges For Violent And Property Crimes (Adults) • Children Receiving Services • Hospitalizations Due To Injury • Hospitalizations Due To Injury And Poisonings • Live Births With High Birth Weight (More Than 4.5 kg) • Live Births With Low Birth Weight (Less Than 2.5 kg) • Number Of Cases Of Sexually Transmitted Infections • Number Of Injury Deaths Excluding Homicides And Suicides • Number Of Premature Deaths (Deaths Before The Age Of 50) • Nurse-Diagnosed Injuries And Poisonings • Other Crimes Rate Per 1,000 Persons • Physician-Diagnosed Injuries And Poisonings • Potential Years Of Life Lost per 1,000 Persons (3 Year Average)	• Average Employment Income • Average Family Income • Average Monthly Income Support Beneficiaries • Average Monthly Income Support Cases • Average Personal Income • Families Earning Less Than $30,000 • Families Earning Less Than $75,000 • Median Family Income • Number Of Taxfilers • Number Of Taxfilers Reporting Employment Income • NWT Community Price Index (Yellowknife = 100) • Taxfilers Earning More Than $50,000

• Property Crime Rates Per 1,000 Persons • Violent Crime Rate Per 1,000 Persons • Youths Charged Per 1,000 (Aged 12 To 17)	
Government • Correctional Facilities Expenditures Per Capita • Early Childhood Services Expenditures Per Capita • Health Services Expenditures Per Capita • Physicians Billings Expenditures Per Capita • Police Services Expenditures Per Capita • Post Secondary Student Services Expenditures Per Capita • Public Housing Contribution Expenditures Per Capita • Schools Expenditures Per Capita • Service Provided By Hospitals Outside NWT Expenditures Per Capita • Social Assistance Expenditures Per Capita • Supplementary Health Benefits Expenditures Per Capita	**Housing** • Percentage Of Households In Core Need • Percentage Of Households In Need Of Major Repairs • Percentage of Households Living In Public Housing • Percentage Of Households Owned • Percentage Of Households With Adequacy Problem • Percentage Of Households With Affordability Problem • Percentage Of Households With Six Or More Persons • Percentage Of Households With Suitability Problem

Concluding Remarks

On October 22, 2010, the GNWT filed a table with the EIRB which briefly described the availability socio-economic data as part of its review of the draft EIS TOR. The accompanying letter also flagged some concerns regarding the socio-economic requirements of the draft TOR. The intent at the time was to encourage the EIRB to scope the project EIS to be relevant to the type of project, the availability of information, and the limited mandate of the Proponent Partnership developer regarding socio-economic monitoring and follow-up. Some recommendations were not applied by the EIRB [e.g., the recommendation to remove the last bullet in 13.4 requiring information on contractor and sub-contractor requirements for promoting activities and programs related to community stability and wellness].

In retrospect, it is unfortunate that the Final TOR did not clearly separate the linkage between the baseline and socio-economic effects analysis (that is the responsibility of a developer) from the socio-economic follow-up and monitoring which is largely already underway as part of the normal social programming of governments and other parties. In most jurisdictions, including the example of a comparable road in northern Saskatchewan currently undergoing a coordinated Comprehensive Study under the *Canadian Environmental Assessment Act* and a provincial environmental assessment[1], the ongoing responsibilities of governments are

[1] Provided by the Project Partnership as part of its comments on the draft TOR.

accepted as a matter of course and the EA requirements of a developer are limited to matters under their control.

In summary, the GNWT social program Departments and related Authorities and agencies carry out a substantial array of programs that support many of the areas raised in the TOR including infrastructure, education training, social services, policing services, health services, and social assistance. As part of its standard business evaluation and planning, these Departments and Authorities monitor a large number of indicators to ensure appropriate program implementation across the NWT. This monitoring, including periodic surveys, is designed to respond to the continuing changes occurring in NWT communities rather than in response to single project effect predictions. While the GNWT does not term the government's programs as a "project mitigation commitment" or its monitoring as a "project followup and monitoring commitment", it is clear the end result is similar to the TOR requirements for socio-economic monitoring and followup. Therefore, the GNWT does not recommend the Project Partnership be held responsible for socio-economic effects monitoring beyond the Developer commitments in the EIS.

The GNWT, as a registered party to the EA, expects to provide further clarification during the technical analysis phase of the project. In the meantime, we trust that this submission will assist the EIRB in its understanding of the roles and mandates of our key social programming departments.

Sincerely

Gavin More

Gavin More
Manager
Environmental Assessment and Monitoring
Environment and Natural Resources

APPENDIX 'A'

HEALTH AND SOCIAL SERVICES PROGRAMMING IN TUKTOYAKTUK AND INUVIK

The Government of the Northwest Territories (GNWT) collaborates on numerous initiatives aimed at providing addiction prevention and sexual education programs to communities.

GNWT supports a variety of alcohol and drug prevention activities, supports community wellness activities, offers treatment programs and supports aftercare programs.

GNWT anticipates that its current programming will meet the needs of residents of the Northwest Territories (NWT) that request access to health and/or social services.

GNWT plans for the delivery of health and social services based on the provision of appropriate access to safe, quality patient focused care. It takes into consideration projected increases in demand related to emerging issues such as: an aging population, increased prevalence of chronic disease, changes in health status, as well as increases in economic development.

As the NWT health and social services system functions as an integrated territorial system, the development of a specific coordinated health care plan related solely to one project would not be in the best interests of the NWT population as a whole.

However, the Department of Health and Social Services (DHSS) monitors and evaluates the efficacy of our programs and tracks health and social indicators in the region.

The DHSS will continue to provide prevention programming aimed at reducing the impacts of mental health and addictions issues in all regions of the NWT.

Below is a listing of services offered in the affected region.

Health Centres	Community	Treatment Pattern	Community Services
Level B **HSS Centre**	Tuktoyaktuk	Stabilize, hold and transport	• Primary community care services are provided by a multidisciplinary team comprised of locally-based nurses, social workers, and counsellors, along with local community health, wellness and other support workers. • Visiting providers such as physicians, dentists, and therapists see patients on a regularly scheduled basis, and remote consultation and support is available via telehealth. • Services not provided at the local level are provided at the regional or territorial level with health centre staff or service partners facilitating the referral and transfer of individuals to higher levels of care and service as required.
Level D **Regional Hospital**	Inuvik Regional Hospital	Regional Referral Hub	• Advanced life support services provided 24/7 with on-call physicians • Acute care inpatient services • Multipurpose/ community support beds • Low complexity surgical services • Obstetrical care • On site rehabilitation team • General diagnostic and laboratory services • Long term care on-site and/or off-site

PCC **Primary Care Centre**	Inuvik	Primary Care – first point of contact	Primary care services are delivered by a broad range of service providers, including physicians, nurse practitioners, nurses, counsellors, and more. Services include: • Health promotion, including healthy lifestyle promotion, maternal health, reproductive and child care and community development • Health protection and preventative services, including screening, intervention disease control, prevention of injury, prevention of chronic diseases and addictions, hearing and vision, early intervention. • Acute, diagnostic and laboratory services • Continuing care, including palliative care and long-term care • Developmental rehabilitation and support services, including mental health and addictions
Level 3/4 **Long Term Care Centre**	Inuvik Regional Hospital Long Term Care Unit	24-hour care for those who can no longer live independently	Long-term care homes are designed for people who require the availability of 24-hour nursing care and supervision within a secure setting. In general long-term care homes offer higher levels of support than assisted/supported living facilities. All long term care homes offer 24-hour supervision including services such as: meals, medical/clinical supplies and devices, medication

			administration, and assistance with essential activities of daily living.
Social Service Facilities	Community Level (Tuktoyaktuk) Regional Level (Inuvik) Territorial Level	Basic care provided locally with access to regional and territorial services through referrals.	Prevention, awareness, and early intervention services are provided at the community level to the greatest extent possible, with a focus on addiction and mental health, child and family services, and family violence prevention. Aftercare programming and services are also offered, wherever possible, within communities. Mental health counselling, prevention, promotion and addiction counselling services, assessment and referral to psychiatric and psychological services, crisis stabilization and group home services for those with a mental disability. Residential treatment, tertiary care, and psychiatric services offered at the territorial level. In some situations, referrals outside of the NWT are required.

* DHSS is mandated to provide the services above. Services being offered in any community may change due to human resource restrictions, in which case health or social service providers will travel to the community on a scheduled basis, or clients will be referred to the regional or territorial level.

ATTACHMENT 2

Taking Care of Caribou

The

CAPE BATHURST, BLUENOSE-WEST, AND BLUENOSE-EAST BARREN GROUND CARIBOU HERDS MANAGEMENT PLAN

Submitted by The Bluenose Caribou Management Plan Working Group in partnership with Terriplan Consultants to:

Advisory Committee for the Cooperation on Wildlife Management

May 9, 2011

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1.0 Preamble

This Plan is called *Taking Care of Caribou*. For as long as Aboriginal people have harvested caribou, they have felt a responsibility to take care of the caribou as related in many oral histories. Barren-ground caribou and the Aboriginal people of the North have a complex and ancient history – the abundance and health of the caribou has profoundly influenced the distribution and health of the people.

In the past, traditional harvesting practices that showed respect for caribou helped to keep a balance between harvesters and caribou. These traditional practices were a way of "managing" the caribou. However, elders recall times when caribou were scarce and people searched out other species - for some regions it was moose and for others it was fish. Their knowledge indicates that caribou populations have a natural cycle of 30-60 years where herds go from high to low numbers and back again.

The basic ways of showing caribou respect through Aboriginal harvesting practices is:

- Take only what you need
- Always share with others in need
- Use all parts of the caribou

All the communities in the range of these three herds - the Cape Bathurst, the Bluenose-West, and the Bluenose-East - have been engaged for their input and knowledge. During community meetings, many participants expressed concern about how historical events, modern practices, and changing cultures have affected the relationship between Aboriginal people and caribou. In the past, as now, taking care of caribou has been about managing human actions to sustain healthy caribou populations. The challenge is to create a plan that respects Aboriginal rights and finds a balance between the resources we use today and the resources we leave for future generations.

For decades, Aboriginal people have worked hard to settle their comprehensive land claims so they would have greater control over their land and their lives. The treaties and land claim agreements provide for certain rights for both the ability and the responsibility to manage wildlife.

"It's very hard for elders to express their feelings when they are asked about caribou. I have feelings for the caribou. We really take care of the caribou... people from the government... don't understand the Dene way and how we relate to the caribou."
(Délįnę)

"All herds are declining. We are not traditional hunters anymore. There are more hunters than before, and younger hunters. We can't say there are many caribou and we can just hunt what we please. We need to think about our future generations."
(Kugluktuk)

"You know we all settled our land claims so we could make decisions rather than government. We have responsibilities that government had in the past. Now we may need to make some difficult decisions, as part of the management plan."
(Inuvik)

Observations by caribou harvesters and elders, and the results of scientific studies, indicate that barren-ground caribou populations in the western arctic declined in the early 2000s. In some cases the decline was quite drastic. Although there is no consensus on the cause of the decline, all agree that caribou are an essential resource and central to the social, economic, cultural, and spiritual well-being of the local people. Considering what is at stake, it is important to have a plan to sustain these herds so we may have *caribou forever*.

The Advisory Committee for Cooperation on Wildlife Management (ACCWM), comprised of seven co-management boards and agencies, was established in 2008. It decided, as a matter of priority, to form the Bluenose Caribou Management Plan Working Group (BCMPWG or the Working Group) to develop a plan for the three caribou herds. This plan was developed with strong involvement by the 15 communities, in six land claim areas, that harvest these caribou.

2.0 Why Make a Plan Now

2.1 Introducing the Plan

Historically, the 'Bluenose Caribou Herd' occupied what is now the northern portion of mainland Northwest Territories (NWT) and western Nunavut. However, the study of caribou movements using satellite collars and genetic studies revealed that there are three different herds with three distinct calving grounds. The Cape Bathurst, Bluenose-West, and Bluenose-East herds are the names which replace the general term 'Bluenose Caribou Herd'.

The Plan describes:

- Principles and goals for taking care of the three herds;
- The need for a plan now and the importance of working together;
- Current population estimates and trends;
- Roles and responsibilities of the wildlife co-management boards and agencies;
- Information required to effectively manage the herds;
- How to make decisions on managing the herds;
- A framework for determining what management actions should be taken; and
- How to communicate with communities, harvesters, youth, and others.

An ENR-GNWT companion document (Technical Herd Status Report) provides more detail on herd status.

"It hurts to see less caribou because we need them for so much. We here have caribou as food – we just take what we need. We talk among the community and discuss what's needed."
(Délı̨nę)

2.2 Working Together Now and Into the Future

The ACCWM was established to "exchange information, help develop cooperation and consensus and make recommendations regarding wildlife and wildlife habitat issues that cross land claim and treaty boundaries." The ACCWM[1] consists of the Chairpersons (or alternate appointees) of:

- Wildlife Management Advisory Council (NWT) (WMAC_NWT);
- Gwich'in Renewable Resources Board (GRRB);
- Sahtú Renewable Resources Board (SRRB);
- Wek'èezhìi Renewable Resources Board (WRRB);
- Kitikmeot Regional Wildlife Board (KRWB);
- Tuktut Nogait National Park Management Board (TNNPMB); and
- Nunavut Wildlife Management Board (NWMB).

The ACCWM decided to develop a plan for the Cape Bathurst, Bluenose-West, and Bluenose-East barren-ground caribou herds. While the immediate need for the plan was in response to drastic declines in the herds, the intent is for the plan to address caribou management over the long term. The ACCWM identified the need to:

- Develop a cooperative approach to managing the herds;
- Protect the habitat in the herds' range, and
- Make decisions on the shared harvests in an open and fair manner.

As was clearly heard in community engagement meetings, the users expect government and the wildlife co-management boards to work together, and with the communities, to ensure that there are indeed *caribou forever*.

The ACCWM established a Working Group[2] to:

- Prepare a draft plan for the Cape Bathurst, Bluenose-West, and Bluenose-East caribou herds and their habitat for recommendation to the ACCWM;
- Recommend an approach with respect to the shared responsibility for implementing the plan; and
- Promote and strengthen communication and sharing of information among all groups interested in, or responsible for, the management of these herds and their habitat.

"Some people have stopped hunting, hoping that this will help there be more caribou for grandchildren. One harvester has stopped for 6 years now." (Inuvik)

[1] The Dehcho First Nation is part of the Working Group. There is an outstanding invitation for them to join the ACCWM.

[2] See Appendix D for a list of ACCWM and BCMPWG member organizations

3.0 How the Plan Was Put Together

"Use traditional knowledge: it's very important to our way of hunting" (gather knowledge and then use it to develop the management plan). (Fort McPherson)

The Plan was developed in close consultation with the communities that harvest from the three herds. Two rounds of community engagement in 2009-2011 involved 15 communities in five regions - Inuvialuit, Gwich'in, Sahtú, Tlicho and Kitikmeot, NU.

Because these herds are shared across jurisdictions and among many communities, it is very important that everyone works together. It was necessary to seek the experience, input, and advice of all regions and communities. The community engagements were designed to:

- **Share the best available information** on the status of the herds, including both scientific information and harvester observations.
- **Identify the key issues and concerns** for each community, e.g. what do you think is happening to the herds? Why?
- **Discuss possible solutions:** What can we do to address these issues and concerns? How can we include this in a plan?
- **Outline the next steps** in developing a plan.

"Back in the 1950-60s, you did not hear about declines in caribou because Aboriginal people were managing properly. We used community freezers which were filled with bulls from fall community hunts. People were allowed to take meat once a week from the freezer. We need to go back to the old ways of managing things." (Tulıt'a)

Summary reports from the community engagements were prepared by the Working Group and provided to each community. Copies (e.g. *Developing a Caribou Management Plan: Summary of Phase I Consultations in the Inuvialuit Settlement Region; December 2009)* are available from Working Group representatives (see Appendix B).

4.0 What We Are Trying To Do With the Plan

The ultimate goal of this plan is to ensure that there are "caribou forever" - caribou for today and for future generations. The herds will be managed to:

- Conserve vital, healthy caribou herds and habitat; and
- Keep the overall harvest within sustainable limits.

The ACCWM believes that traditional Aboriginal values and practices should be protected and promoted, including values such as respect for wildlife and traditional lands. It also includes the traditional harvesting practices of taking only the amount needed, using all parts of the caribou, sharing, and passing on traditional methods and beliefs to the next generation. This plan supports those values and reflects the following principles:

- Management decisions will respect treaties and land claim agreements and Aboriginal harvesting rights in areas both with and without a land claim agreement.
- Management decisions will reflect the wise use of the herds in a sustainable manner.
- Adequate habitat (quantity and quality) is fundamental to the welfare of the herds.
- Management decisions will be based on the best available information - both science and TEK; and will not be postponed in the absence of complete information.
- Effective management requires participation, openness and cooperation among all users and agencies responsible for the herds and their habitat. Shared use requires shared responsibility.
- Harvests must be allocated in a manner which respects Aboriginal harvesting rights and the sustainable harvesting limit, if any, of each herd.
- We must anticipate and minimize impacts to caribou herds and their habitat.

"Young people are getting wiser now and hunting caribou without calves (because of tags)." (Paulatuk)

5.0 What Caribou Are We Talking About

The Cape Bathurst, Bluenose-West, and Bluenose-East herds occupy a large part of northern mainland NWT and western Nunavut (**Figure 1**). Each herd has a traditional calving area that is used in June. After calving and post-calving, the herds migrate southward. The Bluenose-West and Bluenose-East herds reach the tree line for the rut in October, while the Cape Bathurst herd winters inland on the tundra.

From the 1960s to 1990s the three caribou herds were managed as a single herd – the 'Bluenose Caribou Herd' (**Figure 1**). In the mid 1990s, the information from aerial population surveys and satellite collar data showed three different calving areas and two different rutting areas. Scientists also looked at the genetics of the animals by collecting DNA samples from the calving grounds. Results supported the idea of three separate herds within the 'Bluenose caribou herd' and that each herd occupies a different annual calving area. As biologists define herds of barren-ground caribou by their separate calving grounds, the 'Bluenose caribou herd'

was re-named as the Cape Bathurst, Bluenose-West, and Bluenose-East herds. The population size and distribution of herds change over decades because of environmental changes and human activities. The herd ranges shown in **Figure 2** are based on twelve years of tracking radio collared caribou cows within each herd.

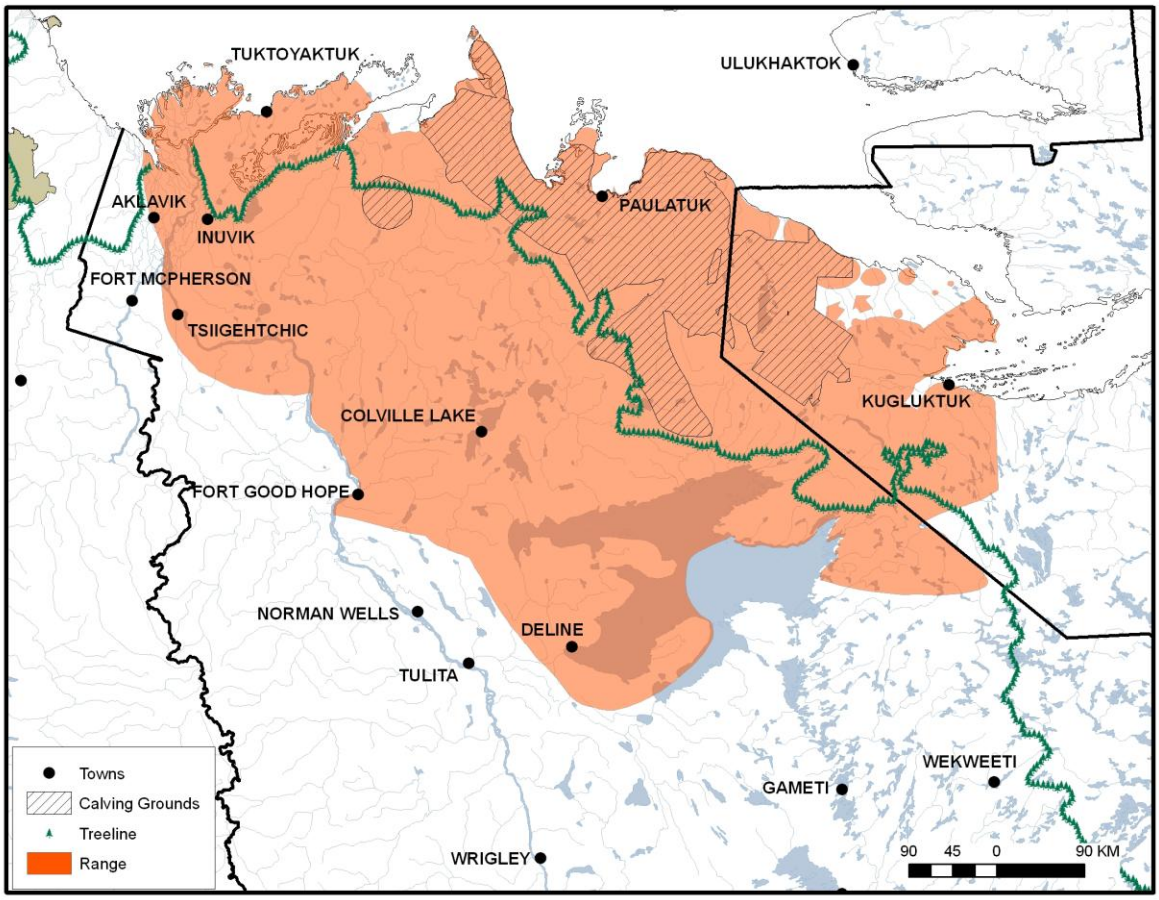

Figure 1 *Historic 'Bluenose Caribou Herd' Range (ENR-GNWT)*

Although the three herds have distinct calving grounds, their ranges sometimes overlap. Cape Bathurst caribou calve on the Cape Bathurst Peninsula, rut east of Husky Lakes, and winter in the Tuktoyaktuk Peninsula-Husky Lakes area (**Figure 2**). Bluenose-West caribou calve west of Bluenose Lake in Tuktut Nogait National Park and adjacent areas to the west, rut in the Anderson River and Colville Lake area and winter on the Tuktoyaktuk Peninsula and south into the Sahtú Settlement Area (**Figure 2**). The Bluenose-East caribou calve east of Bluenose Lake in the headwaters of the Rae and Richardson rivers, rut northeast of Great Bear Lake, and winter north, east, and south of Great Bear Lake (**Figure 2**). Note that there is more detailed information in the companion document – the ENR Technical Herd Status Report.

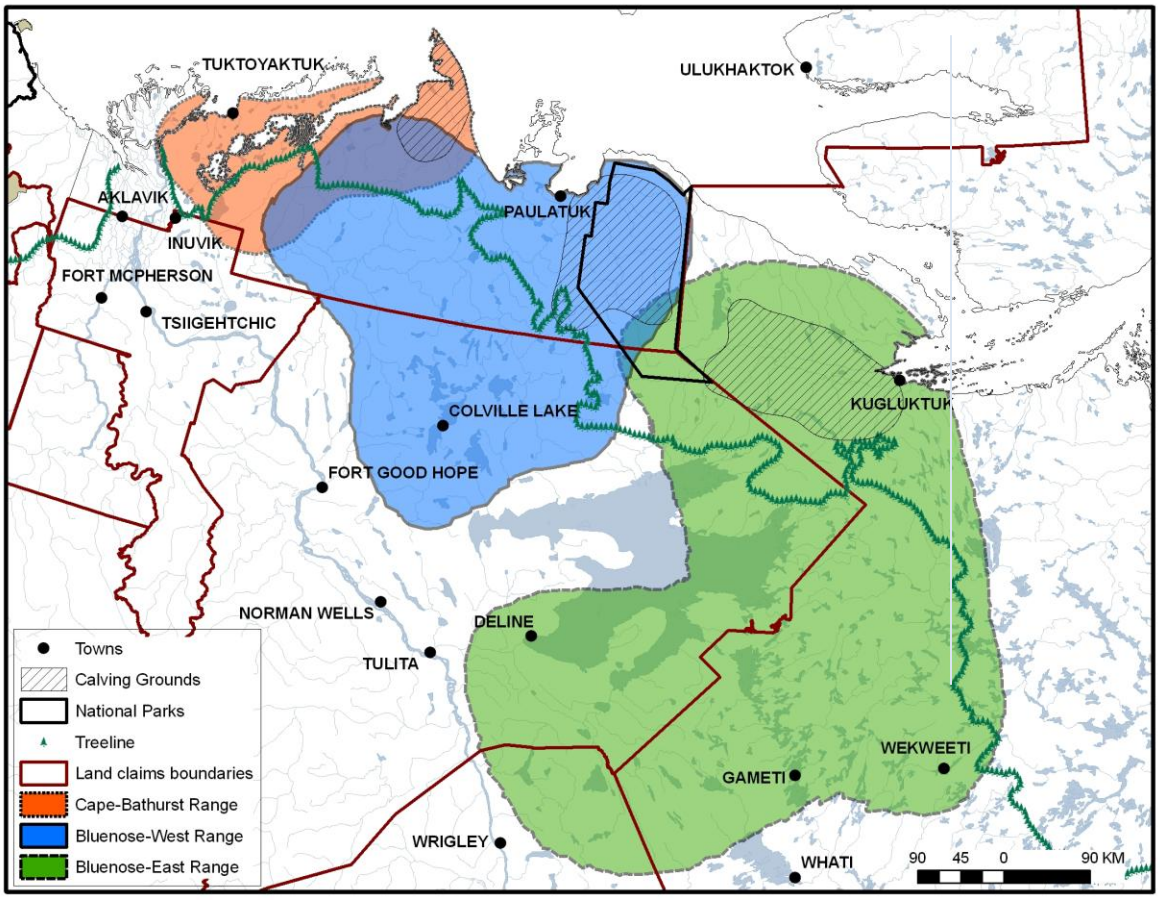

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Figure 2 *Overlapping herd ranges, based on collar data from 1996 to 2008*

Seasonal overlap in herd range creates challenges in allocating appropriate harvest levels for each herd.

The ranges of the Cape Bathurst, Bluenose-West, and Bluenose-East herds may also overlap at times with those of other caribou herds (**Figure 3**). For example, during some winters, the Bluenose-East herd overlaps with the Bathurst herd. As the overlap between herds can change from year to year, several communities harvest from more than one herd. For example, harvesters from Aklavik generally harvest from the Porcupine caribou herd but they sometimes also harvest from the Cape Bathurst herd. Also, herd ranges include different land

"In the past, we had choices on which caribou herds to hunt, because they were close by. But nowadays, we have no choices anymore; the herds are no longer close to the Kugluktuk area. The caribou herds are further away, and the migration routes have changed." (Kugluktuk)

[3] Nagy, John, Deborah Johnson, Nicholas Larter, Mitch Campbell, Andrew Derocher, Allicia Kelly, Mathieu Dumond, Danny Allaire, and Bruno Croft. *In press.* Subpopulation structure of caribou (Rangifer tarandus L.) in Arctic and sub-Arctic Canada. Ecological Applications. [doi:10.1890/10-1410.1]

owners and wildlife management regimes; all of which requires a coordinated approach to habitat and herd management.

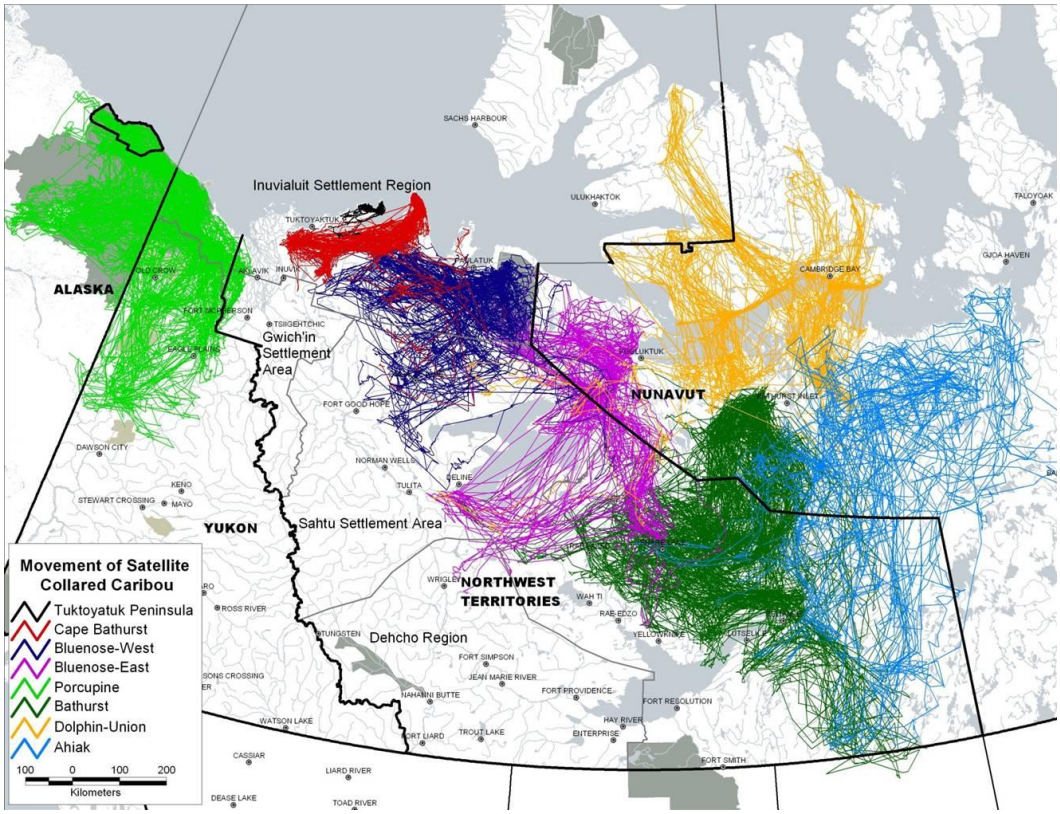

Figure 3 *Range of Barren-Ground Caribou Herds in the Northwest Territories (ENR-GNWT)*

A previous co-management plan for the 'Bluenose caribou herd' was prepared in 2000. It also had extensive community and co-management board involvement; however, the plan was never fully endorsed or implemented. The previous plan grouped all three herds as the Bluenose herd because there was not yet consensus on distinguishing them as three separate herds and because of many common management concerns.

6.0 Who Harvests These Caribou

"Call all groups together…so we can work together. It need not involve a hundred people but we need to start talking." (Inuvik)

Historically, there were subsistence, resident, non-resident (i.e., outfitted), and commercial harvests of the three herds. However, after a series of community meetings in 2005/06, WMAC-NWT, the GRRB, and the SRRB recommended harvest restrictions to the Environment and Natural Resources (ENR) Minister. All resident, non-resident, and commercial harvesting stopped in March 2006 in the Inuvialuit Settlement Region (ISR) and October 2006 in the Gwich'in Settlement Area (GSA) and the Sahtú Settlement Area (SSA).

Resident and non-resident hunting last occurred in the Tłı̨chǫ Settlement Area in 2009. The herds harvested by each community are summarized below.

The **Cape Bathurst herd** typically migrates through two settlement areas/regions and is harvested by three communities in the course of its annual cycle **(Figure 2):** Aklavik, Inuvik, and Tuktoyaktuk.

The **Bluenose-West herd** typically migrates through three settlement areas/regions and is harvested by 13 communities **(Figure 2):** Aklavik, Fort McPherson, Tsıigehtchıc, Inuvik, Tuktoyaktuk, Paulatuk, Colville Lake, Fort Good Hope, Norman Wells, Tulıt'a, Délı̨nę, Ulukhaktok[4], and Sachs Harbour[4].

The **Bluenose-East herd** migrates through four settlement areas/regions in the Northwest Territories and into the eastern portion of the Kitikmeot Region, Nunavut. The herd is harvested by nine communities **(Figure 2)**: Wrigley, Norman Wells, Tulıt'a, Délı̨nę, Whatì, Gamètì, Behchokǫ̀, Paulatuk, and Kugluktuk. This herd may also be harvested by any General Hunting Licence holder from another community who accesses the herd by winter road.

The location and movement of the herds changes over time. Many long term harvesters describe how herds once traditionally available for harvesting now migrate too far from town to access and economically harvest.

7.0 How Well Are the Herds Doing

Aerial surveys from 1992 to 2006 indicated a significant decline in the Cape Bathurst and Bluenose-West herd numbers and the 2009 survey showed the two herds to be stable but still low in relation to historic high numbers. The Bluenose-East herd declined from 2000 to 2006 but the 2010 survey showed the herd appeared to be increasing. Since 2008, recruitment in the three herds has been good (above 30 calves per 100 cows) and health and condition as assessed by harvesters was better in the 2010/2011 season than in the previous three years. For more detailed information on herd status see the companion technical ENR Technical Herd Status Report.

"When you say the herds are in decline – personally I believe it." (Fort Good Hope)

[4] Community harvesters from Ulukhaktok and Sachs Harbour are provided tags and their harvesting occurs on the mainland.

Cape Bathurst Herd

The **Cape Bathurst herd** population declined from an estimated high of approximately 20,000 animals in 1992 to about 2,000 animals in 2005 and 2006 (**Figure 4**). The 2009 population estimate showed the herd to be stable since 2006 but still low in relation to historic high numbers.

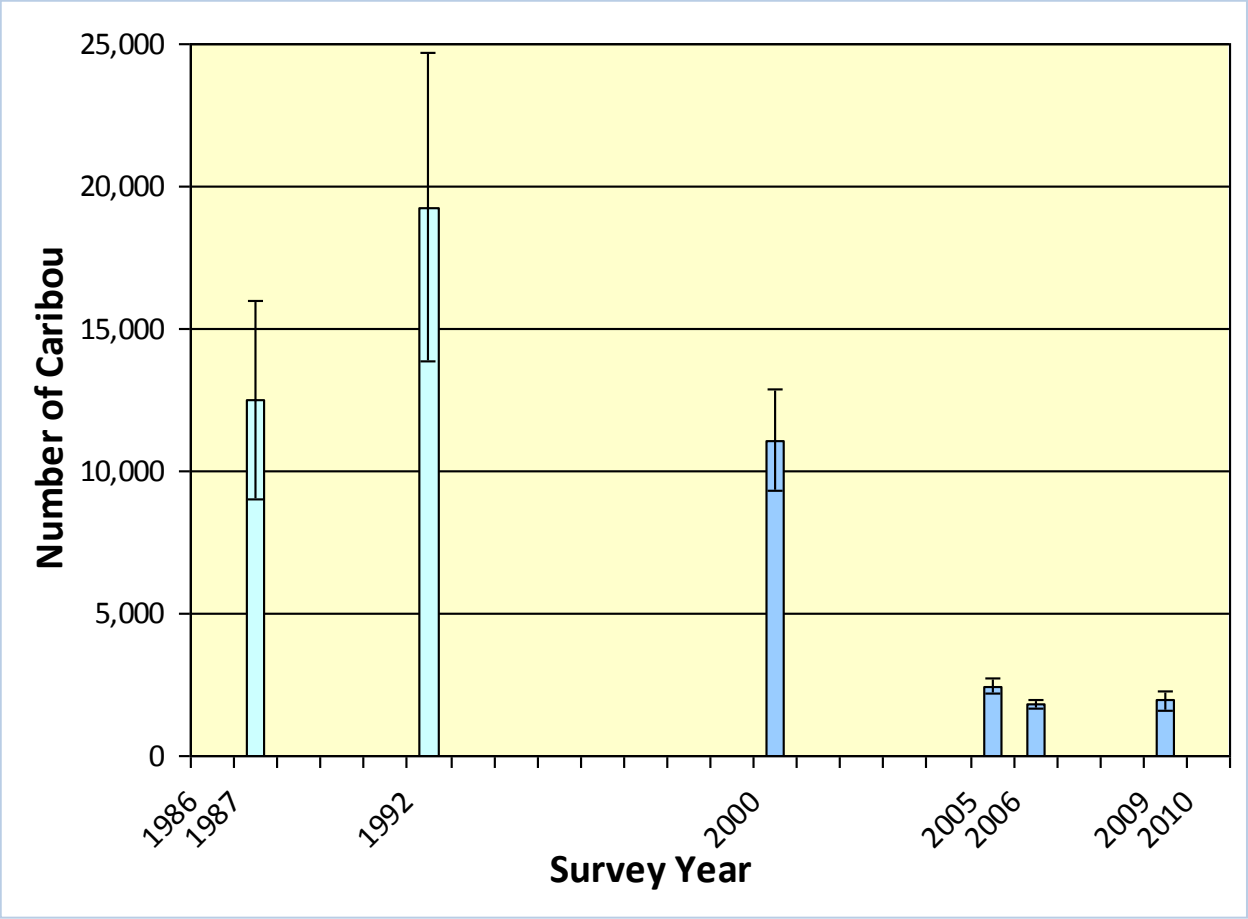

Figure 4 *Cape Bathurst Herd Population Estimates*

Note: There are two shades of colours used for the bars: From 2000 onward herd specific counts have been done; whereas prior to 2000 the 3 herds were surveyed as part of a single "Bluenose Herd"; and that data was later reanalysed and separated into three specific herds.

Bluenose-West Herd

The **Bluenose-West herd** population declined from an estimated high of over 110,000 animals in 1992 to about 18,000 animals in 2005 and 2006 (Figure 7-2). The 2009 population estimate showed the herd to be stable since 2006 but still low in relation to historic high numbers.

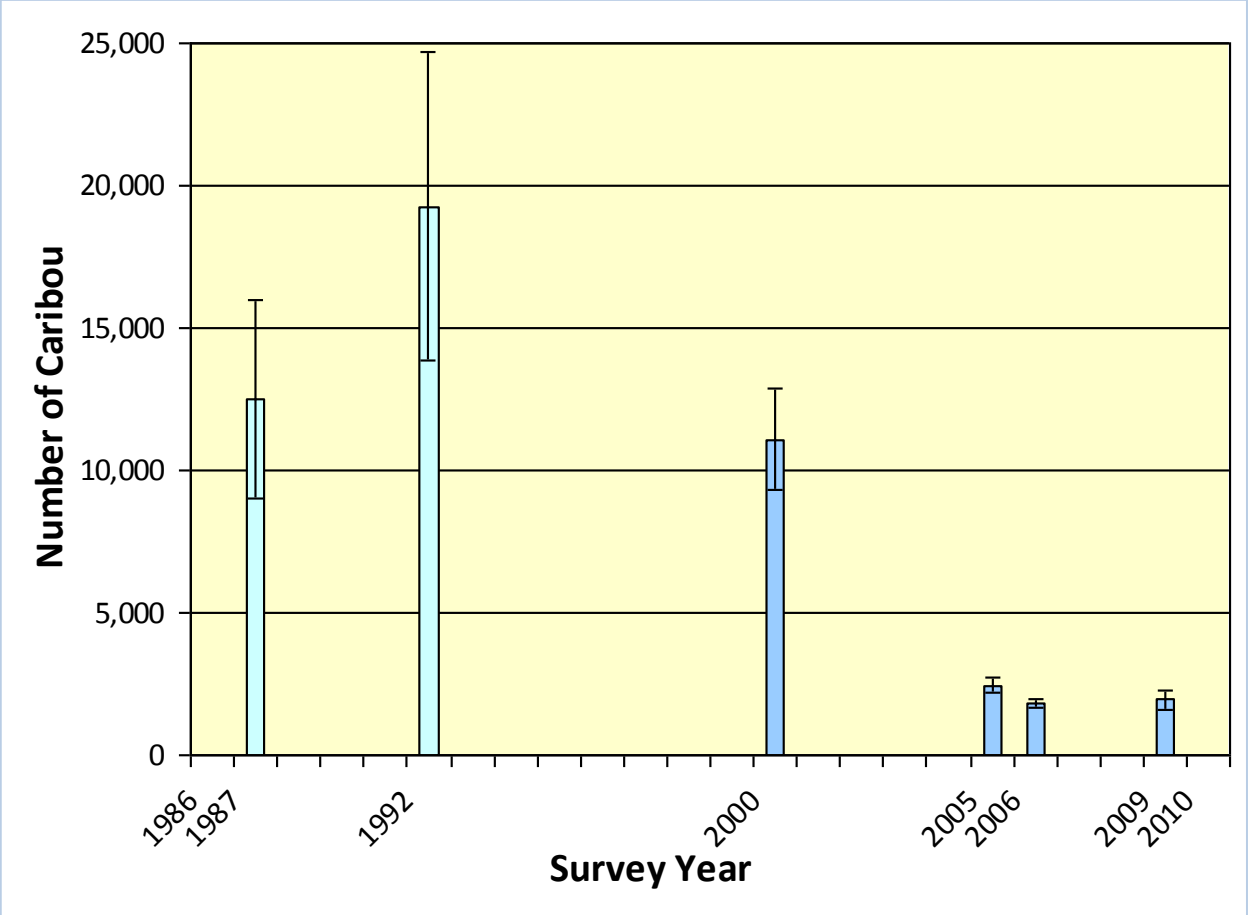

Figure 5 *Cape Bathurst Herd Population Estimates*

Note: There are two shades of colours used for the bars: From 2000 onward herd specific counts have been done; whereas prior to 2000 the 3 herds were surveyed as part of a single "Bluenose Herd"; and that data was later reanalysed and separated into three specific herds.

Bluenose-East Herd

The estimated **Bluenose-East Herd** population varied from over 120,000 animals in 2000 to about 67,000 animals in 2006 and increased to 98,600 animals in 2010 (Figure 7-3).

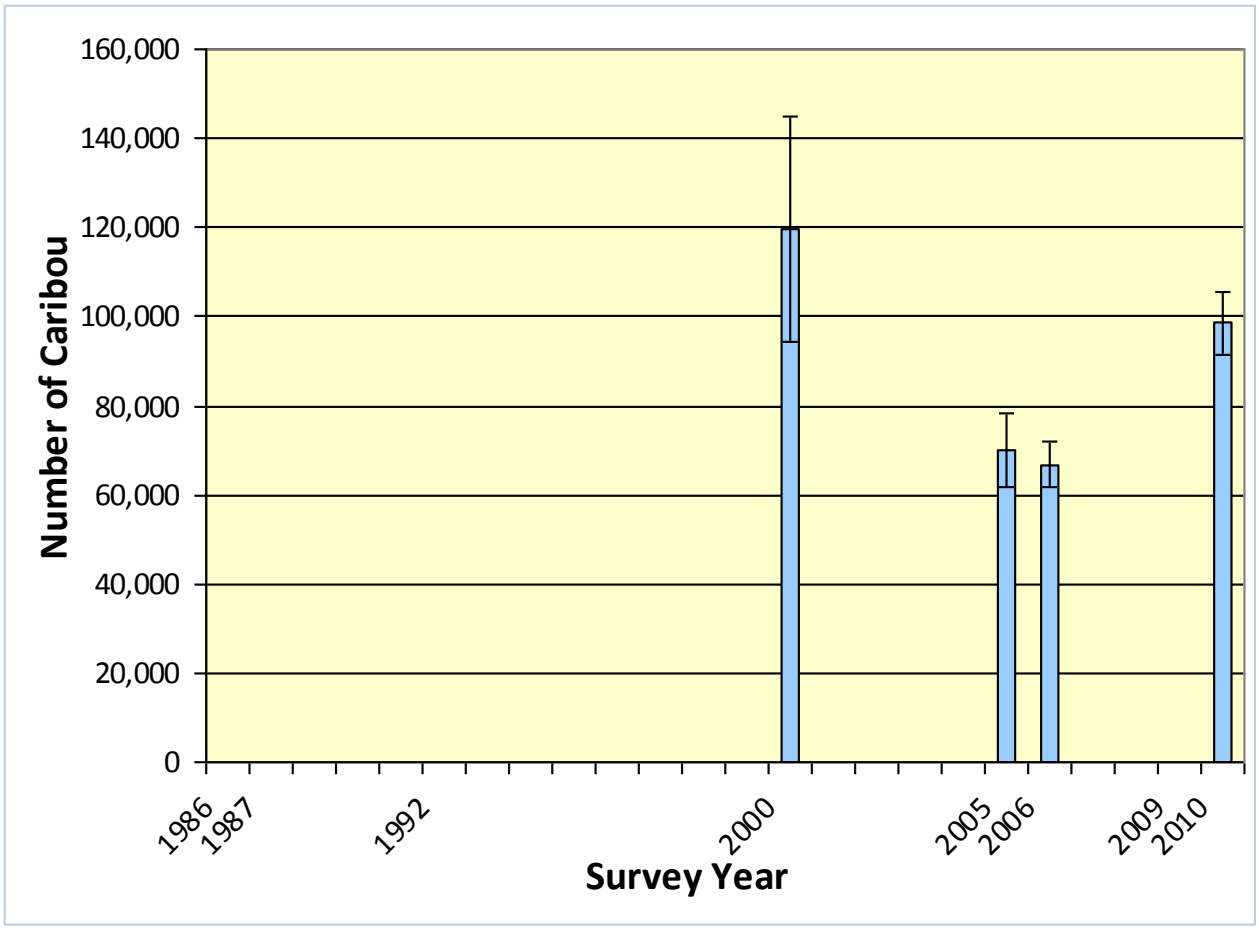

Figure 6 *Bluenose-East Herd Population Estimates*

The large changes in population levels observed in these herds are generally consistent with the trends of other barren-ground caribou populations across North America.

"Caribou have cycles like rabbit and foxes." (Norman Wells)

There are also some factors which make precise estimates of herd population levels more difficult. For example, communities have suggested that large numbers of animals may be moving from one caribou herd to another. There is little scientific evidence of such "inter-herd movement." Moreover, when considering the overall number of caribou in the three herds combined, there were very large changes in population levels, with historic lows in 2005 and 2006.

8.0 What and How We Monitor

The size of caribou herds vary over several decades, with periods of abundance and periods of scarcity. Monitoring programs collect information about changes in the herd size, and changes in ecological factors that affect caribou numbers and health. It is important to involve both scientists and community harvesters; to include the perspectives of both science and traditional knowledge in monitoring.

The size of a herd and the health of its animals are influenced by factors that can work in combination, such that the total or cumulative impact may be different than that which occurs from each factor on its own. These impacts may be either positive or negative.

"Count caribou when they are migrating at traditional water crossing sites. We need a specific management plan for each area and within these plans we need accurate harvest reporting."
(Tuktoyaktuk)

8.1 Criteria for Assessing Herd Status

The main pieces of information on which management actions will be based include[5]:

1. Population size
2. Recruitment
3. Bull-to-cow ratio
4. Body condition and health
5. Population trend and rate of change

"During the fall season, and after the snow has fallen, there are times when it rains, and the snow becomes crusty and the caribou cannot get to the vegetation. Because of this, the herds tend to head south towards the tree line. This is a change that we notice more and more; it rains after it snows and the snow becomes frozen, making it harder for the caribou to get to their food."
(Kugluktuk)

8.1.1 Population Size

The main factor to assess herd status, and the key consideration when recommending the harvest for a herd, is the estimated number of animals in a herd (population size). A "post calving photo survey" is conducted by taking photographs of the herds soon after the calving period. The number of caribou in the photographs is determined and this is used to estimate the total number of adult caribou in the herd. Calves less than 1-year-old are not included in the estimate of population size because of their high death rate experienced over the first year of life.

[5] The list of factors, based on scientific knowledge and TEK, was developed and shared by participants during community engagements used to develop this management plan.

8.1.2 Recruitment

Recruitment refers to the number of calves that survive to one-year of age. Calf/cow ratios in spring (as measured by the number of calves per 100 cows) are used as a measure of recruitment. Groups of caribou are located using radio-collars and local knowledge, and the numbers of cows, calves, and bulls are counted.

These ratios, while informative, are often difficult to interpret as they are influenced by changes in cow mortality (death rates) from year to year. Typically, recruitment rates are low before the number of animals in a herd begins to decline, whereas high recruitment rates, particularly several years in a row, may indicate an increase in herd size.

8.1.3 Bull-to-Cow Ratio

Caribou bulls can mate with many females within the same season. The natural death rate for male caribou is higher than that for females, especially when environmental conditions are poor, so even in non-harvested populations there are usually fewer bulls than cows. Monitoring the bull-to-cow ratio helps determine if there are enough bulls to impregnate cows and enough pregnant cows to maintain or increase the herd size. Monitoring can be done by scientists and by harvesters who can provide information on the number of bulls observed in relation to the number of cows.

8.1.4 Body Condition and Health

The health and condition of individual caribou can affect productivity and survival of calves and adults. The Circum Arctic Rangifer Monitoring and Assessment Network (CARMA) has developed protocols for measuring body condition and health of caribou. The least intensive (Level 1) measurements can be easily done. Sample kits are provided to harvesters to measure or collect: pregnancy (presence of foetus), back fat thickness, left kidney with the fat to assess contaminant levels and condition, body condition score, collection of lower front teeth for age determination, and location, date and sex of the animal harvested. It is most useful to collect Level 1 measurements on an annual basis. More intensive measurements (Level 2 or 3 protocols) of body condition and health, including disease and parasites, are often done by scientists and harvesters during a community hunt but on a less frequent basis (every 3 or 5 years).

Community members typically have a holistic look at the condition of caribou through harvesting, field dressing (skinning, gutting, etc.) and preparing or fixing the meat. Body condition information collected by community members, harvesters and scientists provides supporting evidence of health for predicting or confirming changes to the herd size and trend.

8.1.5 Population Trend and Rate of Change

The trend or the rate of increase or decrease is also a key indicator of herd status. Trend can be determined by comparing herd size estimates over many years. When a population estimate is not possible, we can look at other data to help determine the trend, such as recruitment, body condition and health, and bull-cow ratio. Information on the trend of a caribou herd over the long term can be provided by TEK as observations of changes in abundance and distribution, which are often linked. For example, when caribou are at low numbers they often don't occupy all of the same areas as when they are abundant.

Female survival estimates can also help determine the trend and are important in interpreting recruitment and bull-cow ratios. This is discussed in more detail in the ENR Technical Herd Status Report.

8.2 Additional Criteria for Assessing Herd Status

Beyond information on caribou at the individual and herd level, there is important ecosystem-level information that should be considered. This can include level of harvest and predation, habitat quality and quantity, and disturbance levels that may limit the herd's access to parts of its range. Co-management agencies can support long-term research and monitoring of these factors that will allow management actions to be more proactive. These factors are discussed further below.

8.2.1 Harvest Levels

Harvesting has a direct impact on caribou numbers and accurate information of harvest levels is very important for management decisions. Wounding loss (animals that are wounded but not retrieved) is also important, but is very difficult to measure. There are situations where a herd cannot sustain any harvest because of the number and health of the caribou. Most harvesters support establishing (or re-establishing) a harvest monitoring program in each region.

8.2.2 Predators

Predators affect caribou behaviour and mortality. Some predators take caribou only during the calving period (e.g. eagles) and some only during the spring to fall period (e.g. grizzly and black bears). Wolves prey on all age classes of caribou year-round.

Predator numbers decline as herds decline but usually there is a delay of one or two years; or if other prey species are available, predator numbers may not decline at all. When caribou

numbers begin to decrease, the impact of predation may become proportionately greater. This was reported from several of the communities.

Caribou users have frequently requested programs to reduce wolves in their area. They have also requested increased monitoring of predator populations, measurement of predation and the impact of that predation on the herds.

There is much debate about predator control as a caribou management tool. Experience in Alaska, Yukon, NWT and Nunavut in the 1960s, have shown that predator control can be a tool for short term recovery in caribou populations in some situations. However, there is little evidence of wolf control programs being effective over the long term. Predator control as a management tool in the area of these three herds has not been done.

It is suggested that, prior to the design and implementation of any predator management approach, an open, frank discussion of this topic be held among managers, biologists and harvesters. (See the ENR Technical Status Report for more discussion of this subject).

8.2.3 Environment and Habitat

Better understanding of cumulative effects at the ecosystem level can be obtained through long term research on habitat quality and quantity and impacts of human activities. Co-management agencies can continue to call for and support such long-term research and monitoring. With improved understanding there is a better opportunity to use regulatory management tools to limit disturbance on caribou.

Community members have observed changes in the weather and the environment that may have a positive or negative effect on caribou movements and condition. These observations are generally consistent with scientists' predictions of increased variations in temperatures, more rain and snow, and more severe weather events as a result of climate change. During the summer, shifts in temperatures and precipitation can lead to changes (either greater or lesser) in insect harassment of caribou or the timing of "green up". During the winter, variation in temperature or precipitation can affect caribou energy use through changes in access to food or vulnerability to predation. (See also ENR Technical Status Report)

Changes in habitat conditions (e.g. fires on winter range; levels of rain or snowfall; shifts in vegetation composition) can provide insight into the stresses impacting caribou. Long-term protection of key herd habitat will help to ensure that there are "caribou forever".

"Habitat – need to look at – caribou manage their habitat – the caribou move to other areas and then move back to that area – we need to include more about habitat."
(Tsiigehtchic)

Some steps to assess habitat conditions for each herd are:

1. Define seasonal range use for each herd;
2. Develop and monitor key habitat indicators of quality and quantity using remote sensing and ground surveys;
3. Monitor trends in climate and weather; and
4. Track past and present fire activity.

"We have seen the caribou changing their migration routes from the 1970s. In July caribou are now up in the hills since the summers are colder now and the caribou don't have to hit the beach [inference is that there are fewer bugs bothering the caribou now]. Fall also comes later now and caribou stay longer into the fall and winter."
(Paulatuk)

8.2.4 Human Disturbance

Disturbance of caribou from human activities such as aircraft over-flights, recreational activities, and resource development can influence caribou behaviour and energy use, which in turn can affect condition and health. Indirect effects can also include a reduction in quality and quantity of habitat or access to quality habitat. Particularly when caribou numbers are low, human activities have the potential to alter the rate and extent of the decline or how long it takes the herd to recover.

The range of the three herds extends over lands that are protected from development and lands where exploration and development is occurring. Concern about the impacts of non-renewable resource development grew in the 2000s with a renewed surge in potential developments such as the proposed Mackenzie Gas Project (MGP) natural gas pipeline and associated exploration and development, the proposed Mackenzie Valley Highway extension north of Wrigley, and the Inuvik-Tuktoyaktuk all-weather road. Discovery of diamonds and other valuable minerals in the NWT and Nunavut also led to increased mining activities throughout the herds' range. Land use activities are discussed more in Appendix C.

"One big change we've seen is that now that the oil and gas companies are gone, the caribou have come back closer. When the oil companies were here, there was no caribou close by. They were way up past Aubry Lake." [north of Colville Lake]
(Colville Lake)

Multiple sources of disturbance can have a cumulative impact on herd health. Threshold levels of disturbance are known for some species but not for barren ground caribou. Quantifying levels of disturbance to caribou could help establish how disturbance changes over time and how it influences caribou movements and behaviour. Location and levels of disturbances could then be related to habitat availability and accessibility.

The impact of development can be reduced by working closely with developers and with regulatory agencies such as land and water boards and Indian and Northern Affairs Canada (INAC) to avoid low-level flights and reduce operations when caribou are near project sites.

9.0 How We Make Decisions

9.1 How Herd Numbers Change Over Time

"It's a hard issue to think about or deal with. Harvesting caribou is a tradition. I hunt for my family and people in other communities, and share my hunt." (Kugluktuk)

Understanding changes in caribou populations can be difficult. However, traditional and scientific knowledge agree that caribou herd numbers generally fluctuate over decades – what we call a population cycle. The length of the phases varies, particularly the length of time that a population stays at a low level. Scientific evidence, the journals of missionaries and trading post managers, and TEK all suggest that barren-ground caribou populations go through cycles 30-60 years long.

The cycle itself is not 'neat and tidy', nor is the cycle the same each time. The causes for these population cycles in caribou are not well understood, but likely result from several factors such as habitat quality and quantity, predator populations, climate and disease. Different management actions may be called for - depending on the phase of the cycle. **Figure 8** is a simple, generalized representation of a long-term population cycle.

"Not sure if it is a natural cycle or other reasons but I guess our job is to try to manage the best we can." (Tsiigehtchic)

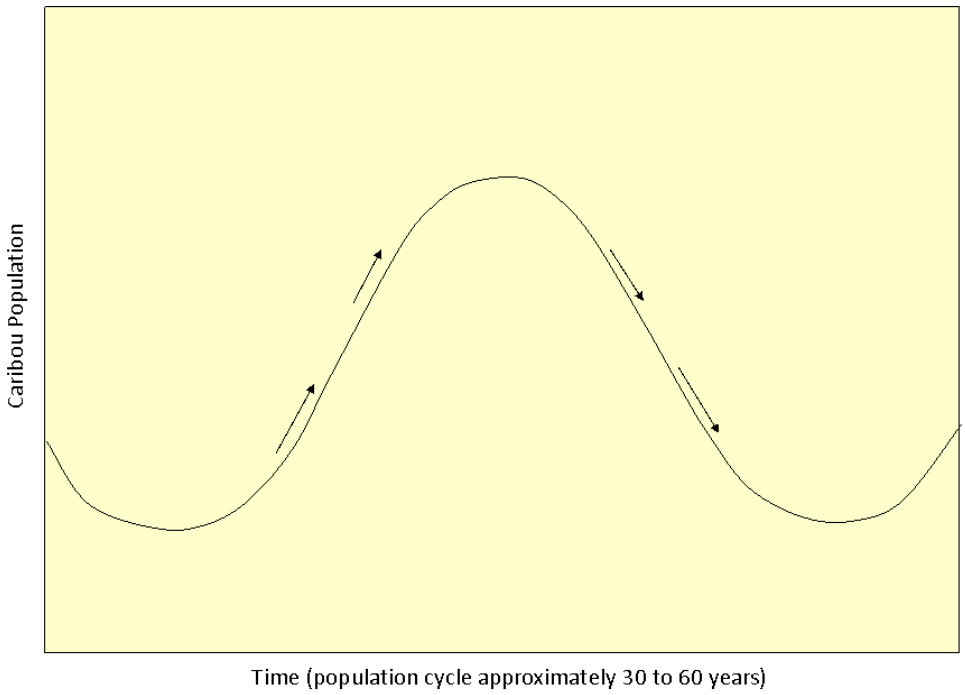

Figure 7 *Simplified curve of caribou abundance over time*

9.2 When Do We Take Action

The things we do to help the caribou herds will be determined in part by the herd size, and whether it is increasing or decreasing. Management decisions will also be influenced by other information from harvesters and scientists such as recruitment, bull-to-cow ratio, body condition and health.

In this management plan there are four levels of herd status and associated management actions. These are colour-coded green, yellow, orange, and red. The herd status provides a trigger for specific management actions.

Green: The population level is high

Yellow: The population level is increasing

Orange: The population level is decreasing

Red: The population level is low

Thresholds for management actions were determined with input from community and technical experts and are presented in **Table 1** below. Slight differences in threshold percentages between herds reflect the results from community engagements.

As an example, the Cape Bathurst caribou herd is considered to pass the threshold into low population (red) when the herd is estimated as being below 4,000 animals or 21% of the historical maximum level of 19,000 animals. It is considered to pass the threshold into high population (green) when the herd is above 12,000 animals or 63% of the historic high as measured by surveys. The maximum levels for each of the three herds, and the change over time, are shown in Figures 4, 5 and 6 of this report and described in more detail in the ENR Technical Herd Status Report.

Table 1 *Thresholds for the Status of the Cape Bathurst, Bluenose-West, and Bluenose-East Caribou Herds.*

HERD	Historic High As measured by surveys	Threshold Between green & yellow/orange	Threshold Between red & yellow/orange
Cape Bathurst Herd	19,000	12,000	4,000
Bluenose West Herd	112,000	60,000	15,000
Bluenose East Herd	120,000	60,000	20,000

A representation of these thresholds is provided with colours in **Figure 8**.

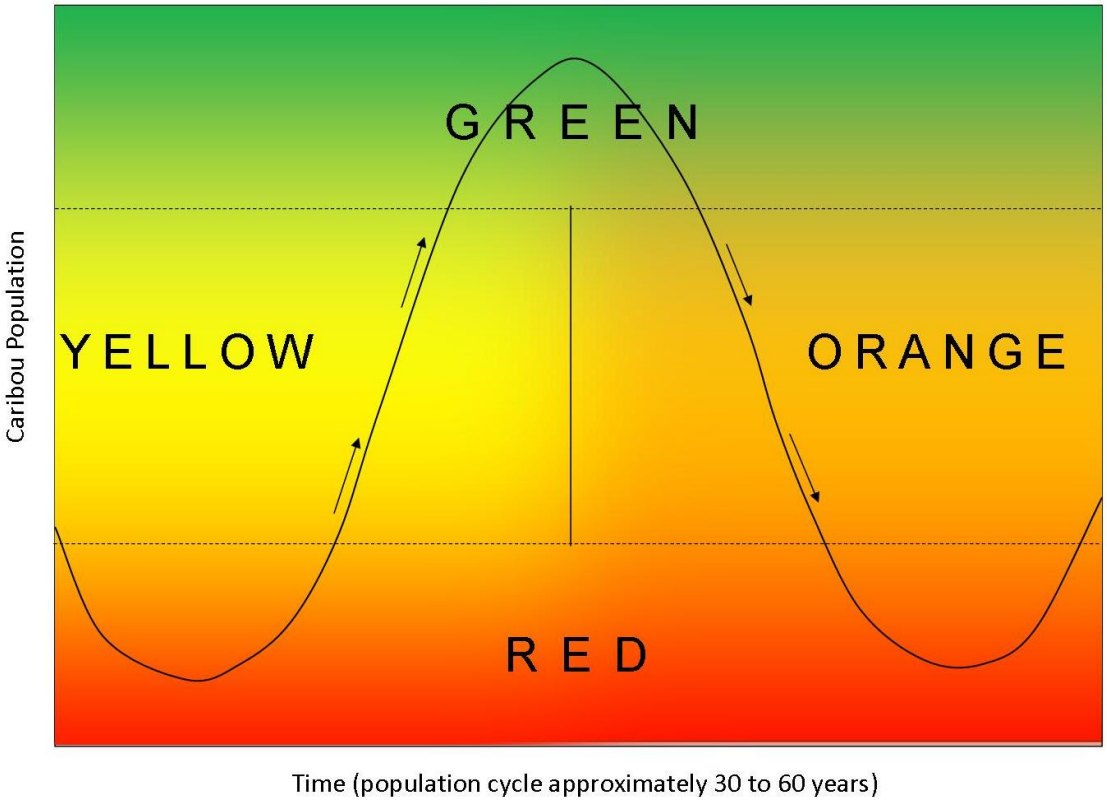

Figure 8 *Caribou Population Status as Colour Zones*

9.3 How We Use Herd Monitoring Information to Make Decisions

Accurate and timely information is necessary for making good decisions that will help the caribou herds. Because the herds are shared between communities and regions, it is also important that information is collected and shared by all harvesters and managers.

Herd status (e.g. green, yellow, orange or red) will be determined based on information including:

- Estimate of the overall size of the herd
- Previous estimates to provide a trend (increasing, decreasing, or stable)
- Additional monitoring indicators (as in **Table 2** below) to supplement the interpretation.

Members of the ACCWM may also use other scientific information as described in the ENR Technical Herd Status Report to help them interpret the monitoring information and determine herd status.

It is important to have up-to-date information, and so the frequency of research and monitoring effort is very important. Certain monitoring will take place regardless of whether the herd status is green, yellow, orange or red. However, the frequency and intensity of monitoring will vary in response to herd status. The monitoring information, frequency, and means of collecting that information are listed in **Table 2** *Herd Monitoring Summary.*

Table 2 *Herd Monitoring Summary*

Information	Community-Based	How often	Scientific[6]	How often
Estimated herd population size	High, medium, low, critical	Throughout the year	High (green) Medium (yellow/orange) Low (red)	Every 3 years when in red and orange; every 3-4 years in yellow; and every 4-5 years in green
Estimated recruitment	Observations: many or few calves	In summer, fall, and winter	Number of calves per 100 cows	Annually, every winter
bull-to-cow ratio	Observations: many or few bulls (and bull health)	Throughout the year	Number of bulls per 100 cows	Every 3 years
Body condition and health	Observations: good, fair, poor, abnormal	Throughout the year, especially during harvest	Fat indexes, pregnancy rate, parasite and disease level	Basic level 1 annually; More intensive level 2 or 3 every 5 years
population trend[7]	Observations: increasing, stable, decreasing	Throughout the year	Increasing, stable, decreasing	Annually
Comprehensive harvest data	Harvest interviews	Monthly during harvest season	Using community harvest data, calculate total and sex ratio of the harvest	Annually
Predator populations[7]	Observations: high, medium, low	Throughout the year	Carcass collection (reproduction, health, etc.)	Every year when in red and orange, every 5 years in green and yellow

[6] More information on scientific indices and their interpretation is available in the ENR Technical Herds Status Report

[7] There is no single indicator for population trend. Rather, it is based on monitoring of population levels, recruitment, body condition, etc.

Habitat and environment[8]	Observations of food quality and availability, extent of burns, weather, snow depth, etc.	Throughout the year	Track seasonal range use, fire, monitor changes in plant productivity, green-up, climate, etc.	Annually to establish baseline and then TBD thereafter
Disturbance levels[7]	Observations: high, medium, low	Throughout the year	Track land uses and disturbance levels	Annually and then TBD thereafter

Long-term monitoring of environmental factors, including range quality and quantity, development activity and trends, and disturbances that influence caribou herds are important in understanding changes in caribou health and abundance.

Some of these indicators of population status can be difficult or expensive to measure. In these cases there may be some information available through long-term research programs or TEK. All of this information will be considered by management agencies and harvesters.

9.4 What Management Actions Can We Take

The individual boards that make up the ACCWM have authority through their land claim agreements to make recommendations and decisions on wildlife management issues. The ACCWM can make consensus-based recommendations to governments, land use regulators, and respective Boards on the general types of management actions that are described below. ACCWM recommendations do not prohibit individual boards from providing additional recommendations, nor are individual boards bound by ACCWM recommendations.

9.4.1 Harvest

The ACCWM can make recommendations with respect to limits on harvest as established through land claim agreements, with non-commercial harvesting having priority over commercial harvesting. With respect to non-commercial harvesting, Land Claim beneficiaries and Aboriginal people have a priority right to harvest over NWT residents who in turn have priority over non-residents. In Nunavut, as per the Nunavut Land Claims Agreement, when a Total Allowable Harvest is established for a population, a basic needs level is to be established, which constitutes the first demand on harvesting.

[8] There is a need for further research and discussion about how these factors, such as predator levels, can affect these three caribou herd populations

The ACCWM can also make recommendations on harvest composition (e.g. bulls vs. cows) or seasonal restrictions on harvest, and it can recommend programs to encourage residents to harvest alternative species and increase trade and barter of traditional foods. Finally, the ACCWM can make recommendations on things like consideration of community monitors and the design and nature of harvesting studies.

9.4.2 Land Use Activities

The ACCWM can provide recommendations to regulators (i.e. Land Use Planning, Environmental Assessment and Land and Water Boards) to help reduce the effects of exploration and development on caribou herds. Advice can be given to avoid important caribou seasonal ranges like calving grounds, and how to mitigate disturbance from noise and access. For example, based on the recommendations of the Tuktut Nogait National Park (TNNP) Management Board and the community of Paulatuk, aircraft access to TNNP has been restricted during the calving and post-calving period to reduce potential disturbance to the Bluenose-West herd.

9.4.3 Predators

The ACCWM can recommend increased research on predators, including distribution and abundance and the impact of predation on caribou herds. It can also recommend means of predator control including incentives for harvest of predators.

9.4.4 Communication and Education

Members of the ACCWM can work together and with government to provide active and accessible communication programs, and recommend education programs. This can include different programs and approaches for elders, harvesters and youth to encourage traditional harvesting practices, use of alternate species and increased trade and barter of traditional foods. It can also include work with members of industry including resource developers and aircraft charter companies.

"How are you going to protect them? Much of the Tłı̨chǫ has been burned… we can suggest making caribou habitat a high value-at-risk so if a fire comes by, ENR can protect it."
(Behchokǫ̀)

9.4.5 Habitat

The ACCWM can recommend increased research and monitoring related to seasonal range use, key habitat indicators, or trends in climate and weather. It can also recommend important habitat as a "value at risk" for forest fire management.

9.5 Management Actions Based on Herd Status

The type of management action and the degree of management intervention will vary depending on the status of the herd. There are four levels of herd status which are colour-coded green, yellow, orange, and red. The herd status will trigger specific management actions or a change in the frequency of action, as described below:

Green: The population level is high

Management actions include:

- Support harvest by beneficiaries of a Land Claim and members of an Aboriginal people, with rights to harvest wildlife in the Region.
- Recommend that subsistence needs are met and resident harvest should be permitted (with limits if established).
- Potentially recommend non-resident (outfitter) and commercial harvests.
- Provide standard advice on mitigation of the impacts of exploration and development activities to proponents and regulators.
- Provide active and accessible communication, and recommend education programs for all.

Yellow: The population level is increasing

Management actions include:

- Recommend easing limits on both subsistence and resident harvests.
- At higher levels of yellow, consider recommending outfitter and commercial harvests.
- Provide standard advice on mitigation of industrial impacts to proponents and regulators.
- Provide active and accessible communication and recommend education programs for all.

Orange: The population level is decreasing

Management actions include:

- Recommend a mandatory limit on subsistence harvest based on a TAH accepted by the ACCWM.
- Recommend no resident, outfitter or commercial harvest.
- Recommend a majority-bulls harvest.
- Recommend harvest of alternate species and encourage increased trade and barter of traditional foods.

- Consider recommending options for predator management.
- Recommend important habitat as a "value at risk" for forest fire management.
- Recommend increased enforcement including community monitors.
- Provide standard advice on mitigation of industrial impacts to proponents and regulators.
- Provide active and accessible communication and recommend education programs for all including developers and airlines, and consideration of community monitors.

"When we are in the low part of the population, is there any way we can enforce what is being suggested? If people don't do what they are supposed to do, we should fine them…." (Fort MacPherson)

Red: The population level is low

Management Actions include:

- Review of mandatory limit for subsistence harvest for further reduction.
- Resident, commercial, or outfitter harvest remain closed.
- Work directly with proponents and regulators of exploration and development activities to advise on mitigation measures.
- Recommend harvest of alternate species and meat replacement programs, and encourage increased trade and barter of traditional foods.
- Consider recommending options for predator management.
- Recommend important habitat as a "value at risk" for forest fire management.
- Recommend increased enforcement including increased use of community monitors.
- Provide active and accessible communication and recommend education programs for all including developers and airlines, and consider increased use of community monitors.

"When it is in that zone [red], maybe harvesting could go to another herd that is stronger and leave these ones alone"

9.6 Process to Make Decisions

The following is a summary of the guiding documents, process and schedule to be followed by the ACCWM to determine herd status and management actions.

9.6.1 Guiding Documents: Action Plan

This Management Plan is supported by an Action Plan which outlines the management actions to be taken and how they will be implemented. The ACCWM is responsible for determining herd status and developing and reviewing the Action Plan following each post-calving photo survey (at three-five year intervals, depending on the population phase of the herd). Based in large part on the herd status, the Action Plan will outline specific management actions and how they will be implemented, by whom, and within what timeframe. Funding for the management action will be discussed by the ACCWM with other management partners. A third document, the ENR Technical Herds Status Report, may assist the ACCWM in making its decisions.

Implementation of the Action Plan is cooperative, and ongoing community input and support will help to develop and implement management actions. Each wildlife co-management board will be responsible for approving the Action Plan for its implementation. The effectiveness of the Action Plan will be reviewed annually.

9.6.2 ACCWM Meetings

The ACCWM meets annually (normally in early fall) to review all new information and implementation of the Action Plan. It will be presented with the best available scientific and traditional knowledge and community monitoring information. The Action Plan will be reviewed, and possibly updated, at the same time that the ACCWM determines herd status.

Although normally revised only following a post calving photographic survey, the herd status or Action Plan may be revised more frequently if, for example, there has been some unanticipated and extreme change since the most recent post calving photo survey.

9.6.3 Allocation of Harvest

If a Total Allowable Harvest (TAH) is recommended, the allocation for each settlement region/area will be determined collaboratively among the responsible co-management boards, based on historical harvest levels.

Formal harvest studies are available for the Inuvialuit, Gwich'in, Sahtú, Tłı̨chǫ, and Nunavut settlement areas. Groups without formal harvest studies will need to find a way to determine

past harvest levels. Individual boards, in association with the ACCWM, will determine how far back to go in order to determine "historical harvest levels."

10.0 How We Communicate

"Education is important – always say at meetings we have to educate our harvesters how to hunt caribou – we need to do that." (Aklavik)

"Good communications are important. Use radio stations. Bring translators to the meetings for elders." (Fort McPherson)

Communication is the responsibility of all parties engaged in wildlife management. Knowledge itself is dynamic and powerful and information must flow both ways - between local knowledge holders and management agencies.

There are many communication and education techniques which will be used depending on the message and the intended audience. They may include local radio programs; visits to schools; posters or presentations; briefing of developers and airlines; and on-the-land gatherings. They will occur on an annual basis and not just when the herds are in the Orange or Red zones. However, conservation and education will be particularly emphasized during times of low or decreasing caribou herds. Further details on timing and communication methods will be provided in the Action Plan.

The kind of information communicated will include the colour-coded herd status; any voluntary or management limits on harvesting; what is being monitored and why; the results of the monitoring programs; why harvesting mostly bulls rather than cows may be preferable; and education of youth in traditional hunting and butchering practices.

11.0 HOW WE UPDATE THE MANAGEMENT PLAN

The Plan for the Cape Bathurst, Bluenose-West, and Bluenose-East barren-ground caribou herds will first be reviewed after five years (i.e. 2016) and at ten-year intervals thereafter. Any party may request a review, at any time, through a formal request to the ACCWM.

12.0 SIGNATORIES TO THE PLAN

Below are the members of the ACCWM and signatories to *Taking Care of Caribou: The Cape Bathurst, Bluenose-West and Bluenose-East Barren Ground Caribou Herds Management Plan*. In recognition of the importance of the Bluenose Caribou Herds and their habitat, the decision of one Party not to accept the management plan will not preclude the remaining Parties from continuing with development and implementation of the plan.

Wildlife Management Advisory Council –NWT (WMAC-NWT)

Gwich'in Renewable Resources Board (GRRB)

Sahtú Renewable Resources Board (SRRB)

Wek'èezhìi Renewable Resources Board (WRRB)

Kitikmeot Regional Wildlife Board (KRWB)

Tuktut Nogait National Park Management Board (TNNPMB)

Nunavut Wildlife Management Board (NWMB)

APPENDICES

APPENDIX A

ACRONYMS AND TERMS USED IN THIS PLAN

List of Acronyms

ACCWM	Advisory Committee for Cooperation on Wildlife Management
ENR	Department of Environment and Natural Resources, GNWT
GLUPB	Gwich'in Land Use Planning Board
GN	Government of Nunavut
GNWT	Government of the Northwest Territories
GRRB	Gwich'in Renewable Resources Board
GSA	Gwich'in Settlement Area
GTC	Gwich'in Tribal Council
HTO	Hunters and Trappers' Organization
IGC	Inuvialuit Game Council
INAC	Indian and Northern Affairs Canada
ISR	Inuvialuit Settlement Region
KRWB	Kitikmeot Regional Wildlife Board
NLCA	Nunavut Land Claims Agreement
NPC	Nunavut Planning Commission
NWT	Northwest Territories
NWMB	Nunavut Wildlife Management Board
SLUPB	Sahtú Land Use Planning Board
SRRB	Sahtú Renewable Resource Board
SSA	Sahtú Settlement Area
TAH	Total Allowable Harvest
TNNPMB	Tuktut Nogait National Park Management Board
TSA	Tłı̨chǫ Settlement Area
WRRB	Wek'èezhìı Renewable Resource Board
WMAC	Wildlife Management Advisory Council (NWT)

APPENDIX B

MANDATE AND WEBSITES OF MANAGEMENT AGENCIES

The many organizations which share responsibility for managing the herds include:

Wildlife Management Advisory Council (NWT)
The Wildlife Management Advisory Council (WMAC) provides advice to the relevant Ministers, ENR and the Inuvialuit Game Council (IGC) on all significant wildlife matters in the Inuvialuit Settlement Region (ISR) including management policies, regulations and harvesting quotas.

Wildlife Management Advisory Council (NWT): www.jointsecretariat.ca

Gwich'in Renewable Resources Board
The Gwich'in Renewable Resource Board (GRRB) is considered to be the main instrument of wildlife and forestry management within the Gwich'in Settlement Area (GSA). It is responsible for establishing harvest levels, approving management plans, approving regulations proposed by government and reviewing any wildlife management matter referred to it by government. GRRB decisions are referred to the appropriate Minister who may accept, vary or set aside the decision, with reasons.

Gwich'in Renewable Resources Board: www.grrb.nt.ca

Sahtú Renewable Resources Board
The Sahtú Renewable Resource Board (SRRB) is considered to be the main instrument of wildlife and forestry management within the Sahtú Settlement Area (SSA). It is responsible for establishing harvest levels, approving management plans, approving regulations proposed by government and reviewing any wildlife management matter referred to it by government. SRRB decisions are referred to the appropriate Minister who may accept, vary or set aside the decision, with reasons.

Sahtú Renewable Resources Board: www.srrb.nt.ca

Wek'èezhìı Renewable Resources Board
The Wek'èezhìı Renewable Resource Board (WRRB) is the wildlife co-management authority for the Tłı̨chǫ Settlement Area (TSA). It is responsible for approving harvest levels, management plans, research plans, and any other wildlife management matter referred to it by government. WRRB decisions are referred to the appropriate government which may accept, vary or set aside the decision, with reasons.

Wek'èezhìı Renewable Resources Board: www.wrrb.ca

Nunavut Wildlife Management Board

The Nunavut Wildlife Management Board (NWMB) is the main instrument of wildlife management in Nunavut (NLCA, s.5.2.33). The NWMB is responsible for establishing Total Allowable Harvests and Basic Needs Levels; participating in research; establishing, modifying or removing non-quota limitations (e.g. sex or age specific harvests); approving the establishment, disestablishment, and changes to boundaries of conservation areas related to the protection of wildlife and wildlife habitat; and other duties assigned to it though the Nunavut Land Claims Agreement (refer to NLCA s. 5.2.33, 5.2.34). NWMB decisions are required to be submitted to the appropriate Minister and follow processes and requirements outlined in Part 3 of Article 5 of the NLCA.

Nunavut Wildlife Management Board: www.wmb.com

Kitikmeot Regional Wildlife Board

The Kitikmeot Regional Wildlife Board (KRRB) is a Regional Wildlife Organization (RWO) under the Nunavut Land Claims Agreement (NLCA). As such, the KRRB is responsible for the allocation and enforcement of the regional BNL among the HTOs in the Region and the regulation of harvesting practices among the members of the HTOs.

Kitikmeot Regional Wildlife Board: www.niws.ca

Tuktut Nogait National Park Management Board

The Tuktut Nogait National Park Management Board (TNNPMB) is responsible, subject to the jurisdiction of the co-management boards within the ISR, for advising the Minister, or other ministers as appropriate, on all aspects of park planning, operation and management, and research.

Tuktut Nogait National Park Management Board: www.pc.gc.ca/eng/pn-np/nt/tuktutnogait

Parks Canada Agency

Parks Canada Agency protects and presents Tuktut Nogait National Park and and the Saoyú-Ædacho National Historic Site to ensure the ecological and commemorative integrity of these places for present and future generations. Tuktut Nogait National Park was established to protect and maintain the Bluenose-West caribou herd and its calving and post-calving habitat. Parks Canada Agency works cooperatively with co-management boards and the GNWT to manage and monitor the herd and its habitat in the Park and in the greater Park ecosystem.

Parks Canada: www.pc.gc.ca/eng/pn-np/nt/tuktutnogait

Government of the Northwest Territories
The Department of Environment and Natural Resources (ENR) has ultimate responsibility for the management of caribou under the GNWT *Wildlife Act.* The Minister is empowered to establish harvest seasons, quotas and other conditions that may be required for the conservation of caribou within NWT.

Environment and Natural Resources, Government of Northwest Territories: www.enr.gov.nt.ca

Government of Nunavut
The Department of Environment (DoE) has ultimate responsibility for the management of caribou under the GN *Wildlife Act.* The Minister is empowered to set harvest seasons, quotas and other conditions that may be required for the conservation of caribou within Nunavut.

Department of Environment, Government of Nunavut: www.gov.nu.ca/env

Kugluktuk Angoniatit Association Hunters and Trappers Organization
The objects of the Association are to constitute an open and accountable forum, organized in a fair and democratic way, to protect and promote the rights and interests of those Inuit in the Kugluktuk area who are involved in hunting and trapping.

Email address: kugluktukhto@qiniq.com

APPENDIX C

MAJOR LAND USE ACTIVITIES IN THE RANGE OF THE CAPE BATHURST, BLUENOSE-WEST, AND BLUENOSE-EAST CARIBOU HERDS

Hydrocarbon Exploration and Development

The proposed Mackenzie Gas Project (MGP) represents a renewed attempt to bring the natural gas from the Beaufort Delta into production. The National Energy Board (NEB) approved the project in 2010. Gas would initially come from three gas fields in the Mackenzie Delta but construction of the pipeline would likely lead to enhanced exploration and development activities throughout the Mackenzie Delta and other areas of the Mackenzie Valley, particularly the Tulıt'ɑ-Norman Wells area and the Colville Lake area. The Mackenzie Delta and surrounding area includes a significant portion of the ranges of Cape Bathurst and Bluenose-West herds, whereas all three herds occur in the Colville Lake area. Herds are not normally in the Tulıt'ɑ-Norman Wells area.

Mineral Exploration and Development

Mineral exploration and development waxes and wanes in response to the global demand. It can change quickly - as seen with the staking rush following the first discovery of diamonds in the NWT or recent interest in rare earths. The presence of base metals and diamonds has been confirmed but projects are still in the planning and surveying stage. Much of the caribou range is subject to mineral claims or prospecting permits. However, the extent of claims and permits is not a true reflection of land use as the activities are often concentrated in a small part of the overall claim area. The cumulative impact of these land use activities is unknown.

Transportation Route Development

The Bathurst Inlet Port and Road, proposed in the 1990's, was put on hold in 2008. If the development were approved, it would shorten the shipping routes to remote mines in the Tłı̨chǫ and Kitikmeot Region by creating a deep-water port and all-weather roads. Other proposed road developments include an all-season road from Tuktoyaktuk to Inuvik, and an 804 km extension of the Mackenzie Valley Highway north from Wrigley.

Land Use Plans

The IFA does not provide for a Land Use Planning Board to develop a plan for the Region. However, the WMAC (NWT) produced community conservation plans for the ISR in 2000 and will release updated plans soon. These plans reflect community concerns and expectations about the acceptable level of impacts on various landscapes.

The Gwich'in, Sahtú and Nunavut agreements provide for land use planning which is undertaken by claim-specific Institutions of Public Government (IPG). In these instances, the land use plans may declare zones in the settlement lands for various purposes. This can include restrictions on land use activities and land management agencies must respect the conditions established through the land use plans.

The Gwich'in Land Use Plan was approved by the Gwich'in Tribal Council (GTC) and the Federal Government in 2003. The plan classified the Gwich'in Settlement Area (GSA) into three zones: General Use Zones (57% of GSA), Special Management Zones (33% of GSA), and Conservation Zones which includes Heritage Conservation Zones (10% of GSA). All licenses, permits or other authorizations relating to the use of land and water must conform to the Land Use Plan. A review of the Gwich'in Land Use Plan is under way.

The Sahtú Land Use Planning Board is preparing a comprehensive land use plan for the SSA that will guide how the land and its resources will be used. It will designate three categories of land: conservations zones where no development will be permitted; special management zones where development will be permitted with conditions; and multiple use zones where development will be permitted subject to current regulatory requirements. The second draft of the plan was submitted in 2010.

The Tłı̨chǫ Agreement does not provide for formal land use planning for the settlement area but in 2010 the Tłı̨chǫ government was developing a land use plan for Tłı̨chǫ lands.

Protected Areas

Herd ranges encompass established and proposed protected areas. Tuktut Nogait National Park protects calving and post-calving habitat of the Bluenose-West herd in the ISR and SSA. Discussions of a new park in Nunavut adjacent to Tuktut Nogait are ongoing with Kugluktuk, Kitikmeot Inuit Association, and the Nunavut Planning Commission.

Edaı́ı́la is a prominent peninsula on the east shore of Great Bear Lake which is an important area culturally and for the Bluenose-East caribou. Edaı́ı́la has been proposed for formal protection by the Délı̨nę Land Corporation, and is identified as a conservation zone in the draft Sahtú Land Use Plan. Saoyú-ʔehdacho National Historic Site of Canada

protects the two westernmost peninsulas on Great Bear Lake. The land is co-managed by the Edɑ́ɻ́lɑ Cooperative Management Board and Parks Canada.

Ezǫ̨dzìtì is an area protected through the Tłı̨chǫ Final Agreement for its historical and cultural importance. The area, which encompasses approximately 1,374 km^2 of settlement land, is protected from non-renewable resource development.

APPENDIX D

ADVISORY COMMITTEE FOR COOPERATION ON WILDLIFE MANAGEMENT (ACCWM) AND BLUENOSE CARIBOU MANAGEMENT PLAN WORKING GROUP (BCMPWG) MEMBERSHIP

The ACCWM consists of the Chairpersons (and/or their alternates) of:

- Wildlife Management Advisory Council (NWT);
- Gwich'in Renewable Resources Board;
- Sahtú Renewable Resources Board;
- Wek'èezhìı Renewable Resources Board;
- Kitikmeot Regional Wildlife Board;
- Tuktut Nogait National Park Management Board; and
- Nunavut Wildlife Management Board.

The BCMPWG consists of representative of:

- Wildlife Management Advisory Council (NWT);
- Gwich'in Renewable Resources Board;
- Sahtú Renewable Resources Board;
- Wek'èezhìı Renewable Resources Board;
- Kitikmeot Regional Wildlife Board;
- Kugluktuk Hunters and Trappers Association;
- Dehcho First Nation;
- Tuktut Nogait National Park Management Board;
- Tłı̨chǫ Government;
- Environment and Natural Resources, GNWT;
- Department of the Environment, GN; and
- Parks Canada.

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