YUKON ENERGY

YUKON ENERGY CORPORATION
P.O. Box 5920
WHITEHORSE
YUKON Y1A 5L6
(867) 393-5300

October 13, 2006

Mr. Dale Eftoda
Chair,
Yukon Environmental and Socio-Economic Assessment Board
3059-3rd Avenue
P.O. Box 31642,
Whitehorse, Yukon Y1A 2C6

Dear Mr. Eftoda:

RE: EXECUTIVE COMMITTEE PROJECT PROPOSAL FOR THE PROPOSED CARMACKS-STEWART/MINTO SPUR TRANSMISSION PROJECT

We are pleased to submit for your consideration the Project Proposal for the proposed Carmacks – Stewart/Minto Spur Transmission Project. This submission is provided in hardcopy as well in electronic format on the accompanying CDs.

As previously discussed with you, Yukon Energy is providing 25 copies of the project proposal as follows:

- eight copies of the project proposal are included with this letter.
- The remaining 17 copies we expect to provide the week of October 23, 2006.

We look forward to receiving your comments and questions about the filing and welcome this important step in advancing public review of the Project. Should you require additional information, please do not hesitate to call Mr. Hector Campbell, P. Eng, Director Resource Planning & Regulatory Affairs at 393-5331.

Yours truly,

David Morrison
President & CEO

Enclosures

PROPOSED CARMACKS-STEWART/MINTO SPUR TRANSMISSION PROJECT

YUKON ENERGY

YESAB EXECUTIVE COMMITTEE PROJECT PROPOSAL

Submission & Appendices

September 2006

Submitted by:

Yukon Energy Corporation

Prepared by:

InterGroup Consultants

Access Consulting Group

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1.0 PROJECT INTRODUCTION AND OVERVIEW

1.1 EXECUTIVE SUMMARY

The **Carmacks-Stewart/Minto Spur Transmission Project** (**the Project**) involves development of the following related transmission lines and substations in the Northern Tutchone Planning Region:

1. The **Carmacks-Stewart (CS) Transmission Project**: The CS development will connect the 138 kV **Whitehorse-Aishihik-Faro** (**WAF**) and 69 kV **Mayo Dawson** (**MD**) electricity grids in order to encourage economic development along the corridor and enhance overall WAF and MD system reliability, economic efficiency and flexibility in resource use. The CS development involves a new 138 kV transmission line of approximately 172 km in length located within a 60 metre **right-of-way** (**ROW**) which proceeds generally along the Klondike Highway east of the Yukon River between Carmacks and Stewart Crossing. The CS development also involves new transmission substations to be located in the Carmacks airport area and at Pelly Crossing, and expansion of the existing Stewart Crossing substation north of the Stewart River. The CS facilities will be operated and maintained as long-term infrastructure without any expected decommissioning date; and

2. The **Minto Spur (MS) Transmission Project**: The MS development will provide surplus WAF grid power to the new copper-gold mine under development west of the Yukon River at Minto (the Minto Mine), utilizing the CS development from Carmacks to the Minto Landing area. The MS development involves a new 35 kV transmission line of approximately 27 km in length within a 30 metre ROW which proceeds generally along the existing access road between the Minto Mine and the Klondike Highway in the vicinity of Minto Landing. A new transmission substation in the vicinity of Minto Landing, and additional equipment at the Minto Mine site to tie into the existing Minto Mine Site distribution system are also planned. The MS facilities will be operated and maintained during the life of the Minto Mine, after which time most of the facilities are expected to be decommissioned and removed.

Yukon Energy Corporation (**Yukon Energy**) is undertaking all the necessary planning, consultation, environmental, engineering and other related activities required in order to obtain the authorizations and regulatory approvals necessary to allow for a decision to commence construction of the Project in the summer of 2007. Yukon Energy is providing for the Project to be developed in two stages: Stage One will involve the CS development from Carmacks to Pelly Crossing as well as the MS development (target for first transmission in-service to the Minto Mine in the third quarter of 2008), and Stage Two will involve the balance of the CS development from Pelly Crossing to the MD grid substation at Stewart Crossing (target for potential in-service in the second half of 2009).

At this time, Yukon Energy has made no final decision to proceed with the Project, either in whole or in part.

To date, funding for the Project's development has been provided by the Yukon Government and by Yukon Energy. As set out in Yukon Energy's 20-Year Resource Plan, filed with the **Yukon Utilities Board (YUB**) in June 2006, the development of both stages of the Project is subject to the provision of Yukon Government funding and mine customer contributions in order to ensure that there is no net cost to Yukon Energy or to Yukon ratepayers beyond what would be required for any other option to provide required electric energy and capacity.

Yukon Government, First Nation and federal regulatory approvals and decisions are required before any construction activities may be undertaken; however, these approvals and decisions may only be made after the required screening assessment by the Executive Committee of the **Yukon Environmental and Socio-economic Assessment Board** (**YESAB**) of this Project Proposal Submission (**Project Proposal**). Yukon Energy has engaged the InterGroup/Access socio-economic and Environmental Assessment Study Team (**Study Team**) to carry out all necessary studies and assist Yukon Energy in preparing the Project Proposal in response to YESAB guides (Reference Materials 1R) and the requirements set out pursuant to the Yukon Environmental and Socio-economic Assessment Act (**YESAA**).

Yukon Energy carried out preliminary studies in 2002/2003 in order to define a 500 metre corridor for the CS project which was generally located along the Klondike Highway. A Map Notation for this corridor was issued in May 2004 by the Lands Branch. Yukon Energy also reserved land from the Crown for the new transmission substation at Carmacks, located north of the Yukon River on the 138 kV WAF line from Carmacks to Ross River. In late 2005, Yukon Energy secured the Yukon Government funding necessary to proceed with initial planning studies and consultations for the CS development. Thereafter, in the fall/winter of 2005/2006, Yukon Energy provided general information regarding the CS development to Yukon Government departments, the **Northern Tutchone First Nations** (**NTFN**)[1], the general public, YESAB and the developer of the Minto Mine.

In May 2006, a **Memorandum of Understanding** (**MOU**) was concluded between Yukon Energy and the three NTFNs. The MOU provided for joint support of the CS development which was to be generally located within the 500 metre corridor identified along the Klondike Highway and for the MS development which was to be located generally along the Minto Mine access road (the Route Study Area). The MOU established commitments with regard to a consultation process for the route selection and for a YESAB filing process targeted for completion before the end of June 2006. Principles regarding a Project Agreement and arrangements relating to benefits, access rights and easements were targeted for completion by October 31, 2006.

Pursuant to a **Letter of Intent** (**LOI**) signed in March 2006, Yukon Energy is proceeding with negotiations with the developer of the Minto Mine (Sherwood Copper Corporation (**Sherwood Copper**)) and its wholly owned subsidiary Minto Explorations) in order to finalize a **Purchase Power Agreement** (**PPA**) to supply WAF grid power to the Minto Mine through the new transmission facilities that would be

[1] The three NTFNs are **Little Salmon Carmacks First Nation (LSCFN)**, **Selkirk First Nation (SFN)** and **Na-Cho Nyak Dun (NND)**. The CS development will, in some areas, be adjacent to or crossing settlement lands of each of the three NTFNs. The MS development generally crosses SFN settlement lands.

provided by the Project. Under the anticipated PPA, the mine developer will pay all costs for the MS development. The Minto Mine is currently under construction and is expected to begin operations in spring/summer 2007, using on-site diesel generation to supply its power needs until such time as grid power can be provided by the Project. Mine/mill operation is currently planned into 2014, with shut down activities and related power loads continuing thereafter until 2018; however, three or more additional years of production are projected if additional high grade resources are confirmed by drilling currently being completed. Stockpiled low grade material will also be available for processing in the future should economics warrant after processing of higher grade material has been completed.

Yukon Energy has also engaged in initial discussions with Western Copper Corporation, the new entity responsible for developing the Carmacks Copper Mine, in order to confirm interest in potential future transmission development that would connect this mine site, west of the Yukon River, with the CS development in the vicinity of McGregor Creek, south of Minto Landing (i.e., transmission to be developed as part of the Stage One CS development). The Carmacks Copper Mine is currently in the permitting stage, with potential for start of construction in summer 2007 and start of operations in the third quarter of 2008.

As fully described in the Project Proposal, Yukon Energy selected a preferred transmission route for the Project within, or near to, the Route Study Area based on consultation with interested parties and consideration of various factors such as environmental and socio-economic effects, engineering requirements, and costs. Generally, the Route Study Area provided an environment already disturbed by established linear road development as well as other activities, and route selection was generally able to address concerns and interests with regard to current resource use activities, cultural and heritage areas, protected areas, trapper's cabins, special viewpoints and recreation areas, wetland areas, other infrastructure (e.g., local airports and quarries), and other valued environmental and socio-economic components. Given the inherent flexibilities in selecting a final ROW, as well as pole placement and clearing within such ROW, the route selection process generally sought to identify areas to be avoided and/or used to minimize adverse effects and enhance beneficial effects. Cumulative effects were fully considered as an integral part of the effects assessment process.

The Project Proposal reflects, as relevant, the agreement with the NTFNs and Sherwood Copper on the Project's selected route as well as any review undertaken with relevant Yukon Government department interests.

The Project Proposal indicates that the Project is expected to cause no likely significant adverse effects on the biophysical environments (e.g. land, water and air environments and associated terrestrial and aquatic life) or on the socio-economic components (e.g., resource and other land use, economy, and social components including infrastructure and services, aesthetics, cultural/heritage sites, traditional lifestyle, human health and social well being). This conclusion reflects careful routing of the transmission lines and the consideration of mitigation measures that would reduce or eliminate remaining potential adverse effects. Planned mitigation includes an **Environmental Protection Plan** (**EPP**), to be finalized following the YESAB screening, which will be designed to provide direction to contractors regarding the requirements of Yukon Energy and the regulator. Some residual adverse effects (e.g., the physical presence of the facilities result in an altered landscape and other changes for as long as the facilities are in place, and improved access in some areas may create concerns about potential conflicts with existing resource uses) are anticipated, but are not expected to be significant based on criteria relevant to the YESAB assessment.

The Project Proposal also indicates that positive environmental and socio-economic effects are likely to result from the Project as it improves the use of existing WAF and MD grid power resources (including existing surplus hydroelectric generation) and consequently displaces diesel generation emissions; it is anticipated that this will create associated benefits for Yukon electric utility ratepayers, enhance the feasibility and economics of new mining developments, improve access to certain areas, and provide opportunities for local jobs and business activity during construction and subsequent periodic ROW clearing and maintenance.

1.2 PROPONENT INFORMATION

Yukon Energy is the Project proponent.

Yukon Energy is a public electric utility which is owned by the Yukon Government through the Yukon Development Corporation (a Crown corporation) and subject to rate regulation by the YUB. Yukon Energy owns and operates the 138 kV WAF and 69 kV MD transmission grids as well as over 90% of the electric generation resources on these grids; it is also the public utility with primary responsibility for planning and development of new generation and transmission facilities in Yukon. Yukon Energy's recent transmission development experience includes the MD grid development completed in 2002.

Yukon Energy management reports to its Board of Directors through the President. Final approval to proceed with the Project will be subject to the approval of the Board of Directors as well as the Minister responsible for Yukon Energy. Project design and construction will be under the overall direction of Yukon Energy's Director of Technical Services (Alex Love), and Project operation and maintenance will be under the direction of Yukon Energy's Director of Operations (Dave Wray).

Through a competitive request for proposal process, Yukon Energy will retain the required consulting and engineering services to complete preliminary and detailed engineering design for the Project, and to provide contract tender engineering design documents and contractor supervision services during construction. The MOU provides that, through the final Project Agreement, NTFN businesses will have the opportunity to provide all route clearing and brushing services required for the Project on a sole source basis. Contracts to construct the remaining components of the Project will be awarded by Yukon Energy through an open and competitive tendering process. It is expected that the final Project Agreement with the NTFN will provide the opportunity and preference for qualified NTFN citizens to be employed by Yukon Energy contractors working on the Project.

The primary YESAB contact for the Project is Hector Campbell, Yukon Energy's Director of Resource Planning and Regulatory Affairs.

1.3 PROJECT BACKGROUND

Yukon Energy carried out preliminary studies in 2002/2003 in order to define a 500 metre corridor generally along the Klondike Highway for the location of the CS project route. A Map Notation for this corridor was issued in May 2004 by the Lands Branch. Yukon Energy also reserved land from the Crown for the new transmission substation at Carmacks, located north of the Yukon River on the 138 kV WAF line from Carmacks to Ross River. In late 2005, Yukon Energy secured Yukon Government funding required to proceed with initial planning studies and consultations for the CS development. Thereafter, in the fall/winter of 2005/2006, Yukon Energy provided general information of the CS development to Yukon Government departments, the NTFNs, the general public, YESAB and the developer of the Minto Mine.

In May 2006, a MOU was concluded between Yukon Energy and the three NTFNs addressing joint support for the CS development to be generally located within the 500 metre corridor identified along the Klondike Highway and for the MS development to be located generally along the Minto Mine access road (the Route Study Area). The MOU set out commitments for a consultation process regarding the route selection and the YESAB filing process targeted for completing before the end of June 2006. Principles regarding a Project Agreement and arrangements relating to benefits, access rights and easements were targeted for completion by October 31, 2006. More detail on the MOU, including updated information on current scheduling, is provided in Chapter 4, Section 4.3.1.1.

Pursuant to a LOI signed in March 2006, Yukon Energy is proceeding with negotiations with the developer of the Minto Mine, (Sherwood Copper and its wholly owned subsidiary Minto Explorations), in order to finalize a PPA to supply WAF grid power to the Minto Mine through new transmission facilities to be provided by the Project. Under the anticipated PPA the mine developer will pay all costs for the MS development. The Minto Mine is currently under construction and is expected to begin operations in spring/summer 2007 using on-site diesel generation to supply its power needs until such time as grid power can be provided by the Project. Mine/mill operation is currently planned to continue into 2014, with shut down activities and related power loads continuing thereafter until 2018; however, three or more additional years of production are projected if additional high grade resources are confirmed by drilling currently being completed. Stockpiled low grade material will also be available for processing in the future should economics warrant after processing of higher grade material has been completed.

Yukon Energy has begun initial discussions with Western Copper Corporation, the new entity responsible for developing the Carmacks Copper Mine, in order to confirm its interest in potential future transmission development to connect the mine site west of the Yukon River with the CS development in the vicinity of McGregor Landing, south of Minto Landing (i.e., transmission to be developed as part of the Stage One CS development). The Carmacks Copper Mine is currently in the permitting stage, with a potential start of construction in summer 2007 and start of operations in the third quarter of 2008.

The **Public Involvement Program** (**PIP**) consultations to date are fully reviewed in Chapter 4 of this Project Proposal.

To date, funding for the Project's development has been provided by the Yukon Government and Yukon Energy. As set out in Yukon Energy's 20-Year Resource Plan (see Appendix 1A), filed with the YUB in June 2006, development of both stages of the Project is subject to the provision of Yukon Government funding and additional mine customer contributions in order to ensure that there is no net cost to Yukon Energy or to Yukon ratepayers beyond what would be required for any other option to provide required electric energy and capacity.

Yukon Energy is providing for the Project to be developed in two stages: Stage One will involve the CS development from Carmacks to Pelly Crossing as well as the MS development (target for first transmission in-service to the Minto Mine in the third quarter of 2008), and Stage Two will involve the balance of the CS development from Pelly Crossing to the MD grid substation at Stewart Crossing (target for potential in-service in the second half of 2009).

At this time, no final decision has been made by Yukon Energy to proceed with the Project, either in whole or in part. Current schedules to plan, design and construct Stage One and Stage Two of the Project are set out in Chapter 5, Section 5.4.

Before any construction activities may be undertaken Yukon Government, First Nation and federal regulatory approvals and decisions are required. These approvals and decisions may only be undertaken after a screening assessment of this Project Proposal by the Executive Committee of the YESAB.

Prior to any final decision by Yukon Energy's Board of Directors on the Project, the following tasks will all need to be completed (in addition to securing all required regulatory approvals and decisions): final engineering design, costing and construction contract tendering, the completion of the current YUB review of Yukon Energy's 20-Year Resource Plan, the completion of the PPA with Sherwood Copper, the finalization of Yukon Government funding related to the Project, and approval of the Minister responsible for Yukon Development Corporation pursuant to Order-in-Council 1993/108.

1.4 PROJECT PURPOSE

The Project's prime purpose is twofold:

1. to connect the WAF and MD electricity grids in order to encourage economic development along the corridor, including new mine developments, and enhance overall WAF and MD system reliability, economic efficiency and flexibility in resource use; and,
2. to provide surplus WAF grid hydroelectric power to the new copper-gold mine under development west of the Yukon River at the Minto Mine, utilizing the CS development from Carmacks to the Minto Landing area.

Specific Project objectives include:

1. Providing near-term and long-term benefits to all Yukon ratepayers, the mines connected to the Project, governments and others through development of new transmission access

connecting the WAF and MD grids, and also connecting grid power resources with customer power loads that would otherwise be supplied solely with diesel fuel power generation.

2. Providing the near-term opportunity specifically for the Minto Mine, the Pelly Crossing community, and other mines in the Project Study Region[2] (e.g., the Carmacks Copper mine) if and when developed, to have access to near term surplus hydroelectric power to displace local diesel fuel power generation with its associated added costs, emissions and noise.
3. Providing the opportunity for meaningful consultation and involvement with the NTFN and the other residents of communities in which the Project will either be located or might have significant environmental or socio-economic effects.
4. Developing the Project through an approach consistent with the purpose of YESAA, and involving among, other elements, PIP consultations and a MOU with the NTFN, which:
   a) protects and maintains environmental quality and heritage resources;
   b) protects and provides for the well-being of Yukon Indian persons and their societies in the NTFNs, as well as Yukon residents and the interest of Canadians;
   c) intends to be undertaken in accordance with principles that foster beneficial socio-economic change without undermining the ecological and social systems on which community/residents/entire societies depend; and
   d) recognizes and, to the extent practicable, enhances the traditional economy of Yukon Indian persons and their special relationship with the wilderness environment.

1.5 REQUIRED AUTHORIZATIONS AND REGULATORY APPROVALS

A YESAB Executive Committee screening is required under Section 5 and Section 22 of Schedule 3 of the YESAA regulations[3] as the Project components will involve the construction of an electrical transmission line with a voltage that is at least 138 kV. An Executive Committee screening may also be required where the power line is of a length of more than 50 km where the power line is not on a right of way developed for a power line, pipeline, railway line or road or on a right of way contiguous to, for its whole length, a right of way developed for a power line, pipe line, railway line or road. Absent these components, the MS components of the Project would be subject to a Designated Office (under Schedule 1, Part 4, Section 1 of the regulations[4]) assessment due to the required voltage (less than 138 kV) and line distance (less than 50 km). In accordance with Section 1(1) of the YESAA regulations, a "power line" includes the transmission line and related transformers and switching stations.

In addition to approval of the Minister responsible for Yukon Development Corporation pursuant to Order-in-Council 1993/108, regulatory permits and approvals are required for land use (Crown lands and settlement lands), river and stream crossings and other activities related to the Project's development. Table 1.5-1 lists the regulatory permits and approvals that have been identified. Construction of the Project is planned to be in conformance with **Fisheries and Oceans Canada** (**DFO**) "Overhead Line

[2] The Project Study Region is described in Chapter 2, Section 2.2.
[3] The *Assessable Activities, Exceptions and Executive Committee Projects Regulations* (SOR/2005-379) ("*Assessable Activities Regulations*"), made under Section 47 of YESAA.

Construction Operational Statement, Version 2. 2006", and accordingly no DFO permit requirement is included in Table 1.5-1.[5]

Table 1.5-1
Regulatory Permits and Approvals Required for the Project

Activity	Permit Required	Regulation
Clearing or installing a utility ROW Conducting geotechnical studies (for substations)	Land Use Permit Land Use Permit	*Territorial Lands (Yukon) Act, Lands Act, Land Use Regulations*
Clearing or installing a utility ROW on settlement lands	First Nation access for construction approval	*N/A*
Tenure for Land Lease	Application for Land	*Territorial Lands (Yukon) Act, Lands Act, Land Use Regulations*
Tenure/easement for Land Lease on settlement land	As-built easement or equivalent for ROW on settlement lands	*N/A*
Construction of new road access Construct road access on highway ROW Use of land within highway ROW Perform work within highway ROW Erect a sign within highway ROW	Above, and Permit under Highways Act Section 7(2) Access Permit License of Occupation Work in ROW Permit Sign Permit	*Highways Act, Highways Regulation*
Permission to obtain gravel/sand from quarry	Quarry Permit (submitted along with Land Use Permit)	*Quarry Regulations, Territorial Lands (Yukon) Act, Quarry Regulations, Lands Act*
Timber cutting – if less than 1000 m^3 per year Timber cutting – if greater than 1000 m^3 per year	Commercial & Personal Use Permit Timber Permit or Timber Harvest Agreement	*Territorial Lands (Yukon) Act, Timber Regulation*
Burning refuse (wood)	Burning Permit	*Forest Protection Act, Forest Protection Regulation, Territorial Lands (Yukon) Act*
Work over or across any navigable water	Application for Approval of Proposed Works under the Navigable Water Protection Act, and Lands Act (Yukon)	*Navigable Water Protection Act* *Territorial Lands (Yukon) Act, Lands Act, Land Use Regulations*
Storage and handling of Petroleum Products	Storage Tank Systems Permit, Land Use Permit	*Environment Act, Storage Tank Regulation* *Territorial Lands (Yukon) Act, Lands Act, Land Use Regulations*
Handling, Disposal, Generation or Storage of Special (Hazardous) Wastes	Special Waste Permit (Environment Act)	*Environment Act, Special Waste Regulation*
Construction of buildings outside a municipality	Building Permit	*Building Standards Act*
Work within 4 km of aerodrome property	Transport Canada Obstacle Clearance Form	*Canadian Aviation Regulation* *TP 312 Standards and Recommended Practice*

[4] Schedule 1, Part 4, Energy and Telecommunications Section 1 provides that a Designated Office assessment is required for construction, installation, operation, modification, decommissioning or abandonment of, or other activity in relation to, a power line or a telecommunications line.

[5] Among other considerations, this Operational Statement requires that the overhead lines do not require the construction or placement of any temporary or permanent structures (e.g. islands, poles, crib works, etc.) below the high water mark, restrictions are incorporated on clearing of riparian vegetation (area within minimum 15 m from top of bank or high water mark of any watercourse) and the stipulated "Measures to Protect Fish and Fish Habitat" are incorporated when constructing overhead lines.

1.6 SUBMISSION ORGANIZATION AND CONTENT

The Project Proposal has followed the *Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submissions* (v. 2005) *(Proponent's Guide*) in structure and content with a few variations. As the *Proponent's Guide* describes in general terms the form of Project Proposal submissions, it has been adapted to meet the unique needs of the Project. Two key variations to the *Proponent's Guide* are:

- **Assessment Approach**: A new chapter (Chapter 3) has been added to the Project Proposal intended to outline the assessment approach, including the route selection process, specific to transmission line projects. This chapter also explains the incorporation of cumulative effects assessment in the chapter on Environmental Affects (and not as a separate chapter as outlined in the Proponent's Guide). This chapter also includes a discussion regarding the determination of significance.
- **Evaluation of Alternative Routes**: A new chapter (Chapter 7) has been added to the Project Proposal which focuses on the process the Proponent uses in determining its preferred route for the transmission lines. This chapter reflects best practice on route selection, and incorporates an iterative process of route refinement based on extensive public consultation. Because the route selection process adopted by the Proponent seeks to identify and avoid wherever possible potential adverse effects before the determination of a preferred route, it has been placed in advance of the chapter assessing effects associated with the preferred route.

Other differences relate to a re-ordering of the chapters, and the inclusion of a reference section at the end of each chapter. The following outlines the chapter organization:

- Chapter 1: Project Introduction and Overview
- Chapter 2: Project Location
- Chapter 3: Assessment Approach
- Chapter 4: First Nation and Community Consultation
- Chapter 5: Project Description
- Chapter 6: Description of Existing Environmental and Socio-Economic Conditions
- Chapter 7: Evaluation of Alternative Routes
- Chapter 8: Environmental and Socio-Economic Effects Assessment
- Chapter 9: Acknowledgement and Certification
- Chapter 10: Appendices

2.0 PROJECT LOCATION

2.1 INTRODUCTION

Chapter 2 provides a general geographical setting for the Project Proposal in terms of its location within the Yukon. It addresses the requirements in Section 3.0, Project Location, of the *Proponents Guide to Information Requirements for Executive Committee Project Proposal Submissions* (YESAB, 2005) by setting out information regarding geographic location, land tenure, traditional territory of Yukon First Nations, Yukon Land Use Planning Region and consistency with existing plans. It also outlines the broad Project Study Region for the Project Proposal assessment approach as more fully described in Chapter 3, as well as the Route Study Area used in discussions on route selection and alternatives in Chapter 7. The Project Site Area as defined in the Project Proposal is the smaller area generally within the Route Study Area which contains the proposed transmission line ROW (for the preferred route) and substation footprints.

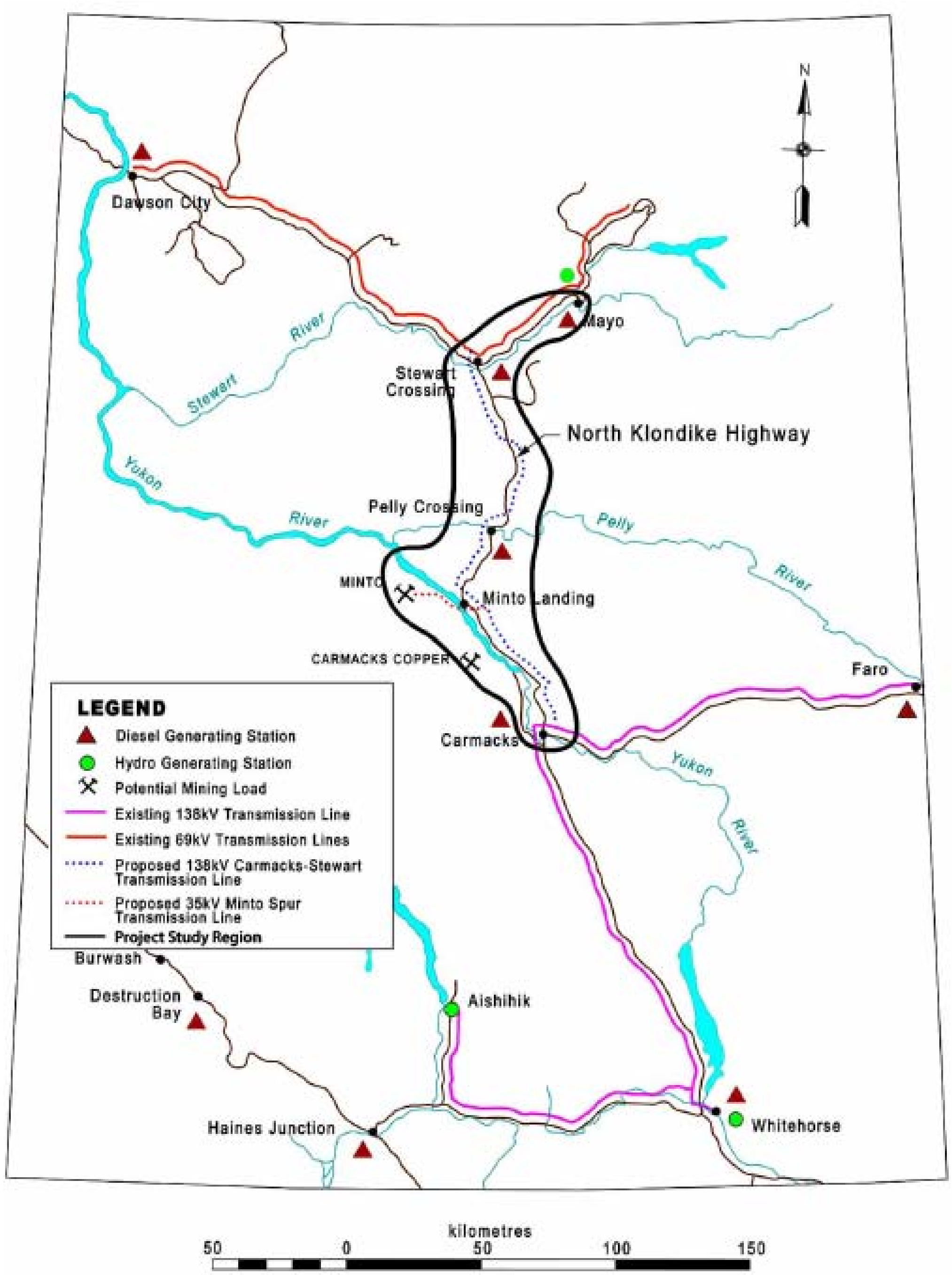
The Proponent cannot provide a legal land description of the Project components at this time. As is standard practice with transmission line developments, precise legal land descriptions for the final route generally will only become available after construction is complete and final easements have been agreed upon with the Crown for use of Crown land, any private property owners, and the respective First Nations for use of their settlement lands. Details on the process are outlined in each section below.

2.2 GEOGRAPHICAL LOCATION

The proposed Carmacks-Stewart/Minto Spur Transmission Project is located in the Yukon interior region. Based on the final route selected as described in Chapter 7, the 138 kV CS transmission line will be approximately 172 km in length, starting at a new substation adjacent to the Carmacks Airport and 138 kV WAF transmission line at the southern end, and terminating at the existing Stewart Crossing substation at the northern end. The 35 kV MS transmission line is approximately 27 km in length, starting at a new substation east of the Klondike Highway in the vicinity of Minto Landing, and terminating at the Minto Mine site.

As reviewed in more detail in Chapter 3, the Project Study Region for the Project Proposal is that portion of the Northern Tutchone Planning Region, between Carmacks and Mayo that is generally in close proximity to the Klondike Highway and the existing access road from the Klondike Highway to the Minto Mine Site. This Project Study Region also falls within YESAB's Central District. A schematic of the Project Study Region is provided in Figure 2.2-1 below.

Figure 2.2-1
Proposed Carmacks-Stewart / Minto Spur Transmission Project Study Region



The Project Study Region used in focusing the collection of environmental and socio-economic baseline information found in Chapter 6 lies within the Boreal Cordillera Ecozone, which is generally characterized by rolling hills, uplands and plateaus separated by deep and broad U-shaped valleys. The Project Study Region is also within the Yukon River Major Drainage Area which encompasses approximately 66% of the

Yukon Territory and is its largest drainage area. Details on the drainage basin, topography and ecoregions are found in Chapter 6, Section 6.2.1. The Project Study Region includes the communities of Carmacks, Minto Landing, Pelly Crossing, Stewart Crossing and Mayo which are connected by Klondike Highway # 2 and Silver Trail Highway # 11.

As indicated in Chapter 1, Section 1.3, preliminary studies resulted in a 500 metre wide route study area for the CS project route generally located along the Klondike Highway, and including several alternatives. In May 2006, a MOU was concluded between the Proponent and the three NTFNs which outlined support for the CS project, generally located within this 500 metre wide route study area and the MS development generally located along the Minto Mine access road. As reviewed in Chapter 3, the overall Route Study Area as defined on this basis was the focus of the public consultation and route selection process outlined in Chapters 4 and 7 respectively.

Upon completion of the route selection process, an approximate 100 metre wide corridor was selected to visually describe through GIS mapping the preferred route location for the CS and MS transmission lines for regulatory review. This corridor is discussed in Section 2.4 below. Within this corridor, the final Project Site Area will be defined after construction is complete and all easements with the Crown, NTFNs and any private property owners are finalized. This Project Site Area will include a 60m ROW for the CS development, a 30 m ROW for the MS development, and any added ROW or land acquired for substation sites.

Regarding the associated substations, the Project Proposal defines general proposed locations and approximate footprint sizes in Chapter 5, Project Description. Final precise dimensions and land tenure areas will be known for substations only after final engineering design is complete.

2.3 PROJECT COMPONENTS

The Project consists of the following components:

- The 138 kV CS transmission line from Carmacks to Stewart Crossing
- The 35 kV MS transmission line from the vicinity of Minto Landing to the Minto Mine Site
- New substations at Carmacks, Minto Landing, and Pelly Crossing
- Expansion of the existing substation north of Stewart Crossing
- Step-down transformer and switches at the Minto Mine Site substation

Approximate **Universal Transverse Mercator Coordinate System** (**UTM**) and Latitude/Longitude coordinates for the Project's substation components are provided in Table 2.3-1 below:

Table 2.3-1
Project Substation UTM and Latitude / Longitude Coordinates

	UTM coordinates		Latitude	Longitude
Substation	**Easting**	**Northing**		
Carmacks	437300	6887800	62°52'30"N	136°11'10"W
Minto Landing	405750	6942500	62°35'30"N	136°50'W
Minto Mine Site	385300	6945100	62°37'10"N	137°14'40" W
Pelly Crossing	419300	6967150	62°47'10"N	136°35'20"W
Stewart Crossing	414450	7030000	63°23'30"N	136°42'W

2.3.1 Legal Land Description

A detailed legal land description of the transmission lines and associated substations will be available after detailed engineering design, construction and easements are finalized with the Crown, private property owners and relevant NTFNs for their settlement lands. This will be filed with Yukon Government Lands at that time.

2.4 LAND TENURE

A land tenure search along the proposed Route Study Area is provided in Appendix 2A. The line primarily crosses Crown Land and First Nation Settlement Land and Yukon Energy has made every attempt to avoid crossing privately-owned lands.

Land Use Maps depicting land use along both the CS and MS Route Study Areas are provided in Appendix 2B, (Maps 2B-1 through 2B-7). Original 28 x 24 scale maps of these Land Use Maps are included on the Map Folio CD accompanying this submission.

Management and Protected Areas:

The Project is adjacent to the following management and protected areas (more detail is provided in Chapter 6, Section 6.3.2.1):

- Five Finger Rapids Recreation Site
- Lhutsaw Wetland Habitat Protection Area
- Jackfish Lake Park Reserve
- Ddhaw Ghro Habitat Protection Area

These areas are avoided by the Project's final ROW, due to the iterative route selection process outlined in Chapter 7, Evaluation of Route Alternatives.

Trapping and Outfitting Concession Areas:

The Project overlaps 12 trapping concessions: 10 concessions for the CS line and two for the MS line. More detailed information, including a trapping concession map, is found in Chapter 6, Section 6.3.2.1.

The Project overlaps three outfitting concessions: Trophy Stone Safaris, Mervyn's Yukon Outfitting, and Rogue River Outfitters Ltd. More detail including a map of outfitting concessions is found in Chapter 6, Section 6.3.2.2.

Mineral, Aggregate and Agricultural claims:

There are two known mining claims within the Route Study Area: Cash Resources has a coal exploration concession on the east side of Tantalus Butte which lies adjacent to the proposed CS transmission ROW, and Sherwood Copper Corporation owns and is developing the Minto Mine claims where the MS line crosses into and terminates. Western Copper holds numerous quartz claims and leases within the broad Project Study Region, extending from the Klondike Highway at McGregor Creek west to their proposed mine site along Williams Creek.

In addition to mining claims, aggregate materials are mined throughout the Project Study Region. The Yukon Government Department of Highways has 23 aggregate notations within the Project Study Region which include active quarry pits, stockpiles, reserves and maintenance yards. The Project is immediately adjacent to or will cross 7 of these gravel pits. Greater detail on mining and aggregate materials can be found in Chapter 6, Section 6.3.2.2

There is one parcel of agricultural land which the CS transmission line is proposed to cross, running along the west side of the Klondike Highway immediately south of McGregor Creek. This AG Application # 746 has recently been approved by Yukon Government but is pending due to a challenge by LSCFN. The CS line also passes in the vicinity of three other agricultural parcels: two applications north of McGregor Creek and one Agreement for Sale at McCabe Creek. In these cases the CS transmission line is on the opposite side of the Klondike Highway. More details on the use of this land are found in Chapter 6, Section 6.3.2.2.

2.5 TRADITIONAL TERRITORY

The proposed Project crosses the traditional territory of three First Nations: Little Salmon/Carmacks, Selkirk and Nacho Nyak Dun. Figure 2.5-1 shows the traditional territory of these First Nations in a regional setting.

Figure 2.5-1
First Nation Traditional Territory

In addition to crossing the traditional territory of these First Nations, the route selection process (as outlined in Chapter 7) results in the proposed transmission lines crossing approximately 74 kms of settlement land belonging to Little Salmon/Carmacks and Selkirk First Nations. Table 2.5-1 outlines the approximate amount of settlement land by line segment:

Table 2.5-1
Settlement Lands Crossed or Adjacent to the Project Site Area

Transmission Line Segment	On Settlement Lands (approximate km)	Adjacent to Settlement Lands[1] (approximate km)
Carmacks to McGregor Creek	LSCFN: 2.5 km (north of Tatchun Creek)	LSCFN: 5 km
McGregor Creek to Pelly Crossing substation	SFN: 6.9 km (McCabe Creek to proposed Minto Landing substation) SFN: 14.8 km (north of EMR block to end of SFN R10B block)	SFN: 25.8 km
Minto Spur line – Minto Landing to Mine Site	SFN: 1.8 km from substation to Yukon River crossing SFN: 23.2 km from west bank of Yukon River to mine site	
Pelly Crossing substation to Stewart Crossing substation	SFN: 25.2 km	SFN: 9.1 km NNDFN: 15.3 km
TOTAL LINE	**74.4 kms**	**55.2 km**

The overall estimated area of settlement land which will be required for the CS transmission ROW will be:

- LSCFN: 2.5 km x 60 m width = 15 hectares
- SFN: 46.9 km x 60 m width = 281.4 hectares

The overall estimated area of settlement land which will be required for the MS transmission line ROW will be 75 hectares, using a 30 m wide ROW.

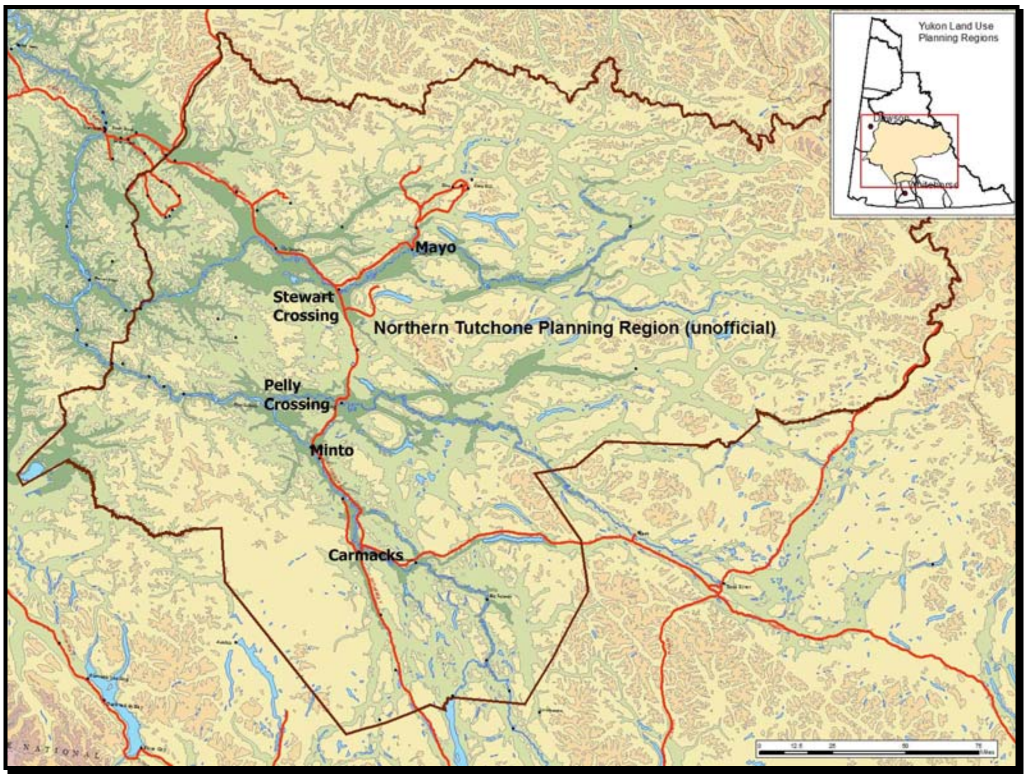
In addition, the CS line will run adjacent to another 55 km of settlement land generally located on the side of the Klondike Highway opposite from the proposed route.

[1] "Adjacent to settlement lands" refers to the line running on the opposite side of the highway to settlement land blocks which are in addition to lands that have been crossed by the CS line. The MS line is wholly in SFN settlement lands other than in the vicinity of the Minto Landing substation.

2.6 YUKON LAND USE PLANNING REGION

The proposed Project falls within the Northern Tutchone Planning Region as illustrated in Figure 2.6-1. No regional Land Use Plans have been developed for this region at this time.

Figure 2.6-1
Yukon Planning Regions



(Source: www.planyukon.ca)

2.7 CONSISTENCY WITH OTHER PLANS

The proponent has reviewed publicly available fish and wildlife and community plans in the Project Study Region in order to ensure the proposed transmission lines and substations are consistent with these plans.

2.7.1 Current Land Use and Management Plans

There are currently no land use plans in place in the Project Study Region; however, there are several management plans that are applicable. These plans include Community-Based Fish and Wildlife Management Plans for the Project Study Region First Nations, the Village of Carmacks: **Official Community Plan** (**OCP**), the draft community plan for Minto Landing, the Yukon Wildland Fire Management Program, along with the Ddhaw Ghro Habitat Protection Area Draft Management Plan and newly released Łútsäw Wetland Habitat Protection Area Management Plan. A summary of the plans considered in relation to the Project is provided in Table 2.7-1.

Table 2.7-1
Land Use and Management Plans that Relate to the Project

Plan	General Description	Objectives Related To The Project
Community-Based Fish and Wildlife Management Plan: Little Salmon/Carmacks First Nation Traditional Territory, 2004-2009	Consists of a five year work plan to address local concerns about fish and wildlife. Consultation identified multiple concerns, solutions and commitments.	Items pertaining to the Project are largely located in the Carmacks to Minto area and include Yukon River Habitat Protection, the Tatchun Caribou Herd, making corridors less attractive to wildlife, and fire management strategies.
Community-Based Fish and Wildlife Management Plan: Nacho Nyak Dun Traditional Territory, 2002-2007	This is the third such plan for the community. Community consultation allowed for concerns about fish and wildlife to be identified for the entire traditional territory of the First Nation of NND. Multiple concerns, solutions and commitments were identified.	Moose populations and habitat, caribou, harvesting of moose and caribou, and access are all concerns identified in the plan.
SFN Draft Land Use Plan for Hetsutthat (Minto)[2]	This plan is in the formative stages and identifies various R-blocks for purposes such as wood cutting and cabin/house building, along with areas that are inappropriate for activities such as wood cutting (especially commercial) and agriculture.	Areas of interest for wood cutting (or disallowing wood cutting) are most relevant for the Minto Spur line. The plans for Minto Landing do not give any details on a transmission line or substation.
Village of Carmacks: Official Community Plan, 2004.	The **Official Community Plan** (**OCP**) is a roadmap of the community's vision for the future. The plan addresses community development and land use, economic development, social development, education and public safety, parks, recreation and open spaces, environmental protection and stewardship, and infrastructure and	The provisions of the OCP that are most applicable to the transmission line include environmental protection and stewardship objectives along with future land use plans.

[2] The draft plans for the Minto Landing area are still in the early stages. Since the original draft plans were produced in 2002, no further details for the area have evolved.

Plan	General Description	Objectives Related To The Project
	municipal services.	
Yukon Wildland Fire Management Program	The program aims to protect Yukoners, their communities and resources by enforcing the Forest Protection Act and suppressing wildfire from a priority-based approach which places human life, community value and firefighter safety above all else.	The Project will fall within two management zones: a Full Fire Management Zone, and a Strategic Fire Management Zone. Suppression activities will vary depending on the type of management zone.
Łu̇tsäw Wetland Habitat Protection Area Management Plan	The plan delineates the management recommendations for various land uses in the habitat protection area. It includes the maintenance of both the natural and cultural environment. The Plan was approved in May 2006 by SFN and YG.	The plan seeks to protect wildlife habitat, as well as recognize the importance of the area to the Selkirk First Nation. It contains recommendations specific to linear developments such as transmission lines.
Ddhaw Ghro Habitat Protection Area Draft Management Plan	The Draft Management Plan was released in May 2006 and is currently under public review by the Yukon government, SFN, and NND. The vision, objectives and recommendations of the management plan envision the area so that it is left as is, i.e. it remains in its natural state.	Since Ddhaw Ghro exists outside of the Route Study Area, the items pertaining to the Project are limited to the aim of protecting key habitat outside the current Ddhaw Ghro boundaries. This includes protection of the Ethel Lake caribou herd winter range, riparian areas and wetlands, and raptor nesting sites.

Aside from the plans listed, it should be noted that the Community-Based Fish and Wildlife Management Plan: Selkirk First Nation Traditional Territory is currently in the process of being edited and accepted by the First Nation. According to a member of the Selkirk Renewable Resources Council (personal communication, July 12, 2006) there are no items of concern in regards to the Project in the Management Plan that have not otherwise been stated in the community consultation process.

2.7.2 Project Consistency with Other Plans

The Project took into consideration the objectives of various management plans that are currently in place. Objectives identified in the various documents were also items frequently identified in the public consultation and involvement process, and thus were dually considered in the selection of the route.

Appendix 2C provides a summary of the objectives of the applicable management plans, identifies whether the objective was acknowledged during public consultation, and describes how the Project is consistent with each plan objective. The following provides a summary description showing that the Project is in line with the objectives and strategies of these management plans.

The LSCFN and NND Community-Based Fish and Wildlife Management Plans, along with the Łú̲tsäw Habitat Protection Area Management Plan and Ddhaw Ghro Habitat Protection Area Draft Management Plan, are largely focused on the protection and enhancement of wildlife. Further, the Łú̲tsäw Habitat Protection Area Management Plan contains recommendations for linear projects. Concerns related to the objectives of these plans were also frequently identified in consultation with First Nations, government agencies, and other publics such as the local Renewable Resources Councils. Routing of the transmission line was sensitive to the various wildlife concerns contained within these management plans.

The environmental protection and stewardship objectives of the Village of Carmacks OCP aim to protect environmentally sensitive areas from the encroachment of incompatible land uses. This will be accomplished by establishing buffers and setbacks and by adopting other management practices to protect the area's integrity, productivity, and resilience. The OCP also aims to protect residents from incompatible land uses and potential sources of pollution such as noise, odour, dust and other potential sources of nuisance or public safety risk. Given that the new substation for the Project will be located near the airport, while the remainder of the transmission line will avoid the community, the Project is consistent with the development plans stated in the OCP.

Each of the communities concerned has recent experience with forest fires, and consequently the consultation process identified concerns regarding the effect that a transmission line would have on potential future fires. The areas of Carmacks and Stewart Crossing have a higher priority fire management designation, while fire suppression activities near the communities of Pelly Crossing and Minto Landing will be limited according to Wildland Fire Analysis. Given that a transmission line has the ability to act as a firebreak in the case of a wildfire, the Project helps to enhance the objectives of the Wildland Fire Management Program.

3.0 ASSESSMENT APPROACH

Chapter 3 reviews the assessment approach in the Project Proposal, focusing on the following items:

- Overview of Approach
- Route Selection and Evaluation Process
- Assessment Framework
- Cumulative Effects Assessment Approach
- Determining Significance of Residual Effects
- Sources of Information

3.1 OVERVIEW OF APPROACH

The Project Proposal has been prepared in accordance with YESAA, the YESAB Guides[1] and standard environmental and socio-economic assessment practice. It sets out the information required from Yukon Energy (the Proponent), for a screening assessment of the Project by the YESAB Executive Committee. In accordance with the matters to be considered under s. 42(1) and 42(2) of YESAA, likely environmental and socio-economic effects of the Project, as well as likely cumulative adverse environmental and socio-economic effects of the Project and their significance are identified after considering the implementation of proposed mitigation, monitoring and follow-up measures. The submission utilizes and integrates available scientific, **traditional knowledge** (**TK**) and other information relevant to the assessment of Project effects.

Following the direction of s. 50(3) of YESAA, the assessment approach has incorporated an extensive consultation and public involvement process which sought views from First Nations and residents of communities where the Project is to be located or might have significant environmental or socio-economic effects (Chapter 4). Early and meaningful ongoing opportunities have been provided for First Nations, other local residents, other segments of the public and governments to receive information on, and provide views and information about the Project and the environmental and socio-economic planning and assessment process. These consultations have contributed to the mitigation of adverse environmental and socio-economic effects that could potentially be associated with the Project as well as a consideration of alternatives to the Project or alternative ways of undertaking or operating it that would avoid or minimize any significant adverse environmental or socio-economic effects.[2]

The scoping of the Project, as well as a description of Project activities and components, is provided in Chapter 5. The assessment approach addresses the distinct phases of the Project (i.e., construction, operation and maintenance, and decommissioning) and their effects on environmental components (e.g., air, land and water environments and associated aquatic and terrestrial life) and socio-economic components (e.g., resource and other land use, economies, and social components including

[1] YESAB Guides refers to the Assessor's Guide to the Assessment of Environmental Effects, v. 2006.01; the Guide to Socio-economic Effects Assessment 2006.06; Assessor's Guide to the Assessment of Cumulative Effects v. 06.01.

[2] These matters are required to be considered under s. 42(1)(e) and 42(1)(f) of YESAA.

infrastructure and services, aesthetics, cultural/heritage sites and resources, traditional and other lifestyles, culture, human health, and social well being).

The Project Proposal ultimately assesses (Chapter 8) the effects of a preferred transmission route (Project Site Area) within which it is proposed that the ROW footprint of the Project be located. The preferred transmission route has been selected only after the identification and evaluation of potential route alternatives (Chapter 7) within the Route Study Area; for the CS development connecting the WAF and MD grids this Route Study Area is generally within or near the 500 metre corridor along the Klondike Highway that was identified at the outset of this process, and for the MS development this Route Study Area is generally along or near the Minto Mine assess road.

The assessment approach focuses on the effects of Project construction and operation as well as initial assessment of anticipated decommissioning effects related to the MS development since it is anticipated that decommissioning of major parts of the MS facilities will occur when the Minto Mine closes[3]. At this time there is no timetable for decommissioning of the CS development facilities, and it is currently not feasible to provide a meaningful assessment of any likely CS decommissioning plans or the anticipated effects of decommissioning. If at a later date it is determined that the CS facilities are no longer required, then Yukon Energy would adhere to the legislation and regulations in place at that time and would review decommissioning plans with regulatory authorities and affected First Nations and other local communities.

3.2 ROUTE SELECTION AND EVALUATION PROCESS

Careful routing of the Project transmission lines, along with other mitigation measures, are key factors utilized in project planning to avoid potential significant adverse environmental and socio-economic effects.

The Route Study Area is generally an area already disturbed by established linear road development as well as other activities. The route selection process generally sought to identify areas to be avoided and/or used in order to minimize adverse effects and enhance beneficial effects; this process reflects the inherent flexibilities in selecting a final ROW for a transmission line within the Route Study Area as well as options then remaining for pole placements and clearing within that ROW.

The route selection and evaluation process relied upon public consultation and professional judgement to identify and evaluate potential routes before selecting a preferred route. This routing process utilized regional and site-specific environmental and socio-economic features to identify and evaluate viable alternative routes and to assess measures for avoidance, minimization, and mitigation of potential adverse environmental and socio-economic effects as well as avoiding cumulative adverse environmental or socio-economic effects and addressing issues of public concern.

[3] See Chapter 5, section 5.10. Closure of all Minto Mine activities and decommissioning of relevant parts of the MS facilities may occur as early as 2018; however, the life of this mine may well be extended through confirmation of additional high grade reserves to be mined and through future decisions to process stockpiled low grade materials.

The objectives of the route selection process were:

- To provide a description of the proposed Project to First Nations, other interested publics, and governments.
- To select route alternatives for the transmission lines and associated facilities to minimize adverse environmental and socio-economic effects, to enhance beneficial environmental and socio-economic effects, and to satisfy technical engineering and cost requirements for the Project.
- To assess the potential effects of the proposed Project components (lines & substations) during the relevant Project phases (construction, operation and decommissioning).
- To conduct the process with consideration of local input from:
  - Potentially affected First Nations.
  - Other local residents and communities.
  - Land and resource users and managers.
  - **Non-government organizations** (**NGOs**) and interest groups.
  - Government and the general public.
- To find practical ways to reduce potential negative effects and enhance benefits of the proposed Project.
- To prepare a Project Proposal assessment that documents the results of the route selection process and addresses issues raised by First Nations, local residents, other members of the public and governments during the process.

The assessment process sought to avoid adverse effects and enhance potential benefits whenever possible and practical. With regard to conducting an assessment for transmission lines, where effects could not be avoided, routes and/or sites were selected that were best suited to effective mitigation and sound management with regard to limiting potential negative effects on the environment and socio-economic conditions. The route selection process applied an iterative and progressively more detailed analytical approach that involved systematic refinement and reduction of the effective study area to identify issues and then assess the best balanced choice of a preferred route, with ongoing input provided through First Nation, public and government involvement. This subject is dealt with in greater detail in Chapter 7.

3.3 ASSESSMENT FRAMEWORK

For the purpose of assessing environmental and socio-economic effects of the Project, current conditions in areas potentially affected by the Project and the projected evolution of these conditions without the Project are considered as the baseline. Potential environmental and socio-economic effects of the Project on this existing baseline are predicted separately in the Project Proposal for each environmental and socio-economic component by comparing:

a) <u>what would be expected without the Project</u> (i.e., the “existing conditions” or baseline expected for each environmental and socio-economic component without the Project, including as relevant consideration of other projects or activities that have been or will be carried out without the Project); and

b) what would be expected with the Project (i.e., each environmental or socio-economic component as modified or affected by the Project based on direct and indirect effects pathways[4] from the Project to the environmental or socio-economic component, including as relevant consideration of other projects or activities that have been or will be carried out in combination with the Project).

Following from the Project description and determination of the Project scope (Chapter 5), and reflecting the YESAB Guides and standard environmental and socio-economic assessment practice, the assessment framework for the Project Proposal (including cumulative effects assessment) to assess effects of the Project includes the following five basic steps:

1. **Scoping of Assessment**: It is critical at the outset to address assessment scope issues, including selecting **valued environmental and socio-economic components** (**VCs**) for the assessment[5], sources of Project effects for each VC, and scope of geographic and temporal assessment boundaries for each VC. Scoping of the assessment is generally addressed below in section 3.3.1; however, determination of specific VCs and their respective scoping is addressed in setting the framework for review of relevant environmental and socio-economic baseline conditions (Chapter 6). Overview of other specific methods of assessment approach for specific VCs is reviewed as required in Chapter 8.

2. **Existing Conditions:** This is a baseline analysis and includes review of current and evolving future VC conditions without the Project, as affected by past, current and other future projects included in the cumulative effects assessment. Each existing VC is described in the baseline analysis only to the extent needed to predict the effect of the Project on that VC as set out in the assessor's guides. A cumulative effects assessment forms an integral part of this assessment of baseline conditions (see section 3.4 regarding cumulative effects approach). The analysis of baseline conditions is provided in Chapter 6, and provides information used in the route selection analysis (Chapter 7) as well as the effects assessment related to the selected route (Chapter 8).

3. **Effects and Mitigation**: This describes quantitatively and qualitatively both positive and adverse effects on VCs likely to result from the Project, after consideration of the baseline conditions without the Project as well as proposed mitigation measures with the Project beyond those already included in the Project description. In accordance with YESAA and the assessor's guides, the scope of this assessment includes an examination of both

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[4] As reviewed in the YESAB Guides, "direct effects" are the initial, immediate effects caused by a specific activity and "indirect effects" are caused by a given action, but occur later in time or further removed in distance.

[5] Valued Environmental and Socio-economic Components (VCs, sometimes referred to in YESAB Guides as VESECs) are elements of the Project Study Region valued for environmental, scientific, social, aesthetic, or cultural reasons. Selecting project-specific VCs is essential in the YESAB Guides for focusing assessments, and for determining the significance of effects.

environmental and socio-economic effects arising from the Project. Cumulative effects assessment forms an integral part of this assessment (see section 3.4 regarding cumulative effects approach). This analysis is provided in Chapter 7 for the route selection process and in Chapter 8 for the selected route.

4. **Residual Effects and their significance**: This describes summaries of the nature and extent of any residual environmental effects of the Project after implementation of proposed mitigation (including route selection), and includes characterization with rationale as to whether adverse residual environmental and socio-economic effects are significant or not significant, as defined in S. 58 of YESAA (see section 3.5 of the Project Proposal). Included as part of mitigation are any plans for responding to any known or predicted residual effects, and procedures for identifying and responding to effects that were not predicted or foreseen. This assessment is included in Chapter 8.

5. **Monitoring and follow-up**: This is a description of the proposed monitoring and follow-up activities should the Project proceed. This description is included in Chapter 8.

This framework is reviewed in more detail below for the following elements:

- Scoping of the Assessment
- Analysis of Effects (combines existing conditions with effects and mitigation steps)
- Evaluation of Significance and description of Residual Effects
- Monitoring and Follow-Up

3.3.1 Scoping of the Assessment:

This step includes:

- identifying issues of concern related to the Project,
- selecting VCs for further examination,
- identifying potential sources and pathways of effects from the Project to each VC selected,
- identifying spatial and temporal boundaries for assessing effects of the Project for each selected VC; and
- identifying other actions and effects pathways that may act cumulatively with the Project to affect the same VCs.

It is standard practice to focus an assessment on specific environmental and socio-economic components which are determined to be of particular importance. A VC based approach is intended to ensure that potential significant adverse effects to important environmental and social components will be detected and mitigated through the assessment process. Measures designed to mitigate adverse effects on major components should also minimize likelihood of adverse impacts on other environmental and social components.

In considering the existing biophysical environment and existing socio-economic conditions, the scope of study focused on examining components that could be linked to the Project. The Guide to the Assessment of Environmental Effects (YESAB, 2006(a)) sets out that the assessor should look at both project-specific issues and also identify regional environmental issues relevant to the project, with the goal of delineating valued components and associated project effects on those components through the life of the project. The Guide to Environmental Effects Assessment states in this regard:

> It is not possible for an assessment to consider all possible ecological and socio-economic interactions with respect to a project; an ecosystem alone may contain thousands, or perhaps millions, of variables. A pragmatic and widely accepted method for overcoming this challenge and focusing the assessment is to delineate priorities—valued environmental and socio-economic components. (YESAB, 2006(a), p. 13)

Similarly, the Guide to Socio-Economic Effects Assessment states:

> The assessor must bear in mind that, as discussed in Step 2 – Determine Assessment Scope, only those elements of the socio-economic environment within the established study area that are potentially affected by the project need be further identified and characterized (YESAB, 2006(b), p.47)

In this assessment VCs were determined after consultation with interested parties and experts, and consideration of any plans and policies applicable to the regional area. The selection of VCs helped to focus the analysis on components deemed to be of particular importance or of special interest to residents or to the ecosystem. Well chosen VCs can also provide a representative measure of the Project's effects on the non-selected environmental and socio-economic components.

Based on the YESAB Guides, VCs for this assessment were identified and grouped under one or more of the following headings:

- Focal species and habitat (environmental VC defining landscape attributes required to meet the needs of biota, and also the management regimes that should be applied to them).
- socio-economic context (socio-economic VC recognized as being important because of its integral connection to, or reflection of, the socio-economic system; its commercial or economic value; and/or its role in maintaining quality of life in a community).
- Representation (seek to maintain an appropriate representation of ecosystem networks and populations on the landscape over time, while recognizing and managing for natural temporal fluctuations in composition that occur).
- Special elements (may include rare or under-represented ecosystems, rare and/or threatened flora or fauna species, important harvested species, and unique landforms).
- Ecological processes (processes of social or environmental importance).
- First Nation/Resident/Community values or concerns.

The YESAB Guides provided considerable initial guidance as to scoping. Public consultations and further analysis were used to focus assessment of specific environmental and socio-economic components to define effects pathways, and to identify temporal and spatial boundaries for the assessment of Project effects on selected VCs. Section 3.4 reviews the overall approach to identify other actions or projects to address cumulative effects assessment requirements.

Temporal and geographic study area boundaries for Project effects were identified separately for each VC based on predicted links with the Project.

The time periods examined include the Project construction, operations and decommissioning periods as required to assess duration and/or timing of specific effects related to the Project. In summary, the following distinct time periods are assessed in which Project related effects accrue:

- **Construction Phase:** This phase generally consists of the estimated two years required to complete the construction of the full Project, including commissioning of the facilities; Stage One construction (CS development from Carmacks to Pelly Crossing, plus the MS development) is currently planned from mid 2007 to third quarter 2008, and Stage Two construction (CS development from Pelly Crossing to Stewart Crossing) is currently planned for 2008-2009.

- **Operation Phase:** This phase will see the operation of the CS and MS facilities and will extend from the end of construction throughout the life of the relevant components of the Project.

- **Decommissioning Phase:** For the CS Project component, there is no timetable or plan for final disposition or decommissioning of the Project facilities. The design life of the facility before substantial refurbishment is 50 to 100 years. When such plans need to be developed, Yukon Energy would submit these plans as then required for regulatory review and approval prior to its implementation. Accordingly, the Project proposal does not provide any further assessment of the CS Project final disposition.

  For the MS Project component, the timetable for final disposition or decommissioning of portions of the Project facilities (e.g., facilities other than those used on an ongoing basis to serve the community at Minto Landing) is dependant on the realized economic life of the Minto Mine. Currently, it is estimated that closure of all activities at the mine may occur as early as 2018; however, such closure may also occur several years later (see section 5.10).

The assessment process commenced with the definition of a general geographic location for the Project and a Project Study Region (Section 2.2) as well as the Route Study Area for the CS and MS developments. For assessment purposes the following areas were defined:

- **Project Site Area**: The ROW and footprint area ultimately needed for the Project construction and operation is defined as the Project Site Area. The Project Proposal describes a preferred route area that typically reflects up to about a 100 metre width within which the Project Site Area will be located with ROW requirements of 60 metres for the CS line and 30 metres for the MS line (plus any added ROW or land acquired for substation sites).

- **Project Study Region**: A broader Project Study Region for examining environmental and socio-economic effects is defined as the portion of the Northern Tutchone Planning Region between Carmacks and Mayo that is generally in close proximity (e.g., 30 to 50 km) to the Klondike Highway and the existing access road from the Klondike Highway to the Minto Mine Site (see Figure 2.2-1). The maximum geographic extent of most environmental and socio-economic effects is expected to be included in this region. The generic nature of the definition adopted for this study region reflects the absence of any specific administrative area available for overall data collection or mapping purposes relevant to this assessment. Within this Project Study Region, the Route Study Area represents the much smaller local region examined to assess route alternatives (i.e., 500 metre corridors identified along the Klondike Highway for the CS development and a somewhat smaller corridor generally along the Minto access road for the MS development).

3.3.2 Analysis of Effects

To determine the Project's effects the baseline conditions for the selected VCs were considered. Following the YESAB Guides, the consideration of baseline conditions for VCs may include information on project components, technologies/approaches, test results, existing environmental conditions and anticipated effects. Understanding the past and current conditions in which each VC exists is considered important for providing a baseline against which present and future effects of the Project may be measured and determinations of significance of Project effects may be made.

Once baseline data was collected for each VC the assessment considered the effects of the Project, as well as other actions which may act cumulatively with the Project, on the selected VCs. Effects were examined at each phase of the Project. Applying standard practice and the YESAB Guides, the assessment of each VC provides a description of the existing baseline environment as scoped, before providing an analysis of Project effects expected to interact with the VC.

The analysis of Project effects considers both the temporal and spatial scope of effects on selected VCs. The temporal scope is VC specific and extends as long as the Project effects are predicted to occur, taking special consideration of the seasonality of effects where necessary. The spatial scope includes all areas of overlap and interaction between Project effects and VCs including determinations regarding whether Project activities overlap with one or more VCs seasonally or year round and duration of such effects.

In accordance with standard assessment practice, YESAA and the YESAB Assessor's Guides, the Project Proposal includes identification of mitigation as part of the effects analysis. Mitigation measures considered during the assessment process includes measures to reduce, eliminate or control adverse affects. As set out in YESAA and the guides such measures may also include compensation and alternative ways of undertaking or operating a proposed project that would avoid or minimize any significant adverse effects.

3.3.3 Evaluation of Significance and Describing Residual Effects

This step evaluates the significance of adverse residual effects likely to result from the Project after consideration of recommended mitigation. Evaluation of significance was carried out in accordance with YESAA, and involves (where feasible) comparing such residual effects against thresholds for a VC. Examples of thresholds that may be used include specified goals or targets, standards or guidelines, carrying capacity or limits of acceptable change. Significance may also be measured by land use objectives or trends, as well as a range of other methods.

In the absence of thresholds or other specified guides, YESAB Guides set out criteria such as likelihood, duration, magnitude and extent that can be used to provide a preliminary identification of potentially significant effects (see Section 3.5).

3.3.4 Follow-up and Monitoring

This step sets out recommended monitoring and effects management measures. The need for monitoring environmental and socio-economic effects is required for consideration for screenings by the Executive Committee under YESAA. Effects monitoring may be necessary to ensure the success of any mitigation measures that are to be implemented and to ensure the accuracy of any assumptions made regarding predicted effects and their mitigation.

Follow up monitoring may prove valuable to ensure that the Project does not have any unanticipated adverse significant effects through providing additional information regarding whether predictions were accurate, whether any unanticipated effects occur and whether the Project remains in compliance with any terms and conditions specified in its approval.

3.4 CUMULATIVE EFFECTS ASSESSMENT APPROACH

The **cumulative effects assessment** (**CEA**) is integral to the assessment approach and examines the likely effects of the project in combination with the likely effects of other past, existing and future projects and activities. To be considered a cumulative effect, the other past, existing and future projects being considered in the assessment must affect a VC that is also being affected by the principal project; in this way the projects act cumulatively upon a valued component.

The CEA for the Project Proposal was conducted concurrently with the other elements of the environmental and socio-economic effects assessment and there is no explicit distinction in the submission between the CEA and other effects being assessed. As reviewed in Section 3.3.1, this approach is consistent with common environmental assessment practice and not inconsistent with YESAA or the Assessor's Guide.

Sections 3.4.2 and 3.4.3 review other projects and activities specifically considered as part of the CEA.

3.4.1 YESAA Requirements and Overall Approach for the Project Proposal

YESAA Requirements

YESAA requires that an Executive Committee Screening consider the significance of any adverse cumulative environmental or socio-economic effects of a project in combination with the ongoing effects of existing projects or the predicted effects of projects that will occur in the future. In environmental assessment practice the effects pathways from other projects and human activities must overlap with the effects pathways identified for the project being assessed in order to be considered to act cumulatively on identified VCs.

Although YESAA does not require that a project proposal submission to the Executive Committee consider cumulative effects[6], CEA is standard to good environmental assessment practice and has been included as part of this submission. The cumulative effects analysis conducted is designed to assist in determinations regarding whether there will be any significant adverse cumulative environmental or socio-economic effects.[7]

YESAA [8] describes the criteria for projects that must be included in a CEA as:

- Other projects for which proposals have been submitted under Subsection 50(1) of YESAA.
- Other existing or proposed activities in or outside Yukon that are known to the Designated Office, Executive Committee or Panel of the Board from information provided to it or obtained by it under YESAA.

Only those projects whose effects are likely to act in combination with the anticipated effects of the proposed project must be considered for the purposes of a CEA under YESAA.

Overall Assessment Approach

The *Assessor's Guide to the Assessment of Cumulative Effects* (YESAB, 2006(c)) suggests the application of a cumulative effects framework which closely mirrors the process outlined for the assessment of environmental effects and includes:

- The identification of regional VCs;
- The compilation of cumulative effects VC baseline information;
- The determination of spatial boundaries for the assessment;
- Identification of other projects and activities and a determination regarding their residual effects;
- The determination of the temporal boundaries of the assessment;

[6] See, YESAA, s. 50(2)(a)
[7] See, YESAA, s. 42(1)(d)
[8] At, YESAA, s. 42(1)(d)

- Identification of potential cumulative effects, the characterization of such effects and identification of mitigation measures; and
- Determination of significance of identified cumulative effects.

Following the above-noted guidance from YESAB, the assessment approach considered other projects and activities which may potentially act cumulatively with effects of the Project and affect selected VCs. The CEA identified all inputs from other projects that could act in concert with effects of the principal Project and influence the VCs identified, including:

- Past, present and likely future projects and activities in the area that may affect identified VCs
- Other existing or anticipated pressures (direct or indirect) on identified VCs

In identifying future projects or activities to be included in the cumulative effects analysis the assessment considers:

- Projects or activities that have already been approved;
- Projects or activities that are already in a government approvals process and on the YESAB registry;
- Other eligible projects or activities not subject to a formal government approvals process are included if there is a high level of certainty that they will occur; and
- The environmental effects of uncertain or hypothetical projects were not considered.

The assessment examined the YESAB Registry and selected those projects for further examination which were anticipated to cause effects within the same spatial and temporal scope in which the effects of the principal Project were anticipated to act. Eligible past, current and future activities that could potentially overlap with the Project were identified, and a description of these activities along with their spatial and temporal scale and additional assumptions and analysis regarding how they were addressed in the Project Proposal is discussed further for each VC in Chapter 8.

Following standard assessment practice, where adverse cumulative effects were considered probable, mitigation was applied and determinations were made regarding the significance of the residual adverse cumulative effects after the application of those mitigation measures. While the effects of other projects on selected VCs must be considered, mitigation could only be applied with regard to the Project being proposed.

3.4.2 Existing Activities

Past and current projects and activities were considered to form an integral part of the existing environment against which predicted effects are assessed. These activities, along with their projected future levels, are accounted for in the initial assessment of Project effects. Past projects considered in the cumulative effects assessment included the Mayo Dawson Transmission Project, the North Klondike Highway, past and current Minto Mine development activities (including the existing access road), and existing diesel generation activities at Pelly Crossing.

The existing environment in which the Project will take place is described in detail in Chapter 6. It is described with consideration of potential overlaps with Project effects, i.e., it is described with potential effects in mind and in sufficient detail to permit the evaluation of significance of Project effects in that environment set out in Chapter 8.

3.4.3 Projects for which proposals have been submitted

There are over 50 projects listed within the Mayo Assessment District, where the proposed Project will occur. Many of these projects are located at distances farther than the scope of the Project Study Region. In order to determine which projects are relevant to the CEA, the following rationale was used for inclusion:

- Only projects using Carmacks, Pelly Crossing and Stewart Crossing as a reference point were selected; and
- Projects had to be located north of Carmacks and south of Stewart Crossing.

Table 3.4-1
Other Projects Considered for Cumulative Effects – Projects with proposals submitted to YESAB

	Number	Title	Proponent	Description	Status	Seeking Views End Date
Forestry – *Total of 1 project listed*						
1.	2006-0144	Minto Slash Burning	Minto Explorations	The principal activity of this project is to burn slash piles that were piled in association of clearing land on an existing quartz exploration program near Minto Creek. This project is physically located 40.4 km from Pelly Crossing. Accessory activities include: Use of heavy equipment to moving slash piles. Hauling burned debris with heavy equipment.	Preparing Recommendation	2006-05-18
Mining – *Total of 30 projects listed*						
2.	2006-0220	Freegold	Northern Freegold Resources	The principal project is a five year quartz exploration program to locate new mineralization and define and expand on known mineralization targets on the Freegold property. The principal project is located approximately 70km from the Village of Carmacks.	Recommendation Sent	2006-08-03
3.	2006-0158	Sonora 2006 Drilling Program	Firestone Ventures Inc.	The principal activity of this project is a drilling exploration program approximately 110km north of the Village of Carmacks near Hayes Creek	Decision Document Issued	2006-06-08
4.	2006-0146	Carmacks Copper Drill Program	Western Copper	The principal activity of this project is a quartz exploration drilling program, approximately 40 claims 45km from the Village of Carmacks, in the Williams Creek.	Recommendation Sent	2006-05-23

Number		Title	Proponent	Description	Status	Seeking Views End Date
5.	2006-0156	Tinta Hill	Northern Freegold Resources Ltd	The principal activity of this quartz exploration drilling program on approximately 62 claims is located 38 km from the Village of Carmacks near Stoddart and Merrice Creek	Recommendation Sent	2006-05-30
6.	2006-0123	Klaza	Rob Schneider	Trenching on prospecting leases to ascertain gold bearing potential	Decision Document Issued	2006-05-09
7.	2006- 0122	Iron	Rob Schneider	Trenching on prospecting leases to ascertain gold bearing potential	Decision Document Issued	2006-05-09
8.	2005-0028	Carmacks Coal (Tantalus Butte)	Cash Minerals	The principal purpose of this project is exploration drilling, and the creation of two test holes and associated activities, located 4km north of the Village of Carmacks. The principle activities involved are drilling of two holes with reverse circulation drill.	Decision Document Issued	2006-01-24
9.	2005-0025	Carmacks Coal (Rink Rapids)	Cash Minerals	The principal activity is drilling for coal and the associated activities for 2 holes at Rink Rapids 27km north of the Village of Carmacks. Activities involved include the construction of a 1200m winter trail with heavy equipment, drilling of two holes with reverse circulation drill, reclamation of trail by replacing cut brush on trail.	Decision Document Issued	2006-01-23
Agriculture – *Total of 3 projects listed*						
10.	2006-0189	Scientific Research/ Wildlife Mgmt McIntyre Salmon	Northern Research Institute, Yukon	The principal activity for this project is the collection, incubation and release of Chinook salmon from Tatchun Creek and Takhini River. Principal activities include: Collecting Chinook Salmon eggs and milt, Releasing	Decision Document Issued	2006-06-27

Number		Title	Proponent	Description	Status	Seeking Views End Date
		Incubation Project		Chinook fry. Accessory activities include: Incubating Chinook Eggs, Rearing and tagging Chinook fry.		
11.	2006-0175	Fisheries-Yukon River Drainage Collection/ Release Project	Fisheries and Oceans Canada	The proposed fisheries project will provide 50-75 salmon eggs for each Yukon school participating in the "Stream to Sea" educational program over the next ten years. The collection and release of salmon will occur on various tributaries flowing into the Yukon River drainage system. The proposed creeks and rivers include … Tatchun Creek-25km from Carmacks… Yukon. Activities associated with the principal project include the following: The capture of adolescent Chinook or Chum Salmon broodstock (August/ October, 2006- 2016); Collection of eggs and milt; Incubation of eggs at the McIntyre salmon facility and various register classrooms in the Yukon Territory; and Rearing, transport and release of salmon fry back into the tributaries they originated from (May/June 2007-2017).	Decision Document Issued	2006-07-04
Utilities – *There are three projects within the Village of Carmacks (water supply test wells, waste water and treatment facility, LSCFN community septic field) which should have no interaction or effect on the CS transmission project &/or its VEC's.*						

3.4.4 Other proposed activities that are currently known

In order to consider the effects from other projects and activities the *Assessor's Guide to the Assessment of Cumulative Effects* (YESAB, 2006(c)) provides that it is necessary to identify all inputs from other projects that could influence the identified VCs.

There is no project proposal for the Carmacks Copper Mine project currently on the YESAB registry, but there is a reasonable degree of certainty that it will proceed through the YESAB project proposal adequacy review stage and into a full YESAB review process in the near future. The project is considered more than hypothetical, thus, it is included in the CEA as a "currently known" activity. Assumptions with regard to this project are outlined below.

There is no project proposal at this time for YECL distribution line connection from the Pelly Crossing local community distribution system to the CS development substation at Pelly Crossing. Nevertheless, there is a high degree of certainty that this project will proceed concurrently with the CS project in order to enable Pelly Crossing to hook up to grid power and thereby displace operation of diesel fuel generation currently serving that community. The project is considered more than hypothetical, thus, it is included in the CEA as a "currently known" activity. On a similar basis, but without assuming necessary concurrent timing, it is reasonable to anticipate a future project proposal for YECL distribution line connection from the Carmacks local distribution system to the new CS substation at Carmacks, and then a future proposal for decommissioning of the existing YEC WAF substation at Carmacks.

SFN is currently in the engineering and planning phase to develop a sewage lagoon to service the needs of the community of Pelly Crossing. No application for the sewage lagoon has been made to YESAB, nor is one expected in the next year. Yukon Energy has been in discussion with SFN and the engineering design consultant to ensure the CS development where practical complements this potential future development.

In dealing with uncertain future projects or activities, it is important to note that any such project would typically be subject to its own regulatory review and approvals. Issues related to the cumulative effects of new future development in combination with the Project can therefore be best and most properly be assessed when and if such new government approvals are sought for such projects.

Carmacks Copper Mine

The Carmacks Copper Mine is the only known "uncertain future" project that is currently in the system, but not beyond the YESAB adequacy review stage. The Carmacks Copper Mine is an advanced-stage, copper mining project located in central Yukon 38 km northwest of Carmacks and 180 km north from Whitehorse. The project site is located within a group of mineral claims covering 1,000 ha. (Western Silver Corporation, 2005)

It is anticipated that the open-pit mine will have a stripping ratio of 4.6 tonnes of waste to 1 tonne of ore, and it will treat oxide ore to produce 14,310 tonnes of copper cathodes per year at a recovery rate of 80%. Copper in solution will be recovered from the oxide ore by acid heap leaching of crushed minus 19 mm, agglomerated ore. (Western Silver Corporation, 2005)

Active mining is estimated to last for eight years once operations begin. During the project's expected life, crushing and heap leach pad loading will take place during 200 days of the year over early summer and fall and ore leaching will continue year round. Mine operations will be carried out using conventional mining equipment and process facilities. Ultimate leach pad, open pit and waste rock storage will occupy an area of approximately 100 ha. Other site facilities will include offices, change house, operations camp, gatehouse/first-aid, work shops/warehouse and laboratory water supply and distribution system, power supply, fuel storage, acid storage, sewage treatment, and communications system. (Western Silver Corporation, 2005)

Western Copper has confirmed with Yukon Energy its interest in potential future transmission development to connect the mine site with the CS development in the vicinity of McGregor Creek, with a potential start of service for operations as early as 3rd quarter of 2008 if construction on the mine starts in summer 2007. The Carmacks Copper Mine plans currently assume on-site diesel generation.

3.5 DETERMINING SIGNIFICANCE OF RESIDUAL ENVIRONMENTAL EFFECTS

Predicted residual environmental and socio-economic effects of the Project (i.e., effects after implementation of mitigation measures) are set out in Chapter 8 for the identified VCs. Environmental and socio-economic effects, including the potential effects of accidents and malfunctions, are examined at all stages of the Project's life-cycle from construction to operation and maintenance activities and, for the MS development, to the decommissioning of certain MS facilities. The assessment approach looks at both positive and adverse residual effects of the Project and includes full consideration of cumulative effects. As required by YESAA (S. 58), the assessment includes a determination as to whether adverse residual effects are significant, or not significant, and the rationale for this determination.

3.5.1 Significance Determination Approach

Environmental and socio-economic effects and their significance are identified and determined using standard assessment practice, the requirements of YESAA, and methodologies set out in the YESAB Assessor's Guides. (YESAB, 2006(a); YESAB, 2006(b))

Deciding whether a project is likely to cause significant adverse environmental or socio-economic effects is central to the concept and practice of project assessment under YESAA and other assessment legislation. The concept of "significance" in this regard cannot be separated from the concepts of "adverse" and "likely".[9]

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[9] YESAA S.58, regarding ultimate decisions for an Executive Committee screening assessment of a project. See *Assessor's Guide for the Assessment of Socio-economic Effects*, YESAB, 2006 (sections 11 and 12) on the need to determine significance only for adverse effects. See *Assessor's Guide for the Assessment of Environmental Effects,* YESAB, 2006 (section 2.8) on the relevance of "likely". Also, *Determining Whether a Project is likely to Cause Significant Adverse Environmental Effects: A Reference Guide for the Canadian Environmental Assessment Act (Federal Environmental Assessment Review Office.1994).* The **Canadian Environmental Assessment Act** (**CEAA**) Guide also notes; "The 'likely' applies to the environmental effects of the project that are both adverse

Determining "significance" involves scientific (including traditional ecological knowledge) analysis and interpretation of environmental and socio-economic effects, and consideration of effects of environmental or socio-economic changes caused by the Project on the following (YESAA, s.42):

- the need to protect the rights of Yukon Indian persons under final agreements;
- the special relationship between Indian Yukon persons and the wilderness environment of Yukon; and
- the cultures, traditions, health and lifestyles of Yukon Indian persons and other residents of Yukon.

Mitigation measures and strategies can be important in the assessment of residual effects. Possible mitigation options include (a) integral parts of the Project design and implementation (e.g., route selection measures and EPP measures adopted during construction and operation), (b) a specific "no net loss" habitat regeneration measure approved by a specific regulatory authority, and (c) other measures to manage specific risks (including adaptive management strategies that identify and respond in the event of unexpected adverse effects or when mitigation measures may not be effective).

The determination of significance of residual effects may involve comparing such effects against thresholds for environmental components such as specified goals or targets, standards or guidelines, carrying capacity, or limits of acceptable change. Land use objectives and trends may also be utilized to determine significance of residual effects. However, it is recognized in standard assessment practice that the assessment of project effects is often hindered by a lack of specific thresholds.

Pursuant to standard assessment practice and YESAB Guides, the following criteria were used in the Project Proposal to evaluate the significance of adverse residual environmental and socio-economic effects:

- **Direction or nature of the effect:** positive, neutral, or negative/adverse; in the case of socio-economic effects, as noted in the YESAB Guides, effects may at times be considered to be both positive and negative (see comments below).

- **Magnitude of the effect** (level of detectability of effect):
  - low (effect unlikely to be detectable or measurable, or below established thresholds of acceptable change; for some environmental assessments, less than 5% of the VC population or area is affected).
  - moderate (effect could be detectable within normal range of variation with a well designed monitoring program,[10] or below established thresholds of acceptable change; for some environmental assessments, from 5 to 10% of the VC population is affected).
  - high (effect would be readily detectable without a monitoring program and outside normal range of variation, or exceeds established thresholds of acceptable change; for

and significant." Notwithstanding differences in wording of YESAA and CEAA on this matter, the ultimate assessment requirement remains to determine significance for effects that are adverse and likely.

[10] Implies that effects are statistically significant as determined by such a well-designed monitoring program.

some environmental assessments, greater than 10% of the VC population or area is affected).

- **Geographic or socio-economic extent of the effect:**
  - low (effect extends only within the Project footprint or Project Site Area; for socio-economic effects, includes residents and activities in Route Study Area other than communities).
  - moderate (effect extends beyond footprint and is within the Project Study Region; for socio-economic effects, extend to a moderate number of people within a definable group in this region).
  - high (effect extends beyond Project Study Region and is within Yukon, or extends outside Yukon; for socio-economic effects, extend to a major portion of a definable group of people, e.g., a major portion of specific communities).

- **Duration of the effect** (how long the effect would last):
  - low (short-term effects lasting less than one year, or not materially beyond the duration of the construction phase or the decommissioning phase of the Project).
  - moderate (medium-term effects lasting from 1 to 10 years, or no more that one-generation span of the species affected).
  - high (long-term effect lasting more than 10 years or more than one generation of the species affected; effects lasting throughout a major portion of the operations phase of the Project).

- **Frequency of the effect** (how often the impact would occur):
  - low (never, once, seldom).
  - moderate (occasionally).
  - high (continuously - on a regular basis or at regular intervals).

- **Reversibility of the effect** (how soon could restoration occur to acceptable conditions):
  - low (less than one year).
  - moderate (1 to 10 years, or no more that one-generation span of the species affected).
  - high (greater than 10 years, or more than one generation of the species affected).

- **Ecological or Socio-Economic Context** (sensitivity to environmental or socio-economic disturbance, capacity to adapt to change):
  - low (VC is resilient to imposed change).
  - moderate (VC has some capacity to adapt to imposed change).
  - high (VC is fragile and has low resilience to imposed change).

The assessment of significance for environmental effects typically can determine a clear overall direction of change (positive, neutral or negative/adverse) for a specific VC, although issues can arise when a specific species or habitat has positive effects in some areas and is harmed in other areas. In contrast, the assessment of significance for socio-economic effects also considers the following:

- the relevance of perceptions in affecting how people view changes;
- differing perspectives and values among different groups of people about their community and region, as well as their individual and family circumstances; and
- the problems inherent in assessing separately effects on different aspects or components (i.e., different VCs) of people's lives that each contribute to an overall "effect" on any group of people, i.e., effects may be either positive or negative, depending on the people affected, and may be both positive and negative when different groups are affected differently or when different VCs are considered for the same group.

Potential adverse effects that are likely were initially ranked in the Project Proposal based on three of the above criteria: duration, magnitude and geographic or socio-economic extent of the effects. The initial rating of these likely adverse residual effects used the following definitions (see Figure 3.5-1):

- **Significant - High Residual Effect:** Effects are long-term (high) duration, large (high) magnitude, and extend beyond the Project Study Region (high geographic or socio-economic extent).

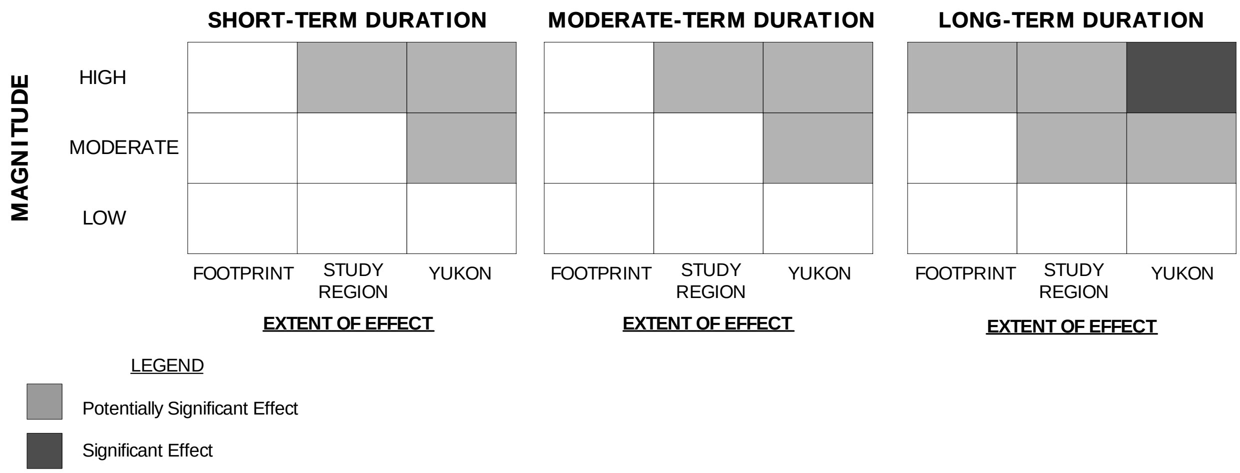
- **Potentially Significant – Moderate Residual Effect**: Effects which fall between "high" and "low" in this list of initial definitions, and thus are "potentially significant" and merit consideration of additional significance criteria. In essence, "moderate" effects are either
  - Within the Project footprint or Project Site Area (low in extent) and high in both magnitude and duration; or
  - Beyond the footprint and into the Project Study Region (moderate in extent) and either high in magnitude (regardless of duration), or moderate in magnitude and high in duration; or
  - High in extent (Yukon region or beyond) and either moderate or high in magnitude (regardless of duration).

- **Not Significant or Insignificant - Low Residual Effect**: Effects are either
  - Low in magnitude (regardless of duration or extent), as the effect cannot be detected; or
  - Low in extent (e.g., footprint of Project) and not high in both magnitude and duration, or
  - Short-term (low) or moderate in duration, and not high in magnitude or extent (i.e., not extend beyond the Project Study Region).

- **Not Significant or Negligible (Insignificant) Residual Effect**: No definable effects at any level or insufficient to be termed a low effect, and generally indistinguishable from project baseline conditions.

Figure 3.5-1

Potentially Significant and Significant Effects on Environmental or Socio-economic VCs[1]



[1] In addition to the above criteria, "potentially significant effects" are further assessed in terms of frequency, reversibility, and ecological or socio-economic context (resilience).

Figure 3.5-1, demonstrates that when the criteria of duration, magnitude and geographic extent are applied in order to determine if there are significant or potentially significant effects, there is no practical distinction between effects that are short-term in duration and effects that are moderate-term in duration. Accordingly, to simplify the discussion in Chapter 8, the duration of effects is addressed as being either "short-term" or "long-term".

For "potentially significant" and "significant" effects, initially ranked on the above basis, it is relevant to consider other significance criteria such as frequency, reversibility, and ecological/socio-economic context or resilience. For example, if an environmental VC is known to be highly resilient (i.e., adaptable and recovers well from disturbance), effects that would otherwise be considered significant could be determined as insignificant, despite magnitude and/or duration or the extent of the effects. Conversely, it is likely that thresholds or guides will identify highly vulnerable environmental VCs where the loss of even a few individuals may affect the long-term status of the population. For socio-economic VCs, additional factors that may need to be considered include concurrent effects on other socio-economic VCs affecting the same group of people or others in the same community or region, effectiveness of mitigation measures and the degree to which the affected people have any control over mitigation (which may affect "vulnerability" in socio-economic terms), the extent to which the socio-economic component is affected by the Project (magnitude, frequency, reversibility of the effects), and overall confidence in the assessment after consideration of proposed mitigation measures.

In the event that significant adverse effects are predicted for residual effects on VCs, the likelihood is discussed in terms of both the probability of occurrence of the significant adverse effect and the degree of "scientific uncertainty".

Assessment conclusions are supported by technical information, TK and local knowledge based on experience in Yukon and elsewhere. Deficiencies in the information base about potential effects have been noted and are addressed further in Section 8.6 Environmental Protection and Monitoring.

3.5.2 Adverse Cumulative Environmental or Socio-Economic Effects

YESAA requires that the Executive Committee determine whether the Project might contribute significantly to cumulative adverse environmental socio-economic effects in Yukon. The Project Proposal has examined whether the Project will interact with other past, existing or proposed projects cumulatively and whether such intersection will have adverse impacts in Yukon.

As reviewed in Section 3.4, consideration of adverse cumulative environmental or socio-economic effects was conducted concurrently with other elements of the environmental and socio-economic assessment. This cumulative effects analysis involves the consideration of likely residual cumulative effects after the application of measures designed to mitigate any potential adverse cumulative effects on VCs. As with determining the significance of other environmental and socio-economic effects, the probability of success of mitigation and the uncertainty inherent in any assumptions about possible effects and their significance are considered.

3.6 SOURCES OF INFORMATION

The assessment incorporates original studies[11] commissioned by Yukon Energy specific to the Project, including identification of potential facility design prepared by engineers and scientific and technical reports and papers on topics relevant to the Project, and local knowledge and available experience. Other information sources include meetings with First Nations, regulatory agencies and existing public and unpublished information.

The assessment process for the Project has emphasized consultation and involvement with potentially affected First Nations, communities, and other interested groups. This consultation and public involvement has provided the Project Proposal with important information with regard to local knowledge, concerns and interests as well as available experience.

Meetings with YESAB as well as territorial departments were also held to discuss the status of the environmental and socio-economic studies and provide information to assess ongoing changes to this program (Chapter 1, Section 1.5).

Detailed literature searches and personal contacts were conducted to identify both published and unpublished information. A list of documents utilized and depended on in this assessment is provided in the reference section in Chapter 10.

[11] Primary references in this regard are Mougeot GeoAnalysis Report, 2000 (Appendix 3A), I.A. Hayward Corridor Review and Requirement Report, 2001 (Reference Materials 3R-1), Stantec Report, 2002 (Reference Materials 3R-2) and A.B. Sturton Report, 2003 (Reference Materials 3R-3).

4.0 FIRST NATIONS AND OTHER PUBLICS CONSULTATION

An overview of PIP activities and affected publics is provided in Section 4.1 of this chapter. The program principles and consultation methods are described in Section 4.2. Details on the activities in each round of consultation are provided in Section 4.3, while the key issues and perspectives provided throughout the process are described in Section 4.4. Section 4.5 explains how these issues influenced the Project design and environmental assessment process. Section 4.6 describes how consultation activities beyond this submission to YESAB will occur.

4.1 OVERVIEW

Yukon Energy developed a PIP for the Project (see Reference Material 4R-1). The PIP was designed to incorporate public input in the Project design and environmental assessment, as well as meeting the regulatory requirements for public involvement in an effective and credible manner. The PIP addresses the requirements of YESAA, and is consistent with the guidance provided by YESAB on the topic in their (2005) *Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submissions* . Section 2.0 of that guidance document states:

> "Before submitting a proposal to the Executive Committee, the proponent of a project shall consult any first nation in whose territory, or the residents of any community in which, the project will be located or might have significant environmental or socio-economic effects."

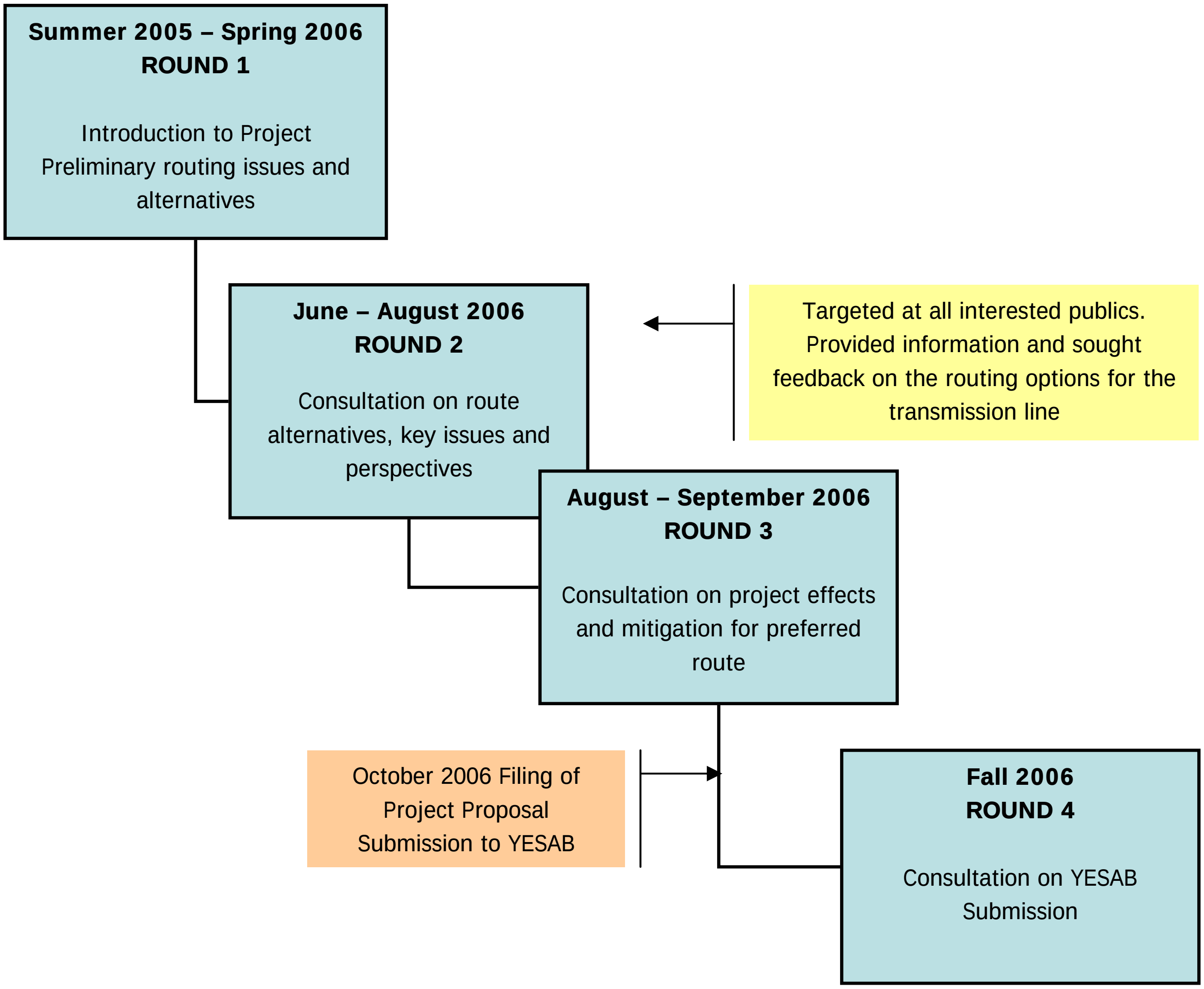
The PIP focused on affected First Nation communities, including LSCFN, SFN, NND, along with other individuals and interested parties who could potentially be affected by the Project. This included community members from Carmacks, Pelly Crossing, Stewart Crossing and Mayo, major customers, private land owners, resource users including trappers, the various Renewable Resources Councils in the region, non-government organizations, private enterprises, and various government departments.

The process was designed to provide early and ongoing opportunities for potentially affected and interested parties to participate by providing information, allowed for sharing key perspectives and issues regarding the Project, and assisted in devising measures to mitigate potential Project-related effects through the environmental and socio-economic assessment process.

4.1.1 Rounds of Consultation

The Project consultation and involvement activities were organized into four rounds, with the first three rounds occurring prior to submitting the Project Proposal. An overview of the initially planned rounds of PIP is presented in Figure 4.1-1, with actual timing to date indicated where relevant. As noted below, Round Three has in practice tended to become combined with extended Round Two consultations on route selection.

Figure 4.1-1
Rounds of Public Involvement in the Carmacks-Stewart / Minto Spur Transmission Project



<u>Round One: Summer 2005 – Spring 2006</u>

Round One was designed to: initiate dialogue about the proposed Project; advise the public about the public involvement process and anticipated schedule for the route selection and environmental assessment process; provide a description of the Project based on what was known at the time; and, identify and confirm initial perspectives or concerns. It also sought technical engineering and cost advice, as well as initial input from First Nations and government departments with interests in the area. Round One occurred when initial route alternatives were being developed. Information obtained during Round One was provided to Yukon Energy early enough in the design process to influence preliminary route design alternatives as well as the **Environmental Assessment** (**EA**) approach and content.

In May 2006, at the conclusion of Round One, a MOU between the NTFNs (LSCFN, SFN, NND) and Yukon Energy was finalized. The MOU outlined an agreed process for the parties to work together to guide the consultation process, determine a preferred route for the transmission line, and provide for economic opportunities and arrangements related to the Project. More discussion on the MOU is found in Section 4.3.1.1.

Round Two: June – September 2006

Round Two was aimed at all interested publics and focused on key perspectives and issues regarding the preliminary route alternatives. During Round Two, Yukon Energy provided information regarding the route options for the Project to various government agencies, the NTFNs, and other interested publics. Feedback on the routing options was requested and received through various formats including open community meetings, targeted group meetings, in-person conversations, and written commentary provided by interested parties.

It was during this time period that Yukon Energy was also involved in community consultation activities throughout Yukon associated with the 20-Year Resource Plan. These meetings provided another venue and opportunity for the general public to ask questions and provide input on the Project. Further discussion about the outcomes from these community meetings is presented in Section 4.2.2.4.

In response to the availability of some communities during the summer resource harvesting season, not all potentially affected communities were able to complete Round Two PIP activities before the end of June, 2006. Subsequent community and stakeholder discussions on routing alternatives began to identify and address potential effects and mitigation strategies. This resulted in some degree of overlap between Round Two and Three activities.

Information obtained from Round Two and Round Three helped Yukon Energy to refine route alternatives and develop appropriate mitigation strategies to address potential project effects that could not be avoided in the route selection process. Information relevant to other members of the Study Team (e.g. identification of heritage resources, unique habitat, trapper's cabin) was forwarded to the team members. The selection of a preferred route option has considered input from all interested parties and attempted to provide a balance between First Nation perspectives and issues, environmental considerations, aesthetic concerns, technical engineering feasibility, and cost.

Round Three: August - Fall 2006

Round Three provided another opportunity to examine route refinements and identify potential Project effects that could influence route selection. Potential Project-related effects were presented and possible mitigation strategies were discussed. Information received during Round Three aided in the final determination of a preferred route for the Project. As stated above, because the PIP schedule in practice ended up overlapping with seasonal resource harvesting activities of some communities, Round Three public involvement occurred over a longer period of time in some communities. However, during the overall period covered by Rounds Two and Three, all affected communities were given the ability to identify potential opportunities and constraints, provide input on the preliminary route alternatives, help identify refinements to these and/or new options, and provide feedback on potential effects and mitigation strategies.

During Round Three, discussions were initiated at the Steering Committee level between Yukon Energy and the NTFNs to finalize the Project route selection and to begin consideration of Project mitigation and economic development opportunities across the Project Study Region. These discussions will ultimately influence the final Project Agreement, to be finalized in the first quarter of 2007.

Round Four: Fall 2006

Round Four will consist of consultation on the YESAB Project Proposal Submission and will include any enhancement or mitigation measures that have been developed and incorporated in the submission document. Yukon Energy also intends (separate from the Project) to conduct additional community meetings associated with the 20 Year Resource Plan which will provide an additional opportunity for the general public to provide feedback on the Project.

The emphasis of PIP activities to date has been on providing opportunities for involvement to potentially affected communities and segments of the public in the Project Study Region including communities, resource users, Renewable Resource Councils, private land owners, and local residents in the communities of Carmacks, Pelly Crossing and Stewart Crossing. Opportunities for input have also been provided for individuals, organizations, and communities who may, or may not, be within the Project Study Region or affected by the Project but have an interest in the Project.

4.2 PRINCIPLES AND METHODS OF CONSULTATION

4.2.1 Guiding Principles

Yukon Energy developed the following principles for the PIP and seeks to apply these principles consistently in its design and implementation:

- **Opportunities for early involvement:** Initiate consultation activities with interested parties early in the process to provide interested parties information on the proposed Project and receive input with respect to concerns and opportunities.
- **Opportunities for ongoing involvement:** Provide opportunities for interested or potentially affected parties to learn about the process and provide inputs with respect to concerns and opportunities. Where possible, work through the consultation process to resolve issues and enable participants to have inputs recorded at each stage.
- **Opportunities at various stages:** Before and after filing the Project proposal, provide opportunities for public input.
- **Provide various communication mechanisms:** Provide a variety of mechanisms to communicate and interact with the public.
- **Proper consultation with Aboriginal Peoples:** Recognize the unique status of First Nations and Aboriginal peoples who may be affected if the Project is developed. In particular,

discuss the location and effects of transmission line routes which may traverse settlement lands of three First Nations.

- **Adaptive Approach:** Adjust the Public Involvement Plan, as required and feasible, throughout the environmental review and planning process in response to issues, concerns and challenges.

These principles are consistent with the YESAB intentions, which call for sufficient notice to affected and interested parties to prepare their views, reasonable time for consultation activities, and fair and full consideration of all views presented. The public will have additional opportunities to participate in the Project review during the YESAB review process. As the Project crosses settlement lands of both LSCFN and SFN, these First Nations will be decision bodies in the YESAA process, while NND will be a reviewer of the submission. Yukon Energy will continue to consult with First Nations and other interested publics throughout the Project Study Region during construction, operation and decommissioning activities.

The purpose of the PIP activities was to identify opportunities and constraints in relation to the Project. Activities contributed to the mitigation of adverse environmental and socio-economic effects that are associated with the Project, as well as consideration of alternatives to the Project or alternative ways of undertaking or operating it that would avoid or minimize any significant adverse environmental or socio-economic effects as required under S. 42(1)(e) and 42(1)(f) of YESAA.

This routing process utilized regional and site-specific biophysical, socio-economic and cultural features to identify and evaluate viable alternative routes and assess measures for avoidance, minimization and mitigation of potential adverse environmental and socio-economic effects, as well as addressing issues of public concern. Further details on the route selection process are found in Chapter 7 - Evaluation of Alternative Routes.

In order to consider a range of potential issues, the route selection process applied an iterative and progressively more detailed analytical approach that involved systematic refinement of route alternatives to identify the Project Site Area. This was accomplished by considering, among other inputs, ongoing input through public and government involvement. By applying multiple rounds of various approaches to consultation, the PIP helped to ensure that potentially affected and interested publics had opportunity to contribute to the Project.

4.2.2 Consultation Methods

Several methods to facilitate public consultation were adopted in the PIP. These methods were designed to ensure that Yukon Energy was providing information on the Project, as well as providing the opportunity to receive information and perspectives from affected and interested publics. The audience and the methods for communication varied as the PIP proceeded and included components such as face-to-face interaction, electronic and paper communication. In addition to consultation activities implemented by Yukon Energy, each of the NTFNs developed and implemented community-based consultation activities designed to inform and consult with their membership and provide feedback to the Study Team. As well, Yukon Energy completed a separate Yukon-wide community consultation process on the 20-Year Resource Plan, of which the Project was one component. This provided a broader audience of interested publics an opportunity to present and hear comments on the Project.

4.2.2.1 Face-to-face interactions

Face-to-face interactions with First Nations, government departments, non-government organizations and interested publics took a variety of formats depending on the desired level of interaction from the consulted party. This section describes the various formats of interactions in each series, while the subsequent section describes the details of the activities in each round of the PIP.

<u>Interaction with First Nations</u>

- **Meetings with NTFN representatives:** Meetings between Yukon Energy and various representatives from the NTFNs have occurred throughout the PIP, as documented in this chapter. Round One resulted in the negotiation of the MOU between the NTFN and Yukon Energy. Pursuant to the MOU, more detailed consultations were held with representatives of each NTFN community during Rounds Two and Three, and community meetings were also held with LSCFN at Carmacks, SFN at Pelly Crossing, and NND at Mayo; a Steering Committee was also established to oversee and co-ordinate NTFN participation in consultation activities.

- **Steering Committee Meetings:** To facilitate the consultation and discussion process, the NTFNs established a steering committee to oversee and co-ordinate NTFN participation. Administrative support is provided by the Northern Tutchone Council and has representation from Yukon Energy's President and Director of Resource Planning. The NTFN Steering Committee met with Yukon Energy in September to review the status of the Project, to finalize the Project route selection and to begin consideration of Project mitigation and economic development opportunities across the Project Study Region (see Appendix 4D). The Steering Committee in future will focus on activities related to negotiation of the Project Agreement.

- **Small Group Meetings:** Small group meetings occurred largely in Round Two of the PIP, with the First Nation's opting for targeted audience meetings to discuss key perspectives and issues on route alternatives. Individuals involved in these smaller meetings included First Nation Lands Directorate staff members, renewable Resources Council Members, trappers, elders, and other potentially affected publics.

- **Community Open Houses:** Open public meetings were held in the communities of Carmacks, Pelly Crossing and Mayo during Round Two. The format and content of these meetings was determined in cooperation with each First Nation and provided an informal opportunity to discuss the project. At some meetings, it was also an opportunity for the community to receive information on self-directed consultation activities or perspectives from interested stakeholders outside the Study Team.

- **Personal Communications:** Various key-person conversations took place, not only to address the key issues and perspectives regarding route alternatives but also to get a broad understanding of the socio-cultural baseline. These communications were accomplished in person, through email, and by telephone.

Interaction with Government

- **Small Group Meetings:** Small group meetings were held with government departments with specific interests in the Project, primarily in Round Two of the PIP although certain meetings did take place during Round One. These meetings focused on key perspectives and issues related to the routing of the transmission line.

- **Personal Communications:** In many instances, consultation with government departments did not require small group or in-person discussion and occurred via email or telephone calls.

Interaction with Other Publics

- **Small Group Meetings:** Small group meetings were held with various interested publics, including various NGO's and local Renewable Resources Councils. These meetings occurred during Round Two of the PIP and focused on key perspectives and issues related to the routing of the transmission line.

- **Personal Communications:** Not all of the identified organizations with potential interest in the Project felt that holding a meeting was necessary as they had no major concerns. In such cases, email &/or telephone conversations were felt to be adequate forms of consultation. Additionally, personal communications via telephone, email, and in-person were held with potentially affected individuals such as trappers, land owners, and other community members.

4.2.2.2 Electronic and Paper Communication

Yukon Energy Website

In the fall of 2005, Yukon Energy created a link on their website posting a brief description of the proposed Project. Along with providing a brief overview of the Project components, the website described the contingencies for the development to move ahead (such as agreement from the First Nations and the securing of necessary environmental approvals and permitting including a licence under YESAA). It also described the consultation process. The website also included Yukon Energy's media releases pertaining to the Project and links to the newsletters developed for consultation. A copy of all the materials posted on the website is provided in Reference Material 4R-1.

Carmacks-Stewart/Minto Spur Transmission Line Newsletter

A newsletter was produced to provide initial information on the Project. It was designed as a tool for consultation and described: the Project and its components; the benefits; proposed routing options for certain sections of the transmission line; and, general timelines for public involvement. Copies of the newsletter were mailed directly to the stakeholders identified as affected or interested publics (see the complete list in Appendix 4A). As well, 7,900 copies were distributed in the May 26th edition of the Yukon News. Further copies were distributed at all face-to-face public consultation events in Round Two and Round Three. A copy of the newsletter can be found in Appendix 4A.

A second newsletter describing the contents of the Project Proposal, namely the preferred route as well as potential project related effects and mitigation, will be produced for Round Four consultation activities.

4.2.2.3 NTFN Self-Directed Consultation Activities

The MOU between the NTFNs and Yukon Energy provided for financial resources for each First Nation to facilitate consultation activities associated with development of the Project Proposal, including selection of a preferred route. Each NTFN developed and implemented independent consultation activities adapted to meet their specific community needs. Where possible, the information drawn from these activities was provided to Yukon Energy and can be found in Reference Material 4R-1. A summary of the activities undertaken by each First Nation, beyond participation in activities with Yukon Energy and its representatives, are as follows:

LSCFN

- Support for a First Nation representative to facilitate Yukon Energy consultation activities with LSCFN.
- Discussions with elder trappers regarding potential compensation requirements.
- Ground truthing various locations where route options existed, including the Tantalus Butte area, and various locations in trapping concession #151.
- Community meeting held to review alternatives.
- Project was included on the Carmacks **Renewable Resources Council** (**RRC**) agenda.

SFN

- Support for a First Nation representative to facilitate Yukon Energy consultation activities with SFN.
- A door-to-door survey was completed to gain community perspectives on the Project.
- A van trip with elders was undertaken to drive certain sections of the route between Pelly Crossing and Minto Landing on June 15, 2006.
- Project was included on the Selkirk RRC agenda.
- Community meeting held to review alternatives.
- Addressed at an elders meeting in 2003.

<u>NND</u>

- Support for a First Nation representative to facilitate Yukon Energy consultation activities with NND.
- Discussions with community members in Stewart Crossing on route alternatives.
- Ground truthing activities were completed using a **global positioning system** (**GPS**) to determine whether heritage sites were present in the Crooked Creek area.
- The Chief included the Project among issues to discuss at a regular elders meeting.
- Project was included on the Mayo RRC agenda.

These self-initiated processes assisted the local communities in understanding and describing local concerns and perspectives. It also helped to involve individuals that may have been reluctant to participate in community meetings. The information from these activities was shared with Yukon Energy and incorporated in the same manner as the information gained throughout the PIP.

4.2.2.4 Connections to Consultation on the 20-Year Resource Plan

In 2006, Yukon Energy filed a 20-year Resource Plan with the Yukon Utilities Board. The plan addresses the Yukon's major electrical generation and transmission needs from 2006 until 2025. The Carmacks-Stewart Transmission Project is identified in the Plan as a near-term requirement that would connect the WAF and MD power grids. A public review of the Resource Plan, consisting of 13 community meetings, took place over the course of June and July 2006. Within the Project Study Region, meetings were held in Carmacks and Mayo on July 5, 2006. The meeting scheduled for Pelly Crossing for July 19, 2006 was postponed and will take place during an additional round of consultation activities in the Fall of 2006. Comments made in any of the 13 community sessions relevant to the Project were incorporated into the route selection and environmental assessment process.

Resource Plan consultations in Whitehorse were advertised in both the Whitehorse Star and the Yukon News, while other community meetings were advertised only in the Yukon News. Since the Yukon News is distributed to all Project Study Region communities on Fridays, meeting announcements for Carmacks and Mayo were advertised on Friday June 30th and for Pelly Crossing on Friday July 7th and July 14th. Further, each community was sent posters announcing the consultation dates to be displayed at prominent locations such as the post office and community store. Radio advertisements ran on all three Yukon radio stations for two days prior to each meeting.

Meetings consisted of a PowerPoint presentation from Yukon Energy and an opportunity for attendees to ask questions and make comments. A copy of the Resource Plan Public Information Session summary notes are provided in Appendix 4A. Further materials from these meetings are available in Reference Material 4R-1.

4.3 REVIEW OF PUBLIC INVOLVEMENT ACTIVITIES TO DATE

The following section summarizes the involvement activities that have taken place in each of the three PIP rounds to date. Appendices 4B, 4C and 4D, and Reference Material 4R-2 and 4R-3 contain additional details for each round.

4.3.1 Round One

Round One introduced the proposed Project, as well as the route selection and environmental assessment process, to the public. It also sought technical engineering and cost advice, as well as initial input from First Nations and government departments with interests in the area. Route alternatives within a 500 metre notational reserve (the Route Study Area) were developed for further consultation.

4.3.1.1 First Nations Consultation

Yukon Energy in 2003 provided a letter to each of the NTFNs notifying them of Yukon Energy's application for a notational corridor for a future transmission line between Carmacks and Stewart Crossing. This 500 metre-wide planning area eventually formed the basis for the Route Study Area referenced in the MOU signed between the NTFNs and Yukon Energy. Consultation activities regarding the transmission Project began in early August of 2005. The Project was introduced and described to the three NTFN's, and each was provided with 1:50,000 scale maps and CD's showing the 500 metre notational reserve on Crown Land, and where the proposed transmission line would cross settlement lands. A summary of Round One consultation meetings with the NTFNs is provided in Table 4.3-1. Records of personal communication with the First Nations are located in Appendix 4B, while all meeting materials can be found in Reference Material 4R-2.

Table 4.3-1
Summary of Round One Consultation Meetings with First Nations

Date	Location	In Attendance	Notes
Nov. 13, 2003	Notification letter by mail	LSCFN, SFN, NND, Yukon Energy	Map Notation Application
Aug. 2 2005	Pelly Crossing	SFN Chief & Council, Jim Harper, Yukon Energy	The proposed transmission Project was introduced as one of the topics on the Agenda. 1:50,000 maps on the notation were discussed and left with SFN.
Oct. 13 2005	Mayo	NND, SFN, LSCFN, Yukon Energy	Northern Tutchone Tribal Council Annual General Meeting. Yukon Energy provide a description of the Project. A full set of 1:50,000 maps showing the notational reserve and CD's were left for distribution at the three First Nations.

Date	Location	In Attendance	Notes
Nov. 23 2005	Carmacks	LSCFN, Yukon Energy	Proposed transmission line was introduced and discussed.
Dec. 14,2005	Whitehorse	NND, Yukon Energy	Discussions with the representatives from NND on the proposed Project.
Feb. 22 2006	Whitehorse	SFN, NND, LSCFN, Yukon Energy	Agreement to meet with all three First Nation's in Pelly on March 10.
Mar. 10 2006	Pelly Crossing	LSCFN, SFN, NND, chiefs, elders, community members, Yukon Energy	Discussions lead to the preparation of a draft MOU.
May 1, 2006	MOU Signed	LSCFN, SFN, NND, Yukon Energy	MOU is signed between the First Nations and Yukon Energy, establishing the proposed approach to further consultation.

MOU

As a direct result of this initial consultation between Yukon Energy and the NTFNs, Round One concluded with the signing of a MOU between the NTFNs (LSCFN, the SFN, the NND), and Yukon Energy on May 1, 2006. The MOU proposed the development of the Project in accordance to regulatory requirements and conditions and arrangements with the NTFNs. The signatory parties indicated that the establishment of the Project should:

- enhance the continued economic viability of the Minto Mine now under development in SFN Settlement Land;
- improve conditions for other economic activity in the NTFN region;
- enable electricity to be supplied to households and communities in the NTFN region on a more reliable and less expensive basis; and
- enable Yukon Energy to achieve better utilization of its existing generation facilities by facilitating the sale of otherwise surplus hydro-electricity power, and, enable Yukon Energy to better manage system-wide electricity supply and demand between the WAF and MD systems.

The NTFNs and Yukon Energy agreed to support the establishment of the Project and agreed to cooperate with each other in good faith in the matters described in the MOU. The MOU called for the creation of a Steering Committee to guide the consultation process, determine a preferred route for the transmission line, and provide for economic opportunities and arrangements related to the Project. Provisions within the MOU included commitments to:

- require no more than a 60 metre ROW for the Project;
- strive to avoid trapline improvements owned by NTFN citizens on and off Settlement Land;
- be situated in proximity to Minto, Pelly Crossing and Stewart Crossing so as to be most conducive to community development and other land use plans;

- be developed so as to enable power to be delivered by way of the Project to residential and commercial customers in the Minto Landing area and to the community of Pelly Crossing at the same time as, and as part of the same stage of the Project, as the Project enables power to be delivered to the Minto Mine;
- proceed with construction, if approved, within a pre-identified specific final route and access corridor; and
- employ or sponsor one or more the NTFN members as Project monitors whose duties, among other things, will be to ensure on-site construction activities are in compliance with the approved final route.

In terms of consultation, the NTFN's and Yukon Energy agreed to carry on co-operatively and diligently towards discussions on various topics. This included consultation activities on route alternatives and impacts, the best ways to enhance benefits and avoid, mitigate or compensate for the negative effects of the transmission Project. In order to facilitate the consultation process, a Steering Committee was mandated to oversee and co-ordinate First Nation participation at the community level. To support these activities Yukon Energy made an initial accountable financial contribution to each First Nation, with further accountable support to be provided when planning and design advanced further.

The MOU identified a nominal target date of June 30, 2006 for the completion of consultation activities required for the YESAB Project Proposal submission. This was done in part to acknowledge the challenges inherent in conducting community consultation activities during the summer months. These activities in fact carried on through the summer into the first week of October. The MOU has also contemplates that a Project Agreement, describing the economic opportunities and other Project arrangements will be concluded in Fall of 2006 (October 31, 2006); it is now expected that the Project Agreement will be concluded during the first quarter of 2007.

4.3.1.2 Government Consultation

Various government agencies were consulted prior to the identification of initial route alternatives. Contact was made with numerous departments, including Yukon Environment (Forestry, Wildlife, Parks), the Department of Tourism and Culture, the Department of Highways, Energy Mines and Resources (Oil and Gas, Agriculture), and the federal Department of Fisheries and Oceans. Where meetings were thought necessary, further face-to-face sessions were arranged, a summary of which is provided in Table 4.3-2. A record of personal communication with government departments in Round One is located in Appendix 4B, while supplemental information provided by government departments specific to the Project can be found in Reference Material 4R-2.

Table 4.3-2
Round One Consultation Meetings with Government Departments

Date	Location	In Attendance	Notes
April 4, 2006	Whitehorse	Yukon Environment, Forestry	Meeting to introduce Project and to determine interaction of Project with forestry activities.
April 10, 2006	Whitehorse	Yukon Environment	Meeting with senior wildlife biologist to discuss wildlife concerns in the Project area.
April 10, 2006	Whitehorse	Yukon Environment	Meeting with Director to introduce Project and inquire about trapping and wildlife information.
April 10, 2006	Whitehorse	Yukon Environment, Parks	Meeting to introduce the Project and discuss park reserves and campgrounds within the Project area.
April 10, 2006	Whitehorse	Department of Tourism and Culture	Meeting that introduced the Project and responded to request for information.
April 11, 2006	Whitehorse	Department of Highways	Meeting to introduce Project and request information on the gravel and borrow pits along the proposed transmission line corridor.

These initial discussions with government departments provided further input into the identification of initial route alternatives within the Route Study Area. The initial route alternatives reflected consideration of any identified potential adverse interactions between the Project and the various government departments' activities. In most instances, these potential concerns were simply avoided in route design.

4.3.2 Round Two and Round Three

Round Two was aimed at all interested publics and focused on key perspectives and issues regarding route alternatives. During Round Two, Yukon Energy provided route alternatives based in part on information received in Round One. This route information was shared with the various government departments, the NTFN's, and other interested publics. Feedback on the routing options was requested and received through various formats including open community meetings, targeted group meetings, in-person conversations, and written commentary provided by interested parties.

Identification of a single preferred route did not result from the initial consultation activities and further refinements were identified to either mitigate potential adverse effects or enhance a potential opportunity associated with the Project. Further meetings were conducted in order to provide a reasonable period for the consulted parties to prepare their views. These activities were largely focused on the NTFNs, each of whom were conducting internal consultation activities and required additional time to consider route alternatives. As well, during the course of discussions, interested publics also expressed views on potential effects and mitigation. This resulted in an overlap of Round Two and Round Three discussion topics and provided for further opportunity for Yukon Energy to understand the First Nation's perspectives. Information on potential effects and mitigation was forwarded to the various Study Team members for consideration in the environmental assessment process.

4.3.2.1 First Nation Consultation

Round Two consultation activities focused on discussion of route alternatives which considered key perspectives and issues provided by community members. Meetings held in Carmacks, Pelly Crossing, and Mayo adopted a consultation format determined by each First Nation. For example, the first meeting with the LSCFN was with a targeted group of potentially concerned community members, including elders, trappers, RRC members, and representatives from Yukon College. In comparison, the meeting in Mayo was focused with Lands Department staff members who were familiar with the area and the potential areas of concern. In Pelly Crossing, an all day community workshop was organized and included presentations by elders, regional government officials, community members, and Yukon Energy. A summary of Round Two and Round Three meetings involving YEC representatives is provided in Table 4.3-3. A summary of all related meetings, and records of personal communication pertaining to Round Two and Three are located in Appendix 4C. Consultation materials such as notes, agendas, and presentation materials are located in Reference Material 4R-3.

Table 4.3-3
Round Two and Round Three Consultation Meetings with First Nations

Date	Location	In Attendance	Notes
May 18, 2006	Pelly Crossing	NTFN representatives and members, Yukon Energy	Meeting to discuss how to move forward from the MOU, including route alternatives consultation process.
June 1, 2006	Carmacks	Various LSCFN members and identified Village of Carmacks stakeholders, Yukon Energy	Meeting with a targeted group of stakeholders including elders, trappers, the Renewable Resources Council, Yukon College, and others. Discussions focused on key perspectives and issues relating to route alternatives.
June 1, 2006	Carmacks	Open community dinner and meeting. 52 adults in attendance	Further discussions on key perspectives and issues on route alternatives, open to the entire community.
June 5, 2006	Mayo	NND lands directorate and staff, Yukon Energy	Discussions on the proposed route options in the Stewart Crossing area
June 21, 2006	Pelly Crossing	All-day open community workshop, Yukon Government biologist, Yukon Energy (in afternoon only)	This all-day event was organized by SFN and included a variety of agenda topics to address key perspectives and issues about the Project and route alternatives
June 22, 2006	Carmacks	LSCFN Staff, Yukon Energy	Field activity to review site specific issues raised by individuals at community meeting.
July 4, 2006	Mayo	NND Chief & Council (no quorum), Lands Directorate, Yukon	Meeting to discuss route alternatives and options, and discuss preferred route option. Impacts and mitigation were also briefly

Date	**Location**	**In Attendance**	**Notes**
		Energy	addressed.
July 4, 2006	Mayo	Open community meeting	Meeting to discuss key perspectives and issues about route alternatives near Stewart Crossing
August 9, 2006	Pelly Crossing	Open house, community meeting, community supper	Meeting for a second round of discussions on route alternatives, focusing largely on the options through Pelly Crossing and near Minto Landing. Discussions also addressed impacts and mitigation.
August 10, 2006	Whitehorse	SFN Staff, Yukon Energy	Met to review in greater technical detail route alternatives.
August 16-17, 2006	Pelly Crossing	SFN Staff, Yukon Energy, SFN Lands Directorate	Field work to review route alternatives in SFN traditional lands. Discussion on resource use compensation process.
August 25, 2006	Telephone	Meeting with NND lands department	This conference call addressed the final route selection and briefly described the process to follow in the Fall of 2006.
September 11, 2006	Carmacks	Meeting with LSCFN Elders	Further discussion with Elders on route alternatives.
September 12, 2006	Pelly Crossing	NTFN Steering Committee representatives and members, YEC	Steering Committee discussion on status of projects and how to proceed towards the finalization of route alternatives.
October 3	Carmacks	LSCFN	Meeting to review community concerns and route finalization process

In each community, the first round of meetings did not result in the identification of a preferred route. As a result, additional meetings were scheduled and included potential effects and mitigation topics were discussed prior to the finalization of a preferred route. This adaptive approach to consultation activities allowed for such adjustments to the PIP to be made according to community concerns. Discussions on impacts and mitigation also occurred between Yukon Energy and First Nation representatives as well as in the community meetings. These communications included in-person meetings and field activities, emails and telephone communication to further identify and verify concerns with First Nation staff members from the Lands Department. Similar discussions occurred directly with the various RRC's (See Appendix 4C).

The PIP supported the identification of a preferred route that appropriately reflects community interests by adapting to accommodate community interests and amalgamating discussion on route finalization and effects and mitigation.

4.3.2.2 Government Consultation

Further meetings with various government departments, along with email and telephone communication occurred throughout Round Two. These communications sought to further understand issues and perspectives identified during Round One. It was also the first opportunity to formally involve the Village of Carmacks. Consultation activities with government departments focused on route refinement alternatives as well as effects and mitigation and as such Round Three activities were not differentiated from Round Two activities. A summary of consultation meetings with government departments is provided in Table 4.3-4. Records of personal communication with government departments are located in Appendix 4C, while all meeting notes can be found in Reference Material 4R-3.

Table 4.3-4
Round Two / Three Consultation Meetings with Government Departments

Date	Location	In Attendance	Notes
June 1, 2006	Carmacks	Village of Carmacks Deputy Mayor, 2 councillors, Yukon Energy	Meeting to discuss proposed route alternative and hear key perspectives and issues.
June 5, 2006	Mayo	Meeting with Yukon Government Regional Biologist	Meeting to introduce the Project and identify any specific routing concerns in terms of wildlife in the area.
June 7, 2006	Whitehorse	Department of Tourism & Culture, Yukon Environment – Parks	Meeting to discussed proposed route alternative and hear key perspectives and issues
June 20, 2006	Whitehorse	Yukon Environment, Forestry	Meeting to discuss forestry permits in the Project area.

4.3.2.3 Other Publics Consultation

Round Two actively sought feedback from various non-government and private citizens or organizations. From the newsletter distribution list, feedback was sought from an assortment of groups including NGOs (**Yukon Conservation Society** (**YCS**), Yukon Trappers Association, **Canadian Parks and Wilderness Society** (**CPAWS**), Yukon Outfitters Association, **Wilderness Tourism Association of the Yukon** (**WTAY**), the Yukon Fish and Wildlife Management Board, Klondike Snowmobile Association), private enterprise (three outfitters with concessions in the area, Big River Enterprises, Yukon Quest), trappers (most of whom were included in First Nation consultation activities), and potentially affected landowners in the Project Study Region.

A summary of all in-person meetings is provided in Table 4.3-5. All meeting notes and records of personal communication are located in Appendix 4C. Other Publics consultation did not include a large component of Round Three discussions on impacts and mitigation. Where Other Publics had potential to experience Project effects (e.g., RRC's), discussion occurred on impacts and mitigation.

Table 4.3-5
Round Two/Three Consultation Meetings with Other Publics

Date	Location	In Attendance	Notes
June 2, 2006	Whitehorse	Yukon Quest International	Meeting to discuss proposed route alternative and hear key perspectives and issues
June 5, 2006	Carmacks	Yukon College, Yukon Energy	Meeting to discuss the potential training needs arising from the Project
June 7, 2006	Whitehorse	Wilderness Tourism Association of the Yukon (WTAY)	Meeting to discuss proposed route alternative and hear key perspectives and issues
July 6, 2006	Whitehorse	Yukon Conservation Society (YCS)	Meeting to discuss proposed route alternative and hear key perspectives and issues
July 6, 2006	Whitehorse	Canadian Parks and Wilderness Society (CPAWS)	Meeting to discuss proposed route alternative and hear key perspectives and issues
July 6, 2006	Whitehorse	Yukon Trappers Association	Met with the acting director to introduce Project and inquire about trapping information.

In many cases, the individual or group consulted had no identified issues or concerns with the Project and saw it as an opportunity for the region. Many of the issues and perspectives provided by other publics were often broader in scope than those living in the Project Study Region. For example, a concern about the propagation of invasive plant species was cited as a potential issue across the Yukon that could be enhanced in the Project Site Area through brushing and clearing activities.

4.4 KEY ISSUES AND PERSPECTIVES HEARD TO DATE

Participants in the public involvement activities identified a wide range of issues and perspectives during the three rounds of PIP. Some were very specific and were raised one time; however, many were raised a number of times by different participants. In the process several key issues and perspectives emerged which can broadly be categorized as emerging themes, and site specific concerns. Certain issues were far more relevant to the Project Study Region communities (e.g., trapping and resource use), while many of the issues were identified by First Nations and other publics alike (e.g., access to timber).

- <u>Issues related to past experiences with transmission projects:</u> relates to effects associated with previous transmission project developments, primarily the MD Transmission Project, but to a lesser extent the WAF Transmission Project to Faro.
- <u>Issues related to route selection and environmental assessment:</u> consists of effects potentially caused by construction or operation of the proposed Project. These effects are within the scope of what is assessed and considered in the preferred route selection and mitigation in the effects assessment for the Project.

- Issues related to the environmental assessment process, including PIP: relates to scope, approach and process for conducting the route selection and environmental assessment process including PIP.

4.4.1 Issues Related to Past Experiences with Transmission Projects

The most recent experience the Project Study Region communities have had with similar transmission projects was the Mayo-Dawson Transmission Project which was completed in 2003. Comments made by those participating in the PIP suggest that the experience associated with the MD project was not positive. The NND, one of two First Nations through which the project crossed settlement lands, had a particularly poor experience. One NGO consulted commented that the errors made in the construction process have resulted in a lack of confidence in Yukon Energy. General consensus among PIP participants was that the experience and process with the MD project should not be repeated with the Carmacks-Stewart/Minto Spur Transmission Project. Further details on the MD experience can be found in the socio-economic baseline of this document, Section 6.3.4.

During the PIP, Yukon Energy has continually emphasized a commitment to not repeat the MD experience with the proposed Project. This has been practically demonstrated in the implementation of a different and consultative approach to the environmental assessment process, including an extensive consultation process. Yukon Energy's commitment to potentially affected communities and willingness to support self-directed First Nation community consultation activities is also an indication of this shift in approach.

4.4.2 Issues Related to Project Route Selection and Environmental Assessment

Similar issues and perspectives were raised by First Nations and other publics during the PIP. These are recorded in the meeting notes that can be found in the Reference Material 4R-2 through 4R-3, as well as in the record of personal communications in Appendix 4C While some concerns were quite specific and raised only once, many were repeated on numerous occasions by different participants in the PIP process. Frequently cited issues and perspectives included items related to land and resources use, potential environmental effects (beyond those related land and resources use), and potential socio-economic effects.

4.4.2.1 Land and resource use

The potential effects of the Project, land use and resources use were a common concern, especially for those living in the Project Study Region. The following are the key perspectives and issues provided that related to land and resources use:

- The impacts of a transmission line on trapping. Trapping is seen not only as a source of income but a lifestyle. Adequate compensation will need to be provided where mitigation is not entirely effective.
- Effects of the Project on culturally important species such as moose, caribou and salmon.
- Access created by the ROW may have a negative impact on wildlife from increased hunting pressure.

- The line will cross traditional territory and cultural and heritage values need to be respected. Areas that are important medicine spots, berry-picking locations, and other traditional uses need to be considered.
- Interest in accessing the timber harvested from the ROW for both merchantable and personal use (as fuel wood).
- Discussion about the use of a buffer between the transmission line ROW and the highway ROW and if such a buffer can be provided, what is the appropriate width.
- Concern about location of route on higher ground where trapping takes place.

4.4.2.2 Potential Bio-physical Effects

- General concerns about the physical impact on the land including the impacts of clearing and brushing, the position of poles in certain areas that might be unstable or prone to landslides, erosion, etc.
- Cleared ROW will change habitat, attracting some species and discouraging others.
- Concerns about the loss of a carbon sink from the removal of trees in the boreal forest.
- Concerns that brushing and clearing in some areas may encourage re-growth of non-native or invasive species.
- Concerns about the potential affects of the transmission corridor on wildlife habitat and travel.
- Potential to provide fire break protection to communities.

4.4.2.3 Potential Socio-Economic Effects

- The need for local employment and training opportunities.
- The net effect on ratepayers.
- Benefits of the Project beyond the communities in proximity to the Project and to the entire Yukon.
- Concerns about sites with cultural and heritage significance and interaction with the Project.
- The aesthetic impact of a transmission Project on important viewscapes and maintaining the perception of wilderness.
- Questions on the potential effects of **electric magnetic fields** (**EMF**).
- Timing of Project activities could potentially affect tourist travel or events, such at the Yukon Quest.
- Seen as a possible catalyst for economic development in the region.
- Benefit noted of reducing operation of Pelly Crossing diesel plant.

4.4.2.4 Site-Specific Concerns

Site-specific concerns related to land and resources use were identified throughout the PIP. As many of these locations are directly associated with a certain group, site-specific issues are organized according to who raised the concern. These site specific concerns were incorporated where feasible into route selection process.

<u>Little Salmon/Carmacks First Nation</u>

- Tantalus Butte – The east side of Tantalus Butte is important for hunting and cultural reasons. There is important moose habitat and a salt lick that should be avoided.
- Tatchun Creek – The creek is important to the LSCFN for both cultural and resource based reasons. It is important salmon spawning habitat and is an area well-used by the First Nation. Additionally, there is a trapper whose concession, cabin and traplines fall within the vicinity of the eastern route option.

<u>Selkirk First Nation</u>

- Lhutsaw Wetlands – Important habitat for moose and migratory birds, in particular at Lhutsaw Lake. It is also a culturally sacred area.
- Willow Creek – Wetlands should be avoided.
- Graveyards and traditional use sites – This includes Minto Hill and Policeman's Hill, both of which must be avoided.
- Routing through Pelly Crossing was widely discussed and included options to the east, west, and through town.
- Future development plans were considered for areas around McCabe Creek, Minto Landing, and Pelly Crossing.

4.4.2.4.1 First Nation of Nacho Nyak Dun

- Crooked Creek **–** Along with being moose habitat, there are areas along Crooked Creek that have cultural and heritage value, especially as the creek approached the Stewart River.
- Future development plans were considered for the area in proximity to Stewart Crossing.

4.4.2.4.2 Other publics

- Avoid the viewscapes at Five Finger Rapids and Yukon Crossing.
- Avoid the Lhutsaw and Ddhaw-Ghro protected habitats.
- Avoid the Jackfish Lake Park Reserve.

4.4.3 Issues Related to the Environmental Assessment Process

- Concerns that the time frames for the consultation process were too narrow and the process was cumbersome for the communities. Consultation during the summer months is particularly challenging.
- Many individuals asked questions as to who was being consulted, and in many cases, made recommendations as to other parties to involve.
- General comment that consultation process and opportunity to provide issues and concerns before route is finalized (and therefore indirectly participate in route selection) was seen as a positive development.

4.5 FIRST NATION AND OTHER PUBLICS INFLUENCE ON THE PROJECT

The key issues, concerns and perspectives raised during the Project PIP process have been considered by Yukon Energy and incorporated into Project design and environmental assessment process[1]. The key issues and perspectives raised throughout the PIP were balanced with other biophysical, socio-economic, cultural, technical and cost considerations. This section presents only the influence public involvement has had on the Project, while full details on other factors are provided in Chapter 7 - Evaluation of Alternative Routes.

Public influence can be broadly categorized as general influences on the Project and site specific influences. Additionally, the PIP also identified opportunities and constraints that without consultation would not have been incorporated to the Project design. Examples of opportunities included ensuring access to timber, routing to suit future development and land use plans, and the use of the 11 Percent trail. Examples of constraints presented include the identification of cultural sites, areas of critical habitat for wildlife (such as certain wetlands), and trappers' cabins that needed to be avoided.

These opportunities and constraints influenced or, and in some cases, resulted in adaptations either parts of the Project or the entire Project. The following are some of the notable changes:

- **Future Development Plans** - Suggestions were made to routing that provided the opportunity to optimize development in the future, by taking steps today. Examples of this are present at McCabe Creek, Minto Landing, the EMR gravel pit at Minto Landing, Pelly Crossing, and Stewart Crossing.

- **Buffer** – Yukon Energy had originally intended to have transmission line ROW share the Klondike Highway ROW wherever possible. Due to the concerns expressed by various parties regarding the potential effect on wildlife corridors and aesthetics, a 30 metre buffer between the highway ROW and transmission line ROW will be provided wherever feasible.

- **Trapping** – Trapping was an issue repeatedly identified in the First Nation communities and as such was given special consideration during the environmental and socio-economic assessment. As it is impossible for the Project to proceed without crossing registered trapping concessions, mitigation measures were designed to avoid traplines and associated camps/cabins wherever possible. In several instances, route refinements were made to avoid trappers' cabins and specific resource harvesting areas.

- **Harvesting of timber and fuel wood** – Community members made it clear that they wanted to have access to merchantable timber and fuel wood that would be cleared for the Project. Yukon Energy will work in cooperation with the Yukon Government Forestry Department to issue timber permits where merchantable stands and fuel wood exist. As it is unlikely that the timber cleared from the entire transmission line route will be required to

[1] Section 3 of YESAA "duty to consult shall be exercised… by considering, fully and fairly, any views so presented."

satisfy community needs, arrangements will be made that the timber to be collected will be accessible to those with interest.

- **Aesthetics** – in response to concerns raised about the visual effect the transmission line and substations may have on the viewscapes, where feasible, transmission line routing and substation locations have been moved to minimize the effect on the physical landscape.

Site specific influences include:

- **Five Finger Rapids / Tatchun Creek Area** – The preferred route from Yukon Energy's perspective (2ATatchun East) crossed through a trapping concession, crossing prime trapping areas, along with being in close proximity to a trapper's cabin. In response to concerns raised by the trapper and in the interest of protecting the viewscape at Five Finger Rapids, a transmission line route alternative was designed to avoid the trapper's cabin and site lines to the Five Finger Rapids viewing area. This option was a variation of Option 2B and is located behind the first bench of a slope closer to the Klondike Highway.

- **McCabe Creek** – In response to concerns raised by SFN, the transmission route will remain on the east side of the highway, cross McCabe Creek and route along the bottom of the hill to the east through to Minto Landing **Energy Mines and Resources** (**EMR**) reserve. This refinement helps to reduce the aesthetic impact of the transmission line as it crosses the McCabe Creek and proceeds to the Minto Landing area. The McCabe Creek area was identified by SFN as a possible future development area.

- **Minto Substation** – Yukon Energy originally identified a location at the south end of the EMR reserve adjacent to the Klondike Highway. Following discussions with Yukon Government Highways, the substation will be located at the north-east corner of the reserve lands thus reducing the visual impact, providing access to the site with an existing all-weather road, and facilitates the routing of the Minto Spur transmission line close to the Yukon Government Highways gravel pit (providing Yukon Government Highways with a connection point in the event they choose to connect).

- **Minto Landing** – Three options for crossing the Yukon River were developed based on suggestions made during Round One of the PIP. The option of crossing at the existing barge landing was identified as the preferred route by SFN members, including those with seasonal residence at Minto. The Project in the Minto area is designed to incorporate potential local electricity needs of those residing in the area now and potential for growth.

- **Pelly Crossing** – Route options in the vicinity of Pelly Crossing were discussed at length. Initially, three conceptual options were presented by Yukon Energy – one to the east, one to the west, and one going through the community. Each of these options produced a series of concerns, including the desire to avoid fish camps, the desire to avoid residential or commercial property, the aesthetic impacts, concerns about EMF, future development options, and so on. Three additional routes to the west of the community were developed in response to these comments but further consultation led to revisiting and ultimately selecting the route option through the community.

- **Pelly Crossing Substation** – SFN discussed several options for the substation location and decided that the Pelly substation will be located on land immediately to the west of the SFN Lands Department equipment yard.

- **Jackfish Lake Park Reserve** – the park reserve was identified by the Yukon Environment, Parks Department. This area was also of interest to the Wilderness Tourism Association of the Yukon and SFN members with cottages on the north side of the lake. As such, the Project adopted a route option that avoided the park reserve staying on the east side of the Highway.

- **Use of 11 Per Cent Hill Trail**: The initial route selection had been to follow adjacent to the Klondike Highway in the vicinity of 11 Per Cent Hill which would have required crossing low lying and poorly draining land. The suggestion to consider instead the old trail on higher ground was a better solution.

- **Stewart Crossing** – Two route options for the Stewart Crossing area were developed, and after several discussions with the NND Lands Department, a variation to the west of the community was selected that allowed for access to merchantable timber, avoided critical habitat and heritage concerns near Crooked Creek, and was located on higher more suitable land.

4.6 FUTURE STEPS IN PUBLIC CONSULTATION

Round Four of consultation will focus on the Project Proposal Submission filed with YESAB. It is scheduled to take place after September of 2006 and will include meetings in each of the Project Study Region communities.

Public consultation activities will continue throughout construction, operation/maintenance, and decommissioning activities. Throughout construction activities, Yukon Energy will ensure open and timely communication with potentially affected publics so as to minimize any interference between construction activities and resources use. As stated in the MOU, a NTFN member will be sponsored or employed to ensure that on-site construction activities are in compliance with the approved final route. A similar approach to communication will be taken when intermittent brushing and clearing is required for maintenance of the line.

Yukon Energy will make efforts to continue communication with the current list of affected and other publics, as many stakeholders requested ongoing updates on the process. Following completion of the Project Proposal, a second newsletter to describe the preferred route will also be produced and distributed.

Yukon Energy will continue to work with NTFNs towards a conclusion of a Project Agreement, as provided for in the MOU that documents commitments the parties will make towards Project elements, such as employment and business opportunity development.

5.0 PROJECT DESCRIPTION

5.1 PROJECT INDENTIFICATION/SCOPE OF PROJECT

Yukon Energy is proposing to develop the Project to connect the WAF and the MD power grids. The Project includes a new 138 kV transmission line generally along the Klondike Highway from Carmacks to Stewart Crossing (the CS line), a 35 kV spur line from Minto Landing out to the Minto Mine Site (the MS line), new transmission substations at Carmacks, Pelly Crossing, Minto Landing, and changes to the existing substation at Stewart Crossing.

5.1.1 Principal Project

The Project is an enhancement opportunity which will interconnect the MD and WAF grids. This new transmission project will provide surplus WAF grid hydroelectric power to the new copper-gold mine under development at Minto Mine; and it will also in the near-term provide the opportunity for grid hydroelectric power for any future mining developments in the Project Study Region (e.g. the Carmacks Copper Mine). The Project will also enhance overall WAF and MD system reliability, economic efficiency and flexibility in resource use. A schematic of the proposed Project in relation to Yukon Energy's existing network has been previously illustrated in Figure 2.2-1.

The selected route for 138 kV CS transmission line, as described in Chapter 7, is approximately 172 km in length. The selected route for the 35 kV MS transmission line is approximately 27 km in length and will start at the Minto Landing substation, follow the access road through the community of Minto Landing to the existing barge landing site, cross the Yukon River at the barge landing site, and then generally follow the mine access road from the southern shore of the Yukon River, to the mine site. Poles will be either wood or metal and could be either a single or H frame design.

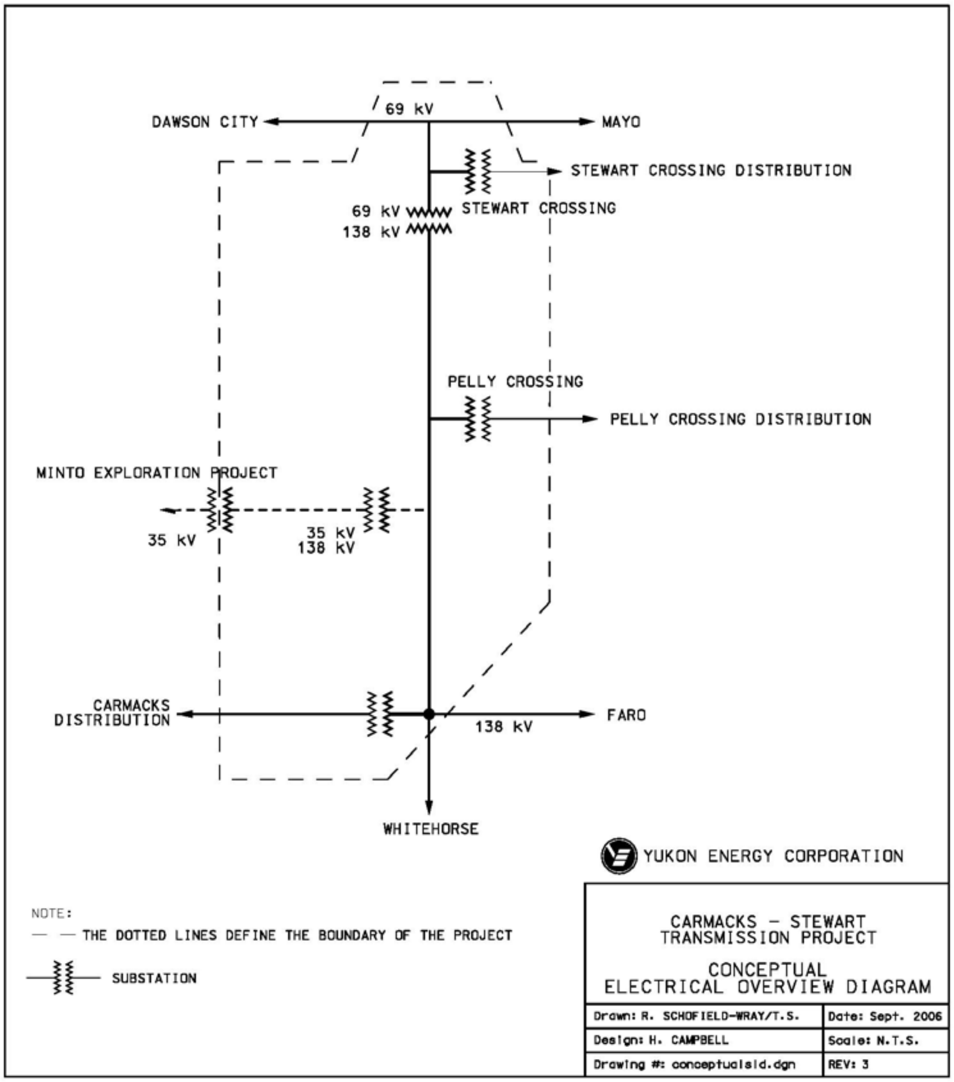
The Project will be constructed in two stages. Stage One will include the 138 kV CS line from Carmacks to Pelly Crossing, the 35 kV MS line from Minto Landing to the mine site, new substations in Carmacks, Minto Landing and at Pelly Crossing, and a step-down transformer at the Minto Mine Site. Stage One of the Project will enable the Minto Mine Project, owned by Sherwood Copper[1], to access surplus grid power rather than continue to rely on diesel generation. The CS line will also allow Pelly Crossing, a community relying on diesel generation, to have access to hydro power. The extension of grid power between Carmacks and Pelly also provides opportunity for future development to access grid power, including any future community at Minto Landing.

Stage Two will include the continuation of the 138 kV CS line from Pelly Crossing north to Stewart Crossing and the expansion of the existing Stewart Crossing substation. Stage Two of the Project will connect the two existing power grids, providing long-term benefits to all Yukoners, including the encouragement of development along the corridor and enhancing overall system reliability and flexibility.

[1] Sherwood Copper Corporation's wholly owned subsidiary Minto Explorations Ltd. is developing the Minto Mine.

Figure 5.1-1 shows a conceptual electrical overview of the Project and the connection to the existing WAF electrical grid at Carmacks and to the MD grid at Stewart Crossing.

Figure 5.1-1
Conceptual Electrical Overview Diagram



5.1.2 Activities of Other Projects

Connections to new electrical loads, such as future mines (e.g. Carmacks Copper Mine connection in future by Yukon Energy), or new distribution such as YECL providing grid power to Pelly Crossing will be done with new transmission or distribution lines off the main CS transmission line. Similarly, connection of the new Carmacks substation to the distribution facilities serving Carmacks will require a new distribution line connection by YECL (at which time Yukon Energy would anticipate decommissioning and removal of its existing Carmacks substation). Approval for these other transmission or distribution lines (and any related decommissioning of existing facilities) is not part of the Project. Each other project, if justified, would require separate environmental and regulatory approvals and accordingly would be the subject of a separate application as required when and if the project was to be developed.

5.2 ALTERNATIVES AND CHOSEN APPROACH

As stated previously, the Project will enhance overall WAF and MD system reliability, economic efficiency and flexibility in resource use. This flexibility in resource use will allow surplus hydroelectric power to be provided to potential future development.

5.2.1 Alternatives to the Project

Alternatives to the Project are either a 35 kV transmission line to service the Minto Mine Project only; or not proceeding with the Project, resulting in continued reliance on diesel by the Minto Mine and community of Pelly Crossing (as well as other future developments in the Project Study Region). These are described below.

5.2.1.1 35 kV line to Minto Mine:

This alternative would be developed to meet the needs and requirements of the Minto Mine Project. A LOI between Yukon Energy and Sherwood Copper in March 2006 agreed to work towards developing a PPA to provide electric grid power from the WAF grid before the end of 2008. If this WAF grid power was not available through the currently contemplated Project, a separate 35 kV line between Carmacks and the Minto Mine site would be developed along the same route.

The elements of this alternative Minto Mine Transmission Project would include:

- a new substation in Carmacks;
- a 35 kV line from the new substation in Carmacks generally following the Klondike Highway north to a Yukon River crossing in the vicinity of Minto Landing; and
- a 35 kV line generally following the existing Minto Mine Project access road, to terminate at a step-down transformer at the Minto Mine site.

Minto Explorations Ltd. (the wholly owned subsidiary of Sherwood Copper) is currently developing the Minto Mine and intends to start production in the spring or early summer of 2007 using on-site diesel generation to supply its power needs until such time as grid power can be provided by the Project.

Upon completion and hook up of the 35 kV transmission line, WAF grid power would be available to the Minto Mine site during the remaining life of the mine and subsequent shut down activities, currently estimated at ten to more than thirteen years. This project alternative by itself would result in the continued reliance on diesel power for the community of Pelly Crossing unless YEC was to extend the 35 kV line from Minto Landing to Pelly Crossing (this would be seriously considered, pursuant to the MOU with NTFN). The 35 KV option from Carmacks to Minto Landing and/or Pelly Crossing, however, would not be of sufficient voltage to supply future potential mines such as the Carmacks Copper Mine Project in the Williams Creek area. This alternative would also not support future interconnection between the WAF and MD systems. Unless long-term expected service could justify its retention, the 35 kV line would be partially or completely decommissioned at the end of the mine life with limited, if any, future long-term benefits to Yukoners.

5.2.1.2 Do not proceed with the Project or any other option:

If the decision is made not to proceed with the Project or any other new transmission option, the following would not be realized:

- The provision of grid power to future mining development along this route would not be possible, including the Carmacks Copper Mine Project. Inability to secure grid power would adversely affect mine operating costs and economics, reducing royalties to government and potentially First Nations, and increasing diesel **generation greenhouse gas** (**GHG**'s) emissions.
- Pelly Crossing would continue to have long term reliance on diesel power.
- Interconnection of Yukon Energy's existing power grids would not be realized, thus preventing this improvement to Yukon Energy's overall system reliability and efficiency.
- Economic development opportunities that could be realized in the Project Study Region with grid power may not be encouraged.

5.2.2 Alternative Means of Carrying out the Project

This will be addressed in *Chapter 7* of this document as part of the route selection process.

5.2.3 Comparison and Selection of Alternatives

This will be addressed in *Chapter 7* of this document as part of the route selection process.

5.3 TECHNOLOGIES

Previous projects in the Yukon Territory have utilized transmission line design and technology similar to that proposed for the Project. The WAF transmission line is a 138 kV line utilizing the same style of poles, conductor wire and insulators which will be used in the proposed Carmacks to Stewart Crossing line segments. These materials have been used in the climatic extremes that are experienced in the Yukon Territory and Northern British Columbia. Construction of the 35 kV spur line will be similar in design to Yukon Energy's and YECL's current distribution lines elsewhere in the Yukon. The design will be to Yukon Energy standards which are consistent with industry practices in North America.

Throughout the Project Proposal, standard environmental protection practices as found in Yukon Energy's **Environmental Management System** (**EMS**) (see Appendix 5A) will be applied to construction, operation, maintenance and eventual decommissioning of the project components.

Following receipt of the required environmental approvals, a Project specific EPP will be developed to guide contractors as well as Yukon Energy staff. The EPP, which will be founded on the basis of Yukon Energy's EMS document appended to this Project Proposal, outlines specific mitigative measures, including any required monitoring to be implemented during all phases of the project (construction, operation & maintenance and decommissioning). The EPP will be generally developed to accomplish the following goals:

- To facilitate the mitigation of environmental effects throughout the full life cycle of the project by providing clear reporting protocols for field construction and operating personnel;
- To incorporate issues and concerns identified by the public during the PIP;
- To identify modifications to construction methods or schedules, summarize environmental sensitivities and mitigation actions;
- To provide specific information on practices to be utilized during the clearing and construction phases of the project; and
- To monitor clearing and construction (including a NTFN monitor) to ensure that the work proceeds according to the EPP.

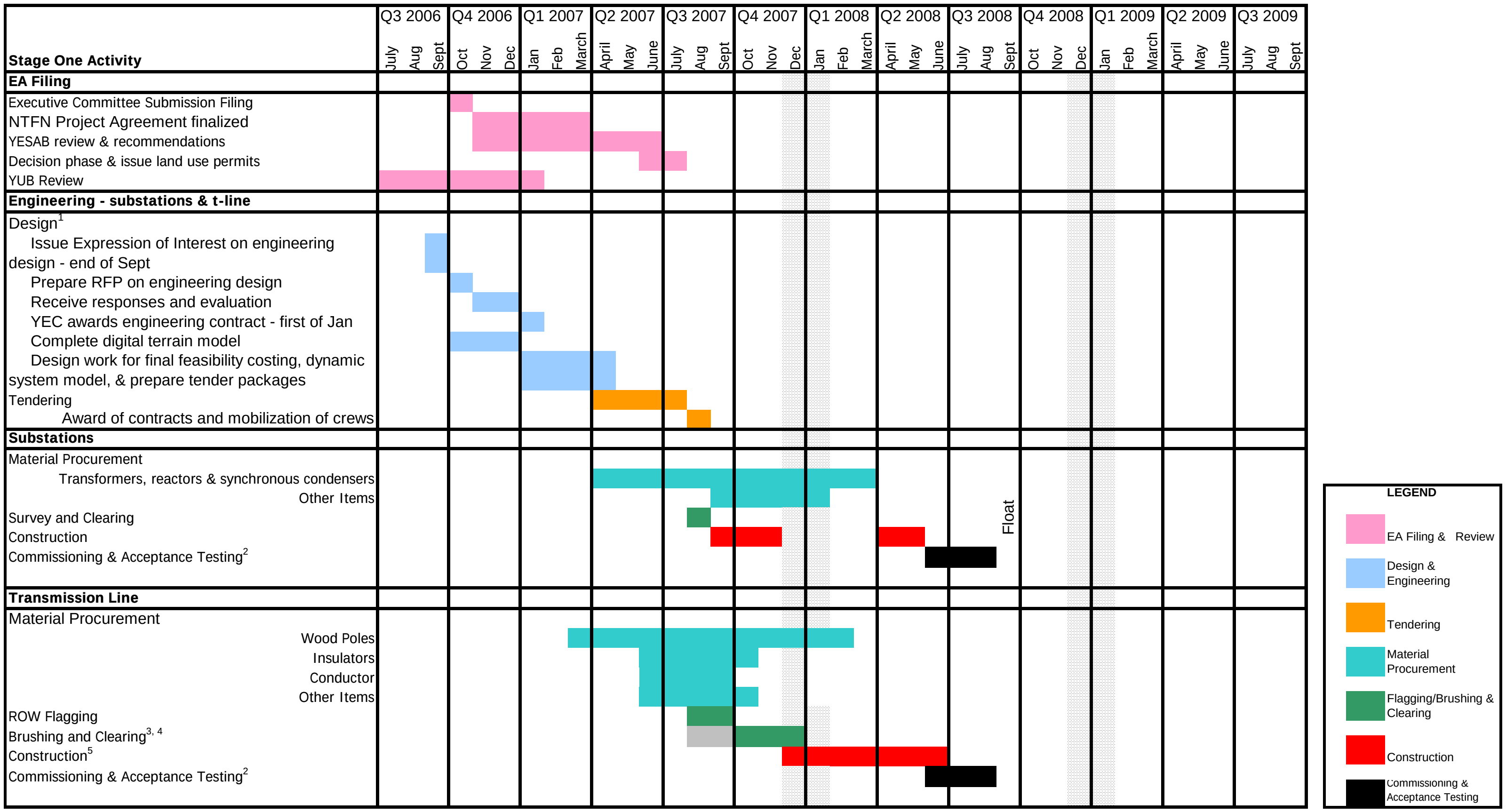
5.4 PROJECT CONSTRUCTION STAGES AND SCHEDULING

5.4.1 Project Construction Schedule

As previously noted, the Project is anticipated to be built in two stages subject to provision of Yukon Government funding plus mine customer contributions. If a staged approach to construction is followed Stage One to Pelly Crossing would begin construction preparation early in 2007, with a projected completion in the third quarter in 2008. Stage Two is currently anticipated to begin in early 2008, with anticipated project completion in the third quarter of 2009.

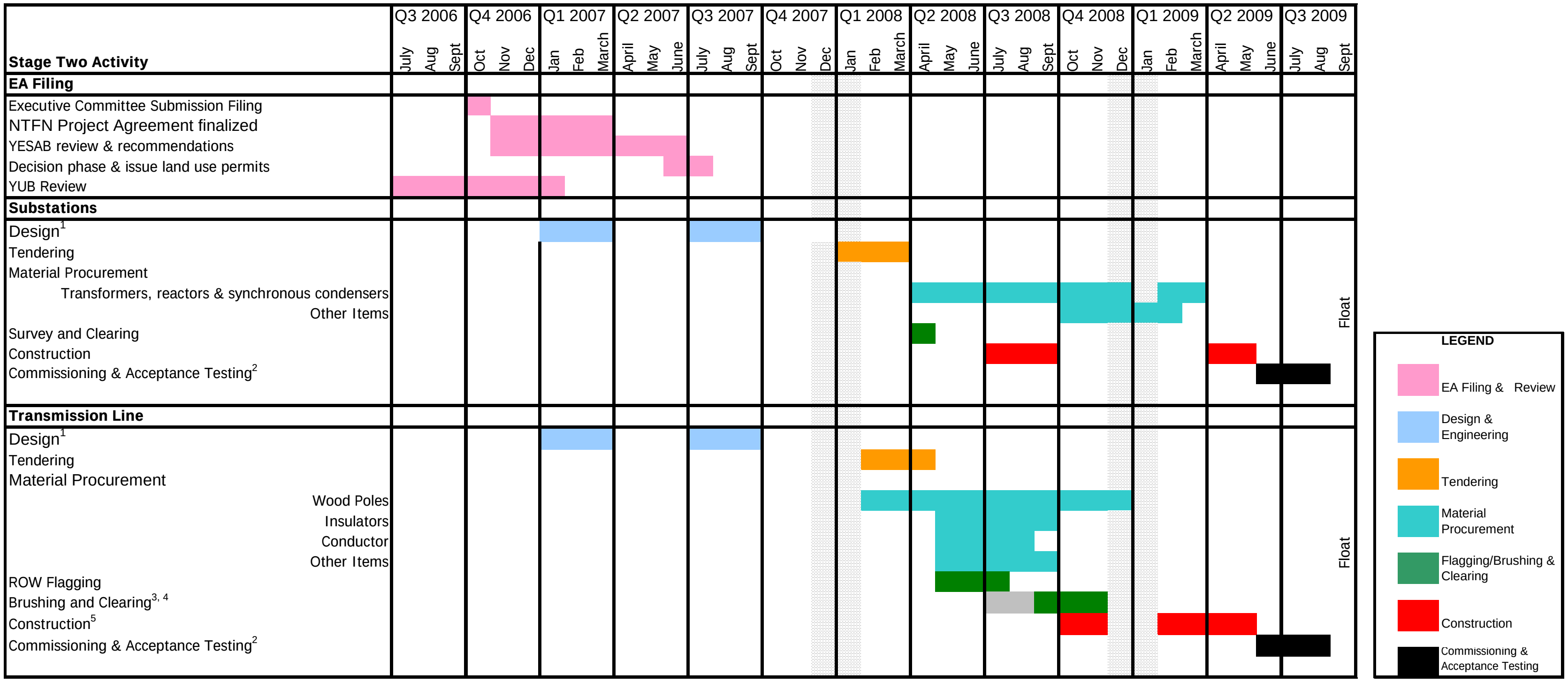
Figure 5.4-1 provides a summary of the timing of anticipated Project construction activities for Stage One. Figure 5.4-2 provides a similar summary for Stage Two.

Figure 5.4-1
Anticipated Project Schedule for Stage 1



[1]Preliminary design work for Stages 1 and 2 is anticipated to be done in IQ1 2007. If YG funding for Stage 2 does not materialize, Stage 2 final engineering and design will face material delays. [2] Commissioning is done by the contractor; Acceptance Testing is done by Yukon Energy - both take approximately 6 weeks each. [3]The grey part of the clearing schedule could accommodate advance permits for cutting fuel wood and merchantable timber. Once this time frame has past the ROW is brushed and cleared to the standard required for the transmission line. It is important that any sections of the corridor used for fuel wood or timber harvesting be surveyed and flagged prior to issuing any permits. [4] The months of May and June are not used for brushing and clearing of the ROW to reduce the impact on nesting birds (Yukon Energy, 2005) and spring break-up. [5] Line construction must occur after brushing and clearing is well in hand. Line construction over the small number of wetland sites will occur primarily in winter to minimize the impact on wetlands and permafrost soils.

Figure 5.4-2
Anticipated Project Schedule for Stage 2



[1] It is anticipated that Preliminary design will occur for Stage 2 in Q1 of 2007, with final design work occurring in Q3 2007 depending on funding from YG. [2] Commissioning is done by the contractor; Acceptance Testing is done by Yukon Energy - both take approximately 6 weeks each. [3]The grey part of the clearing schedule could accommodate advance permits for cutting fuel wood and merchantable timber. Once this time frame has past the ROW is brushed and cleared to the standard required for the transmission line. It is important that any sections of the corridor used for fuel wood or timber harvesting be surveyed and flagged prior to issuing any permits. [4] The months of May and June are not used for brushing and clearing of the ROW to reduce the impact on nesting birds (Yukon Energy, 2005) and spring break-up. [5] Line construction must occur after brushing and clearing is well in hand. Line construction will occur primarily in winter to minimize the impact on wetlands and permafrost soils.

5.4.1.1 Preparation and Line Construction Timing

Timing of ROW clearing and brushing will be subject to physical and biophysical sensitivities such as spring nesting season for birds in May and June, and avoidance of wet/rainy seasons. The anticipated schedule in Figures 5.4-1 and 5.4-2 incorporates these sensitivities.

Stage One will include the 138 kV line from Carmacks to Pelly Crossing and the 35 kV Minto spur line. Meeting an in-service date in the third quarter of 2008 would require the following:

- Approvals by June/July 2007, including any required Yukon Government funding and authorizations.
- Flagging of the ROW will need to occur in early third quarter of 2007 with a possible overlap with clearing of merchantable timber. Areas of merchantable timber and fuel wood will be surveyed first based on the available forest inventory maps from Yukon Forest Management Branch.
- Brushing and clearing is anticipated to commence in late third quarter of 2007 (if ROW flagging finished), or start of Q4; and be completed by end of January 2008. Any work that requires winter clearing will occur during the winter months of 2007/2008. Yukon Forest Management Branch may be interested in issuing timber harvesting permits in advance of the scheduled brushing and clearing work to encourage the harvesting and utilization of merchantable timber and fuel wood.
- Pole framing and setting – to commence in 4th quarter 2007 and be completed by first quarter of 2008 (weather dependent).
- Line stringing – this will start after pole framing and setting is well in hand, likely first quarter 2008, with completion by second quarter 2008.
- Line commissioning and acceptance testing – second and third quarter of 2008.

Stage Two will include the 138 kV line from Pelly Crossing to Stewart Crossing, with an in-service date in the third quarter of 2009. It is possible that funding for Stage One and Stage Two will be separate; in which event Stage One may proceed and Stage Two may face material delays relative to the schedule assumed in Figure 5.4-2.

- Approval of required **Yukon Government** (**YG**) funding and authorizations prior to Q1 2008.
- Flagging of the ROW will need to occur in second quarter of 2008 with a possible overlap with the clearing of merchantable timber. Areas of merchantable timber and fuel wood will be surveyed first based on the available forest inventory maps from Yukon Forest Management Branch.
- Brushing and clearing is anticipated to occur in the third to fourth quarter of 2008. Any work that requires winter clearing will occur during the winter of 2008 - 2009. Yukon Forest Management Branch may be interested in issuing timber harvesting permits in advance of the scheduled brushing and clearing work to encourage the harvesting and utilization of merchantable timber and fuel wood.

- Pole framing and setting - to commence late in fourth quarter of 2008 and be completed by the second quarter of 2009.
- Line stringing - first to second quarter of 2009.
- Line commissioning – second and third quarter of 2009.

5.4.1.2 Substation Construction Timing

- Construction of the Stage One substations is anticipated to commence in the third quarter of 2007 with clearing and civil work (including build up of gravel pad). Construction of electrical equipment and fencing will occur in the second quarter of 2008 (provides for the long-lead time for equipment such as transformers, reactors and synchronous condensers).
- Expansion of the existing Stewart Crossing substation for Stage Two is anticipated to commence in the third quarter of 2008 with clearing and civil work (including build up of gravel pad). Construction of electrical equipment and fencing will occur in the second quarter of 2009.

5.4.1.3 Access and Transportation Timing

Stage One

Access to the transmission line ROW during Stage One construction is anticipated to be spread out over four quarters, starting with ROW flagging and salvage of merchantable timber and followed by brushing and clearing of the transmission line ROW. Equipment used for these activities will be traveling the Klondike Highway, the Minto Mine access road and access trails during Q4 of 2007.

Pole location staking is anticipated to start in the fourth quarter of 2007 in areas where ROW brushing and clearing is complete. Pole placement and line construction will likely begin in the first quarter of 2008 with projected completion in the second quarter of 2008. Initially work will occur in the winter taking advantage of the frozen ground conditions to reduce the possibility of any impact on wetlands or permafrost areas and to avoid disturbance to nesting birds in May and June. These activities will utilize the Klondike Highway, the existing Minto Mine access road, existing access trails and cleared ROW as travel routes.

Clearing of the required all-weather access road to the substation locations and all clearing and ground work of the substation sites is anticipated to occur in the third and fourth quarters of 2007. This will be followed by the construction of the site infrastructure and connection of the lines in the second quarter of 2008. The Carmacks substation will be fenced and gated. There will be a vehicle access gate and a personnel gate which will be kept locked. The Pelly Crossing and Minto Landing substations will follow a similar schedule and procedure for access. The Minto Mine site transformer and associated equipment will be within the prepared site of the Minto Mine Site substation.

Stage Two

Access to the transmission line ROW during Stage Two construction is anticipated to be spread out over five quarters, starting with ROW flagging and salvage of merchantable timber and followed by brushing and clearing of the transmission line ROW. Equipment used for these activities will be traveling the Klondike Highway and access trails over the third and fourth quarters of 2008.

Pole location staking, placement and line construction is anticipated to begin in the fourth quarter of 2008 with projected completion in the second quarter of 2009. Initially work will occur in the winter taking advantage of the frozen ground conditions to reduce the possibility of any impact on wetlands or permafrost areas.

Any required upgrading to the existing Stewart Crossing access road and substation site, including clearing and ground work, is anticipated to occur in the third quarter of 2008. This would be followed by the construction of the site infrastructure and connection of the lines in the second quarter of 2009. The existing substation will be enlarged and will continue to be fenced and gated. There will be a vehicle access gate and a personnel gate which will be kept locked.

5.5 TRANSMISSION LINE PLANNING AND PRELIMINARY DESIGN

Preliminary design review has been a factor in route selection for the transmission line (for details on route selection, see Chapter 7). Detailed engineering design of the transmission lines will start in early January of 2007 and is expected to be completed by early Q2 2007 for Stage One. Preliminary engineering design for Stage Two is anticipated to be completed by end of Q1 of 2007, with final design work occurring in Q3 2007 depending on funding from YG. Yukon Energy is using a digital centreline survey process involving the use of high quality aerial photos that have been digitized, triangulated and control survey points taken in order to generate a digital terrain model that is accurate to +/- 0.5 m. This model is then used by a digital powerline routing and offset mapping program to generate a digital powerline centreline with pole placements and offsets identified.

General design considerations:

In general, the line has been planned to depart from the Klondike Highway or Minto Mine access road where it can be made significantly shorter and/or to avoid recognized sights, private property or difficult terrain (i.e. either too steep or too wet). Clearing will generally be 15 m and up to 20 m each side of the centreline for the 138 kV line; and 7.5 m up to 10 m for the 35 kV line. It will be based on a 10-year tree free standard. This can be reduced in areas where the transmission line ROW is contiguous with the highway or mine access road ROW. Clearing on steep slopes and the approach to any watercourse will be done by hand. In all cases, danger trees will be removed (Yukon Energy, 2005).

Areas of limited stability (e.g. permafrost or wetlands) will be given particular attention including non-standard spans to improve foundations and construction will be done during the winter to limit disturbance of the terrain. There will be no work done in streams – structures will be selected and placed so that any watercourse will be crossed with a single span. Any stream crossing by equipment would only be done with prior approval of DFO.

Site condition studies at substation locations are anticipated for completion late in 2006, and will be provided, if required, when available.

5.5.1 Line Length

Final line length requirements are determined through the route selection process, which is detailed in Chapter 7. This process balances general technical (engineering), economic and environmental implications of increased line length and the reduction of adverse effects through avoidance of sensitive environmental features.

Based on the route selection process set out in Chapter 7, the approximate line lengths for the preferred routes in each of the four line segments are as follows:

- Carmacks substation to McGregor Creek: 42 km
- McGregor Creek to Pelly Crossing substation: 56 km
- Pelly Crossing substation to Stewart Crossing substation: 74 km
- Minto Landing substation to Minto Mine site substation: 27 km

5.5.2 ROW and Property Requirements

A 60 m ROW width will be required for the 138 kV transmission line between the Carmacks and Stewart Crossing substations. A vegetative buffer of at least 30 m between the Klondike Highway ROW and the transmission line ROW will be left wherever feasible.

A 30 m ROW width will be required for the 35 kV Minto Spur Line between the Minto Landing substation and the Minto Mine site substation. The 35 kV Minto spur line will be within the agreed upon access road ROW that Sherwood Copper and SFN have identified, except at noted deviations such as at Big Creek and along Minto Creek (due to terrain constraints).

The transmission line ROW will be cleared to allow the line to be installed and will be kept cleared of vegetation, as required, so that trees and shrubs do not come in contact with the power line. Yukon Energy determines ROW widths to ensure danger trees cannot hit, damage or come in contact with or within the flashover distance of any portion of the transmission/distribution system and according to the limits of approach standard (the distance a person, machine or conductive material can safely approach energized conductors) as outlined in the *Alberta Electrical & Communications Utility Code*. No vegetation overhang is allowed. (See Appendix 5A.)

Based on the route selection process set out in Chapter 7, the 138 kV line primarily traverses Crown territorial lands and settlement lands for two First Nations – approximately 2.5 km of LSCFN land north of Tatchun Creek; and several blocks of SFN land from south of Minto Landing to north of Pelly Crossing totalling approximately 72 km of First Nation settlement land. The 35 kV line is entirely through SFN settlement land, except for the line exiting the Minto Landing substation which is located on Crown land. Where Crown land is encountered, Yukon Energy will secure the necessary ROW through a Land Use Permit in accordance with *"Territorial Land Use Regulations";* and in the case of within a highway ROW, in accordance with Government of Yukon Department of Highways *"Permit for Work within the Right-of-Way"* issued under the Highways Act. Where the transmission line crosses privately owned land including First Nation settlement lands, Yukon Energy will secure the necessary registered easements from the First Nations and private land owners following the completion of a final route survey.

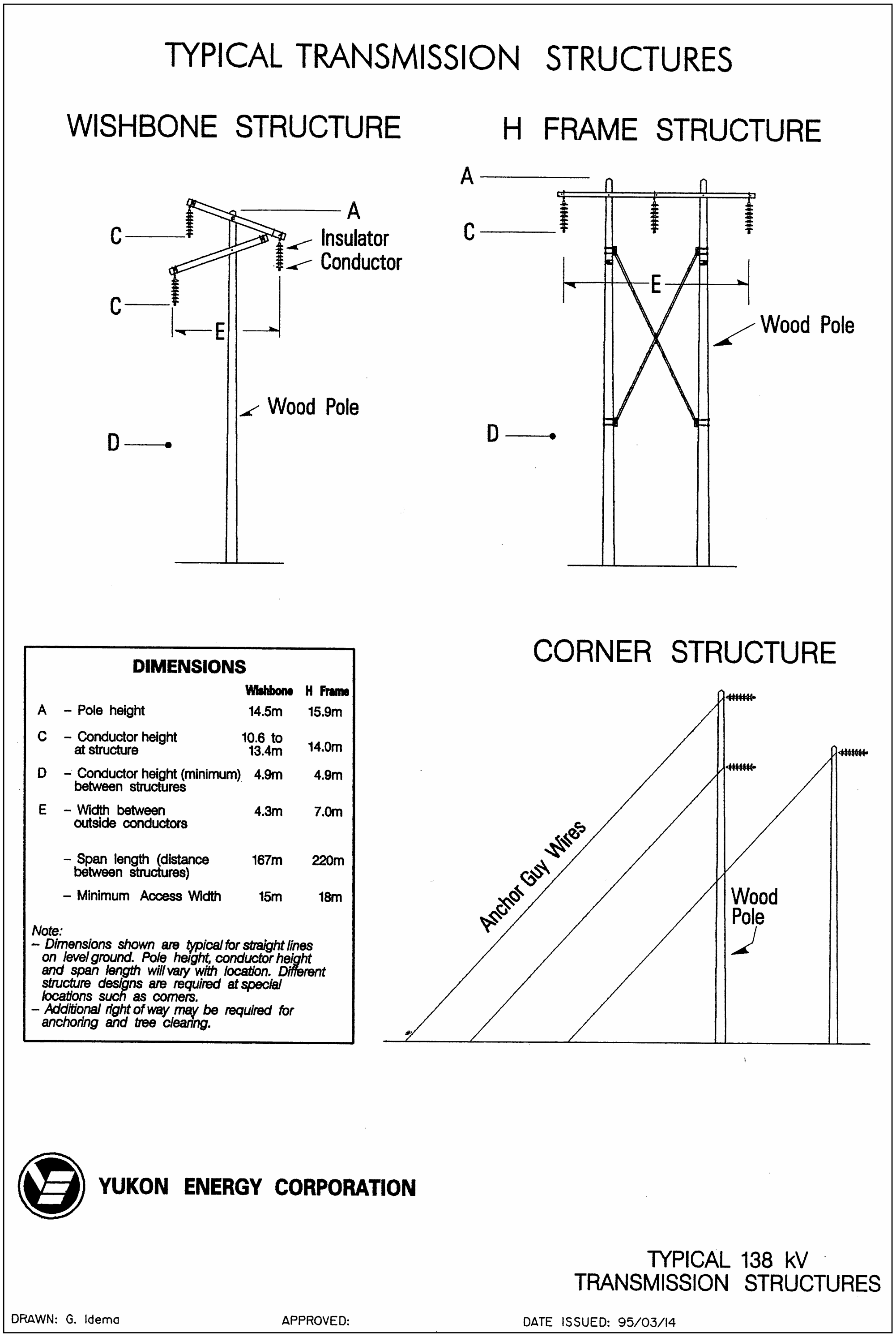
5.5.3 Structure and Conductor Design

Structures will consist primarily of wood poles, with options for metal poles or towers where required. Final pole structure locations will be fixed on the basis of digitized mapping and will reflect assessment of engineering and economic factors with respect to line-length, clearing requirements, site-specific topographic and geo-technical considerations, in conjunction with environmental and socio-economic factors.

Subject to detailed engineering analysis, future pole location can be selected as a potential mitigative measure to reduce adverse environmental and aesthetic impacts (i.e. preservation of wilderness views and avoidance of wetlands). Location preferences identified in the course of the PIP, and specifically in discussion with the three First Nations in their traditional territories, will be reflected in the final engineering analysis. This information, in conjunction with more detailed pre-construction evaluation of ROWs respecting cultural and archaeological resources, rare and endangered plant species, etc., will be incorporated where technically and economically feasible in the pole placement.

The structures will be either single pole types, such as the "wishbone" structure, or multiple pole structures, such as H-Frame structures. Typical wood pole types are shown in Figure 5.5-1 for a 138 kV transmission line following the same design as the WAF line between Whitehorse and Carmacks (Figure 5.5-2). Special structures will be employed where longer spans are necessary, for instance at major river crossings. Pole height will typically vary between 14 m and 20 m, depending on site-specific circumstances. Structures will be guyed in areas of unstable or difficult terrain, and as per Yukon Energy's EMS manual all guy wires will be equipped with guy guards for public safety. Figure 5.5-3 shows a typical 35 kV pole structure for use on the MS line. Pole height for the 35 kV line will typically vary between 12 m and 17 m, depending on site-specific circumstances.

Figure 5.5-1
Typical Wood Pole 138 kV Structures



DIMENSIONS

		Wishbone	H Frame
A	– Pole height	14.5m	15.9m
C	– Conductor height at structure	10.6 to 13.4m	14.0m
D	– Conductor height (minimum) between structures	4.9m	4.9m
E	– Width between outside conductors	4.3m	7.0m
	– Span length (distance between structures)	167m	220m
	– Minimum Access Width	15m	18m

Note:
- *Dimensions shown are typical for straight lines on level ground. Pole height, conductor height and span length will vary with location. Different structure designs are required at special locations such as corners.*
- *Additional right of way may be required for anchoring and tree clearing.*

Figure 5.5-2
Typical 138 kV H-Frame Wood Pole Structure (WAF Transmission Line)

Figure 5.5-3
Typical 35 kV Pole Structure

The average span between structures for the 138 kV line will be approximately 150 m to 200 m, resulting in approximately five to seven structures per kilometre. However, spans of up to 900 m are also possible for crossing wetlands, creeks and rivers when there is sufficient clearance by placing H-frames on adjacent ridges or high ground. Yukon Energy will follow DFO's Overhead Line Construction Pacific Region Operational Statement and Riparian Areas guideline included in Reference Material 5R-4 for all line construction activities in the vicinity of waterways and riparian habitat. Longer spans require additional guy wires to offset the pull of the conductor wires over a larger span. The average span for the 35 kV spur line is expected to be approximately 80 m to 100 m, resulting in approximately 10 to 12 structures per kilometre.

The line will generally use standard structures for tangent, small angle, intermediate angle or large angle deflections, and for dead-ending. In general, tangent and small angle structures will each use two poles, a steel cross arm, suspension insulators, and steel braces. Most of the other structures will use three poles, suspension insulators, and an appropriate variety of stand-off brackets. If the ROW is restricted, consideration will be given to using shorter spans on single pole structures of wishbone construction. The H-frame structures are designed to carry a single three-phase circuit consistent with industry standards.

The foundations for the poles will be selected according to the site conditions. These will vary from simple augered holes to rock anchors or extensions such as piles or rock-filled barrels depending on the depth to rock and the type of covering soil. Particular care will be used to avoid any unnecessary disturbance of permafrost.

Anchored guys will be used at dead-ends, deflections, and at unstable sites. The number of guys and the type of anchor will be selected as required for each site. Push braces will not be used unless there is no practical alternative.

5.5.4 Access and Transportation

The access and transportation requirements for the Project will be finalized when the engineering design work is completed. Preferred access to the ROW will be to use existing access trails or roads. If none are available, new access trails will be required to access the ROW between stream crossings and where the land slopes upward or downward. Details on access and transportation requirements are found in Section 5.7.3 under the Construction Phase.

Vehicular traffic at these sites will likely involve both rubber tired and track-mounted vehicles. Any temporary noise generated during the construction phase will be limited to working hours.

5.6 SUB-STATION PLANNING & PRELIMINARY DESIGN

Substation design will follow generally accepted and approved design standards such as established by the Canadian Standards Association, the Institute of Electrical and Electronics Engineers Standards Association and the Alberta Electrical and Communication Utility Code, which are consistent with current industry practice.

5.6.1 Station Concepts, Sites and Property Requirements

General site considerations:

The engineering design work is expected to be completed by the end of March 2007. This will incorporate a soil analysis for the new Carmacks substation and the Pelly and Minto Landing Substations. Information for the Stewart Crossing site is found in Appendix 5R-3. This site would be an expansion of the existing substation and would follow the same type of base preparation as indicated in the appended report (EBA Engineering Consultants Ltd., 2004).

In each of the proposed substation locations, there will be secondary containment around the large oil-filled transformers. All oil containment and materials handling/spill response standards and protocols will be applied through the design, construction and operations phases.

General Property Requirements:

Based on the route selection process set out in Chapter 7, the following identifies the general location of each of the substations. Details on footprint size and site location (including a footprint sketch) are found in Section 5.7.2 below.

- **Carmacks Substation**: Yukon Energy will establish a new substation on reserved land north and east of the town near the airport. The location is adjacent to the existing 138 kV WAF line for ease in connection of the two lines.
- **Minto Landing**: Yukon Energy will construct a new substation on the east side of the Klondike Highway across from the community of Minto Landing. The substation will be located within the EMR reserved parcel of land. Consultation with Department of Highways has resulted in an agreed location in the northeast corner in order to enable power hook-up to their gravel operations.
- **Pelly Crossing**: Yukon Energy will construct a new substation on land immediately to the west of the SFN Lands Department equipment yard.

Yukon Energy will apply for all necessary Land Use Permits to secure the required land for these substations upon completion of detailed engineering study and design.

- **Stewart Crossing**: Stage Two of the Project will include an expansion of the existing substation at Stewart Crossing. The existing substation is located approximately 1.5 km west of the Stewart River bridge on the north side of the Klondike to Dawson City Highway.
- **Minto Mine Site**: Sherwood Copper is building a substation on the north side of their property to service the mine and camp facilities. The MS line will terminate at the Minto Mine substation site with a step down transformer and associated equipment to tie into the existing Minto Mine Site distribution. The location of the substation is seen in Figure 5.6-1.

Figure 5.6-1
Location of Minto Mine Site Substation

5.7 CONSTRUCTION PHASE

Construction of the transmission lines and substations will adhere to Yukon Energy best practices as outlined in their EMS Manual. In all aspects of the construction work, each site will have spill kits on hand and all waterways will be avoided by all wheeled and tracked vehicles.

5.7.1 Transmission Line Construction

Construction of the transmission line will be carried out by experienced contractors, subject to Yukon Energy's EMS, any EPPs specific to this Project and developed after receipt of environmental approvals, and subject to conditions specified in the Land Use Permit. Yukon Energy will have construction inspectors on site throughout the construction process to ensure conformity to specifications and specific mitigation measures. This will include project monitors from the NTFN throughout the construction phase to ensure conformity with the approved route alignment. In addition, where noted in the Heritage Resource Inventory and Assessment Preliminary Report (see Appendix 6G) or as noted as a form of mitigation, an archaeologist will be present to ensure no disturbance can occur to identified archaeological or heritage resources.

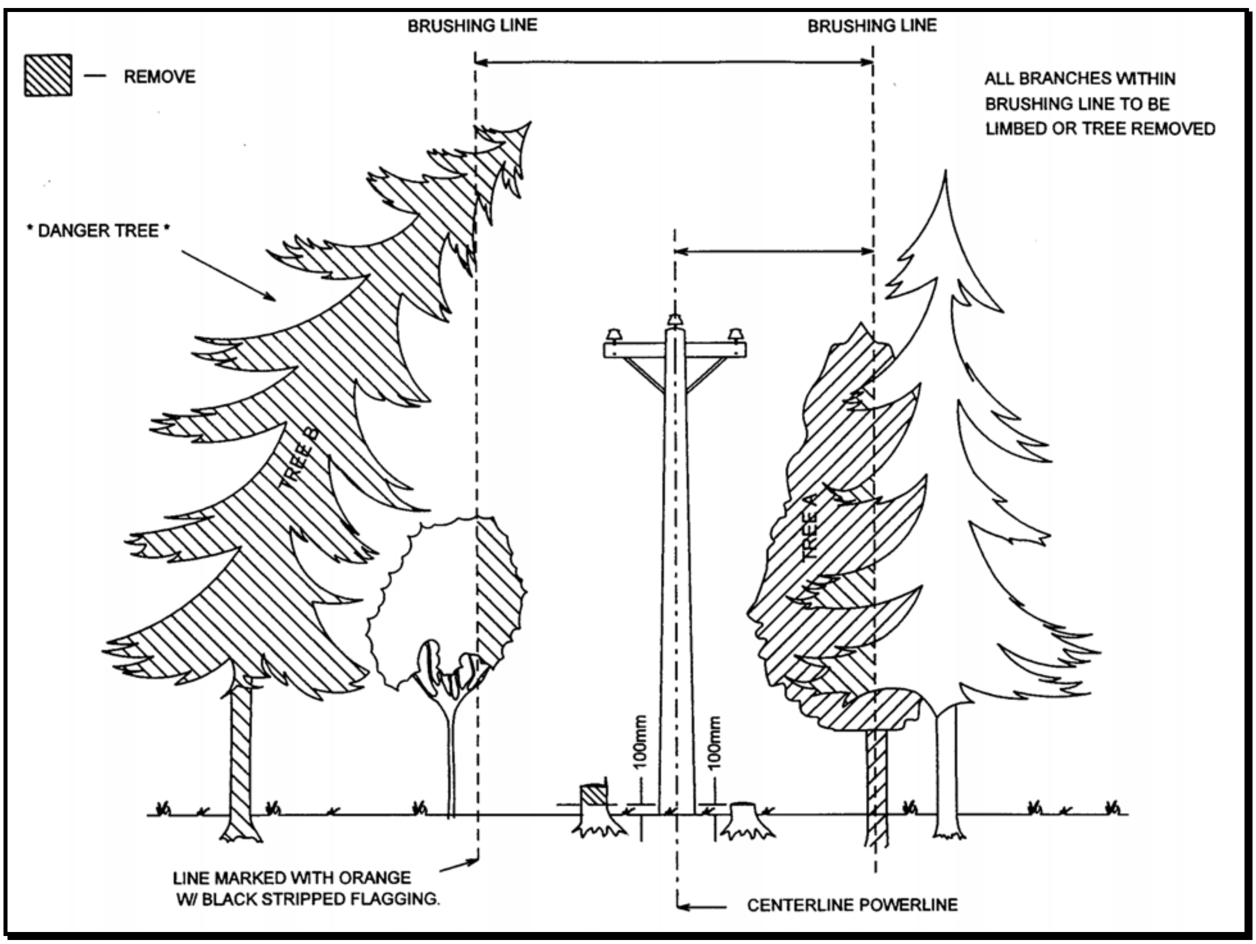
5.7.1.1 Survey and Clearing of ROW

As noted earlier in Section 5.5, the final transmission line routing will be designed through the use of digitized mapping. Prior to construction, the ROW will be flagged by a survey crew using GPS units to establish ROW edges for clearing widths. This work will be done ahead of the ROW brushing and clearing. As an alternative, GPS units may be mounted in the mechanical brushing equipment to identify the ROW.

Clearing and disposal of trees, including danger trees, on the established ROW allows construction activities to proceed and is required for line operation safety and reliability. ROW brushing and clearing also aims at minimizing the risk of wildfires. Brushing and clearing will be carried out in accordance with Yukon Energy EMS Manual best practices (see Appendix 5A). Figure 5.7-1 from Yukon Energy's EMS Manual illustrates brushing and clearing of danger trees.

The cleared ROW width for the 138 kV CS line will generally be 15 m to 20 m from centreline, for a total cleared width of between 30 m and 40 m. The cleared ROW width for the 35 kV MS line will generally be 7.5 m to 10 m from centreline, for a total cleared width of between 15 m and 20 m.

Figure 5.7-1
Clearing of Danger Trees



In accordance with the MOU between Yukon Energy and the three NTFNs, the NTFNs will have the opportunity to provide, on a sole source basis, all route clearing and brushing services required for the Project. ROW clearing will typically be done by mechanical methods. A mechanical feller buncher is mounted on crawler tractors to cut tree growth up to approximately 8 inches in diameter. This method provides minimal ground disturbance (typically done under frozen ground conditions). If mechanical feller bunchers are not available, a combination of chainsaw and skidders to remove salvageable timber will be used in denser forest cover. Further clearing is expected to be done by bulldozers and excavators. Selective clearing methods (hand clearing with chain saws) are typically used in rugged terrain in the vicinity of all river and stream crossings and sensitive riparian areas.

Slash from the clearing activity will normally be piled within the ROW and burned. Steps will be taken to minimize the contamination of merchantable timber. Salvage of merchantable timber may be available through the Department of Forestry where reasonable merchantable timber volumes are present. Preliminary discussion has been initiated with Forestry Branch of the YTG (personal communication, Forest Management Branch, June 20, 2006). In addition, community and First Nation fuel wood salvage opportunities will be encouraged where safety, access and environmental concerns are manageable.

Typical equipment for ROW clearing may include:

- mechanical feller buncher
- excavators to pile and burn waste wood in machine accessible areas
- tracked bulldozers for building access and some clearing
- grapple skidders to move merchantable timber
- propane fan burners
- fuel trucks (1 ton and 3 ton)
- crew trucks (1/2 ton and ¾ ton)
- chainsaws and brush saws
- spill kits

5.7.1.2 Line Construction

Line construction consists of the following basic activities: establishing the pole foundations, hauling the poles and insulators, hardware and reels of conductor to the ROW; assembling and erecting the structures and installing anchors; installing insulators and stringing of the phase conductors and overhead ground wires; and clean-up. Line construction is generally a specialized skill with line crews coming from outside the territory. Line construction is also anticipated to involve the use of heavy equipment and local labour.

The poles are hauled from the marshalling area (if required) to the identified locations on the ROW with tandem axle trucks and trailers. The structures are then assembled ready for installation into the ground. A digger with an earth auger excavates a hole to the proper depth. The structure is placed into the hole and properly aligned. Backfill is then compacted around the pole to hold it in place. Anchors for the deflection and dead-end structures are then installed and randomly tested to ensure suitable holding capacity.

The stringing operation begins by attaching a large diameter pulley (“dollies”) onto the insulators. The reels of conductor are loaded onto a trailer that secures the reels as the conductor is pulled out. The wire is fed through the dollies and pulled out for a length of approximately 3,200 m. After the conductor is fed out off the reels, it is pulled up to the design tension. After the wire is tensioned, it is put into the clamps at the bottom of each insulator. A clean-up crew then moves through to ensure all debris has been cleaned up and the line is ready to be energized.

At waterway crossings, structures will be located as far back from the water's edge as possible for maximum stability and prevention of bank damage, with a minimum distance of "15 m from the high water mark or top of bank of any watercourse" according to DFO's riparian areas and revegetation guidelines (See Reference Material 5R-4) Construction procedures used at each required crossing will be based on site-specific considerations such as existing soil and subsurface conditions, biophysical sensitivities and operational requirements. Yukon Energy will follow DFO's Overhead Line Construction Pacific Region Operational Statement and Riparian Areas guideline included in Reference Material 5R-4 for all line construction activities in the vicinity of waterways and riparian habitat.

Typical equipment for line construction could include the following:

- pickups and crew cabs for transportation of crews and small tools
- highway trucks and hiabs for hauling of material from the delivery point to site
- tandem axle trucks and trailers for hauling of poles
- tandem flat decks with hiab, preferably 6 x 6 for ROW access trails
- crawler tractor for access construction
- rubber tired (4 x 4) or skidder backhoes and small tracked excavator
- auger truck
- compressor and hand drills for rock work
- tandem flat line truck with truck mounted crane of required capacity, preferably 6 x 6 for ROW access trails
- fork lift (15T)
- stringing equipment, single drum or bull wheel puller, bull wheel tensioner, rope machine, baby puller, correctly rated for conductor and installation tensions of conductor, reel stands for conductor reel size, 100T press and compressor
- line truck with manlift, preferably 6 x 6 for ROW access trails.
- nodwells (tracked)
- helicopter
- spill kits

5.7.2 Substation construction

General site construction activities

A substation will be developed where the new line connects into the existing systems and where the new line is tapped for intermediate loads. Each will be developed to suit the needs of its specific site. Site preparation activities for substation development will typically include:

- removal of existing vegetation and organic topsoil from the site;
- excavation to a depth of no more than 1.0 m except for specific transformer locations that require additional foundation support, depths could be up to 2.4 m for transformer foundations;
- addition and compaction of aggregate fill material from nearby borrow pits;
- placement of a ground grid of un-insulated copper wire attached in a checkerboard pattern;
- cover materials layer approximately 200mm deep placed on top (Pit Run imported structural fill, free draining screened gravel 25 mm top size) for drainage and vehicular access base.
- addition of a layer of aggregate fill (washed crushed aggregate) until site is level and approximately 200 mm deep; and

Once site improvements have been completed, concrete equipment foundations (i.e. transformer bases, etc.) and necessary grounding arrangements and oil containment systems will be installed. Station apparatus and equipment installations will follow, including filling of equipment with insulating oil, construction clean up and commissioning. Perimeter fencing and vehicular and personnel gates will also be installed, each with appropriate locking mechanisms. Clearing around the substations will be done to a minimum of 15 m around the perimeter of the substation to prevent trees from falling on the fence and substation equipment.

Once complete and commissioned, the stations will be operated 24 hours a day, year round, and will be visited regularly by Yukon Energy personnel performing inspections and maintenance. Qualified operators and maintenance personnel will visit the stations routinely to inspect and maintain the sites and, in the case of contingencies, correct any problems or related environmental effects. Emergency repairs may involve repair or replacement resulting from equipment failure.

Typical equipment for substation construction could include the following:

- back hoe
- compactor
- crew trucks (½ ton and ¾ ton)
- chainsaws and brush saws
- survey equipment
- spill kits
- trucks to haul gravel/aggregate
- mobile crane

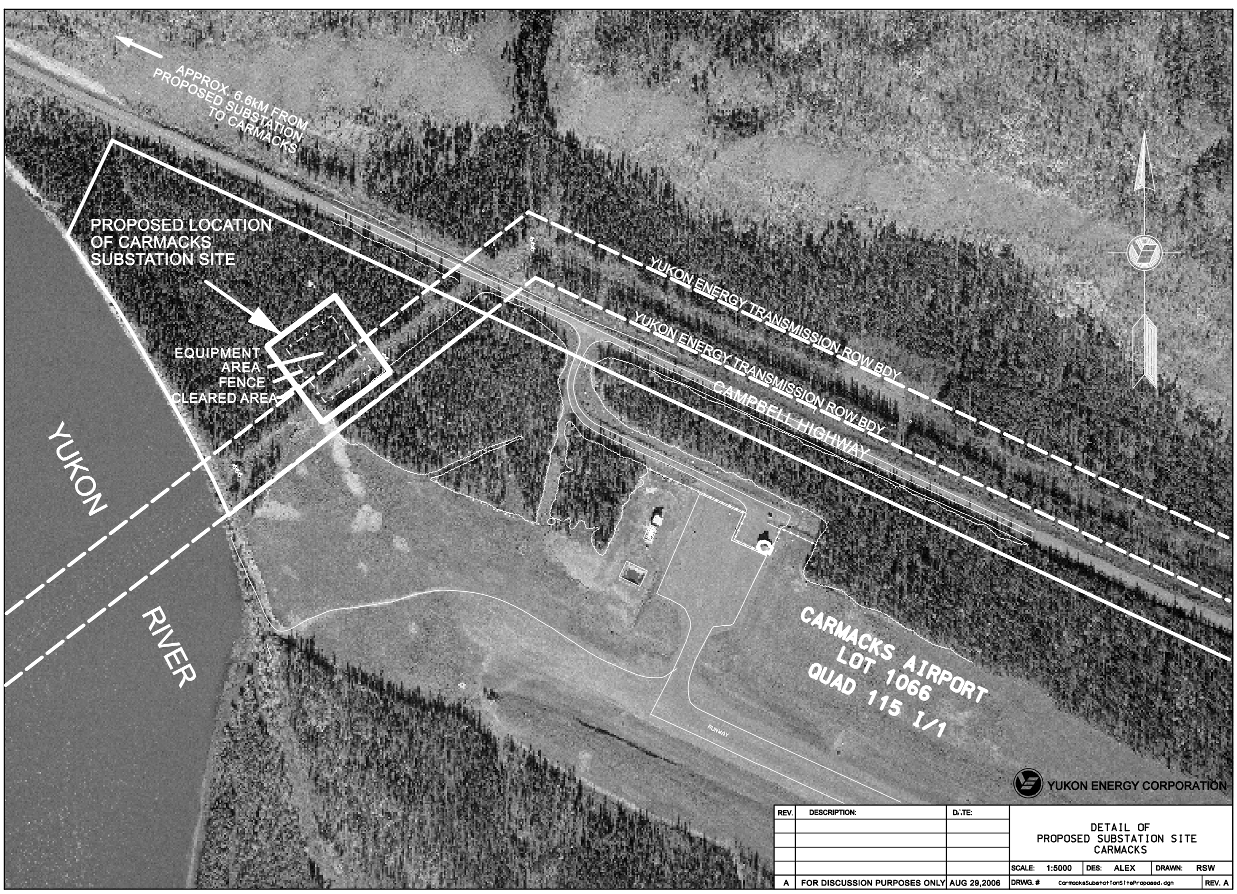
5.7.2.1 Carmacks Substation

Subject to confirmation by design engineering studies (including a study of dynamic stability and voltage regulation), typical electrical equipment for this substation includes:

- a 138 kV bus
- 138 kV circuit breakers
- disconnect switches, fuses, transformers and indoor circuit breakers
- lightning arresters, metering equipment, relays and cables; and
- a synchronous condenser

The station will typically include a building to house the indoor circuit breakers, controls for the 138 kV circuit breakers, space for four more (future) circuit breakers, and the station auxiliaries. The building will be arranged for extension to house future development of the substation and will be 15 m maximum height. A preliminary footprint for the Carmacks substation will be 60 m by 70 m and will be fenced, gated and locked. The substation including gravelled areas will typically be 63 m by 73 m. The site will include a 15 m perimeter clearing around the substation resulting in a total preliminary footprint of 90 m by 100 m. Figure 5.7-2 shows the footprint of the proposed substation.

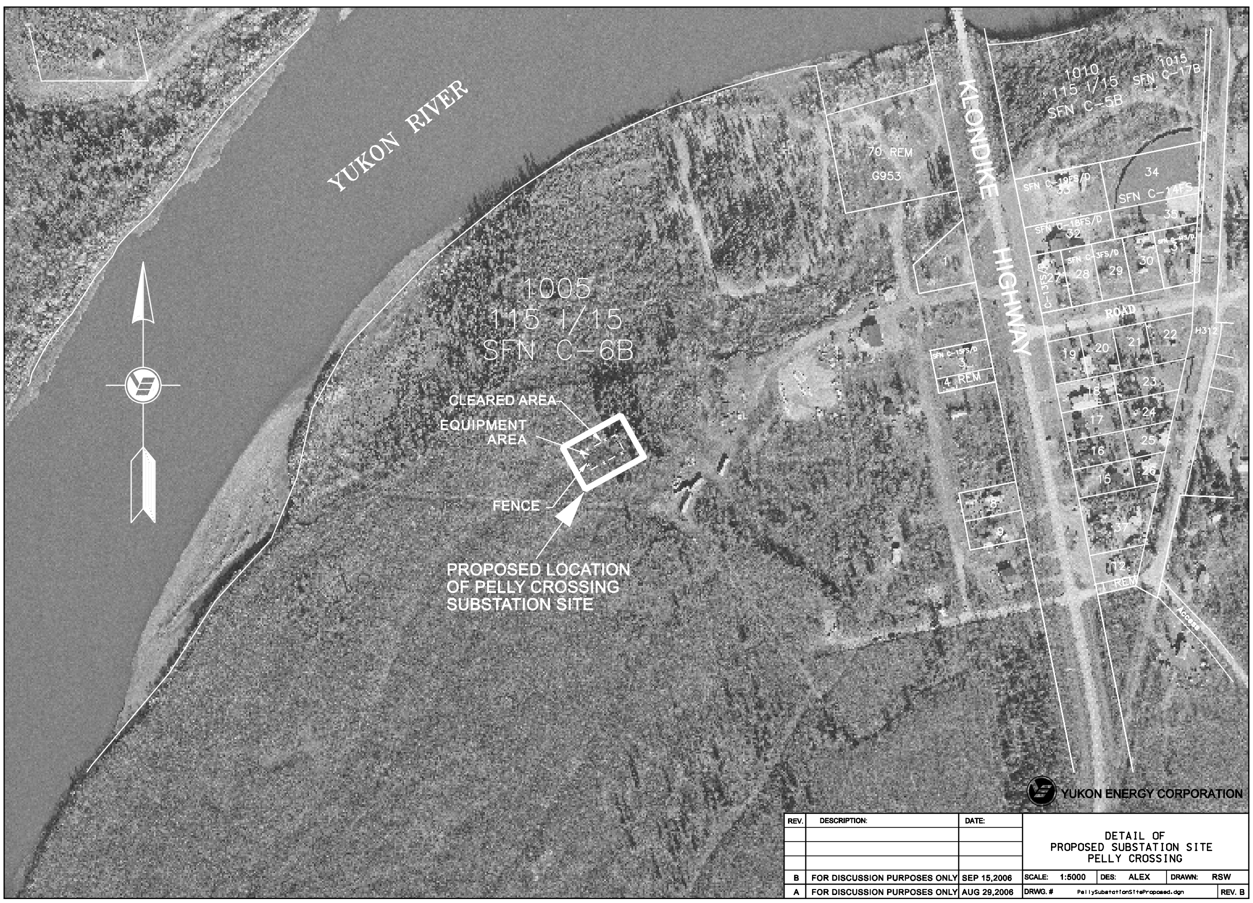
Figure 5.7-2
Carmacks Substation Footprint



5.7.2.2 Pelly Crossing and Minto Landing Substations

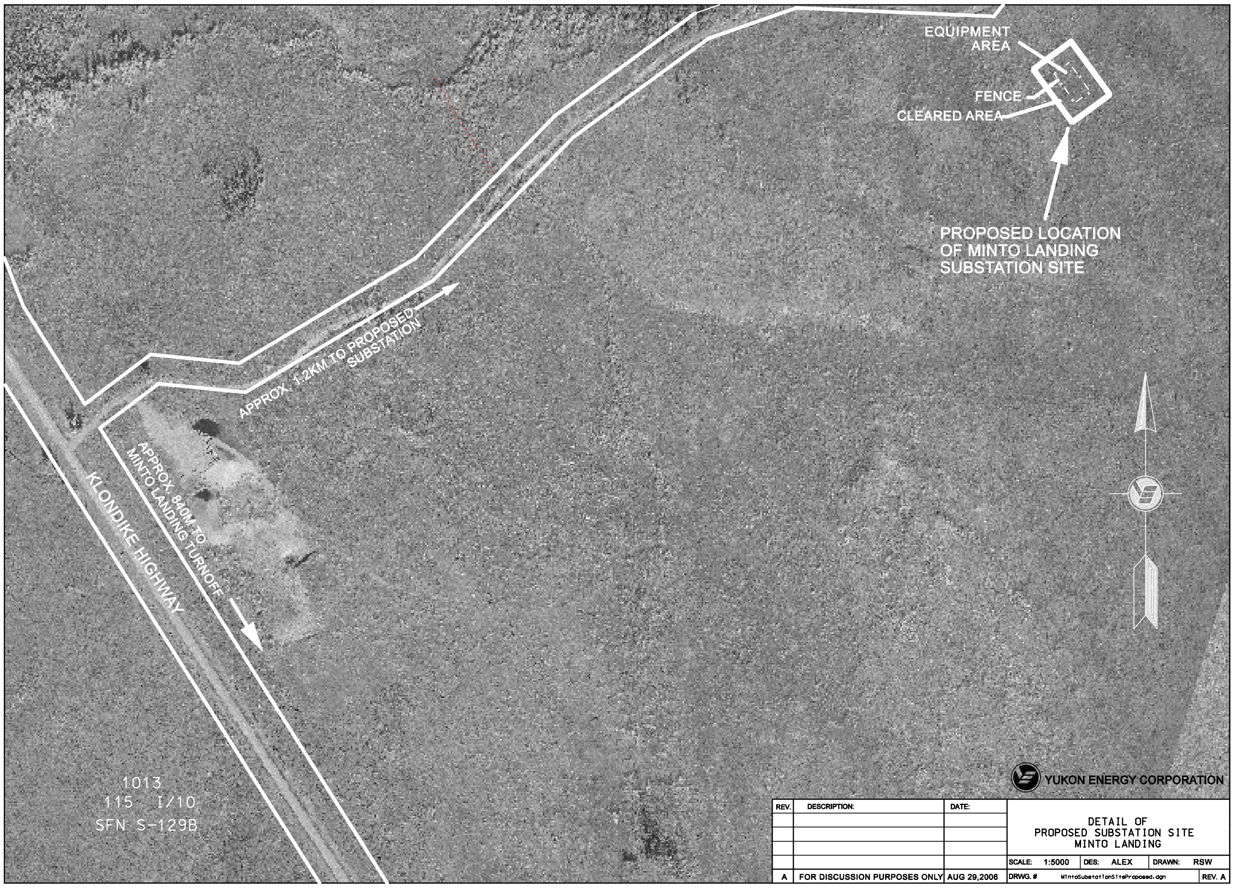
The proposed substation at Pelly Crossing will contain a step-down transformer to convert the 138 kV power to either 12 kV or 4.2 kV power for future distribution into Pelly Crossing. A reactor may also be required. Various breakers and electrical switches, electrical measurement devices and a small substation control building will be required. A preliminary footprint will be approximately 20 m by 40 m with a perimeter fence that is gated and locked. A gravelled area will extend 1.5 m in each direction outside the perimeter fence. The site will include a 15 m perimeter clearing around the substation, resulting in a preliminary footprint size of 50 m by 70 m. Maximum structure heights will be 15 m. Figure 5.7-3 shows a sketch of the proposed substation.

Figure 5.7-3
Footprint Conceptual Layout of the Pelly Crossing Substation



The Minto Landing substation will contain a transformer to step-down the 138 kV power to 35 kV for the Minto Spur line. A reactor may also be required. Various breakers and electrical switches, electrical measurement devices, and a small substation building of maximum height 15 m will likely be required. Size will be approximately 20 m by 40 m for the fence line; 23 m by 43 m for the gravelled area. The site will include a 15 m perimeter clearing around the substation resulting in a total preliminary footprint of 50 m by 70 m. Figure 5.7-4 shows a sketch of the proposed substation.

Figure 5.7-4
Footprint Conceptual Layout of the Minto Landing Substation



5.7.2.3 Stewart Crossing Substation

Yukon Energy will be required to expand the existing substation at Stewart Crossing to connect the 138 kV CS transmission line and the 69 kV MD transmission line. Site work will include additional clearing and civil work (including built-up gravel pad) in the summer of 2008. Construction of electrical equipment and fencing would occur in spring/summer of 2009. Maximum structure height will be 15 m.

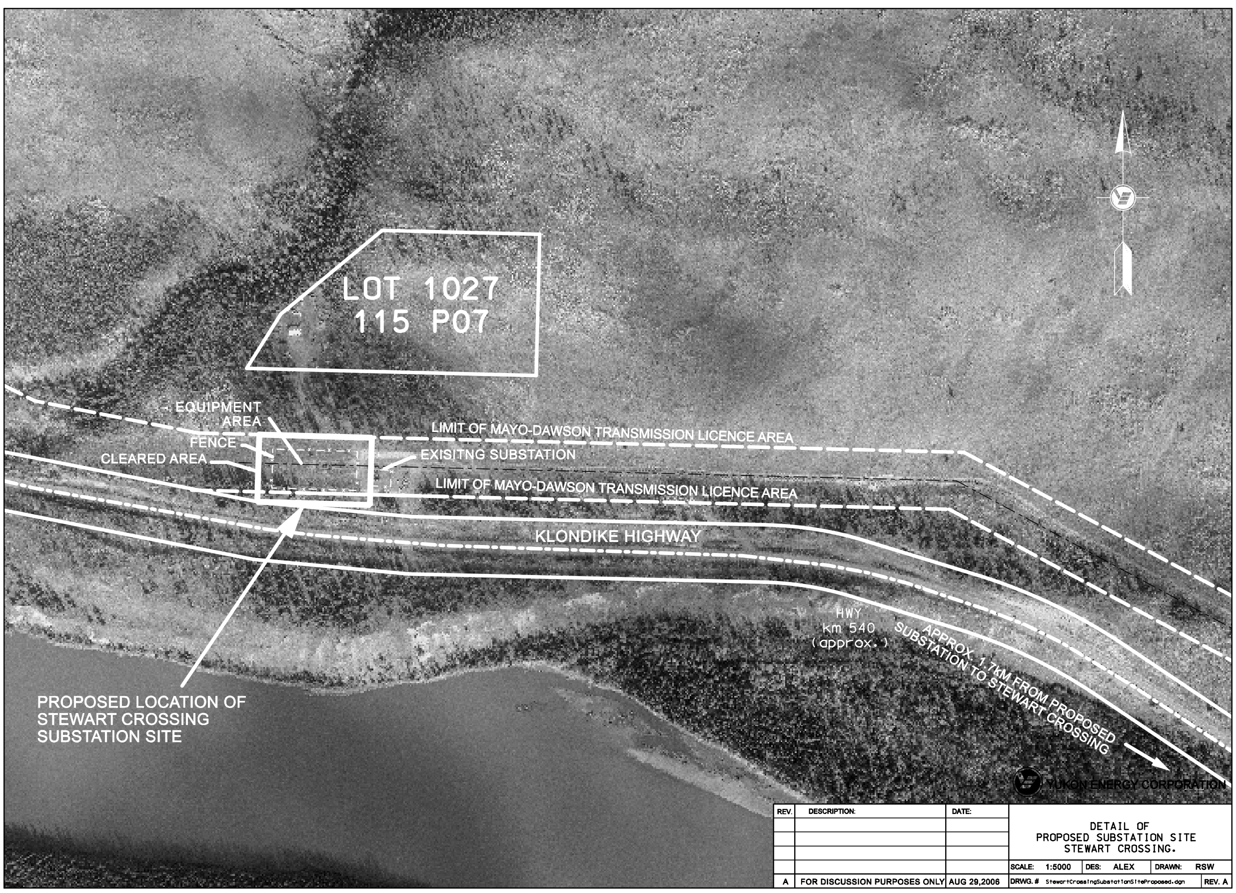
Typical equipment for the expanded Stewart Crossing substation may include the following:

- two transformers, each 138/69-25-4 kV
- two reactors
- capacitor bank
- four 69 kV disconnect switches and 3 – 69 kV circuit breakers
- two - 138 kV disconnect switches and fuses

- various circuit breakers, disconnects, lightning arresters, metering equipment, relays and cables
- small control building housing 4 - 25 kV circuit breakers, up to 12-4 kV circuit breakers and a synchronous condenser
- expansion of existing fencing

This station will likely be terraced with a 69 kV by-pass north of the present line and a 138 kV structure and the transformers south of the line. Additional equipment associated with the Project will be enclosed by a fence about 90 m by 41 m and the entire facility will continue to be gated and locked. A 15 m area around the facility will be cleared of vegetation, resulting in a total preliminary footprint of 120 m by 71 m. Figure 5.7-5 provides a conceptual footprint of this substation.

Figure 5.7-5
Proposed Footprint Layout of the Stewart Crossing Substation



5.7.3 Access and Transportation

Access to any aspect of the Project will follow Yukon Energy EMS Manual on best practices (see Appendix 5.A).

Access for construction and subsequent transmission line maintenance activities will generally occur along the ROW and any existing public access roads or trails. This enables maximum use of existing road access and minimizes the requirement for the development of new temporary trail access. Where no existing access trails exist, temporary access trails may be necessary between the Highway and the ROW. Development of these trails may require installation of culverts to cross ditches. Access trails would be built to accommodate vehicles that are brushing and clearing the ROW – a typical access trail can be approximately 6.5 m wide – 3 m in trail width and 2 m either side for clearance. During construction, these trails must be wide enough to accommodate vehicles delivering line construction equipment, such as poles and cables, to the ROW. ROW access trails will not be regularly maintained post-construction. Construction activity and access requirements will be subject to standard environmental protection measures associated with Yukon Energy's EMS Manual, which describes best practices for transmission line construction (see Appendix 5A).

<u>Water and airborne access</u>:

- Frozen ice surfaces or snow bridges may be used to move materials across water bodies.
- Helicopter access will be used to help string very long spans across the rivers and possibly at Tatchun Creek where a longer span is desirable.

A permanent all-weather access road and associated drainage will be required from the Highway into all substation sites. Each substation will have its own site-specific access road requirements and will be designed as part of the final engineering design phase. Existing territorial highways and roads will be supplemented with newly developed site access roads into the Carmacks, Minto Landing (via the NW Tel access road) and Pelly substations. Use of the existing Stewart Crossing substation access road will continue. Access to the Minto Mine site substation is controlled by Minto Explorations from the mine site.

Vehicular traffic at these sites will likely involve both rubber tired and track-mounted vehicles. Any noise temporarily generated during the construction phase will be limited to working hours.

Material required for substation construction including the access road (i.e. concrete and granular fill) will be obtained where possible from local suppliers (providing specific material specifications can be met) using YG aggregate locations in close proximity to the substation locations. Sources of aggregate supplies have been confirmed with YG Highways and Public Works and are listed in Table 5.7-1 below. All non-toxic waste materials will be disposed of using existing, appropriately licensed local disposal facilities. As with construction activity, material supply and waste handling will be subject to Yukon Energy's best practices and relevant territorial regulations. Excavated organic matter which can be salvaged in the excavation process will be distributed/broadcast in the immediate area to support revegetation. Remaining material will be used where feasible on site during construction. Surplus non-organic material excavated during construction will be used where practical to make berms to restrict access onto the transmission line ROW. In general, erosion control measures will be implemented if required.

Table 5.7-1
Pit Run and Crushed Aggregate Supplies

Substation	Aggregate Supply
Carmacks	Pit ID 115 I-01 (Carmacks Dump) for pit run aggregate Ken Roberts, Carmacks for crushed aggregate (If latter not available, Pit ID 115 I-01 or Pit ID 115 I-09 (on the Robert Campbell Hwy.) can supply once confirmation is received by HPW that Roberts can not supply required crushed aggregate)
Minto Landing	Pit ID 115 I-15 (at Minto Landing) – both pit run and crushed aggregate
Pelly Crossing	Pit ID 115 I-07 (at Pelly Crossing) – both pit run and crushed aggregate
Stewart Crossing	Pit ID 115 P-05 (Stewart Dump Road) and/or Pit ID 115 P-07 – both pit run and crushed aggregate (location chosen will be determined based on haul distances)

5.7.3.1 Carmacks Substation

The Carmacks substation is immediately adjacent to the Robert Campbell Highway. A short all-weather access road will be constructed into the site, complete with associated drainage requirements. The site may also house a small temporary marshalling yard for delivery and storage of equipment and materials during the construction phase of the project. As noted in the previous section, the substation will be fenced and equipped with locked gates for vehicular and pedestrian access.

As noted in the above table, aggregate arrangements have been completed with **Department of Highways and Public Works** (**HPW**) for use of granular fill for the substation gravel pad. Other local suppliers will be contacted prior to construction for the required crushed aggregate for the substation gravel pad. The gravel pad will use an estimated 1,000 m^3 of washed crushed gravel to a depth of 200 mm and 1,000 m^3 of Pit Run and Structural Fill.

5.7.3.2 Pelly Substation

The Pelly substation will be located on land immediately to the west of the SFN Lands Department equipment yard. The existing access road to the equipment yard may require upgrading to ensure an all-weather access road to the substation site is available, complete with associated drainage requirements As noted in the previous section, the substation will be fenced and equipped with locked gates. Aggregate arrangements have been completed with HPW for use of granular fill for the substation gravel pad from their pit just south of Pelly Crossing. The gravel pad will use an estimated 200 m^3 of washed crushed gravel to a depth of 200 mm and 200 m^3 of Pit Run and Structural Fill.

5.7.3.3 Minto Landing Substation

The Minto Landing substation will be located on the east side of the Klondike Highway on EMR reserved land. Consultation with the Department of Highways has refined the location to be beneficial to both Department of Highways for power hook-up, as they use the northern section as a gravel pit, and Transport Canada regarding clearance around the Minto airstrip. A short all-weather access road will be constructed into the site from the NW Tel access road, complete with associated drainage requirements. As noted in the previous section, the substation will be fenced and equipped with locked gates.

Aggregate arrangements have been completed with the HPW for use of granular fill, for the substation gravel pad, from their associated gravel pit to the west of the substation site. The gravel pad will use an estimated 200 m^3 of washed crushed gravel to a depth of 200 mm and 200 m^3 of Pit Run and Structural Fill.

5.7.3.4 Stewart Crossing Substation

The existing substation at Stewart Crossing has an all-weather access road, approximately 300 m in length, to the site from the North Klondike Highway. This will continue to be used and may require some upgrading. The expanded substation will continue to be fenced and gated. The gravel pad will use an estimated 800 m^3 of washed crushed gravel to a depth of 200 mm and 1,000 m^3 of Pit Run and Structural Fill. Aggregate arrangements with HPW have been completed (as noted in Table 5.7-1) for crushed and pit run aggregate supplies from either HPW gravel pits in the vicinity of Stewart Crossing.

5.7.4 Fuel and Hazardous Material Management

No explosives are expected to be used for the construction of the substations and the transmission line.

Yukon Energy will adhere to all of the Legislation and Regulations pertaining to the transportation, handling, storage and disposal of fuels and hazardous materials and require any and all contractors to do the same. In addition, the Yukon Energy EMS manual specifies Emergency Response procedures which include spill contingency plans and the storage and handling of hazardous materials (Yukon Energy, 2005). Yukon Energy has developed "Job Site Spill Contingency Plans, Reporting Procedures", which will be followed in all the construction activities (see Appendix 5.D).

The following Acts and Regulations along with Yukon Energy's best practices as outlined in their EMS Manual will be followed:

- Transportation of Dangerous Goods Act (Federal Government)
  - Transportation of Dangerous Goods Regulations (Federal Government)
- Yukon Environment Act (YG)
  - Dangerous Goods Transportation Regulations (YG)
  - Spill Regulations (YG)

5.8 WORK FORCE REQUIREMENTS (CONSTRUCTION PHASE)

Details on work force requirements are provided by construction activity below. Yukon Energy committed in the MOU with the NTFN to strive to avoid issues with final route construction and related land use, such as those experienced with the recent Mayo-Dawson Transmission Project construction. This commitment included the following provision:

- To employ or sponsor the NTFN employment of one or more project monitors whose duties, among other things, shall be to ensure on-site that the Project line, as it is constructed, is at all times located in compliance with the approved final route and access corridor and to bring forthwith to the attention of the NTFN and Yukon Energy for action any departure or proposed departure there from.

This provision will ensure a NTFN construction monitor be present during construction activities, including ROW flagging, brushing and clearing and line construction activities.

5.8.1 ROW Flagging

ROW flagging for Stage One is estimated to require approximately four to five weeks of effort using one crew, (based on flagging at 5 km/day or 25 km/week and allowing for some weather delay). Stage Two is estimated to require approximately five to six weeks of effort using one crew. With today's electronic design systems and digitized mapping, crews will be able to follow the mapped route with GPS units with a high degree of accuracy (+/- 0.5 m). Sensitive terrain areas that require hand clearing will be flagged prior to brushing and clearing (e.g. wetlands, riparian areas, and other sensitive terrains).

5.8.2 ROW Preparation

ROW clearing and access construction involves a variety of skill levels from the less technical job of piling brush for burning to more skilled jobs such as heavy equipment operators handling timber and road building machinery. The labour component is primarily for fallers and swampers to pile and burn waste wood in hand cleared areas only.

The MOU indicates that NTFN businesses will have the opportunity to provide, on a sole source basis, all route brushing and clearing services. It is yet to be determined how many brushing and clearing crews will be working simultaneously. For example for Stage One Carmacks to Pelly Crossing, one scenario may be as follows:

- a crew may start from Carmacks and work north;
- a second crew may start in Minto Landing and work south;
- a third crew may start from Pelly Crossing and work south to Minto Landing; and
- a fourth crew may work along the MS route from Minto Landing to the mine site.

If time becomes a severe constraint, there will likely be more crews working.

Each crew is anticipated to generally include a feller buncher operator to mechanically clear the growth, a bulldozer/excavator/skidder operator and three labourers to assist. Areas of slope, permafrost and wetlands require hand clearing which necessitates a larger workforce. Assuming four crews as outlined above, a preliminary sample list of potential workforce requirements is identified in Table 5.8-1. This is provided as an example only and does not necessarily represent actual brushing and clearing workforce requirements, which will be determined by the responsible contractor(s).

Table 5.8-1
Brushing and Clearing Workforce Requirements
Stage One: Carmacks to Pelly Crossing

Position	Function	Positions / Crew	Duration	Total # of positions
Feller buncher operator	Tree clearing	1	1.5 months	4
Bulldozer/excavator/skidder operator	Brushing	1	1.5 months	4
Chainsaw operators	Brushing	1	1.5 months	4
Labourers (fellers & swampers)	Brushing	2	1.5 months	8
Truck drivers	Brushing	1	1.5 months	2

5.8.3 Line Construction

The line construction workforce generally requires a higher level of skill sets, qualifications and experience. Table 5.8-2 outlines the requirements by main work activity:

Table 5.8-2
Line Construction Workforce

Work Activity	Skill, Qualification and Experience
Material handling	• Long haul truck drivers • Truck drivers experienced at driving on primitive roads in rough terrain and experienced in operating hiabs and handling poles. Must be experienced in the placing of material to the advantage of the installation crews with minimal supervision • General labourers as helpers, experienced in line hardware
Access & site preparation	• Surveyor, acting as sub-foreman, familiar with soils, transmission line structure staking and general line construction requirements • Heavy equipment operator, experienced in the requirements for providing access on a linear project • General labourer
Wood pole structure framing	• Lineman Supervisor, Journeyman • Lineman, Journeyman • Lineman, Apprentice • Equipment operator (backhoe, auger, crane, etc.) • General labourers
Wood pole and guy anchor installation	• Equipment operator (backhoe, auger, crane, etc.) • General labourers

Work Activity	Skill, Qualification and Experience
Wood pole setting/structure erection	• Lineman Supervisor, Journeyman • Lineman, Journeyman • Lineman, Apprentice • Equipment operator (backhoe, auger, crane, etc.) • General labourers
Conductor installation	• Lineman Supervisor, Journeyman • Lineman, Journeyman • Lineman, Apprentice • Equipment operator (backhoe, crane, etc.) • General labourers
Clean-up	• Equipment operator (backhoe or crawler tractor) • General labourer
Testing and commissioning	• Lineman, Journeyman • Technicians

(Source: Mayo-Dawson preliminary engineering and cost estimating document)

Stage One:

The first activity in line construction is to stake the exact locations for each pole structure. To final stake the estimated 500 to 600 structures between Carmacks and Pelly Crossing, one crew could complete this work in 25 to 30 days (using a rate of 20 structures/day/crew). To final stake the estimated 300 to 375 structures between Minto Landing and the Minto Mine Site, one crew could complete this work in 15 to 20 days (using a rate of 20 structures/day/crew). The project schedule allows a total of two months for this work due to weather delays during December and January.

The second activity is line construction which includes structure framing, structure setting and stringing of the line. It is estimated using a 30 to 40 person line crew, it may take 1 crew approximately 80 to 90 days (or 16 weeks) to build Stage One. It is anticipated a second crew will be required to complete the Minto Spur line segment. Each crew (framing, setting and stringing) will require an inspector in addition to an overall site project manager. The Project schedule allows a total of four months for this work to be completed. Final determination of workforce requirements will be made by the construction contractor hired to complete the work.

Stage Two:

Similarly, to final stake the estimated 600 pole structures between Pelly Crossing and Stewart Crossing, one crew could complete this work in 30+ days. The project schedule allows for a total of two months. Line construction is expected to be similar to Stage One, using a 30 to 40 person line crew. The work is expected to take approximately 60 days of construction (or 12 weeks) to build Stage Two. Each crew will require an inspector in addition to an overall site manager. The Project schedule allows a total of four months for this work to be completed to allow for weather delays and/or equipment failure. Final determination of workforce requirements will be made by the construction contractor hired to complete the work.

5.8.4 Substation Construction

Substation construction will be carried out in two parts – the civil and site preparation work and the highly technical electrical work. The site preparation component will entail labourers and heavy equipment operators, in addition to a foreman/engineer overseeing the work. Crew size is expected to be between five to ten people. This work will occur concurrently with ROW brushing and clearing and is estimated to take three months for each Stage. Assembly, construction and hook-up of the electrical components of the substations require highly skilled, technical expertise that will be contracted out to an electrical contractor experienced in building electric substations. These activities are scheduled to take three months for each Stage.

5.9 OPERATION AND MAINTENANCE PHASE

The operation and maintenance phase for the CS and MS developments will extend from the end of construction throughout the life of the relevant components of the Project.

- **Stage One operation (CS development from Carmacks to Pelly Crossing and the MS development)**: Stage One operation will begin when Stage One construction is completed (projected to occur in the third quarter of 2008). There is no timetable or plan for decommissioning of the CS Project component (see section 5.10). For the MS Project component, decommissioning for most elements is expected to depend on the economic life of the Minto Mine (expected operating period of about ten to more than thirteen years for most MS facilities - see section 5.10); some MS component elements on the east side of the Yukon River may operate on an ongoing basis, along with the CS component, to service residential and general service customers in the Minto Landing area.

- **Stage Two operation (CS development from Pelly Crossing to Stewart Crossing and connection of the WAF and MD grids):** Stage Two operation will begin when construction is completed (projected to occur at the earliest in the third quarter of 2009). There is no timetable or plan for decommissioning of the CS Project component (see section 5.10).

Operation and maintenance procedures will follow Yukon Energy's best practices as outlined in the EMS Manual (see Appendix 5.A).

5.9.1 Inspection & Maintenance of Facilities

Inspection of the transmission line will be done annually. This will involve inspection by vehicle, where there is road or trail access, and helicopters to fly remote sections of the line. The line patrols include checking for movement of structures, broken insulators, vandalism and other damage to the line. If urgent, the damage is fixed immediately; if not, the repairs are usually scheduled during summer and fall

(Yukon Energy, 2005). Ground inspection can be undertaken using light trucks, all terrain vehicles and snowmobiles. Hardware tightening is generally completed after the first year of operation. Non-scheduled patrols by air or ground may be conducted should unexpected repairs to the line be required.

Maintenance of the cleared ROW while the facilities remain will depend on height of tree growth and likelihood of danger trees coming in contact with the wires; clearing and brushing maintenance will likely recur every seven to ten years. Any required preventative substation maintenance will be performed on an annual basis. Additional monthly inspections are often performed on an as-needed basis.

5.9.2 Operation work force requirements

Transmission lines and substations are designed to operate continuously. Operation and maintenance of the lines and substations may generally be handled within Yukon Energy's present capabilities.

5.9.3 Fuel and Hazardous Material Management

Contractors working on location may have fuel delivered to location by bulk fuel suppliers. These fuels are stored in approved facilities and transported in approved vehicles for this purpose. It is anticipated that the majority of fuels and other hazardous substances will be stored at the Yukon Energy facilities in Whitehorse and Mayo. Any fuels and substances that Yukon Energy may store at these locations, on site, or transported to where it is needed will adhere to all of the Legislation and Regulations pertaining to the transportation, handling, storage and disposal of fuels and hazardous materials. Yukon Energy will require any and all contractors to do the same. In addition, Yukon Energy's EMS manual specifies Emergency Response procedures which include spill contingency plans and the storage and handling of hazardous materials (Appendix 5.A). Any spills related to fuels, construction equipment and substation equipment will follow spill contingency plans and reporting procedures for the specific material as outlined in the "Job Site Spill Contingency Plan, Reporting Procedures" (Appendix 5D).

The following Acts and Regulations along with Yukon Energy's best practices as outlined in their EMS Manual will be followed:

- Transportation of Dangerous Goods Act (Federal Government)
  - Transportation of Dangerous Goods Regulations (Federal Government)
- Yukon Environment Act (YG)
  - Dangerous Goods Transportation Regulations (YG)
  - Spill Regulations (YG)

5.9.4 Project-related Effects

<u>Noise:</u>

Most of any anticipated audible noise will be heard during clearing and construction activities. This will be no different than other activities such as road clearing and construction, wood cutting and general traffic (including the operation of ATVs and snowmobiles). Any noise temporarily generated during the construction phase will be limited to working hours.

Additional noise will come from the background noise of transmission lines and the substations. Small audible noise levels, generated by corona from the proposed 138 kV CS line, may be heard at the edge of the ROW as a slight hissing sound. The audible noise level from a transmission line will decrease by approximately three to four dBA for each doubling of the distance from the line (Wuskwatim, 2003). According to the U.S. Department of Agriculture, Rural Utilities Service, corona noise at voltages less than 230 kV is not very consequential (USDA, 2001).

There will be noise generated by the substations due to the presence of transformers, switches and circuit breakers. All substations are well-removed from noise-sensitive areas or human activity such as residential areas. Given that the location of the CS line is adjacent to an existing highway corridor; the MS line is adjacent to an existing and remote access road; and the substations are a distance from any noise-sensitive development; noise levels are not expected to be a concern.

Electrical and Magnetic Effects:

The PIP raises questions about electrical effects related to the Project.

Other recent environmental reviews of new transmission developments have included review of electrical effects issues. The following comments summarize analysis provided in Section 3.6.3 of the Environmental Impact Statement filed in April 2003 by Manitoba Hydro and Nisichawayasihk Cree Nation for the Wuskwatim Transmission Project.[2]

> EMFs are invisible lines of force surrounding any wire carrying electricity, and are produced by all electric tools and appliances, household wiring, and power lines. A transmission line produces an electric field, a magnetic field and corona. Corona and an electric field can cause electrical effects, the most common of which are radio interference, audible noise, and induction effects of nearby metallic objects.
>
> The strength of electric and magnetic fields depends on the voltage level and the amount of current flow, respectively. The fields around a transmission line fall off sharply with increasing distance from the line. Electric fields are easily blocked by vegetation, buildings and obstacles, while magnetic fields are unaffected by these types of objects.
>
> Many studies on electric and magnetic fields have been completed worldwide. Some studies have shown certain biological responses. Some have indicated a possible association between electric and magnetic fields and human health effects, while others have not. The general consensus of the worldwide scientific community is that a public health risk from exposure to these fields has not been established. Position statements adopted by federal and provincial health agencies express the same view. A recent health and EMF expert's consensus statement on human health effects of EMFs suggests that "*the weight of scientific evidence does not support the conclusion that extremely low frequency EMFs, such as those produced by power*

[2] The Wuskwatim Transmission Project involved 230 kV lines and related stations.

lines, are a cause of adverse effects on human health" (Manitoba Clean Environment Commission, March 2001). The consensus statement also states that *"research to date has not confirmed any biophysical mechanisms that would link properties of power and frequency fields to the initiation or promotion of cancer or any other adverse effects on human health"*.

While Yukon Energy is sensitive to public concerns regarding possible health effects from electric and magnetic fields, there is at present no scientific evidence to justify modification of existing practices or facilities for the transmission and distribution of electricity.

5.10 DECOMMISSIONING/ABANDONMENT/RECLAMATION PHASE

For the CS Project component, there is no timetable or plan for final disposition or decommissioning the Project facilities. The design life of the facility before substantial refurbishment is 50 to 100 years. This is so far into the future that it is not feasible today, based on available information and agreements, to provide meaningful assessment of likely plans or their effects for rehabilitating the operational components and related infrastructure of the Project at the end of operational life. When such plans need to be developed, Yukon Energy would submit these plans as then required for regulatory review and approval prior to its implementation. Accordingly, as reviewed in Chapter 3 (section 3.3.1), the Project Proposal does not provide any further assessment of the CS Project final disposition.

For the MS Project component, the timetable for final disposition or decommissioning of most components of the Project facilities (other than potentially the MS facilities located on the east side of the Yukon River) is dependant on the realized economic life of the Minto Mine. Currently, the operator of the mine estimates that the existing reserves and operation will facilitate an economic mine life of at least slightly more than seven years, and potentially more than about 10 years, and that some power would continue to be required for about four years thereafter before full decommissioning of mine facilities would occur[3]; based on these estimates, and the expected operation start dates for the mine (spring/summer 2007) and the MS facilities (fall 2008), decommissioning of the relevant MS facilities would be expected to occur potentially as soon as 2018 and as late as after 2021 (i.e., after ten to more than thirteen years of MS operation).

Anticipated decommissioning activities for the MS facilities are reviewed below.[4]

[3] As at August 28, 2006, Sherwood Copper announced an update to the Feasibility Study on the Minto Mine with an optimized mine plan with a mine life of 7.2 years after mine operation start (expected in spring/summer 2007); power loads for years 2 through 7 are forecast at 32.5 GWh/year, and at 3.4 GWh in the 8th year. Shut down activities with greatly reduced power loads (about 0.876 GWh/year) are forecast to be required for three years thereafter. Sherwood's stated objective is that resource definition drilling currently underway at Area 2 on the Minto property would result in the deferral of stock pile processing in Year 7, and continued processing of high grade material for several more years at grades similar to those projected for the first six years of operations. Stockpiled low grade material will also be available for processing in the future should economics warrant after processing of higher grade material has been completed.

[4] The following information on decommissioning activities has been adapted (and approved by Yukon Energy) from Manitoba Hydro's document: *Manitoba Hydro (1995) Fur, Feathers & Transmission Lines – Oji-Cree: How rights of way affect wildlife. Written by Robert P. Berger, Wildlife Resource Consulting Services MB Inc*

5.10.1 Decommissioning Transmission Towers / Poles

Decommissioning of conductor support poles/towers involves dismantling structures and the salvage or disposal of all steel and wood pole components. Decommissioning also involves the collection and salvage or disposal of conductor and counterpoise (ground wire).

Possible environmental concerns and regulatory requirements resulting from the decommissioning of poles/towers and ROW involve the following:

- Disposal of waste material
- Disposal of hazardous material
- Remediation of contaminated soils
- Proliferation of noxious weeds in ROW
- Maintenance of public safety
- Alteration of habitat

To ensure that the ROW is left in a state that will allow for future land use or natural re-growth of the indigenous vegetation the following steps will be taken:

a) All conductors, insulators, counterpoise and other material employed in transmission lines will be collected and removed from the ROW. Salvageable materials will be salvaged. Other materials will be collected and transported to an approved landfill site.
b) After materials have been removed, the ROW will be inspected to ensure that all materials have been retrieved and that the ROW will be left clean.
c) All tower foundation structures will be excavated and removed.
d) All holes or ruts created by foundation removal or ROW travel will be filled or graded. In agricultural land, at least 300 mm of topsoil should be spread on any excavation site.

5.10.2 Decommissioning Transmission ROW

In the event of decommissioning, an alternative use will be identified for the property. That use will determine many of the environmental measures that may have to be undertaken to convert a ROW to another use. The following measures will, nevertheless, be undertaken:

a) If required, the ROW will be graded, disked or ploughed to remove ruts caused by rubber-tired and tracked vehicles.
b) Where any grading, disking or ploughing is required, the disturbed area will be reseeded if the disturbed area is extensive and root zones have been disturbed.
c) Noxious weeds along a ROW in agricultural land will be ploughed or sprayed with an approved herbicide at the request of the land holder.
d) In forest or wooded areas, if the abandoned transmission line is not to be replaced by a new transmission line on the same ROW, the unused ROW will be allowed to re-vegetate naturally. Specific areas subject to erosion may be reseeded manually.

5.10.3 Decommissioning Access Roads / Trails

When an access road/trail is no longer required, it may be decommissioned if no other permitted use is identified. Some roads/trails can be simply left to naturally rehabilitate; however, most require some physical action prior to abandonment. Decommissioning involves the removal of any drainage structures, road material and any associated steps to minimize and control erosion. The following environmental practices should be considered:

a) The road/trail should be inspected prior to decommissioning to document areas of staining, stressed vegetation, debris, etc. Soil and ground water samples should be taken at suspect areas to delineate the extent of any contaminated areas.
b) Access road/trail ownership and management may be transferred to the adjacent landowner, First Nation, or the Crown. Often, these stakeholders will request that access roads/trails remain intact for public use. Yukon Energy will leave access roads/trails in a serviceable condition for future maintenance requirements. This may require partial obstruction of access to ROWs.
c) Natural regeneration of abandoned roads/trails should be considered wherever possible.
d) The road/trail and ditch should be graded to allow coverage of suitable material for natural vegetation regeneration.
e) Where possible, banks and approaches should be graded to match existing topography.
f) Removing culverts and crossings and breaking up the access road/trail allows natural drainage paths to be restored.
g) The entrance to the abandoned access road/trail may be suitably barricaded to prevent vehicle access.
h) Ongoing visual inspection is required to ensure adequate restoration and minimal environmental degradation.

5.10.4 Decommissioning Transmission Stream or River Crossings

Decommissioning transmission stream and river crossings requires the same sensitivity as constructing transmission lines in the vicinity of waterways and riparian habitat in order to mitigate against potential adverse environmental effects. As previously noted, Yukon Energy will follow DFO's Overhead Line Construction Pacific Region Operational Statement and Riparian Areas guideline included in Reference Material 5R-4 for all line construction activities in the vicinity of waterways and riparian habitat (see section 5.7.1.2)

Prior to decommissioning any transmission stream or river crossing, the Proponent will contact DFO to secure any needed permits and will provide information as required on how many times the watercourse will be crossed, types of vehicles to be used, timing of activities and other stipulated information. Yukon Energy will follow all requirements set out in any permits.

5.10.5 Decommissioning Substations

The MS substation is not anticipated to be decommissioned upon closure of the Minto Mine, as the facility is expected to continue to be used by the community of Minto Landing. If at some time in the future it is deemed necessary to decommission this substation, the following is indicative of the measures expected to be followed.

Decommissioning substations requires removal of the structures, equipment and gravel pad, the salvage of reusable materials and the disposal of all unusable materials. The site must then be remediated to accommodate future land use.

There are environmental concerns and regulatory requirements for the decommissioning of substations including:

- Disposal of conventional solid waste material
- Disposal of hazardous materials
- Remediation of contaminated soils
- Determining alternative uses of the site

Upon decision to decommission a substation, alternative uses of the site will be assessed and a preferred use determined.

a) All above ground and underground obstacles that could impede the future use or re-mediation of the site will be removed.
b) Electrical equipment and associated structures will be dismantled and salvaged. All unsalvageable material will be transported to an approved landfill site.
c) Footings and foundations will be removed to a depth of 2 m. Waste concrete will be removed to an approved landfill site.
d) Random samples of soil will be taken to determine levels of contamination for possible contaminants.
e) PCB contaminated soils (in accordance with Federal Department of the Environment Chlorobiphenyls Regulations, 1991) will be removed to an approved storage and/or disposal facility (transformers and equipment installed for this Project will not contain PCBs).
f) Removed soil will be replaced with uncontaminated material.
g) If the site reverts to a natural state, all surface granular materials will be removed from the site and replaced with clean uncontaminated fill.
h) Soil materials will be selected depending on the nature of the proposed use.
i) Depending on the extent of petroleum contamination in soils, remediation may involve in situ treatment, disposal to the local landfill, disposal at a licensed hazardous materials facility, or on-site soil reclamation. A careful investigation of contaminant parameters, future land use, site risks, and remedial technologies must be conducted prior to implementing a remediation plan.

6.0 DESCRIPTION OF EXISTING ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

This chapter provides analysis of the environmental and socio-economic baseline conditions without the Project, focusing on the following topics:

- Approach and Methodology
- Environmental Conditions
- Socio-economic Conditions

6.1 APPROACH AND METHODOLOGY

As reviewed in Chapter 3, the baseline analysis reviews current and evolving future VC conditions without the Project, as affected by past, current and other future projects included in the cumulative effects assessment (other than any future projects dependent on the Project).

The analysis focuses on VCs relevant, or necessary, to assess potential effects of the Project. It reflects the scoping of the assessment as set out generally in Chapter 3, including the following:

- The overall consideration of specific VCs within broad environmental and socio-economic component groupings consistent with YESAA and the YESAB Guides.
- Determination of VCs using the methods described in Section 3.3.1, focusing on only those environmental and socio-economic components that may potentially be affected by the Project after consideration of potential effects pathways linking the VC with Project activities during each phase (construction, operation or decommissioning).
- Temporal scoping for potential Project effects (e.g., time period for Stage One (2007-2008) and Stage Two (2008-2009) Project construction, and the operations period (after about 3rd quarter 2008 for Stage One); decommissioning is examined only for the MS development (assumed to occur as early as 2017).
- Geographic study area boundaries for potential Project effects (e.g., general Project Study Region Figure 2.2-1), the Route Study Area used for selecting Project routes[1], and the Site Study Area (ultimate ROW and footprint areas for the Project).
- Consideration of past, current and other future projects considered in the cumulative effects assessment (Section 3.4).

Sources of information used in describing the environmental and socio-economic conditions are referenced throughout the chapter and include:

[1] The Route Study Area is the area defined to guide the selection of a preferred route and Project Site Area for the Project. It consists of conceptual 500m wide study areas for the CS development route running generally along the Klondike Highway from Carmacks to Stewart Crossing and a similar conceptual study area for the MS development generally alongside the existing access road to the Minto Mine.

1. Public, government and other technical documents;
2. Published statistical information;
3. Project-specific field studies, including key-person interviews conducted for the socio-economic assessment;
4. Comments obtained during the public involvement consultation process (Chapter 4).

The assessment recognizes that the environmental and socio-economic condition is not static, but rather continuously evolving. Therefore, the examination of the environmental and socio-economic conditions considers not only present day characteristics, but also historical developments, as well as trends and plans that may influence their evolution in the future.

6.2 ENVIRONMENTAL CONDITIONS

This section provides a description of the environmental conditions of the Project Study Region without the Project and reflects the requirements of the Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submission (YESAB, 2005). The following biophysical environments are examined:

- **Physical Environment**: includes general physiography, surficial geology/soils, terrain hazards, and climate/air quality.
- **Terrestrial Environment**: includes vegetation, historic wildfires, and wildlife.
- **Aquatic Environment**: includes water resources (hydrology, water quality, hydrogeology) and aquatic ecosystems and resources (including fish and fish habitat).

This section generally focuses only on those components of the biophysical environment that are of particular concern in the region and that may potentially be affected by the Project.

Following the Assessor's Guide, at the initial stages of the assessment regional environmental issues of concern relevant to the Project were identified, along with Project-specific issues, in order to delineate and characterize VCs and associated Project effects. This analysis included consideration of potential sources of effects from the Project on the physical, terrestrial and aquatic biophysical environments (effects pathways).

For the biophysical environments, potential Project effects of construction, operation and decommissioning tend, in many instances, to be restricted to the Project Site Area footprint and areas in close proximity to this footprint. Mitigation measures to be adopted for the Project, including the route selection process, are also expected to minimize or prevent adverse effects in many instances, including such effects on the aquatic environment. In the case of terrestrial wildlife with natural habitat areas ranging throughout the Project Study Region as well as the Route Study Area, it will be relevant to consider potential Project effects on the overall regional population of specific species.

Table 6.2-1 provides a summary of environmental VCs considered for assessment of the Project.

Table 6.2-1
Environmental VCs Considered for Assessment of the Project

Valued Component (VC)	Identified by[1]:	Characterization of Effect
Environmental VCs: Physical Environment		
Sensitive Terrain: • **OZ-** organic-rich material with ice-rich permafrost • **OW**-organic-rich poorly drained material • **OWZ**- organic-rich, ice-rich and poorly drained areas • **OW:FA**-organic and/or silt, poorly drained and subject to regular flooding • **VS:R**-very steep slopes, mainly in colluvium covered bedrock or rock • **VS:G**-very steep slopes, in mainly gravely soil	FN, G, OP	Line cutting and operation of heavy equipment in sensitive terrain can remove soil fixing vegetation and may increase the likelihood of mass movement, localized erosion, and disturbance of soils. Disturbance of poorly drained soils may alter localized drainage path and cause soil erosion. Auguring and excavation activities, pole stabilization, travel along route and decommissioning may affect permafrost soils causing soil instability and erosion during construction, operations and decommissioning.
Air Quality	FN, OP	Equipment use affects local air quality during construction, operations and decommissioning. Reduced use of existing diesel generation plants will reduce emissions and effects to climate change.
Environmental VCs: Terrestrial Environment		
Vegetation	FN, G, OP	Project development will create and maintain cleared areas through different types of vegetation, including sections of natural boreal forest.
Rare Plants:	OP	Proposed route crosses areas where the potential for rare plants have been identified. Pole installation and access trail construction may disturb possible rare plant communities.

Valued Component (VC)	Identified by[1]:	Characterization of Effect
Environmental VCs: Terrestrial Environment (continued)		
Mule Deer	G, OP	A small portion of Mule deer habitat and food source will be removed where the transmission line crosses the Mule Deer Wildlife Key Area near Carmacks. Enduring access indirectly increases hunting.
Moose	FN, G, OP	Construction, maintenance and decommissioning may directly affect habitat and movement. Enduring access indirectly increases hunting.
Woodland Caribou (Tatchun & Ethel Lake herds)	FN, G, OP	Construction, maintenance and decommissioning may directly affect habitat and movement. Enduring access indirectly increases hunting.
Small Furbearing Mammals	FN, G, OP	Direct effect during construction, maintenance and decommissioning through line clearing and habitat disturbance. Indirect positive effects through habitat alteration.
Migratory Waterfowl	FN, G, OP	Direct effect during operation (potentially a hazard during migration periods).
Peregrine Falcon	G, OP	Construction of transmission line may affect hunting success and prey availability.
Environmental VCs: Aquatic Environment		
Riparian Zones and Wetlands (Yukon, Pelly and Stewart Rivers; Tatchun, McGregor, McCabe, Von Wilczek, Willow, Crooked, Big and Minto Creeks)	FN, G, OP	Proposed transmission line corridor, or construction activities will not occur within 30m of the high water level at any stream or stream crossing. No direct or indirect effects to water course or immediate riparian areas. Follow Department of Fisheries and Oceans guidelines for stream crossings. Construction, operation and decommissioning activities may affect wetlands areas.
Salmon and other Fish Species	FN, G, OP	Salmon and other fish species will not be affected due to absence of in-stream work.

[1] Identified by: **FN = First Nation, G = Government, OP = Other Public**

6.2.1 Physical Environment

This section considers the existing Physical Environment in the Project Study Region without the Project including general physiography, superficial geology/soil, terrain hazards and climate/air quality. Following the guidance provided in the Proponents Guide, the study area extends beyond the immediate footprint of the Project activities, where applicable for efficiency, and it is consistent with the area to be analyzed in the cumulative effects analysis. (YESAB, 2006)

6.2.1.1 General Physiography

The Project Study Region follows the existing Klondike Highway and Minto mine road access corridors and extends across a variety of landscapes. The Project Study Region is characterized as the Boreal Cordillera ecozone which is physiographically characterized by mountain ranges containing several high peaks, extensive plateaus, and intermontane planes (Lands Directorate, 1986).

The Project falls within the Yukon Plateau Central ecoregion and Northern Yukon Plateau ecoregion (Figure 6.2-1).

- The Yukon Plateau Central ecoregion covers terrain from Lake Laberge to Stewart River and is composed of groups of rolling hills and plateaus separated by deep, broad valleys (Yukon Ecoregions Working Group, 2004); the communities of Pelly Crossing and Carmacks are found in this ecoregion.
- The Yukon Plateau North ecoregion features rolling uplands, small mountain groups and level table lands dissected by deep-cut, broad and U-shaped valleys (Yukon Ecoregions Working Group, 2004). The communities of Stewart Crossing and Mayo fall within this ecoregion.

Figure 6.2-1
Terrestrial Ecozones and Ecoregions of the Yukon Territory

(Source: Government of Yukon, Department of Environment Geomatics)

The Route Study Area falls within the Yukon River Major Drainage Area which comprises approximately 66% of the Territory and is its largest drainage area. Draining into the Bering Sea via Alaska, the major tributaries to the Yukon River include the Stewart River and the Pelly River in the Project Study Region, as well as the Klondike River, the Donjek River and the White River. There are also many large lakes in the watershed outside the Project Study Region including Teslin Lake, Tagish Lake, Bennett Lake, Kluane Lake and Lake Laberge (Scudder, 1997).

6.2.1.2 Surficial Geology / Soils

Table 6.2-2 summarizes the various types of soils and terrain encountered along the Route Study Area.[2]

Table 6.2-2
Terrain Units along the Route Study Area

Classification / Map Symbol	Terrain Unit Description	Comments
Soils		
OZ	Organic-rich material with ice-rich permafrost	Possibly thicker than 4 metres. Gravel may be present at depth
OW	Organic-rich, poorly drained material	High water table. Gravel may be present at depth greater than 4 metres
OWZ	Organic-rich, ice-rich, and poorly drained areas	High silt and ice content. High water table. Gravel may be present at depth greater than 4 metres
OW:FA	Organic and/or silt, poorly drained, subject to regular flooding	High water table, flooding risk, proximity to stream.
OZ/G	Organic-rich material with ice-rich permafrost over gravel	Gravel may be present within 3 metres of surface
OW/G	Organic-rich, poorly drained material over gravel	High water table. Gravel may be present within 3 metres of the surface
OWZ/G	Organic-rich, ice-rich, and poorly drained areas over gravel	High silt and ice content. Gravel may be present within 3 metres of the surface
F	Fluvial silt and sand/gravel	Water table could be near surface
Gradient		
VS:G	Very steep slope, mainly in gravelly soil	Slopes are greater than 60%
VS:R	Very steep slope, mainly in colluvium-covered bedrock or rock	Slopes are greater than 60%
S:G	Steep slopes, mainly in gravelly soil	Slopes are greater than 40% and less than 60%
S:R	Steep slopes, mainly in colluvium-covered bedrock or rock	Slopes are greater than 40% and less than 60%
S:M	Steep slope in silty gravel, moraine	Slopes are greater than 40% and less than 60%
Water bodies		
ST	Stream/wetland: Creek bottom including steams and adjacent wetlands	Environmentally sensitive areas
RI	River	River
WET	Wetland, variable water table near or at surface, silt, organic, sand or gravel	Environmentally sensitive areas

[2] The locations of these terrain units and soil types are set out in Appendix 6A-1 and the Map Folio CD (Maps Series from Mougeot GeoAnalysis and ACG).

Terrain Modifiers: Modifiers that may be used as additional descriptors of terrain units	
(-K)	Thermokarst
(-S)	Slow Mass Movement
(-CL)	Colluvium and Landslide

(Source: Mougeot GeoAnalysis, 2001).

The landscape in the Project Study Region has been shaped by a combination of volcanic activity and glaciations. A broadly rolling till plain forms the dominant glacial landform and isolated pockets of fluvial and glaciofluvial sands and gravels, glaciolacustrine silts and organic deposits mantle the subdued till. The surface till in the Project Study Region is variable in color, moderately stony and has a silty, sandy matrix. Volcanic ash forms a veneer from 5 to 30 cm thick in various locations throughout the area. (Western Silver Corporation, 2005).

Processes of erosion and deposition have continued in the Project Study Region in post-glacial time. Colluvial materials are common to sloping ground in the region and are easily transported by gravity, while angular bedrock fragments with interstitial sand and silt are ever-present on ridge crests and upper and mid-slope positions in the area.

Fluvial erosion and lateral and vertical cutting through existing surface materials is an ongoing but generally imperceptible process that is usually most dynamic in steeper-gradient channels and where unstable bank material exists. This has resulted in the accumulation of fluvial sediments and organic materials on floodplains, fans and adjacent valley lowlands. Some areas of sloping terrain continue to be modified by rapid, mass movement processes such as landslides and debris flows.

Permafrost tends to occur on many north-facing slopes and where surficial deposits are overlain by a blanket of organic materials. In these areas, ground ice has been encountered at depths of 40 to 50 cm. (Western Silver Corporation, 2005).

Much of the Project Study Region is underlain by glacial till and glaciofluvial deposits left during the activities of the Pleistocene Epoch. These sediments are usually poorly sorted and unstable when they are found on a slope. High percentages of gravel and low silt content in the soil present at surface will increase the percolation of water through the ground and reduce the chance of soil liquefaction. Poorly drained, organic-rich soils (units OZ, OW, OWZ) can change stability over time and permit the formation of ice. Freeze-thaw processes can produce unstable conditions by opening voids in the soil.
The Preliminary Terrain Analysis maps identify a terrain class (S:R) described as colluvial-covered bedrock which consists of steep slopes with gravelly soils. Evidence of this type of terrain can be found on slopes opposite the town of Carmacks on the Northern bank of the Yukon River.

6.2.1.3 Terrain Hazards

Terrain hazards are naturally occurring geologic and geomorphic processes and unstable conditions that present a risk to life and property (Ryder and McClean, 1980). This may include hazards caused by mass movement processes such as landslides and debris flows, hazards related to permafrost and thermokarst, and hazards related to fluvial processes such as flooding or other catastrophic, natural phenomena. The Preliminary Terrain Analysis maps (Appendix 6A-1, Mougeot GeoAnalysis; Appendix 6A-2, Access

Consulting Group (ACG)) identify several potential hazards in the Route Study Area including thermokarst topography, slow mass movement and colluvium.

A large portion of the surficial geology in the Project Study Region consists of glaciofluvial sediments and discontinuous blankets of till (Jackson, L.E. Jr. 1997(a), (b) and (c)). Glaciofluvial material is material deposited by rivers flowing under a glacier, while glacial till is the unsorted mixture of coarse- and fine-grained material deposited by a glacier (United States Geological Survey, 2006). Where portions of the proposed route follow a major waterway or encounter a river bank, till and glaciofluvial deposits are frequently encountered on steep to very-steep, south-west facing slopes. Slopes can become more extreme and landslides may occur in close proximity to the Yukon, Stewart and Pelly Rivers due to incision by these major rivers over time. This may produce linear, exposed units that fall sub-parallel to the river valley. Wetlands, such as bogs, fens and swamp deposits tend to form in areas where the water table intersects the surface and there are finely-grained soils on gentle slopes or plateaus that allow the collection of surface water. These are typically some of the most productive habitats and plant producing areas within the Project Study Region.

Permafrost and thermokarst topography are typically found on north-facing slopes. Vegetation present in the area tends to be small with stubby, sparse tree cover. Permafrost units can become hazardous when disturbed by heavy equipment which causes exposed, frozen soil to melt and become very unstable. The vegetative covering provides an insulating blanket over these sensitive soils.

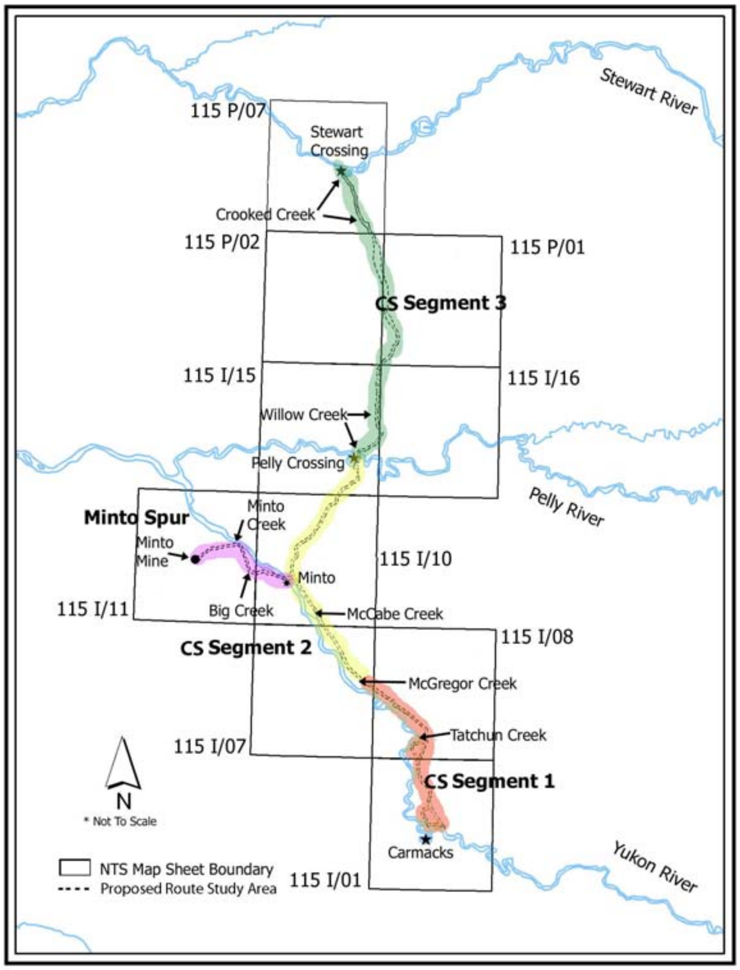
The MS Route Study Area follows the existing access road for the majority of its length. The route travels over material similar to that which has been described above. Prior to Big Creek, the majority of the route trends west, sub-parallel to the Yukon River, and falls on shallow-sloping floodplain regions. After Big Creek, the route trends north-west and as it approaches a crossing at Minto Creek it passes close to the Yukon River. At the Minto Creek crossing, the route bends to the west again and proceeds to the north of Minto Creek. The topography here is more steeply sloped as the route enters a narrow river valley where it is flanked by scree slopes on either side of Minto Creek.

Potential hazards near the Project Study Region were identified by air photo interpretation with terrain survey analysis provided by Mougeot GeoAnalysis (see maps in Appendix 6A-1). The assessment of terrain begins in the southern portion of the Project Study Region with an analysis of the terrain by Project Segments indicating the **National Topographic System** (**NTS**) Map Sheet numbers as outlined in Figure 6.2-2. While potential terrain hazards have been identified along most of the Route Study Area this does not imply that the entire route is impassable due to hazardous terrain. Almost all of the terrain hazards are either linear features or small localized features. There are also many gaps between the potential terrain hazards within which a transmission line can be located. Mougeot's (2000) preliminary terrain survey stated:

> "Reconnaissance level work along the highway corridor indicates that most of the terrain adjacent to the Klondike Highway is composed of well-drained gravely loam. In places, a thin silt to sandy silt veneer covers coarser material, and occasionally organic blankets up to 60 cm thick overlay these two units. Overall, the terrain and topography are suitable for the establishment of a power line corridor over most of the highway route."

Mougeot concludes by stating that "the review confirms that a 66 kV transmission line can be constructed and operated within the proposed corridor subject to minor refinements which will solve a few topographic, physical and terrain conflicts." A 66 kV transmission line would have similar ROW requirements to the proposed 138 kV transmission line.

Figure 6.2-2
NTS Map Sheet Areas for the Route Study Area



CS Line Segment 1: Carmacks to McGregor Creek

Table 6.2-3 below outlines the potential terrain hazards that are associated with Segment 1 of the CS transmission line Route Study Area. The most sensitive terrain locations include wetland and creek crossings in the Tantalus Butte area (map sheet 115I/01 (Appendix 6A-1 Map 6A-1-1 and Appendix 6A-2 Map 6A-2-1)) and the approach to and over Tatchun Creek which is characterized by colluvial deposits on steep slopes. Between Tantalus Butte and Tatchun Creek there are areas with potential terrain hazards on either side of the Klondike Highway. The most prominent terrain hazard is a long steep slope on the east side of the Klondike Highway just south of Yukon Crossing to McGregor Creek; however, there is sufficient space between the highway ROW and the slope to allow for the transmission line ROW. (Map sheet 115I/08 (Appendix 6A-1 Map 6A-1-2))

Regions where the proposed corridor intersects steep slopes show colluvium covered bedrock, and it is anticipated that colluvial deposits and landslide activity will occur in areas where a stream's cut-bank has eroded into hills producing slopes that exceed 30 degrees (or 60%) which consist of poorly consolidated soils of the type found in glaciofluvial sediments. However, there is sufficient space between the slopes or on the top of the slopes to place poles and span sensitive terrain areas where necessary.

The terrain analysis delineates steep to very-steep, gravelly slopes covering bedrock as the main terrain hazards present in the area north of Tatchun Creek on the east side of the Klondike Highway. Moving north-west, units of very-steep sloping colluvium-covered bedrock become interrupted by thin and strip-like trending steep slopes of gravel near where the proposed route crosses McGregor Creek. This section of the Route Study Area is characterized by long stretches of relatively flat terrain between the Klondike Highway ROW and the slopes to the east. This area has more than sufficient space for the CS transmission line ROW (Map sheet 115I/08 (Appendix 6A-1 Map 6A-1-2)).

Table 6.2-3
Potential Terrain Hazards for CS Line Segment 1 (Carmacks to McGregor Creek)

NTS Map Sheet	Location of Terrain Unit	Route Option	Terrain Unit (s)
115 I/ 01	1-3.5 km[1](Highway 4)	1B Tantalus West	S:G-ST
115 I/ 01	1.2-3.1 km[1]	1B Tantalus West	VS:R, S:R, S:R(-CL)
115 I/ 01	6.9-10.5 km[1]	NA	OW, VS:R, S:R, VS:R-VS, S:G
115 I/ 01	10.5- 13.1 km[1]	NA	OW, S:G
115 I/ 01	16.2-17.7 km[1]	NA	OW, S:M
115 I/ 08	1.5 km[2] south	2B Tatchun Creek West	OW
115 I/ 08	0.2-1.2 km[2] south	2B Tatchun Creek West	VS:G
115 I/ 08	NA	2A Tatchun Creek East	OW, S:M, OW/G, VS:G
115 I/ 08	0.4-5.6 km[2] north	NA	VS:G, OW:G
115 I/ 08	6.9-10.4 km[2] north	NA	OW, S:M, OWZ(-K):G, VS:R
115 I/ 08 and 115 I/07	10.3-20.6 km[2] north	NA	VS:G, S:M, VS:R

[1] Approximate location, measurements are taken starting from the intersection of the Klondike Highway and Highway 4.
[2] Approximate location, measurements are taken starting from Tatchun Creek crossing on the Klondike Highway.

CS Line Segment 2: McGregor Creek to Pelly Crossing

Table 6.2-4 below outlines the potential terrain hazards that are associated with Line Segment 2 of the CS transmission line Route Study Area. Preliminary Terrain Survey Map 115I/07 (Appendix 6A-1 Map 6A-1-3) delineates steep to very-steep, gravelly slopes covering bedrock as the main terrain hazards present beginning immediately north of McGregor Creek. This continues in three long sections up to a point adjacent to Minto Landing. Preliminary Terrain Survey Map 115I/10 (Appendix 6A-1 Map 6A-1-4) delineates surficial geology which is mainly very steep, gravely slopes with colluvium-covered bedrock. Units of north by north-west trending, very steeply sloped gravel and colluvium-covered bedrock are found to the north of the Route Study Area along the south-west facing hillside for approximately 7 km. There is a unit of high water table and poor drainage to the east of the Project Study Region where the route bends to the north-east. The Route Study Area also crosses a unit of very steeply sloped gravel at this location.

Where the Route Study Area nears Von Wilczek Creek, an area of scattered wetland contains organic-rich, ice-rich and poorly drained soil. This area is about 1 km north along the corridor from the north-east bend, and Preliminary Terrain Survey Map 115I/10 (Appendix 6A Map 6A-1-4) indicates that units around this area have gravel at depth. There are units of organic-rich and poorly drained material opposite the Von Wilczek Lakes with small streams on the east side of the proposed corridor. The majority of the potential terrain hazards associated with this section of the Route Study Area are on the east side of the Highway. Units of very steeply sloping, colluvium-covered rock and bedrock are found to the west of the Route Study Area at this location. Organic-rich and poorly drained areas with high water table and high silt and ice content are most prevalent on the north shore of the northern most Von Wilczek Lake. On the west side of the Route Study Area there are very steep, colluvium-covered rock and bedrock. Moving from the Von Wilczek Lakes to the northern edge of the map sheet there are scattered units of organic-rich and poorly drained material along the corridor, with the water table near the surface.

Preliminary Terrain Survey Map 115I/15 (Appendix 6A-1 Map 6A-1-5) delineates scattered units of fluvial material and units of colluvium-covered rock or bedrock, on steep slopes in and around wetland and lake environments. The units appear to become more gravel-rich around Six Mile Lake, where organic-rich, poorly drained soils with gravel at depth occur more regularly. Terrain analysis maps, created by Mougeot, depict organic-rich and ice-rich soils with gravel within 3 metres of the surface approximately 5 km south of Pelly Crossing along the Route Study Area.

As the Project proceeds towards, and travels through the town of Pelly Crossing (Route Option through Pelly) both the Mougeot terrain analysis and ACG terrain analysis delineate fluvial and organic-rich, poorly drained materials. Route Option Pelly West encounters units of organic-rich, ice-rich and poorly drained areas including areas of permafrost followed by steep slopes in both gravelly soils and colluvium covered bedrock in the area north of Willow Creek. Route Option Pelly East would encounter very steep slopes in gravelly soil south of the Pelly River, as well as a small area of organic-rich material with ice-rich and poorly drained soils north of the Pelly Airfield.

Table 6.2-4
Potential Terrain Hazards for CS Line Segment 2 (McGregor Creek to Pelly Crossing)

NTS Map Sheet	Location of Terrain Unit	Route Option	Terrain Unit (s)
115 I/ 07	0-9.1 km[3] north	NA	VS:R, VS:G-OW, VS:G, S:G
115 I/07 & 115 I/10	9.1-17.3 km[3] north	NA	VS:R-VS:G
115 I/10	17.3-19.1 km[3] north	NA	S:G, VS:G, S:M
115 I/10	19.1-25.3 km[3] north	NA	VS:R
115 I/10	25.3-27.2 km[3] north	NA	VS:G
115 I/10	28.6-31 km[3] north	NA	VS:G, OW
115 I/10	31.2-37.3 km[3] north	NA	OWZ/G, OW, OW-ST, OW/G
115 I/10	38.4-40.3 km[3] north	NA	VS:R
115 I/10	40.3-43.2 km[3] north	NA	OW, OWZ
115 I/10	44.1-48.3 km[3] north	NA	OWZ. OW/G, VS:R, OW
115 I/15	48.3-53.4 km[3] north	NA	OW/G, OWZ, OWZ/G
115 I/15	55-57.9 km[3] north	3B through Pelly	S:G, OW
115 I/15	55-57.9 km[3] north	Pelly West	S:R, OZ/G, OWZ/G, S:G
115 I/15	55-57.9 km[3] north	Pelly East	OWZ, VS:G, S:G

[3] Approximate location measurements are taken starting from the North side of the McGregor Creek crossing on the Klondike Highway.

CS Line Segment 3: Pelly Crossing to Stewart Crossing

Table 6.2-5 below outlines the potential terrain hazards that are associated with Line Segment 3 of the CS transmission line Route Study Area. Preliminary Terrain Survey Map 115I/15 (Appendix 6A-1 Map 6A-1-5) delineates scattered units of poorly drained, organic-rich and potentially ice-rich soils occurring around 3 to 4 km north of Pelly Crossing. To the north, there are units of organic-rich, poorly drained material with gravel present at depth. These units appear to follow river banks and surround surface water bodies. Willow Creek, a long linear feature west of the Klondike Highway from Pelly Crossing to a location just south of Jackfish Lake, is a significant wetland area (CPAWS, 2005).

Much of Preliminary Terrain Survey Map 115I/16 (Appendix 6A-1 Map 6A-1-6) and Preliminary Terrain Survey Map 115I/15 (Appendix 6A-2 Map 6A-2-2) delineates units of organic-rich material with permafrost over gravel present west of the Route Study Area. Organic-rich and/or silt-rich areas subject to regular flooding are present to the east, running sub-parallel to the corridor for the majority of the route depicted on this map sheet. West of the proposed corridor and opposite Diamain Lake, there are patches of organic-rich and poorly drained material with gravel present around 3 metres from the surface. At the northern extent of the corridor on this sheet there is a large area of organic-rich, poorly drained material with high silt and ice content and a potentially high water table.

Preliminary Terrain Survey Map 115P/01 (Appendix 6A-1 Map 6A-1-7) delineates a linear unit of organic-rich material with ice-rich permafrost and possibly some gravel at depth, east of the Route Study Area and running sub-parallel to the route. West of the route and north of the Selkirk First Nation Settlement Parcel on Preliminary Terrain Survey Map 115P/01 (Appendix 6A-1 Map 6A-1-7), there are patchy wetlands underlain with organic material with ice-rich permafrost. To the north of the westerly situated wetlands, surface material becomes more gravelled, steeply sloping, and rockier with some colluvium-covered bedrock and rock units indicated. West of the route in Preliminary Terrain Survey Map 115P/02 (Appendix 6A-1 Map 6A-1-8) there are regions of organic–rich, gravelly soils with permafrost and poor drainage around several small bodies of water. To the west of the Project Study Region, slopes appear to be gentler than those to the east. Units occurring around surface water display poor drainage and ice-rich permafrost over gravel. Gravel in these areas could be present within 3 metres of the surface. There are units of steeply sloping, gravelly soils in the northern portions of this map sheet area to the east of the Route Study Area.

Beginning in the south of Preliminary Terrain Survey Map 115P/07 (Appendix 6A-1 Map 6A-1-9), there are units of steeply sloped gravel present to the east and west of the Project Study Region, within the edges of the Route Study Area. Units of organic–rich, poorly drained soil with ice-rich permafrost are found in units to the north of Crooked Creek.

Proceeding north into Stewart Crossing, the Project passes through an area of shallowly sloping topography. Mougeot terrain analysis indicates units of organic-rich and poorly drained soils to the east and west of the Route Study Area with evidence of thermokarst activity. There are scattered wetlands throughout the areas to the south of town. Areas with gravel present within 3 metres of the surface tend to be found at the headwaters of creeks. These units are indicated as being rich in organics and can sometimes have permafrost.

Linear units of steeply gravelled material follow the route from its southern extent on this map sheet area into Stewart Crossing. These units intersect with the Route Study Area twice at approximately 2 km and 1 km south of the Stewart Crossing Bridge. At Stewart Crossing, there is a large flood plain which comprises much of the southern bank of the Stewart River. The Stewart River shows evidence of organic-rich, poorly drained material with gravel present at depth. Areas in close proximity to the Stewart River are subject to regular flooding.

Table 6.2-5
Potential Terrain Hazards for Line CS Segment 3 (Pelly Crossing to Stewart Crossing)

NTS Map Sheet	Location of Terrain Unit	Route Option	Terrain Unit (s)
115 I/15	0-22.4 km[4] north	NA	OW-ST
115 I/15	0-1.9 km[4] north	NA	S:G
115 I/15	5.5-10.4 km[4] north	NA	OWZ, OWG, OZ/G, OW, SG
115 I/15	11.6-18 km[4] north	NA	OW/G, OZ/G-OW, OZ/G
115 I/15 and 119 P/01	18-23.9 km[4] north	NA	OWZ/G-S:G
115 P/01	23.9-27 km[4] north	NA	OZ-OWZ/G
115 P/01	27.7-29.3 km[4] north	NA	OZ/G
115 P/01	30.2-34.5 km[4] north	NA	OZ, OZ/G, OWZ/G
115 P/01	34.5-42.3 km[4] north	NA	OWZ/G, OW/G, OZ/G, OWZ, VS:G, VS:R, OW, WZ(-K)
115 P/01	41.1-54 km[4] north	NA	OZ/G-WET
115 P/01	47.9-52.6 km[4] north	NA	S:G, OWZ
115 P/07	53-58.7 km[4] north	NA	S:G, OW-ST, OWZ, OWZ-WET
115 P/07	58.7-66.2 km[4] north	NA	OZ/G, OWZ(-K)-WET, S:G, OWZ
115 P/07	66.2-70 km[4] north	NA	OW, S:G, OW:FA, OW:FA-WET

[4] Approximate location, measurements are taken starting from the north side of the Pelly River on the Klondike Highway.

Minto Spur Line Segment

Table 6.2-6 below outlines the potential terrain hazards that are associated with the Minto Spur Segment of the Route Study Area. Proceeding west, away from the CS Route Study Area and towards the MS Route Study Area, Preliminary Terrain Survey Map 1151/10 and 115I/11 (Appendix 6A-2 Map 6A-2-3) delineates a unit of steeply sloping terrain which consists of mainly colluvial material that covers bedrock lying opposite Minto Landing on the South bank of the Yukon River. The proposed MS Route Study Area intersects this unit of terrain at this location. As the MS Route Study Area proceeds west, the above noted unit runs into a unit of steeply sloping terrain consisting of mainly gravelly soils. The area between the Yukon River and the MS Route Study Area contains units of colluvium. The proposed route along the Minto Mine access road travels over flood plain regions on the south side of the Yukon River

Units of fluvial material are found at the location of the proposed Big Creek crossing. These sedimentary units are noted for approximately 1 km in the upstream and downstream direction from the crossing point. Additional units of fluvial sediments are noted at a location about 2 km northwest from the Big Creek crossing in the MS Route Study Area. This area is also a wetland area (noted as ST on the Terrain Map (Appendix 6A-2, Map 6A-2-3), and stretches between this additional unit of fluvial sediments to the Minto Creek area. On the north side of the bridge across Big Creek the contours indicate a narrower flood plain with the creek bed and surrounding area consisting of fluvial silt and sand/gravel.

Units of steeply sloping terrain are noted to the south of the MS Route Study Area and less than 500 metres before the Minto Creek crossing. These units are mainly in colluvial-covered bedrock or rock. At this location fluvial material is found between the road and the Yukon River. Steep slopes, mainly in gravelly soils, are noted on both sides of the road about 1 kilometre west from the Minto Creek crossing. There is also a small section of steep slope in silty gravel, Moraine west of the Minto Creek crossing. The Minto Creek valley is characterized by areas of permafrost on north facing slopes (Minto Explorations Limited and Hallam Knight Piésold Ltd., 1995).

ACG terrain analysis notes a large unit of steeply sloping material, mainly in colluvial-covered bedrock, which lies to the south of the access road and Route Study Area for approximately 4 km. This unit stretches across the access road and Route Study Area and continues towards the north; the unit continues to occur in the Route Study Area for approximately 2-3 kilometres east of the camp.

Table 6.2-6
Potential Terrain Hazards for the Minto Spur Line Segment

NTS Map Sheet	Location of Terrain Unit	Route Option	Terrain Unit (s)
115 I/10 and 115 I/11	0-3.2 km[5]	NA	S:R, S:G,
115 I/10 and 115 I/11	7.2-7.9 km[5] (Big Creek)	NA	F
115 I/10 and 115 I/11	9.6-10.5 km[5]	NA	F, -ST
115 I/10 and 115 I/11	14.3-15.8 km[5] (near Minto Creek)	NA	F, S:R, -ST
115 I/10 and 115 I/11	15.8-17.5km[5]	NA	S:G, S:M
115 I/10 and 115 I/11	17.5-24.4 km[5]	NA	S:R,

[5] Approximate location measurements are taken starting from the west side of the Yukon River on the Minto Mine access road.

6.2.1.4 Climate and Air Quality

Yukon has a sub-arctic climate featuring cold, dark winters and summers with mild, long, sunny days. When data from Whitehorse and Mayo is taken into consideration, the monthly mean temperature distribution varies between -28.6° C and 14.8° C. The summer mean temperature is about 12° C, while the winter mean is approximately -19°C. The region is relatively dry year-round with total precipitation ranging from 250 mm in valleys to 600 mm in the mountains. While there is more precipitation in winter than in summer, the average depth of winter snow is only 50-70 cm, much lower than many parts of southern Canada (Government of Yukon, 2005).

<u>Project Area Climate</u>

There is no long-term meteorological station located in the Route Study Area. Since the climate in this area is similar to the climate in the Whitehorse and Mayo areas, data from the Whitehorse and Mayo meteorological stations (available since 1971) has been used in this section.

The Whitehorse Airport station is located at latitude 60º 42' N, longitude 135º 4' W and at an elevation of 706.20 m. The Mayo Airport station is located at latitude 63º 37' N, longitude 135º 52' W and at an elevation of 503.80 m (Environment Canada, 2004(a)). The communities of Carmacks and Pelly Crossing are located between these two airport stations: Carmacks is located at latitude 62º 06' N, longitude 136º 18' W and at an elevation of 525 m (Indian and Northern Affairs Canada, 2006(a)) and Pelly Crossing is located at latitude 62º 49' N, longitude 136º 54' W and at an elevation of 454.2 m (Indian and Northern Affairs Canada, 2006(a)). Environment Canada has recently installed a meteorological station at Carmacks, but there is no data available for providing averages, means and extremes prior to 1999.

The three tables set out in Reference Materials 6R-1 provide a detailed breakdown of the average climate data for Whitehorse and Mayo over a twenty-nine year period. These tables provide an overview of the anticipated climate conditions over a twelve month cycle.

The data that has been recorded at the Town of Carmacks indicates annual temperatures that may climb as high as 6º C in January and 35º C in June and fall to -57.8º C in January and -1.1 in July. The greatest single rainfall recorded was 31.4 mm while the greatest single snowfall recorded was 23 cm on February 25, 1987. The greatest recorded snow depth to accumulate was 28 cm in December 1990. The mean daily temperature remains below 0º C from October through February. It may be predicted that sub-zero temperatures will occur later in the spring; however, historic mean daily temperature data for those months was not available from Environment Canada (Yukon Executive Council Bureau of Statistics, 1997).

For Whitehorse, the data indicates that the temperature may climb as high as 9º C in January and as high as 34.4º in June. The temperature can fall to -0.5º C in July and as low as -52.2º C in January. The largest single rainfall recorded was 44.9 mm, while the greatest single snowfall recorded was 27.2 cm. The greatest snow depth recorded was 94 cm. The winds average 12.7 km/h and generally blow in a SE direction. Maximum sustained winds have been recorded at 72 km/h with gusts reaching 106 km/h (Environment Canada, 2004). The mean daily temperature in the area remains below 0º C from October 18 through to April 15 for 179 days of winter (Yukon Executive Council Bureau of Statistics, 1997).

At Mayo Airport, the data indicates that the temperature may climb to 10.1º C in January and 36.1º in June. The temperature may fall to lows of -2.8º C in July and -62.2º C in February. The largest single rainfall was 31.8 mm, while the greatest single snowfall was 35.6 cm. The greatest snow depth recorded was 117 cm. The winds average 6.6 km/h and generally blow in a N direction. Maximum sustained winds have been recorded at 72 km/h with gusts reaching 126 km/h (Environment Canada, 2004). In the Mayo area, the mean daily temperature remains below 0º C from October 8 through to April 17 for 191 days of winter (Yukon Executive Council Bureau of Statistics, 1997).

<u>Climate Change</u>

Most climate scientists have concluded that global temperatures are rising and that warming in the past 50 years has been accelerated by human activities that release greenhouse gases into the atmosphere. (Government of Yukon Climate Change Strategy, 2006)

The effects of climate change are becoming more apparent in the Yukon and throughout the circumpolar north. In Yukon, it is predicted that climate change will result in a moderate warming of the average annual temperature by 2º C to 3º C by the mid-twenty first century in the Yukon Interior, as compared with average temperature recorded from 1970-2000 (Natural Resources Canada, 2006(a)). This moderate warming may be accompanied by more snow in the winter as well as a greater number of severe storms in both winter and summer, which include heavy summer rainfall and more intense thunder and lightning. (Yukon Government, 1999) The warmer temperatures will have an impact on the discontinuous permafrost in the Route Study Area, and as the permafrost thaws, slopes will become less stable and sloughing and settlement of the ground surface will occur (Natural Resources Canada, 2006(b)). This process will also occur where trees and brush are removed, causing changes at the micro-climate level. The effects of climate change will impact on both the biophysical environment and the socio-economic environment and may threaten the structural integrity of buildings and highway infrastructure as well as impact on traditional ways of life, damage heritage sites and increase the risks, costs and impacts of forest fires. (Government of Yukon Climate Change Strategy, 2006 at p. 1)

The Government of Yukon has recently published a Climate Change Strategy which sets out key goals and strategies with regard to developing a response to climate change in Yukon. This strategy includes a consideration of climate change goals and measures to reduce the levels of greenhouse gas emissions in Yukon. This includes undertaking actions to stabilize concentrations of greenhouse gases in the atmosphere by reducing the volume of greenhouse gases discharged. The Climate Change Strategy states that one means of accomplishing this goal is to increase energy efficiency, shift from high carbon to low carbon fuels and increase the use of renewable energy sources. (Government of Yukon Climate Change Strategy, 2006 at p.2)

The Government of Yukon strategy on climate change suggests that greenhouse gas emissions in Yukon may be reduced in the short term through making improvements in efficiency and undertaking measures related to infrastructure replacement which will provide long term benefits, including the development of alternatives to diesel for electricity generation in Yukon (Government of Yukon Climate Change Strategy, 2006 at p. 7).

Air Quality

Since there are fewer industrial activities and smaller dispersed populations, air quality in the Project Study Region is very good compared to southern towns and cities across Canada. The primary source of current air emissions in this region is vehicle traffic on the North Klondike Highway; traffic levels and consequent emissions tend to increase during summer tourist season. Home heating (oil and woodstoves) in the communities also contributes to air emissions, but in amounts relative to a very small population base.

Both Carmacks and Stewart Crossing are connected to an existing power supply grid. The Village of Carmacks is supplied by the WAF transmission line, while Stewart Crossing is connected to the MD Transmission Line.

There is a small diesel generation facility (installed capacity 975 kW) in Pelly Crossing, which contributes to local air emissions (such as carbon monoxide, carbon dioxide, and nitrogen oxides). Historically, the peak has not exceeded 445 kW (personal communication, YECL, July 27, 2006). Generation over the past five years in Pelly Crossing was approximately 2.08 million kW.h/year with a fuel consumption of about 563,000 litres/year. Generators currently in use at the Pelly Crossing facility include: a Caterpillar® (model 3406), a Caterpillar® (model 3412) and a Detroit Diesel (model S-60 D-deck). Each Caterpillar® generator set provides approximately 400 kW of power, and the Detroit Diesel model makes up the remaining installed power.

YECL operates 12 diesel fuelled generation plants which had a net generation of 22 GWh/yr in 2004 and which are estimated by YECL to produce 16,480 tonnes of CO_2 in that year[3] (YECL website, 2006).

New mines in the Project Study Region are also planned to use on-site diesel generation until such time as the Project can deliver grid power supplies:

- **Minto Mine**: At least three Caterpillar 3516 diesel generators are planned at the site with a continuous rating of 1600 kW per generator. Annual power generation is projected currently at 24.6 GW.h in the first 12 months of operation (starting in spring/summer 2007) and at 32.5 GW.h when full production levels occur (i.e., for at least the following six years of operation).
- **Carmacks Copper Mine**: Based on earlier feasibility studies, over 9 MW of diesel generation capacity would be needed at this site during production, with annual power loads of about 48 GW.h. The earliest possible production would be in 3rd quarter of 2008; mine life has been estimated at about 8 years.

The Minto mine at full production anticipates utilizing 32.5 GWh of electrical energy in a year; using diesel generators this power load would require about eight to nine million litres diesel fuel per year. Based on an average production of 2.73 kg/l of CO_2 for diesel fuel (Environment Canada, 2002) the total output of CO_2 would be approximately 23, 000 tonnes per year. This is almost one and a half times the amount of CO_2 produced by all of YECL's diesel generators in one year. If Carmacks Copper Mine goes into production, the CO_2 emissions from that mine would be about 1.5 times those of Minto mine.

In the past, the availability of grid power has created benefits in terms of cleaner energy options for communities and for industrial operations that has helped to reduce CO_2 emissions and greenhouse gases. Past development of the Mayo Dawson transmission line contributed to a reduction in CO_2 production through making grid power available and allowing 15 GWhs/yr of diesel generation to be retired.

In addition to CO_2 gases, Nitrogen Oxides (NOx) are a group of highly reactive gases composed of varying amounts of nitrogen and oxygen (United States Environmental Protection Agency, 2006). Examples of typical NOx emissions include emissions produced from automobile use, electrical utilities and other industrial, commercial and residential sources that burn fuels. A typical "uncontrolled" diesel

[3] This includes Watson Lake and smaller isolated diesel served communities served by YECL (including Pelly Crossing).

generator set is expected to release 10 – 14 grams of NOx per horsepower depending on the unit's horsepower rating (Houston Advanced Research Center, 2003). Appendix 6B illustrates a summary of estimated emissions for a typical diesel generation facility, similar to those in use in Pelly Crossing, or what may be used at Minto mine or Carmacks Copper mine.

The Annual Yukon Development Corporation Progress Reports describe the results of efforts taken to reduce greenhouse gas in operations across the Territory. This represents the contributions by the Yukon Territory to a national effort to reduce the production of greenhouse gasses across Canada. According to the 2005 Yukon Development Corporation Progress Report, the total greenhouse gas emissions released for 2004 were as follows: 1,288,814,545 g of CO_2, 2,732 g CH_4 and 5,920 g of N_2O (Yukon Development Corporation, 2005). Since these emissions are only measured by the Yukon Territorial Government in Whitehorse and at industrial sites, specific levels of emissions for the some of the communities along the Route Study Area are not known.

6.2.2 Terrestrial Environment

This section considers the existing Terrestrial Environment in the Project Study Region, focusing on vegetation, incidence of historic wildfires, and wildlife found in the Project Study Region.

6.2.2.1 Vegetation

Most of the Route Study Area falls within the Yukon Plateau (Central) Ecoregion; only the final approximately 20 km of the CS line in the Stewart Crossing area fall within the Yukon Plateau (North) Ecoregion. The vegetation along the Route Study Area is shown on the Vegetation Maps (Appendix 6C)[4].

The very dry south-facing and west-facing slopes that support extensive grassland communities are notable features of the Yukon Plateau (Central) Ecoregion. These steep, grassland slopes sometimes extend from the valley floor to the alpine. Typical species of these grasslands are sagewort, rose, juniper, kinnikinnick and a number of grasses.

Lodgepole pine often invade burnt over areas, but are in competition with deciduous trees (such as aspen) on moist to wet sites. Mixed deciduous and coniferous forests exist in areas where fire has not occurred for many years. The tree canopy may include lodgepole pine and trembling aspen, with white spruce slowly prevailing in the understory overtime. These areas may include a shrub layer of willow, alder, highbush cranberry, wild rose, and Labrador tea. Bog blueberry, red bearberry, crowberry and lingonberry may also occur. A continuous moss layer, dominated by feathermoss with some sphagnum moss is present.

Black spruce forests are prevalent on undisturbed, colder, north-facing slopes with permafrost. The communities are dominated by black spruce have an understory of scrub, willow, Labrador tea, birch, willow, and shrubby cinquefoil. These are also areas where bog blueberry, crowberry, read bearberry, cloud berry, and lousewort can occur. There is usually extensive moss cover in these areas, typically dominated by sphagnum moss and feathermoss.

[4] These are a series of seven maps which include forest cover and potential locations for rare plants and are based on NTS map sheet numbers. For consistency and brevity, these maps will be referred to as Vegetation Maps.

Aspen grows on sites with finer soils on steep south-facing slopes. Typically, as the soil quality becomes poorer, the understory in such areas becomes less dense. Where favourable conditions exist, willow, wild rose, Labrador tea, and soapberry are often present. Groundcover is comprised of variable amounts of lingonberry, kinnikinnick and moss.

Environment Yukon's Conservation Data Centre prepared a short list of rare plant species possibly occurring in this region, which are summarized by Table 6.2-7. The list includes grassland, wetland and forest edge species.

Table 6.2-7
Potential Rare Plants in the Project Study Region

Family	Species	Common Name	Habitat	Rarity Ranking
Polypodiaceae	*Polypodium sibiricum*	wall fern	forest edge	G5 S1
Ruppiacea	*Ruppia spiralis*	ditch grass	wetland	G5 S3
Alismataceae	*Saggitaria cuneata*	arrowhead	wetland	G5 S2
Poaceae	*Koeleria asiatica*	June grass	grassland	G4 S2
Poaceae	*Koelaria macrantha*	June grass	grassland	G5 S2
Poaceae	*Muhlenbergia richardsonis*	mat muhly	grassland	G5 S2
Poaceae	*Scolochloa festucaceae*	sprangletop	wetland	G5 S1
Poaceae	*Glyceria borealis*	northern manna grass	wetland	G5 S3
Poaceae	*Helictotrichon hookeri*	spike oat	grassland	G5 S2
Cyperaceae	*Carex viridula* ssp. *viridula*	green sedge	wetland	G5 S2
Cyperaceae	*Trichophorum pumilum*	tufted bulrush	wetland	G4 S2
Iridacea	*Sisyrinchium montanum*	blue-eyed grass	grassland	G5 S2
Orchidaceae	*Cypripedium guttatum*	spotted lady's-slipper	forest edge	G5 S2
Hydrophyllaceae	*Phacelia mollis*	scorpion weed	grassland	G3 S2
Apiaceae	*Cicuta maculata* var. *angustifolia*	spotted water-hemlock	wetland	G5 S2
Apiceae	*Sium suave*	water-parsnip	wetland	G5 S2
Santalaceae	*Comandra umbellata*	pale comandra	grassland	G4 S2
Violaceae	*Viola langsdorfii*	Alaska violet	forest edge	G4 S3
Caryophyllaceae	*Silene williamsii*	campion	talus slope	G5 S2
Rosaceae	*Rosa woodsii*	western rose	grassland	G5 S2
Rosaceae	*Geum triflorum*	prairiesmoke	forest edge	G5 S1
Asteraceae	*Haplopappus macleanii*	haplopappus	grassland	G2 S2
Asteraceae	*Antennaria microphylla*	rosy pussytoes	grassland	G5 S2
Asteraceae	*Artemisia laciniata*	wormwood	grassland	G5 S1

Table 6.2-7 Notes:

Global Rankings

G1	Critically imperilled globally
G2	Imperilled globally
G3	Either very rare and local throughout its range or found locally in a restricted range
G4	Apparently secure globally
G5	Demonstrably secure globally

Regional Rankings

S1	Critically imperilled in territory because of extreme rarity or because of some factors making it especially vulnerable to extirpation from the territory (1-6 locations)
S2	Imperilled in territory because of its rarity or because of some factors making it very vulnerable to extirpation from the territory (7-20 locations)
S3	Rare or uncommon in the territory (21-100 locations)
S4	Apparently secure in the territory, with many occurrences (100+ locations)
S5	Demonstrably secure in the territory, with many occurrences

(Source: B.A. Bennett on behalf of NatureServe Yukon - June 9, 2006)

Several sites along the Route Study Area were identified through air photo interpretation as having the potential for rare plant occurrences (Vegetation Maps – Appendix 6C). In the Project Site Area these locations include wetlands (14 potential sites), creek crossings (4 potential sites) and grassland areas (5 potential sites).

There is limited forest cover in the Route Study Area. The Vegetation Maps located in Appendix 6B are used to provide only approximate values of types of vegetative cover in the Route Study Area. Using mapping tools and measuring the areas of vegetative cover for the Route Study Area delineated on the Vegetation Maps, the following provides rough estimates which suggest percentages of the forest cover types for the Route Study Area:

- 54% forest cover
- 36% not sufficiently regenerated from forest fires
- 6% non-productive
- 4% wetlands

Estimated Volume Potential Maps produced by Yukon Forest Management Branch (Maps 6-1 and 6-2 on Map Folio CD) for the CS transmission line suggest that the majority of the area has either low timber potential, or has not recovered from forest fires. Yukon Forest Management Branch is unable to provide information with regard to forest cover where Category A and Category B Settlement Lands are located, thus where the Route Study Area intersects Category A or Category B Settlement Lands there is no available information with regard to timber potential (with the exception of knowledge on recently burnt areas). The Yukon Forest Management Branch maps suggest that approximately six percent of the Route Study Area has medium timber potential, while only three percent has high timber potential.

CS Line Segment 1: Carmacks to McGregor Creek

According to rough estimates taken from the Vegetation Maps (Appendix 6C) there are 21 km of forested land, 10 km of non-productive land and 0.5 km of wetland in the Route Study Area in CS Line Segment 1 extending from Carmacks to McGregor Creek.

While much of the area around Carmacks is comprised of forest cover, the vicinity around Tantalus Butte has some non-productive land. Vegetation Maps (Appendix 6C) delineate one small area of rare plant potential in the vicinity of Tantalus Butte and near the Yukon River, and another small area of rare plant potential intersected by the Route Study Area east of Tantalus Butte and just north of the Carmacks airfield. Estimated Volume Potential Maps (Maps 6-1 and 6-2 on Map Folio CD) also delineate that the area north of Carmacks airfield has some low greenwood volume potential.

North of the Tantalus Butte area the Estimated Volume Potential Map (Map 6-1 on Map Folio CD) notes areas of medium greenwood potential with three small areas of high greenwood potential located east of the Klondike Highway and within the Route Study Area. As the Route Study Area nears Tatchun Creek[5], the estimated volume potential map (Map 6-1 on Map Folio CD) delineates areas of mostly low and medium greenwood potential in the Route Study Area, as well as areas of non-productive land. At Tatchun Creek there are three small areas of high greenwood potential south of the Klondike Highway as it bends to the east in the vicinity of Tatchun Creek and east of the highway as it bends north, which are delineated on the Estimated Volume Potential Map before the Route Study Area intersects settlement land on the north side of Tatchun Creek (Map 6-1 on Map Folio CD). There is no data available with regard to estimated volume potential once the route intersects settlement land.

Where the route proceeds through the Tatchun Creek area it also intersects various small creek crossings. In this area there is a cluster of four sites where rare plants may potentially be found, located mostly in creek crossing areas. As the route proceeds north from Tatchun there is an area of wetland located outside the Route Study Area. From Tatchun to McGregor Creek the Route Study Area is comprised mostly of forest cover with some small areas of non-productive land. Between Tatchun and McGregor Creek, Vegetation Maps 115 I/07 and /08 (Appendix 6C, Map 6C-2) indicate two areas where rare plants may be located.

Estimated Volume Potential Maps (Maps 6-1 and 6-2 on Map Folio CD) indicate that as the Route Study Area emerges from settlement land and continues northwest towards McGregor Creek it intersects mostly medium and low volume potential greenwood and some areas of non-productive land. As the route approaches McGregor Creek there are three areas of high volume potential greenwood located east of the Klondike Highway.

CS Line Segment 2: McGregor Creek to Pelly Crossing

According to rough estimates taken from the Vegetation Maps (Appendix 6C) there are 22 km of forest cover, 0.5 km of lake or river, 1 km of wetland and 34 km of not sufficiently regenerated land in the

[5] Tatchun Creek, on some maps, may also be referred to as the Tatchun River.

Route Study Area (resulting from the 1995 forest fire near Pelly Crossing) in CS Line Segment 2 extending from McGregor Creek to Pelly Crossing.

McGregor Creek to Lhutsaw

In the immediate vicinity of the McGregor Creek crossing there are areas of mostly low and medium volume greenwood potential. Vegetation Map 115 I/07 and /08 (Appendix 6C Map 6C-2), delineates two areas within the Route Study Area from McGregor Creek to Minto Landing where rare plants may be found. Although the area around McGregor Creek is mainly forested, starting four miles north of this location, and continuing north towards Minto, most of the Route Study Area crosses through non-productive land with some isolated pockets of low and/or medium greenwood volume potential. The Route Study Area intersects settlement land at McCabe Creek and no further greenwood volume potential data is available for most of the areas from this location until the route passes the Minto area (see Estimated Volume Potential Maps 6-1 and 6-2 on Map Folio CD).

It is recognized that a large proportion of the area around Minto Landing is not sufficiently regenerated from previous forest fire activity. As the route proceeds directly north just past Minto Airfield, there is an area where rare plants may be found on the eastern edge of the Route Study Area in the vicinity of Von Wilczek Creek.

Lhutsaw Wetland Protection Area

Vegetation Map 115I/10 (Appendix 6C Map 6C-3) delineates that as the Route Study Area proceeds from Minto north-east towards Six Mile Lake it passes the Lhutsaw Wetland Habitat Protection Area and intersects land that is mostly not sufficiently regenerated from past forest fire activity. There are two areas of wetland located east of the Route Study Area as it approaches the Lhutsaw Wetland Habitat Protection Area[6]. West of these two wetland areas and within the Route Study Area there is an area where rare plants may potentially be found; Vegetation Map 115 I/10 (Appendix 6C Map 6C-3) indicates another area where rare plants may be found in the Route Study Area west of the Lhutsaw Wetland Habitat Protection area as the route proceeds north-east towards Six Mile Lake.

As the Route Study Area exits settlement land and proceeds towards the north-east extent of the Lhutsaw Wetland Habitat Protection Area, it intersects mainly forest cover that may be characterized as mostly non-productive land with low greenwood volume potential. (see Estimated Volume Potential Maps 6-1 and 6-2 on Map Folio CD).

In the vicinity of No Name Lake and Six Mile Lake, Vegetation Maps delineate two areas where rare plants may be located and which partially fall within the Route Study Area (Vegetation Map 115I/15 and 115I/16 (Appendix 6C Map 6C-5)). As the Route Study Area proceeds north towards Pelly Crossing there is an area where rare plants may be located one kilometre to the east of the Route Study Area (Vegetation Map 115 I/15 and 115I/16 (Appendix 6C Map 6C-5)).

[6] Listed in the Yukon Gazetteer as Von Wilczek Lakes, but locally referred to, and designated as a habitat protection area as Lhutsaw Wetland.

Six Mile Lake to Pelly Crossing

Approximately one to two kilometres from Pelly Crossing, Vegetation Map 115I/15 and 115I/16, (Appendix 6C Map 6C-5) indicates an area of wetland east of the Route Study Area which runs parallel to the Pelly River. At a creek crossing between one and two kilometres south from where the route crosses the Pelly River there is an area where rare plants may be located. Just after crossing Pelly River, there is another area with potential rare plants to the northwest of the Route Study Area (Vegetation Map 115I/15 and 115I/16 (Appendix 6C Map 6C-5)). The Route Study Area re-enters settlement land again just before Pelly Crossing and in the area of Pelly Crossing no further information on estimated greenwood volume potential is available.

CS Line Segment 3: Pelly Crossing to Stewart Crossing

According to rough estimates taken from the Vegetation Maps (Appendix 6C) there are 53 km of forest cover, 8 km of not sufficiently regenerated land, 5 km of wetland and 3 km of non-productive land in the Route Study Area in CS Line Segment 3 extending from Pelly Crossing to Stewart Crossing.

Starting from Pelly Crossing the Route enters into settlement land and data on greenwood volume potential is unavailable. Where the Route Study Area emerges from settlement land, there are isolated pockets of low volume greenwood potential (see Map 6-2 on Map Folio CD).

From Pelly Crossing to Stewart Crossing the Route Study Area crosses through mostly forest cover. Approximately five kilometres from Pelly Crossing the Route Study Area intersects an area of not sufficiently regenerated land. The route proceeds through this area for roughly three kilometres, before proceeding north towards Stewart Crossing through mostly forest cover. Vegetation Map 115I/15 and 115I/16 (Appendix 6C Map 6C-5) delineates that the Route Study Area crosses an area of wetland for about one kilometre. In this area of wetland cover, there are two areas where the Route Study Area intersects locations where rare plants may be found. These are indicated at the northern extent of Vegetation Map 115I/15 and 115I/16 (Appendix 6C Map 6C-5).

As the Route Study Area proceeds north towards Stewart Crossing it intersects mostly forested area; however, Vegetation Map 115I/15 and I/16, (Appendix 6C Map 6C-5) indicates that the route will cross some wetland areas which extend from the west of Diamain Lake, into the Route Study Area, running parallel to the Route Study Area as it proceeds North toward Stewart Crossing. North of this wetland location, Vegetation Map, 115P/01 and 115P/02 (Appendix 6C Map 6C-6) notes a large area of wetland that is located mostly to the west of the Route Study Area. This same Vegetation Map indicates seven small locations where rare plants may be found that are intersected by the Route Study Area as it runs north towards Stewart Crossing.

Vegetation Map 115P/07 (Appendix 6C Map 6C-7) indicates that the Route Study Area crosses mainly forest cover as it approaches Stewart Crossing; however it does cross a small pocket of not sufficiently regenerated area near North Crooked Creek. The Route Study Area also intersects two areas of non-productive land. There are two areas where rare plants may be found in the vicinity of Stewart Crossing located on the western edge of the Route Study Area on the south side of the Stewart River.

Estimated Volume Potential Maps (Maps 6-1 and 6-2 on Map Folio CD) indicate some areas of high volume greenwood potential on the eastern side of the Route Study Area and east of the Klondike Highway where it runs parallel to Crooked Creek. Proceeding north towards Stewart Crossing the Route Study Area passes through mostly non-productive land and areas of low volume greenwood potential, with two smaller areas of medium volume greenwood potential. At Stewart Crossing there is an area of high volume greenwood potential west of the Klondike Highway.

Minto Spur Line

Those areas around Minto Landing that are not covered by settlement land are comprised of mostly non-productive land (Map 6-1 on Map Folio CD). According to rough estimates taken from Vegetation Map 115I/11 (Appendix 6C Map 6C-4) there are 27 km not sufficiently regenerated land, 5 km of forest cover and 1 km of wetland in the Minto Spur Route Study Area.

While, most of the MS Route Study Area crosses through not sufficiently regenerated land, there is a large area of forest cover west of the Klondike Highway and south of the MS Route Study Area. There is also a small area of forest cover where the MS Route Study Area intersects the Yukon River. As the MS Route Study Area proceeds west there is another small area of forest cover in the vicinity of Big Creek. There is also an area of wetland around Big Creek and another area of wetland where Minto Creek intersects the MS Route Study Area near the Yukon River. Vegetation Maps 115I/10 (Appendix 6C Map 6C-3) and 115I/11 (Appendix 6C Map 6C-4) indicate no potential for rare plants in or near the MS Route Study Area.

6.2.2.2 Historic Wildfires In Project Study Region

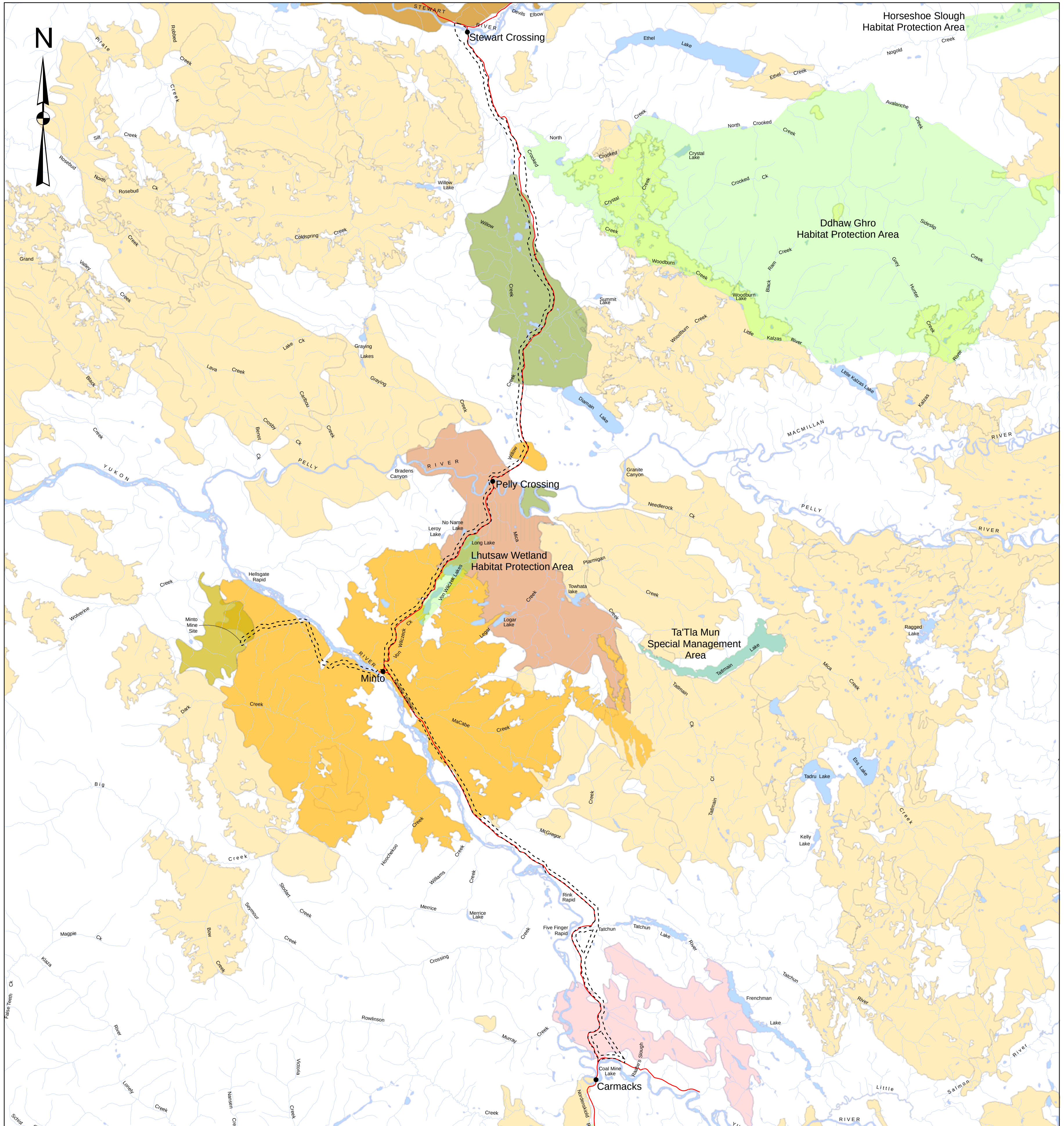
Several wildfires have occurred in the area both surrounding and intersecting the proposed transmission line routes. Figure 6.2-3 presents a map of the burned areas.[7] The following list describes the year the fires occurred, the locations of the fires and the total hectares burned:

- The earliest fire noted occurred in 1950 around the northern shores of Diamain Lake; the burned area extends to the north on both sides of the Klondike Highway for 25,897 hectares (63,992 acres). It is intersected by the proposed CS route.
- In 1951, a fire was recorded near Stewart Crossing and a burned area of 40,178 hectares (99,280 acres) lies mainly on the north side of the Stewart River. The proposed route extends to within 250 metres of the burned area but does not intersect it.
- A 1958 fire occurred north of Carmacks with a burn area of 25,402 hectares (62,770 acres), extending to the east of the proposed corridor; it is intersected by the CS route.
- In 1969, a fire burned an area of 44,174 hectares (109,154 acres) on both sides of the Klondike Highway between Lhutsaw Wetland Habitat Protection Area up to just north-west of Pelly Crossing. The burned region is oriented in a northwest-southeast direction. The CS route crosses through this 1969 burn.

[7] Source: Yukon Fire History Data acquired from Wildland Fire Management, Protective Services Branch, Government of Yukon, December 2005.

- In 1980, a fire burned a 7,236 hectare (17880 acre) area west of Minto Creek and south of the Yukon River. This area surrounds the Minto Mine site.
- In 1983, a 3,048 hectare (7530 acre) fire occurred west of the Yukon River, and approximately 11 kilometres south by south-east of Minto Landing.
- In 1995, three fires were recorded for the Project Study Region. A 1,194 hectare (2950 acre) fire burned across the Klondike Highway and the proposed transmission corridor north of Pelly Crossing. A 55,521 hectare (137,193 acre) area south of Minto Landing and a 58,852 hectare (145,423 acre) area east of the Yukon River in the same region were also burned in 1995. The CS Route Study Area crosses through this Minto Burn area from north of McGregor Creek all the way to the Lhutsaw Wetland Habitat Protection area; and the MS Route Study Area crosses through the Minto Burn area west of the Yukon River for the majority of its length.

Figure 6.2-3
Fire History for Project Study Region



Carmacks-Stewart/ Minto Spur Transmission Project

YUKON ENERGY

Legend

- Town
- Route Study Area
- Road
- Water Course
- Water Body
- Parks and Protected Areas

Areas Impacted by Fire (by Year)

- 1950
- 1951
- 1958
- 1969
- 1980
- 1995
- Other Fire Years

Digital Data Source:

Yukon Fire History Data aquired from Wildland Fire Management, Protective Services Branch, Government of Yukon December 2005.

Parks and Protected Areas data downloaded (January 2006) from Yukon Department of Environment website: http://environmentyukon.gov.yk.ca/geomatics/govdata.html Source: Geomatics, Environment, Yukon Government

Route study area obtained from YEC, 2006.

NTS Sheets 115I, 115P, 105L, 105M
UTM Zone 8 NAD83

Fire History

Scale: 1:275,000
(when plotted at 24"x28", orginal map on cd provided with final document)

0 2.5 5 10 15 20 25 km

Drawn By: HD
Checked By: DC/NL
Date: August 2006

InterGroup Consultants
ACCESS Consulting Group

6.2.2.3 Wildlife

There are a wide variety of habitats for a large number of mammals, migratory and other birds, and fish in Yukon. This section reviews **Wildlife Key Areas** (**WKAs**) in the Project Study Region, and non-aquatic wildlife VCs under the following headings:

- **Large Mammals** (mule deer, moose, woodland caribou, mountain sheep, grizzly bear, wood bison)
- **Small Furbearing Mammals**
- **Migratory Waterfowl**
- **Raptors**
- **Other MS development wildlife**

Mammals present in Yukon are divided into carnivores, hoofed mammals, rodents and other animals.

- Carnivores may be described as any mammal whose primary food source is the tissue of other animals. Carnivores found throughout the Yukon include arctic and red foxes; black, grizzly and polar bears; coyotes; fishers; lynx; martens; mink; river otters; weasels and wolverines.
- The hoofed mammals group includes caribou, elk, moose, mountain goats, mule deer, muskox, thin-horn sheep and wood bison.
- The Yukon Government Department of the Environment indicates that rodents present in the territory include beavers; least chipmunks; lemmings; deer mice and jumping mice; hoary marmots; wood rats; arctic, ground, northern and red squirrels; voles and woodchucks.
- The category of other mammals includes little brown bats, snowshoe hares, collared pikas, seals, and shrews.

<u>(WKA's)</u>

WKA's are known, important habitats for primarily avian and terrestrial wildlife species indigenous to the region. The data base has not been upgraded for some time (Personal communication, Environment Yukon, July 10, 2006) and key areas are subject to revision as new information is made available. The definition of WKA's is consequently an expanding and continuing work in progress. Tables 6.2-8 to 6.2-11 provide a brief description of the species in the Project Study Region, and further details on the WKA's listed can be found in Reference Materials 6R-3. Figure 6.2-4 presents a map of WKA's.

Table 6.2-8
Wildlife Key Areas in the Project Study Region
CS Line Segment 1: Carmacks to McGregor Creek

WKA #	Species	Season	Function	Source	General Location
1088	Mule Deer	winter (Oct-Apr)	range	anecdotal	Carmacks
1925	Bison	year round	all functions	anecdotal	Carmacks
1347	Bald Eagle	summer(Jun-Aug)	reproduction (birth, nest)	field survey[2] (May 31, 1991)	Carmacks
1347	Golden Eagle	summer (Jun-Aug)	reproduction (birth, nest)	field survey[2] (May 31, 1991)	Carmacks
1936	Woodland Caribou	winter (Oct-Apr)	range	field survey[2] (Nov. 22, 1994)	Tatchun River
1926	Bison	year round	all functions	anecdotal	Tatchun Lake
1348	Bald Eagle	summer (Jun-Aug)	reproduction (birth, nest)	field survey[2] (May 31, 1991)	Tatchun Lake

Table 6.2-9
Wildlife Key Areas in the Project Study Region
CS Line Segment 2: McGregor Creek to Pelly Crossing

WKA #	Species	Season	Function	Source	General Location
1900	Duck[1]	fall (Aug-Oct)	stage	field survey[2] (Mar. 20, 1994)	Von Wilczek Lakes
1900	Duck[1]	summer (Jun-Aug)	moult	field survey[2] (Mar. 20, 1994)	Von Wilczek Lakes
1900	Duck[1]	summer (Jun-Aug)	reproduction (birth, nest)	field survey[2] (Mar. 20, 1994)	Von Wilczek Lakes
1350	Alpine Raptor	summer (Jun-Aug)	reproduction (birth, nest	field survey[2] (Nov. 12, 1990)	McCabe Creek
1345	Riparian Raptor	summer (Jun-Aug)	reproduction (birth, nest)	field survey[2] (Nov. 12, 1990)	Legar Lake
1344	Golden Eagle	summer (Jun-Aug)	reproduction (birth, nest)	field survey[2] (May 31, 1991)	Hoochekoo Creek

Table 6.2-10
Wildlife Key Areas in the Project Study Region
CS Line Segment 3: Pelly Crossing to Stewart Crossing

WKA #	Species	Season	Function	Source	General Location
987 and 988	Duck[1]	fall (Aug-Oct)	stage	field survey[2] (Apr. 1, 1991)	Willow Creek
987 and 988	Duck[1]	spring (Apr-Jun)	stage	field survey[2] (Apr. 1, 1991)	Willow Creek
1934	Woodland Caribou	winter (Oct-Apr)	range	field survey[2] (Nov. 22, 1994)	Ethel Lake
104	Black Bear	spring (Apr-Jun)	range	anecdotal	Stewart Crossing

Table 6.2-11
Wildlife Key Areas in the Project Study Region
Minto Spur Line Segment

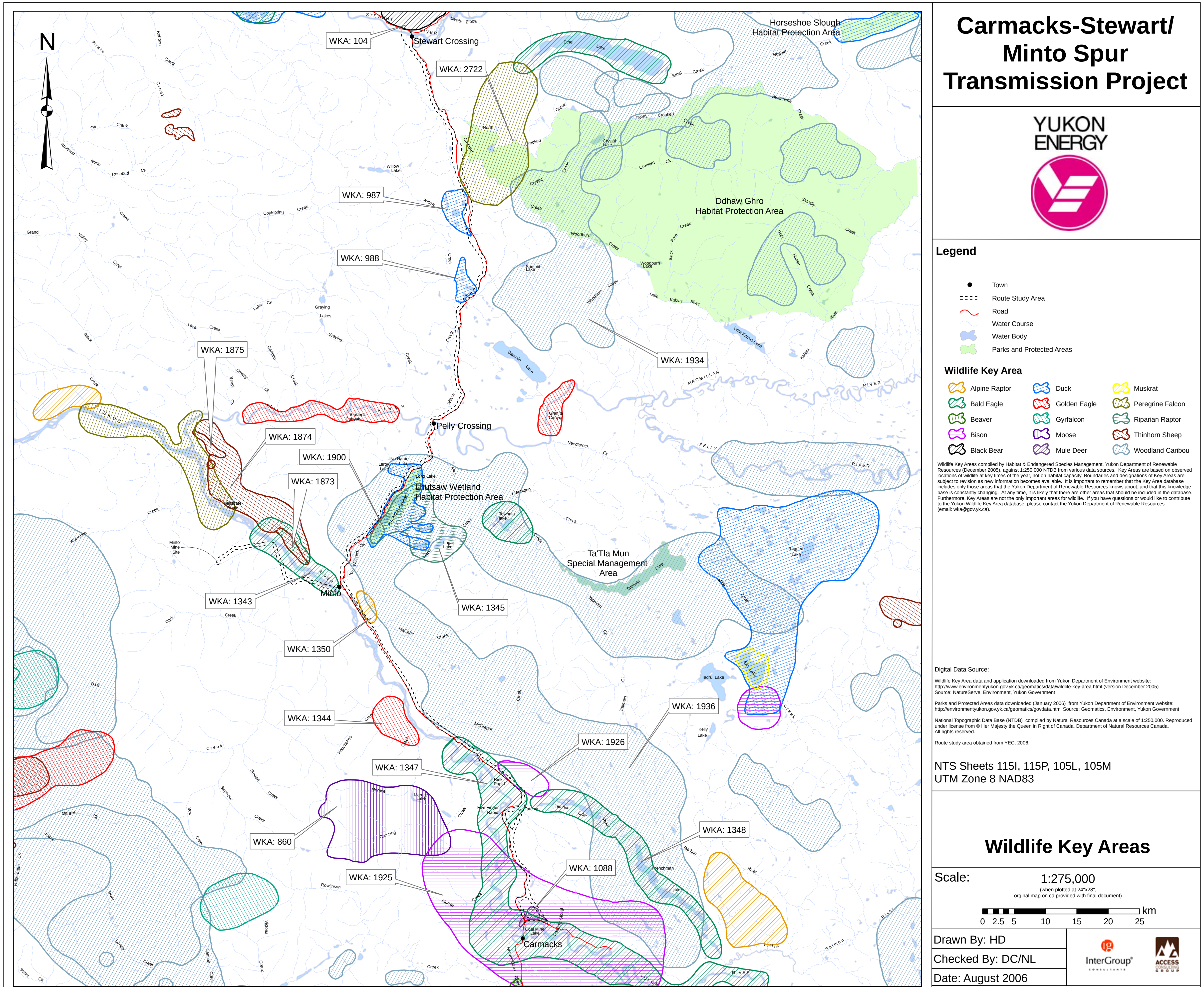
WKA #	Species	Season	Function	Source	General Location
1343	Bald Eagle	summer (Jun-Aug)	reproduction (birth, nest)	field survey[2] (May 31, 1991)	Minto
1343	Golden Eagle	summer (Jun-Aug)	reproduction (birth, nest)	field survey[2] (May 31, 1991)	Minto
1343	Peregrine Falcon	summer (Jun-Aug)	reproduction (birth, nest)	field survey[2] (May 31, 1991)	Minto

1 Species description as described in Yukon Wildlife Key Areas – Summary of Wildlife Values. No further species detail breakdown is currently available from the Habitat and Endangered Species Management Section, Department of Environment, Government of Yukon.

2 Field Survey Data - Habitat and Endangered Species Management Section, Department of Environment, Government of Yukon

(Source: Yukon Wildlife Key Area Application, July 10, 2006)

Figure 6.2-4 Wildlife Key Areas Map for Project Study Region



Large Mammals

A definition regarding what constitutes a large or small mammal is relative to the sample area. Examples of large mammals found in the Project Study Region are grizzly bear, moose, mountain sheep, mule deer, wood bison and woodland caribou. Both herbivorous and carnivorous large animals are indicators of ecosystem health. Large predators are usually top predators and depend upon the success of species lower on the food chain. Large herbivores provide food for a number of large predators and the remains of these kills provide smaller carnivores and scavengers with sustenance.

Each of the above mentioned Large Mammals is described in detail below. Details noted are general habitat, **Committee on the Status of Endangered Wildlife in Canada** (**COSEWIC**) status (COSEWIC, 2006) and some key regional notes and available survey information.

Mule Deer:

- COSEWIC status: No entry
- Yukon Wildlife Act status: Specially Protected (at risk in the Yukon but not elsewhere)

Mule deer can be found in the southern Yukon, as far north as the Pelly River; their populations also extend to the east as far north as the Ross River. Mule deer frequent mountainous terrain, open woodlands and grassy areas broken by dense stands of aspen. Habitats must contain an adequate supply of plant food combined with an escape route into moderately thick tree cover. Mule deer summer at higher elevations and winter in lower, less snowy areas.

Referring to the Wildlife Key Areas Map, Figure 6.2-4, mule deer populations (WKA 1088) may be found at the southern extent of the proposed Route Study Area, just north of Carmacks.

Empirical population and demographic information on mule deer is virtually non-existent. M. Hoefs(2001), provides a considered guess of 500 to 800 mule deer in suitable habitats in the southern Yukon. Despite their Yukon Species-at-Risk status, the Government of Yukon, with approval of the Game Management Board, has implemented a limited hunt for ten male mule deer for the 2006 hunting season.

WKA 1088, located on the south slope of Tantalus Butte, is the only such notation in proximity to the Project. The small area indicated is misleading, and mule deer are known to range at least as far as the mouth of Little Salmon River (Grant Lortie, personal observation, June 2001) and as far north as Minto Landing (Grant Lortie, personal observation, July 2003). At lower density they are known to range as far north as Stewart Crossing (Hoefs, 2001).

Further, occasional mule deer observation along the Free Gold Road, west of the Yukon River in the Murray Creek area, (Personal communication, Environment Yukon, July 28, 2006) reveals their populations may extend, sporadically, as far west as Upper Big Creek near Prospectors Mountain (P. Percival, personal. communication., July 15, 2006). These range extensions do not imply a continuous distribution, but suggest an increasing population expanding into suitable pockets of habitat.

Moose:

- COSEWIC status: not at risk
- Yukon Wildlife Act status: not at risk

Moose inhabit the entire Yukon, but are most numerous in the south. Yukon Fish and Wildlife Branch estimate that, "approximately 65,000 to 70,000 moose live within the boundaries of the Yukon Territory (Environment Yukon, 2006). Moose in the Yukon can be found at treeline, in shrub areas and sub-alpine environments. Moose can also be found in marshy regions and along the edge of slow flowing rivers.

Moose occupy the entire Project Study Region at average densities (approximately 150/1000 sq km) east of the Klondike Highway, and at below average densities west of the highway (40-145/1000 sq km).

Survey Area 17 (Carmacks West) last surveyed in 2003:

- Density: 40/1000 sq km
- Population Trend: unknown
- Population Estimate: 215

Survey Area 23 (Pelly River) last surveyed in 2000:

- Density: 150/1000 sq km
- Population Trend: stable to increasing
- Population Estimate: 3062

Survey Area 28 (Lower Stewart River) last surveyed 2001:

- Density 115/1000 sq km
- Population Trend: Stable
- Population Estimate: 653

Survey Area 29 (Upper Klondike Highway) last survey 2002:

- Density: 145/1000 sq km
- Population Trend: unknown
- Population Estimate: 846

Survey Area 18 (Mayo) last surveyed 1998:

- Density: 155/1000 sq km
- Population Trend: unknown
- Population Estimate: 319

(Source: Personal Communication, Environment Yukon, June 28, 2006).

Wildlife Key Area 860 to the west of the Yukon River (see Figure 6.2-4) has been identified as being in proximity to the Project. Riparian areas including islands along the Yukon River and major tributaries are important calving and early rearing habitat in May and June.

Woodland Caribou:

- COSEWIC status: species of special concern
- Yukon Wildlife Act status: not listed

In winter months the woodland caribou occupy coniferous forests near wetland environments and in summer months herds may be found in areas recovering from logging activities or fire. Woodland caribou in northern mountain regions may be found in lower–altitude, mature lodge-pole pine stands, feeding on both terrestrial lichen and tree lichen or, at higher elevations on windswept slopes where terrestrial lichen is available (Environment Canada, 2006(a))

The Project intersects the winter ranges of two woodland caribou populations: the Ethel Lake herd southeast of Stewart Crossing and the Tatchun Herd north east of Carmacks.

Tatchun Caribou Herd:

A population estimate of 300 made in 1995 (Department of the Environment, Fish and Wildlife Branch, 1996) has been upgraded to 500 animals in more recent surveys (Personal communication, Environment Yukon, June 28, 2006). Perhaps as a result of this population increase, a recent extension of mapped, winter range (WKA 1936) into the area east of the Klondike Highway between Mt. Milton and Lower Tatchun Creek has been documented. This winter range extension is confirmed by telemetry data (Personal communication, Environment Yukon, June 28, 2006 and Personal communication, Environment Yukon, June 27, 2006). Summer range, calving and post-calving areas, and rut areas are all seasonal activities occurring well to the east of the Route Study Area.

WKA 1936 (see Figure 6.2.4) crosses the Klondike Highway and the proposed hydro line ROW north of Minto Landing and overlaps the Lhutsaw Wetland Habitat Protection area. Burned in the summer of 1995, this area is not used as winter range as frequently in post fire years (Personal communication, Environment Yukon, July 27, 2006); however some use of the area can be expected with infrequent crossings from October through April. In 1998, three sub-adult males were observed west of the road in early May (Grant Lortie, personal observation, 1998).

Ethel Lake Herd:

Numbering 300 animals in a 1995 Yukon Government Wildlife Survey (Department of the Environment, Fish and Wildlife Branch, 1996), this small, stable population winters in WKA 1934 east of the Route Study Area and North of Pelly Crossing; however, there has been a recent winter range extension stretching west across the Klondike Highway and the proposed CS Route Study Area and into the wetland complex identified as WKA 987 (Personal communication, Environment Yukon, June 27, 2006). If these caribou continue to use this wetland during the winter, crossings of this corridor can be expected from October through April.

Approximately 40% of the Ethel Lake caribou winter range was burned in 2004 and the range extensions into WKA 987 may be a direct consequence of this fire. If this proves correct, further exploratory expansion west of the CS Route Study Area and into the Willow Creek Wetland Complex (including WKA 988) may be anticipated.

Mountain Sheep**:**

- COSEWIC status: not listed
- Yukon Wildlife Act status: not listed

Mountain sheep can be found enduring harsh environmental conditions at extreme altitudes. Females, lambs and rams summer separately in alpine meadows. In late fall to early winter, flocks descend to less snowy regions. Winter regions include south-facing grassy slopes.

WKA's 1873, 1874, and 1875 (see Figure 6.2-4), identified as sheep winter range, lie to the west of the CS Route Study Area and Minto Landing on the east side of the Yukon River. Demographics and pattern timing of movements of this sheep population (approximately 65 animals) is not completely understood. It is known that some of these sheep occasionally cross the highway and the proposed CS Route Study Area from June through August. This may, or may not, be a regular movement, but sheep have been observed east of the Klondike Highway on the west-facing slopes and breaks south toward McCabe Creek (Personal communication, Environment Yukon, June 27, 2006)

Grizzly Bear:

- COSEWIC status: species of special concern.
- Yukon Wildlife Act status: species of special concern

Grizzly bears possess a varied, omnivorous diet and occupy a variety of habitats ranging from coastal plains to alpine environments. In spring, grizzly bears descend from their dens to earlier–producing, lower regions to consume vegetation and then return to higher elevations in early to mid-summer. Government sources state that, "suitable grizzly habitat must provide an adequate food supply, appropriate denning sites, and isolation from human disturbance" (Environment Canada, 2006(a))

There is very little empirical information available on grizzly bears in the area and management guidelines have been suspended (Personal communication, Environment Yukon, July 12, 2006). A crude density estimate would be 1 bear/50 sq miles, with local, higher numbers as bears exploit seasonal food sources (i.e., soap and blueberry patches, salmon runs, etc.). No WKA's were found in or near the Route Study Area.

Wood Bison**:**

- COSEWIC status: threatened
- Yukon Wildlife Act status: threatened

Wood bison can be found in open spaces mainly treed by aspen stands. Surficial conditions include large, "wet meadows and slight depressions" caused by lacustrine environments. (Environment Canada, 2006(a)). It is stated that, "the population in the Mackenzie Bison Sanctuary (NWT) uses wet meadows and willow savannas in summer and winter and forests in the fall" (Environment Canada, 2006(a)).

WKA's 1925 and 1926 (see Figure 6.2-4) represent older bison sightings prior to 1994. Small groups of four and between three and fourteen animals were reported anecdotally. There is no enduring record of wood bison consistently occupying these areas. Introduced into the Upper Nisling River watershed between 1984-1988, these animals wandered extensively with sight records all over the south-western Yukon. One bull wandered as far west as Tok, Alaska. Estimated at approximately 700 animals, the population is expanding rapidly and venturing into new areas of suitable habitat (Personal communication, Environment Yukon, April 2006).

Several years ago, a limited entry hunt was initiated to maintain the population near 500 animals which was the target population for the Recovery Program (Personal communication, Environment Yukon, April 2006). In recent years, hunt regulations have been liberalized in an attempt to stabilize the population.

Small Furbearing Mammals

The Yukon Northern Plateau and the Yukon Central Plateau (Eco-regions 175 and 176) are regions of small mountain groups, rivers, lakes, valleys, hills and alpine tundra. Wholly located in the Yukon Territory, both regions are home to a wide range of furbearing mammal species and critical habitat. Furbearers inhabiting these regions include: shrews, bats, hares, pikas, voles, lemmings, muskrat, beavers, woodrats, mice, porcupines, marmots, squirrels, woodchucks, chipmunks, coyotes, wolves, foxes, cougars, lynx, wolverine, otters, martin, ermine, mink, and bears. This section presents information on small furbearing mammals with relevance to the Project Study Region communities' trapping activities. Additional information on numerous species can be found in Reference Materials 6R-4.

Three types of squirrels found in these ecoregions are the Northern Flying squirrel, the Red squirrel and the Arctic Ground squirrel or gopher. The Northern Flying squirrel inhabits densely forested areas with mature trees and preferably low elevations. The Red squirrel occurs in forests to the edge of the Alpine and Arctic Tundra in evergreens, spruce, pine, aspen and poplar trees. The Arctic Ground squirrel can be found in eskers, moraines, mountains, river flats, sandbanks, lake shores, tundra ridges and soil/gravel areas with good drainage.

The Snowshoe hare inhabits areas where shrub and forest amalgamate, especially preferring willow thickets and burn areas with growing pine, spruce and aspen where they can obtain nourishment.

Although quite limited in the southern Yukon, muskrats can be seen in abundance in the north. This species inhabits streams, rivers, potholes, shallow lakes, and shallow wetlands with sufficient supply of aquatic plants. Muskrats can also be spotted in slow moving marshy stretches and any shallow productive waters of beaver country where they share beaver houses and ponds.

The beaver can be found in forested and sub-alpine regions. Beaver colonies inhabit ponds, small lakes, and slow-moving streams with the highest densities occurring in burn areas with aspen poplar and willow. Areas close to water bodies with aspen or balsam poplar are prime habitat for beavers where pointed stumps, dome shaped lodges, dams, canals and trails are indicators of their presence.

The porcupine inhabits areas all over the Yukon, being most numerous in northern and central parts of the territory extending as far north as the Arctic Coast. Porcupine dens can be found in caves, hollows among tree roots, culverts and other natural cavities. In winter, porcupines stay close to spruce and pine trees where they can obtain the main portion of their diet.

Being scavengers, coyotes are often sited close to communities but also make homes in riversides, forest burns and farmland. Coyotes prefer to use existing holes or natural cavities rather than building their own dens. In winter, coyotes take cover under overhanging tree limbs where they are sheltered from snow. Coyotes tend to thrive where habitats intersect and there is an abundance of prey, such as the Snowshoe hare.

The Gray wolf tends to avoid human populations in boreal forest habitats. Wolves inhabit rough and hilly areas as well as open tundra and forest regions. The Gray wolf does not use shelter, with the exception of maternity dens for their young. These dens are located on high grounds near water and usually found in hollow logs, caves and underneath tangled tree roots. The same den location may be used for a number of years.

The three main habitat types of the Red fox include white spruce forests, sub-alpine areas of willow and soapberry and alpine tundra. Foxes make their dens away from coyote habitat on brush-covered slopes with sandy soil. The range of the fox seems to be restrained by competition with coyotes for food and territory.

Lynx inhabit the whole of the Yukon except for the Arctic Coastal Plain. This species may be found in large groups when lynx population numbers are high. Lynx prefer to occupy white spruce, lodge pole pine, aspen and willow, and coniferous-deciduous forest areas. Species numbers tend to fluctuate due to their dependence on Snowshoe hare for survival. After they are born, lynx kittens are sheltered under brush piles or tree roots in remote areas of dense, spruce forests. Although cougars have been sited in the Yukon, the lynx is the territories' only resident feline and can often be seen hunting along shorelines or resting under riverside stands of spruce.

Wolverine are found throughout northern North America but are considered endangered in many of these areas. Although the wolverine is generally a rare mammal, it is quite common in Yukon. In areas such as B.C, Yukon, Ontario and Nunavut, the wolverine is considered of "Special Concern" because of its sensitivity to human activity and natural events. This species occurs in all habitats extending from forested valleys to alpine and arctic tundra and is most abundant in population in mountainous regions where there is variety of habitat and plentiful prey. Wolverine can be sited along open ridges, alpine slopes, frozen rivers or glaciers.

It is thought that the River otter is widely distributed throughout forested areas in the Yukon; however, the River otter is not largely abundant in Yukon and no population studies have been conducted. Although in other parts of Canada and the U.S. otters have been wiped out by polluted waterways, Yukon otters have been unaffected by water pollution. Because otter habitat must include sufficient size and depth waterways to support fish populations, the range of River otters in the Yukon is mainly confined to larger river systems and their lakes. The River otter population is thought to be highest in the salmon bearing Yukon River System. The River otter can most likely be seen by remote waterways, inter-connected marshes, meandering streams or small lakes.

The ermine, the Least weasel and the marten are three species of the weasel family that inhabit the Yukon as well as other northern countries around the world. Both the ermine and the Least weasel occur throughout the territory and are most abundant in areas such as forest perimeters, meadows, brushy areas, marshes, bogs and tundra. In Yukon, ermine are quite abundant in population. The Least weasel is uncommon but not endangered. Both weasel species avoid the depths of mature forests. While the ermine hunts larger voles in meadows, boggy or shrubby habitats, the Least weasel prefers to hunt mice and voles in forested habitats. The marten makes its home in mature forests where the Northern Red-Backed vole is abundant. In Yukon, marten inhabit spruce stands as far north as Old Crow Flats.

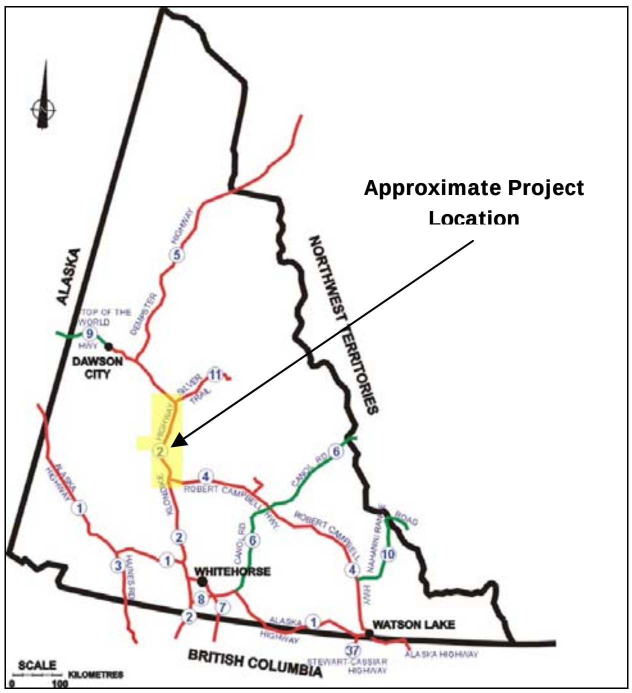
Mink can be found throughout the Yukon in forested areas near ponds, streams and lakes. Since the muskrat is the mink's main food source, this species can be found in high density in the Old Crow Flats area due to the large amount of muskrat that also inhabit that area. Mink are able to pursue prey such as muskrat and fish by traveling in air pockets under the ice of ponds and streams. Mink occupy abandoned burrows or naturally formed den sites for shelter and for raising their young. Mink often take over empty beaver lodges or muskrat dens hidden by dense vegetation.

Migratory Waterfowl

Migratory waterfowl and birds navigate (most often north-south movements) from winter habitats to nesting areas and return to their post-nesting habitat (Lincoln, 1979). The U**nited States Geological Survey** (**USGS**) and the **Canadian Wildlife Service** (**CWS**) conduct an annual survey of North American breeding bird populations (United States Geological Survey/Canadian Wildlife Service, 2005). The USGS/CWS Breeding Bird Database was queried for those bird species having migratory routes near the Route Study Area. A species list for select migratory routes may be found in Reference Materials 6R-5. A USGS/CWS map of breeding bird routes in the Yukon is set out below with the approximate Project Study Region indicated (Figure 6.2-5).

To identify any species of concern, the COSEWIC database was queried for bird species that may potentially migrate through, or live in, the Yukon Territory. A COSEWIC list of birds found in the Yukon can be found in Reference Materials 6R-5. The COSEWIC species listing of birds found in the Yukon Territory lists the American coot, Double-crested cormorant, Red-necked grebe, Common and Yellow-Billed loons, Red-necked grebe, and Trumpeter swan. COSEWIC lists these species has having populations in the Yukon; however, they are not currently considered to be at risk. As of April 2006, Rusty blackbirds are mentioned as a species of special concern to COSEWIC (Committee on the Status of Endangered Wildlife in Canada, 2006).

Figure 6.2-5
Yukon Breeding Bird Survey Routes



(Source: http://www.hpw.gov.yk.ca/images/roadmap.gif)

The CWS describes the possible habitats for breeding birds as grasslands, scrub or edge habitat, urban or suburban, wetlands and woodlands. All of the above noted habitats can be found within the Project Study Region.

Raptors

The description of raptors (or birds of prey) provided by Environment Canada includes falcons, hawks, eagles, vultures, ospreys, and owls (Environment Canada, 2006(b)). Raptors in Prairie and Northern Canada may be grouped into the following four different families: hawks, falcons, vultures and owls (Environment Canada, 2006(b)).

The species of raptors identified by COSEWIC include: eagles (Bald and Golden), goshawk, gyrfalcon, hawk (Red-tailed, Rough-legged, Sharp-shinned), Peregrine falcons, owls (Boreal, Great Grey, Northern Hawk, Short-eared, Snowy), merlin and Northern harrier. The Short-eared owl is currently given the status of special concern. The Peregrine falcon was moved from a lower risk category to "Special Concern" in April 1992 and re-assessed in May 2000 with no change in status. The status for the species as of July 2006 is "Threatened".

WKA 2722, (see Wildlife Key Areas Map, Figure 6.2-4) immediately east of the CS Route Study Area, includes a Peregrine falcon eyrie in the Crooked Creek drainage. The precise location of the nest site is not known, but further inquiry may provide suitable options for mitigation if this is required.

WKA 1350 (Alpine Raptor Nest Site), lying north of McCabe Creek and one-half km east of the proposed CS Route Study Area, is in close proximity to the most southern MS route option for crossing the Yukon River. WKA 1350, which encompasses nest sites of three raptor species (the locations of which have not been determined), was last updated in 1990 and its current status is not known.

The MS Route Study Area intersects WKA 1343 west of the Yukon River at two locations: the fist six kilometres of the Route Study Area and approximately seven kilometres in the Minto Creek Drainage. Data on WKA 1343 has not been updated since 1991, and the current status of the Breeding Pairs (Golden Eagle, Bald Eagle and Peregrine falcon) is not known at this time.

6.2.2.4 Other MS Route Study Area Wildlife

A number of WKAs have been identified peripheral to the MS Route Study Area. However, except as noted above (raptors), all of these WKAs are not relevant to the areas that are expected to be affected by the Project.

One noted wildlife location is a Sharp tailed grouse lek, located east of the Klondike Highway and directly across from the Minto Airstrip access road.

6.2.3 Aquatic Environment

This section considers the aquatic environment in the Project Study Region as it exists without the Project and includes an examination of hydrology, water quality, hydrogeology and aquatic ecosystems and resources for each drainage area potentially affected by the Project.

The *Proponent's Guide* requires that, where it is relevant, a baseline examination of hydrology should include a detailed description and characterization of the project's watersheds, water courses and drainages as well as a description of the existing water quality in the project area, including seasonal variability and water quality variables focusing on water characteristics that may be modified by the project during any phase. Where relevant, the baseline is expected to describe geological elements and processes affecting the hydrogeology of the project area watersheds.

The assessment of the existing aquatic environment includes consideration of existing water resources and existing aquatic ecosystems and resources in this drainage area with particular emphasis on identified VCs (see Table 6.2-1). In general, planned mitigation measures are expected to prevent or minimize Project effects on the aquatic environment and this consideration has guided the level of description provided in this section.

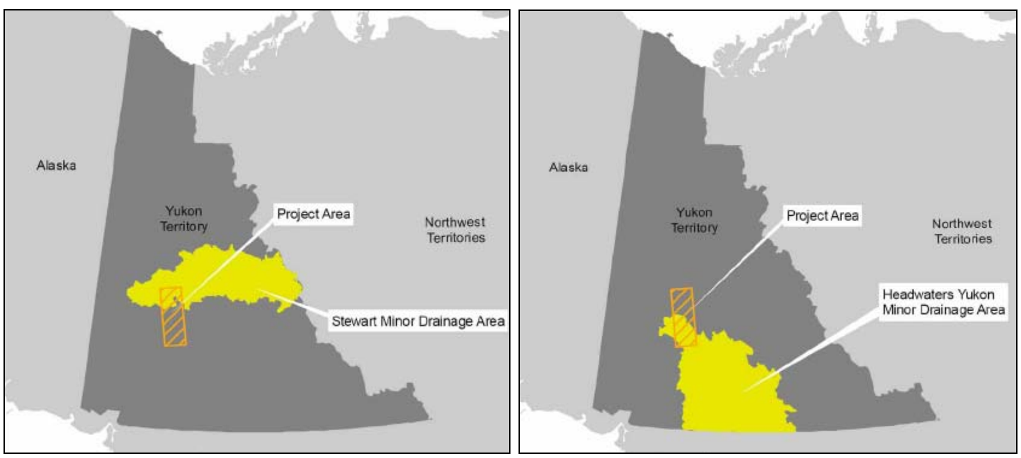
6.2.3.1 Hydrology

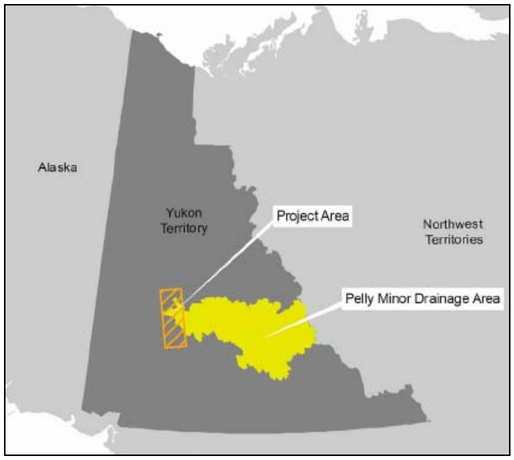
This hydrology section addresses the CS development drainage areas, the MS development drainage areas, and wetlands.

<u>CS Development Drainage Areas</u>

The proposed CS development falls within the Yukon River Major Drainage Area which collects surface water from as far east as the Yukon - North West Territories border and from as far south as Atlin Lake, British Columbia, with an upper limit at around 100 miles north of Dawson City, YT. Water collected in the drainage area empties into the Pacific Ocean, while water collected in the Arctic Drainage Area, to the east, empties into the Arctic Ocean. The CS Route Study Area falls within three Minor Drainage Areas, each named for the river being supplied: Yukon Headwaters, Pelly and Stewart. Three maps displaying the locations of each Minor Drainage Area as well as significant streams and water bodies relative to the CS Route Study Area may be found in Reference Materials 6R-6 Maps 6R-6-1, 6R-6-2 and 6R-6-3. . These figures also show the locations of Environment Canada Hydrometric Monitoring Stations referred to later in this section. An index map in Figure 6.2-6 shows the location of the minor drainage area in the Yukon Territory.

Figure 6.2-6
Index Map of Minor Drainage Areas for CS Development





The Project Route Study Area crosses the Yukon River and two of its major tributaries: the Pelly and Stewart Rivers. Along with these major rivers, the CS Route Study Area also crosses a number of minor tributaries which supply the Yukon River; these tributaries are the Tatchun, McGregor and McCabe Creeks. Major settlements in the area include the village of Carmacks, located on the shores of the Yukon River; Pelly Crossing, located on the Pelly River; and Stewart Crossing, located on the Stewart River near the northern extent of the proposed CS transmission line.

Major water bodies near the CS Route Study Area include Tatchun Lake, Merrice Lake and the Von Wilczek Lakes which supply the Yukon River in the Headwater Yukon Minor Drainage Area. The major lakes supplying the Pelly River are Willow Lake and Diamain Lake. Other notable water bodies located near the CS Route Study Area in the Stewart Minor Drainage Area include: the Reid Lakes west of Stewart Crossing and Crystal and Ethel Lakes to the east.

Hydrological information was based on information taken from the Water Survey of Canada (Environment Canada, 2004(b)). Monitoring station locations within the CS Route Study Area between Carmacks and Stewart Crossing are:

Station Name	**Station Number**	**Longitude (DMS)**	**Latitude (DMS)**
Yukon River at Carmacks	09AH001	136 ^{o} 34’ 50”	69^{o} 49’ 47”
Pelly River at Pelly Crossing	09BC001	136^{o} 16’ 18”	62^{o} 05’ 45”
Stewart River at Stewart Crossing	09DD002	136 ^{o} 40’ 59”	63^{o} 22’ 56”

The maximum rate of mean monthly flow recorded at the Carmacks monitoring station on the Yukon River between 1951 and 1997 was 2690 m^3/s in July, 1962. The minimum mean monthly flow recorded was 142 m^3/s in March, 1951. Annually, for the sample period, the maximum flow was 966 m^3/s, the minimum was 526 m^3/s and the mean rate of flow was 756 m^3/s. Historical data shows a trend of higher rates of flow from May through September. Rate of flow seems to be at the lowest and most consistent level from December through April. A hydrograph for the sample period discussed above, along with a monthly mean summary report, can be found in Reference Materials 6R-7.

Hydrologic station data at Pelly Crossing, recorded between 1951 and 2003, describes a maximum monthly flow of 2840 m^3/s in June of 1964 and a minimum monthly flow of 28.9 m^3/s in March of 1974. The annual mean, maximum and minimum monthly flows were 388 m^3/s, 575 m^3/s and 261 m^3/s respectively (Environment Canada, 2004(c)). The historic data collected suggests a significantly higher flow from May through September. The time period with the steadiest and the least flow rate appears to fall from November through April. A hydrograph for the sample period discussed above, along with a monthly mean summary report can be found in Reference Materials 6R-7.

Stream data was collected between 1960 and 1973, by a monitoring station on the Stewart River at Stewart Crossing. The data displays an historic trend of a high rate of flow between the months of May through October. The maximum flow was 3150 m^3/s recorded in June of 1964 and the minimum rate of flow was 28.9 m^3/s recorded in March, 1969. For the sample period, the mean annual flow was 415 m^3/s, with a maximum of 605 m^3/s and a minimum of 285 m^3/s. Flow rates are relatively low and appear to remain stable from November through April. A hydrograph for the sample period discussed above, along with a monthly mean summary report can be found in Reference Materials 6R-7

MS Development Drainage Areas

The MS Route Study Area crosses the Yukon River at Minto Landing. Major stream crossings intersecting with the proposed MS Route Study Area include Big Creek and Minto Creek. Both Big and Minto Creeks are tributaries of, and flow north-west to the Yukon River. Hydrometric data was acquired from the Canadian Hydrologic Data Collection Station near the mouth of Big Creek. Data at Big Creek was collected for the years 1974 through 2003. There is currently no hydrologic data available for Minto Creek. The Station Name, Station Number and geographic coordinates are noted below.

Station Name	Station Number	Longitude (DMS)	Latitude (DMS)
Big Creek near the mouth	09AH003	137 º 00’ 58”	62º 34’ 07”

The hydrologic station near Big Creek indicates that there is a marked increase in cubic metres of discharge per second at the mouth of Big Creek between the months of April and September. In May 1990, the maximum average monthly rate of flow is recorded as 76.8 m^3/s. In April 1996, the minimum average monthly rate of flow was recorded as 0.003 m^3/s. In 1998, the minimum annual flow rate was 2.17 m^3/s; in 2000, the maximum was 17.2 m^3/s and the average annual rate of flow was 8.07 m^3/s. A hydrograph for the sample period discussed above, along with a monthly mean summary report can be found in Reference Materials 6R-7.

6.2.3.2 Water Quality

Specific information on water quality is not readily available for major rivers in the Route Study Area. An overview of basic factors affecting river sediment loads in this area is provided below.

The type of river that will form is dictated by the surface material geology present as well as the change in elevation in the region. The rivers and streams present in the Project Study Region take on meandering geometries as they wind their way through the sediments. This is indicative of high sediment loads and little change in elevation over the meandering reaches of the stream. The Yukon, Pelly and Stewart Rivers all take on a meandering pattern around the Route Study Area.

Historic data suggests an increase in stream flow for the spring and summer months. Snow storage in the winter followed by snowmelt in the spring re-distributes six to ten months of precipitation during the brief snowmelt period (Yukon Energy Mines and Resources, 2004). This is expected in spring melt conditions and during the warmer temperatures of the summer months. Referring to the climate data in section 6.2.1.4, it can be noted that there is a significant increase in precipitation for Carmacks, Pelly Crossing and Stewart Crossing between the months of May and October. This can result in higher surface water runoff and eroding conditions in regions of increased gradient that are underlain, silt-rich material. This activity will transport greater amounts of sediment into waterways and increase the total suspended solids and conductivity present.

6.2.3.3 Hydrogeology

The water table makes contact with the surface at river, stream and lake locations. Ground water flows more freely through soils with high percolation potential. Percolation potential for loosely packed material is good mainly due to the high pore space. The surficial geology present in the area ranges from loose, glacial till with mixed grain-size, to well-sorted (i.e. more sorted according to grain-size), well-bedded strata. Inclined areas underlain by loosely packed, well-sorted material will transport contaminants, along with ground water, away from the site in the direction of ground water flow. This will occur more rapidly than in areas underlain by more dense soils with a greater amount of fine particles filling interstitial space. Therefore, during and shortly after rainfall events spring fed streams in the vicinity will swell.

Historic flood data for Carmacks, Pelly Crossing, and Stewart Crossing is not currently available from government and municipal sources. Stream level data is not collected at the Pelly Crossing and Stewart Crossing hydrographic stations. As mentioned above, flow data suggests a significant increase in discharge in the spring and summer months. "In the Yukon River Basin, annual high flows for most of the major rivers occur during the summer rainy season. However, on the main stem of the Yukon, flooding commonly occurs from ice jams in the spring (USGS, 2000)."

6.2.3.4 Aquatic Ecosystems and Resources

Riparian Zones and Wetlands

Riparian Zones and Wetlands are considered together as one VC which represents the environment surrounding rivers, creeks and wetland areas in the Project Study Region.

Wetlands are "lands permanently or temporarily submerged or permeated by water, and characterized by plants adapted to saturated-soil conditions" (Natural Resources Canada, 2003). Natural Resources Canada's website goes on to describe the value of wetlands:

> Wetlands are the only ecosystem designated for conservation by international convention because they absorb the impact of hydrologic events, filter sediments and toxic substances,

> supply food and essential habitat for many species, provide products for food, energy, and building material, and are valuable recreational areas. Some wetlands help recharge groundwater, while others receive groundwater discharge. Wetlands are vulnerable to climatic variations and extreme events.

Wetlands are typically found in regions of shallow to steeply sloping terrain and on floodplains in close proximity to surface waters.

Riparian zones are associated with water bodies and wetland areas. A riparian zone is the interface between land and a water body. They are typically characterized by hydrophilic vegetation and are often subject to flooding. Riparian zones are significant in ecology, environmental management and civil engineering due to their role in soil conservation, their biodiversity and the influence they have on aquatic ecosystems. The riparian zones surrounding the large wetland areas (Lhutsaw and Willow Creek) in the Project Study Region are associated with high quality habitat for many Yukon animal and bird species.

Yukon State of the Environment Report (2002) indicates that only 3% of Yukon's land base is made up of wetlands and that "54 wetlands have been identified as significant, based largely on their value to migratory birds". The Canadian Parks and Wilderness Society (2005) identifies two key wetland areas within the Project Study Region: Lhutsaw Wetland Habitat Protection Area and Willow Creek. Additionally, there are a number of small wetland features along the Route Study Area that have been identified in the Preliminary Terrain Survey.

<u>CS Line Segment 1: Carmacks to McGregor Creek</u>

From Carmacks north to McGregor Creek, Preliminary Terrain Survey Maps 115I/01 (Appendix 6A-1 Map 6A-1-1) and 115I/08 (Appendix 6A-1 Map 6A-1-2) delineate no wetlands adjacent to or in proximity to the proposed Route Study Area. However a number of organic-rich and poorly drained soil areas are associated with small creeks and small ponds in this area. These may have small wetland areas associated with them.

<u>CS Line Segment 2: McGregor Creek to Pelly Crossing</u>

Preliminary Terrain Survey Map 115I/07 (Appendix 6A Map 6A-1-3) notes wetland regions which are encountered approximately 2 km north of McGregor Creek, to the east of the Route Study Area. These small wetland regions are in proximity to areas where the CS route has been proposed to be located, and are found within a unit of gravely soil on sloping terrain.

Preliminary Terrain Survey Map 115I/10 (Appendix 6A Map 6A-1-4) notes discontinuous wetlands on the lake shores around the Von Wilczek Lakes. This is within and in close proximity to the Lhutsaw Wetland Habitat Protection Area (Yukon Parks, 2006). This protected area is 31 km^2 and can be seen south of Pelly Crossing to the east of the Klondike Highway. In this area, the proposed CS route will be located west of the Klondike Highway where no wetlands are located. North of the Lhutsaw area, wetlands continue sporadically until reaching Pelly Crossing on Preliminary Terrain Survey Map 115I/15 (Appendix 6A Map 6A-1-5). As delineated by Mougeot's terrain analysis, these are small lakes and poorly drained areas located to the east and west of the Route Study Area.

CS Line Segment 3: Pelly Crossing to Stewart Crossing

Directly north of Pelly Crossing (Appendix 6A-1 Map 6A 1-5), no wetlands are identified on the map; however, the community identified Willow Creek as having wetland characteristics throughout its course and CPAWS (2005) has identified this as one of fifty important wetlands in the Yukon. Preliminary Terrain Survey Map 115P/01 (Appendix 6A-1 Map 6A-1-7) identifies wetlands to the west of the Klondike Highway, in units of poorly drained, ice-rich and organic-rich surface material, while the proposed CS route in this area is located to the east. The northern end of Map 115P/01 (Appendix 6A-1 Map 6A-1-7) marks the start of the Ddhaw Ghro Habitat Protection Area, located to the east of the Klondike Highway. In this area, the proposed CS route remains outside this Protection Area.

Preliminary Terrain Survey Map 115P/07 (Appendix 6A-1 Map 6A-1-9) notes wetland regions on a plateau to the west of the proposed CS Route Study Area. The wetland is located in a unit of poorly drained, ice-rich and organic-rich soil above a linear outcrop of steeply sloped, gravelly material. Moving north along the proposed Route Study Area, wetlands are located to the southeast of Stewart Crossing, while the CS Route Study Area remains west of the community. The area surrounding Crooked Creek, just south of the community, has been identified by members of NND as an important wetland area. There are several minor wetlands outside the Route Study Area to the east and west along the shore of the Stewart River. These are delineated in units of organic-rich, silty material (Appendix 6A-1 Map 6A-1-9).

Minto Spur Line Segment

Preliminary Terrain Survey Maps 115I/10 (Appendix 6A-1 Map 6A-1-4) and 115I/10 and 11 (Appendix 6A-2 Map 6A-2-3), note that there are two areas of riparian/ wetland regions. One area of wetland is located on Preliminary Terrain Survey Map 115I/10 and /11 (Appendix 6A-2 Map 6A-2-3) where Big Creek intersects the Route Study Area. This area of fluvial sand and gravel may be described as a riparian zone that is intermittently wet and thus may also be characterized as wetland. The second area of wetland is located where the Minto Creek intersects the MS Route Study Area near the Yukon River. This is characterized as a riparian zone with wetland characteristics. In total there is roughly 1 km of wetland/ riparian area in the Minto Spur segment of the Route Study Area.

Salmon and Other Fish Species

Salmon was chosen as a VC after public consultation with communities and resource councils indicated that there were concerns that the Project could affect salmon and salmon habitat; this species is an important domestic, sport and commercial resource for First Nation members, local residents and visitors to the region.

Water bodies throughout the Yukon Territory provide spawning areas and habitat for a variety of fish species and "in the Yukon, feisty northern species like Arctic grayling, northern pike and lake trout crowd the eddies and outflows of icy streams and abound in our pristine lakes. Lesser known but highly prized fish like the inconnu and Arctic char navigate wild rivers that flow through one of the world's most remote and extraordinary landscapes (Yukon Department of Tourism & Culture, 2006)." Species of fish that can be found in Yukon water include arctic char, arctic greyling, burbot, dolly varden, inconnu, kokanee, lake trout, bull trout, pike, rainbow trout/steelhead salmon, salmon (Chinook, chum, coho and sockeye) and whitefish (broad, lake (humpback), pigmy and round).

A desktop survey of applicable fisheries information for the Route Study Area was undertaken using the Yukon Fisheries Information Summary System (FISS), an online compendium of fisheries information for the Yukon provided by the Oceans Habitat and Enhancement Branch (HEB) of the Department of Fisheries and Oceans Canada. For the purposes of the Project Proposal, only watercourses that the Route Study Area crosses that contain fish caught for sport or human consumption are being considered based on the criteria used by Fisheries and Oceans Canada to define a fish-bearing stream.

The Project Route Study Area crosses or potentially affects eleven known fish-bearing watercourses. Moving north along the Route Study Area these nine watercourses are as follows: Yukon River, Tatchun Creek, McGregor Creek, McCabe Creek, Von Wilczek Creek, Pelly River, Willow Creek, Crooked Creek, Stewart River, Big Creek and Minto Creek. Each of these streams is a known spawning or rearing area for salmonids, some combination of Chinook salmon, chum salmon arctic grayling, or whitefish.

- The Route Study Area does not cross Willow Creek, but Willow Creek has been included because the Route Study Area crosses three of its tributaries which may be fish-bearing.
- The Route Study Area also crosses Von Wilczek Creek and two of its tributaries which have no fisheries information in FISS, but may also be fish-bearing.

Table 6.2-12 shows the streams with fisheries values that the Route Study Area crosses or potentially affects and the known or documented fish in that stream.

Table 6.2-12
Fisheries Varieties for Streams Crossed by the Carmacks-Stewart / Minto Spur Transmission Project

Watercourse	Mapsheet	Descriptive Position	Intersection Coordinates (UTM)		Known or Documented Fish Species
			Easting	Northing	
Yukon River East Shore South of Option 1	115-I-1 115-I-7 115-I-8 115-I-10	Flows northwest past Carmacks north to Minto Landing, turning west/northwest	404350	6947000	Arctic Grayling, Burbot, Chinook Salmon, Chum Salmon, Coho Salmon, Inconnu, Northern Pike, Sockeye Salmon, Whitefish
Tatchun Creek Bridge	115-I-08	Flows southwest and northwest into the Yukon River, north of Carcross, crosses the Klondike Highway north of Carcross	433600	6906600	Arctic Grayling, Burbot, Chinook Salmon, Chum Salmon, Northern Pike, Whitefish
McGregor Creek	115-I-07	Flows southwest into the Yukon River between Carmacks and Minto, crosses the Klondike Highway	419350	6919600	Arctic Grayling, Chinook Salmon, Whitefish
McCabe Creek	115-I-10	Flows southwest into the Yukon River south of Minto, crosses the Klondike Highway south of Minto	409200	6935250	Arctic Grayling, Chinook Salmon, Whitefish

Watercourse	Mapsheet	Descriptive Position	Intersection Coordinates (UTM)		Known or Documented Fish Species
			Easting	Northing	
Von Wilczek Creek	115-I-10	Flow southwest into the Yukon River near Minto, flows along the East side of the Klondike River, crosses near Minto	405700	6942750	Arctic Grayling, Chinook Salmon
South side of Pelly River	115-I-15	Flows west past Pelly Crossing	457100	6967500	Arctic Grayling, Burbot, Chinook Salmon, Inconnu, Northern Pike, Whitefish
Willow Creek	115-I-15, 115-P-02	Flows south and southwest into the Pelly River, northwest of Pelly Crossing, flows along the west of the Klondike Highway			Arctic Grayling, Burbot, Chinook Salmon, Northern Pike, Whitefish
Crooked Creek	115-P-07	Flows north into the Stewart River, west of Stewart Crossing, flows along the west of the Klondike Highway, crosses Klondike Highway	South(next to Klondike Highway Crossing 420550 North crossing (South of Stewart River) 414550	South(next to Klondike Highway Crossing 7017050 North crossing (south of Stewart River) 7025900	Arctic Grayling, Burbot, Chinook Salmon, Northern Pike, Whitefish

Watercourse	Mapsheet	Descriptive Position	Intersection Coordinates (UTM)		Known or Documented Fish Species
			Easting	Northing	
Stewart River (south shore)	115-P-7	Flows west at Stewart Crossing into the Yukon River	414300	7029450	Arctic Grayling, Burbot, Chinook Salmon, Chum Salmon, Northern Pike, Whitefish
Big Creek	115-I-11	Flows north into the Yukon River	396626	6442600	Chum Salmon, Chinook Salmon, Arctic Grayling and Whitefish
Minto Creek	115-I-11	Flows north into the Yukon River	392350	6948250	Arctic Grayling, slimy sculpins, Whitefish

6.3 SOCIO-ECONOMIC CONDITIONS

This section provides a description of the socio-economic conditions of the Project Study Region without the Project and reflects the requirements of the *Proponents Guide to Information Requirements for Executive Committee Project Proposal Submissions* (YESAB, 2005).[8] The following socio-economic components are examined:

- **Overview of Project Study Region Communities**: includes a brief overview of the specific communities and populations in the Project Study Region.
- **Resource use**: includes use by people of the land and resources in the Project Study Region for traditional and domestic land and resource use (trapping, hunting, fishing, collection of plants, timber harvesting, protected areas, outdoor recreation) and commercial land use (tourism, outfitting, commercial fishing, agriculture, mineral and aggregate extraction, and oil and gas extraction).
- **Economy**: includes economic components and activities in the Project Study Region including the labour force (employment, income, education), local economy and business, government, and utility ratepayers.
- **Social Context**: includes the social and cultural context of the Project Study Region, including population demographics, community infrastructure and services, community and family life, recreation and leisure, public health, aesthetics, heritage resources, and past experience with similar projects.

[8] This guide references description of the economic and social setting which focuses "...on providing a background on individuals, families, communities, businesses, and/or government potentially affected as a result of the project activities" The *Guide to Socio-economic Effects Assessment* (YESAB, 2006, p.4)) defines socio-economic effects to include "effects on economies, health, culture, traditions, lifestyles, and heritage resources" and socio-economic effects assessment as including the likely effects of a proposed project "on the day-to-day life of individuals, families, communities, businesses and/or governments whose reality may be affected by a proposed project'; this guide uses the term "community" to refer "to both place-based communities, which can be defined geographically, and interest-based communities defined by a common interest or activity, also sometimes referred to as a 'stakeholder' group".

The **Socio-Economic Effects Assessment** (**SEEA**) focuses on people and communities affected by the proposed Project. These effects can be both positive and negative in nature. For those people and communities who are affected, it is recognized that the effects experienced may involve more than one of the identified socio-economic components (and that these effects may be positive in some aspects and negative in other aspects for the same people or communities).

Source of effects on people and communities from the Project can follow different pathways (see Figure 6.3-1), including

- **Direct effects from Project activities:** Effects on people and communities can accumulate directly from the Project (such as direct local employment and training opportunities and local business expenditures during Project construction, operation and decommissioning and supply of lower costs grid electricity supplies to displace diesel electricity generation during Project operation, and aesthetics changes resulting from the Project's presence that affect people).

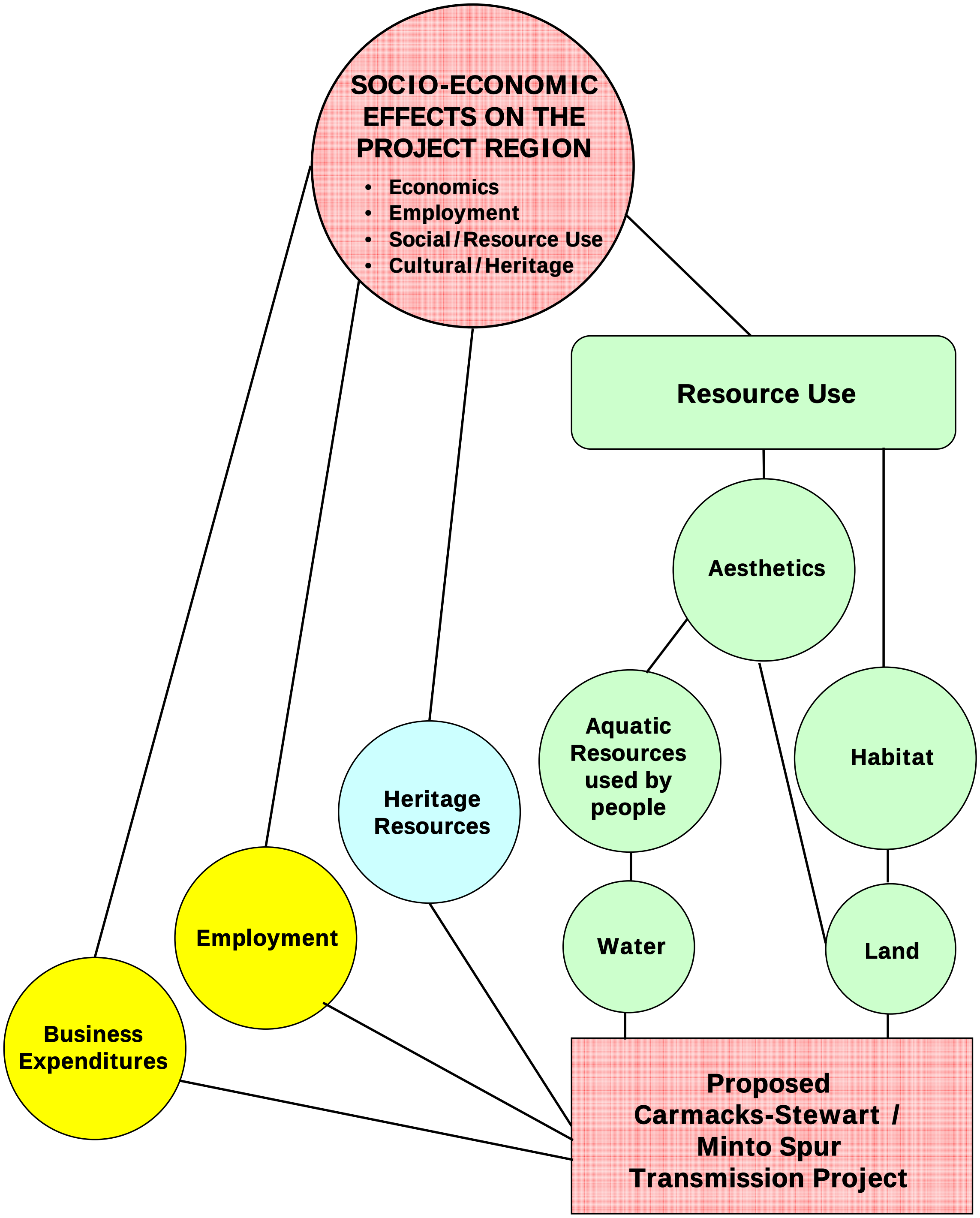
- **Indirect effects from Project-related changes to the land and resources:** Effects on people and communities can also accumulate indirectly through changes in the biophysical environment (land, water, and air physical environments and associated terrestrial and aquatic life) resulting from the Project. In some cases, people depend upon the biophysical environment for income, as well as a way of life and culture. As such, the SEEA, in many instances, relies upon the results of assessments to the environmental components.

- **Overall effects on people and communities:** All of the specific socio-economic effects from the Project through different pathways accumulate on the affected people and communities. The results can be described overall as resource use effects, economic effects, and social effects.

This section generally focuses on those components of the socio-economic environment that are of particular concern in the Project Study Region and that may be potentially affected by the Project based on the above noted effects pathways.

For the socio-economic components, potential Project effects of construction, operation and decommissioning often extend beyond the Project Site Area footprint and the areas in close proximity to this footprint, reflecting the mobility of people and the location of the communities in which they reside. Some effects of the Project on the economy (e.g., construction expenditure effects and utility ratepayer effects) can extend beyond the Project Study Region to affect the overall Yukon economy in particular (and in some instances economies outside Yukon).

Figure 6.3-1
Socio-Economic Pathways of Effects



VCs were determined after consideration of the above factors, and consultation with interested parties. Table 6.3-1 identifies the socio-economic VCs considered for the assessment.

Table 6.3-1
Socio-Economic VCs Identified for Assessment of the Project

Valued Component (VC)	Identified by[1]:	Characterization of Potential Effect
Socio-Economic VCs: Resource Use		
Trapping	FN, G, OP	Clearing and other construction activities, periodic brushing during operation, and future decommissioning may affect wildlife and traplines. Cleared areas may affect access to trapping areas.
Hunting	FN, G, OP	Construction, operation, and decommissioning activities may affect hunting in the Project Study Region.
Fishing	FN, G, OP	The Project transmission lines will cross various streams and rivers. It is expected that fishing will not be affected due to the mitigation measures, including the absence of in-stream work.
Collection of Plants	FN, OP	Berry picking and medicinal plant areas in the Project Site Area may be affected by clearing and other construction activities, periodic brushing during operation, and future decommissioning.
Timber Harvesting	FN, G, OP	Access to potential merchantable timber and fuel wood will result from the construction of the Project right-of way.
Protected Areas	FN, G, OP	Effects on protected areas to be avoided if possible by route selection.
Outdoor Recreation	FN, G, OP	Concerns expressed over conflict with use of recreation sites, particularly Tatchun Creek campground
Tourism	FN, G, OP	Project activities may have an effect on tourist traffic and use.
Outfitting	G, OP	Concerns that Project activities may have an effect on outfitting activities related to local wilderness areas.
Agriculture	F, OP	Construction, pole placement and maintenance may affect agricultural activities in the Project Site Area.
Mining	G	The Project facilitates the development of mining in the Project Study Region through improved access to grid electricity.
Aggregate Sites	G	Some substations may be located in EMR reserves. Transmission lines will span or run adjacent to other aggregate sites. Negotiated agreements and permits will be used in these locations.

Valued Component (VC)	Identified by[1]:	Characterization of Potential Effect
Socio-Economic VCs: Economic		
Local Employment and Training	FN, G, OP	Clearing during construction and periodic brushing during operations will result in opportunities for local employment, and possible training needs.
Local Business	OP, FN	Local businesses (including FN businesses) to provide brushing, clearing and services ancillary to line construction, and decommissioning.
Government Fiscal Flows	G	There may be direct expenditures incurred, and increases in direct and indirect tax and/or royalty revenue.
Utility Ratepayers	OP	Improve system capacity and reliability for existing and future customers, reduce diesel fuel generation costs, provide lower cost power to mines and provide increased utility revenue from use of otherwise surplus hydroelectric generation.
Socio-Economic VCs: Social Context		
Community and Family Life	FN, OP	May have an effect on activities on the land such as hunting, fishing and trapping, among others.
Community Infrastructure and Services	G	Carmacks, Pelly Crossing, and Mayo have gravel airstrips and Minto has a grass airstrip for irregular use and emergency needs; routing will be selected to avoid effects on use of these airstrips.
Public Health	FN	Potential concerns with health and safety during construction and decommissioning, and electrical effects during operation.
Aesthetics	FN, G, OP	Locations with exceptional views and/or wilderness experience may be altered within the Route Study Area by the presence of the transmission line.
Heritage Resources	FN, OP	Known valued sites will be avoided where feasible by route selection and other mitigation measures during construction.

[1] Identified by: FN = First Nation, G = Government, OP = Other Public

Preliminary data for the community baseline was obtained from published sources and readily available statistics. Upon determination of the VCs, the socio-economic baseline compiled to understand the Project Study Region conditions was expanded to focus on the identified VCs. Further collection of data ensued, including personal communication with individuals from the potentially effected communities, other publics, and government.

The level of effort devoted to the description of the socio-economic environment is “commensurate with the size, cost, and degree of expected effects of the proposed project” (YESAB, 2006). It also reflects the fact that the population of the Project Study Region is quite small and in many instances only limited statistical and empirical information was readily available for analysis.

6.3.1 Overview of Project Study Region Communities

The indigenous inhabitants of the Project Study Region are a part of the Northern Tutchone Cultural and Language group. The spatial limits of the Northern Tutchone territory encompass the Pelly, Macmillan, Stewart and Ross river drainages as well as the Yukon River from its confluence with the Teslin to its confluence with the White River. The Northern Tutchone have in the past recognized a close political and cultural affinity with the Southern Tutchone, although the neighbouring groups were distinct inasmuch as their languages were mutually unintelligible (McClellan, 1975). Today, the principal language spoken in the Project Study Region Community is English. The second language spoken continues to be Northern Tutchone.

The residents closest to the Route Study Area are those living in several small communities along the Klondike Highway (Carmacks, Pelly Crossing and Stewart Crossing); the Village of Mayo is also included in the Project Study Region. There are currently about 1,100 people residing in these Project Study Region communities, of whom about 70% are members of the three NTFNs. Some additional population is located in or near the Route Study Area, but outside these specific communities. The following First Nation communities are part of the Project Study Region[9]:

- **Little Salmon / Carmacks First Nation**: currently approaching 600 members, located primarily at the Village of Carmacks (close to 70% of Carmacks population is LSCFN members);
- **Selkirk First Nation**: currently about 500 members, located largely at Pelly Crossing but also at Minto Landing (about 85% of Pelly Crossing residents are members of SFN); and
- **First Nation of Nacho Nyak Dun**: currently about 460 members, located primarily in the Village of Mayo (NND accounts for 60-70% of the population of Mayo) but also at the northern settlement of Stewart Crossing.

The Village of Carmacks, with a 2005 population of just over 400, has served many functions over the years; it has been a campsite, a trading post and a coal mining community. Today it is a service centre on the Klondike Highway (No. 2) and the home of the LSCFN. It is located at the confluence of the Yukon and Nordenskiold Rivers, 180 kilometres north of Whitehorse (Yukon Community Profiles, 2004).

There is a small population of SFN members at Minto Landing, which was their traditional home; however, in the 1950's the community was relocated to Pelly Crossing in an attempt to centralize services. There are a handful of cabins at Minto Landing which are used seasonally by SFN; and Minto Resorts (campground for day-use), a boat launch and a barge landing are also located in the area.

Pelly Crossing, with a 2005 population of about 290, is located on the Klondike Highway in between Whitehorse and Dawson City. Pelly Crossing was originally used by the Selkirk people as a campsite along the Ta'Tla Mun (formerly Tatlmain Lake). The area later developed as a ferry crossing over the Pelly River and then was later used as a construction camp for the workers building the Klondike Highway in the

[9] Population estimates are reviewed in section 6.3.4; sources include Yukon Bureau of Statistics (2005a), Statistics Canada (2001a and 2001b), and INAC, 2006b.

1970s. The highway brought changes to the communities of the area as river-based posts became unnecessary (Yukon Community Profiles, 2004).

Stewart Crossing, with a population of 40 people reported in 2001, acts largely as a service station stop at the junction of the North Klondike Highway and the Silver Trail Highway. There is also a Department of Transportation & Highways service yard, gas station/store and RV Park and Restaurant located immediately south of the bridge. Several members of NNDFN live in the community.

The NNDFN accounts for 60 to 70 percent of the population of the Village of Mayo (overall 2005 population of about 400), and falls within NNDFN's traditional territory. The silver and gold mines around Mayo once drove the Yukon economy. Located along the Silver Trail, or Highway 11, the community currently serves as a distribution centre for the surrounding area (Yukon Community Profiles, 2004).

Given the small population in the Project Study Region, only limited statistical and empirical information was readily available for analysis. In some instances, information is not available because it was suppressed for confidentiality reasons; in these circumstances, specific details on resources use, the economy and the social and cultural context have not included. All Statistics Canada data are subject to confidentiality measures, a copy of which can be viewed in Appendix 6D.

6.3.2 Resource Use

This section considers resource use in the Project Study Region for traditional and domestic land and resource use (trapping, hunting, fishing, collection of plants, timber harvesting, protected areas, outdoor recreation) and commercial land use (tourism, outfitting, commercial fishing, agriculture, mineral and aggregate extraction, and oil and gas extraction). It addresses the socio-economic components identified in the *Proponents Guide* (see Reference Material 1R-1) to:

> Provide information and the historic and current land use and resource use for purposes by First Nation persons, as well as commercial and recreational use by First Nations and non-First Nations persons.

Resource use is integral to the economic fabric and well-being of the Project Study Region communities, and is part of the day-to-day lives of many individuals and families. Data on resource use are often not reported specifically for the Project Study Region or the Route Study Area.

6.3.2.1 Traditional and Domestic Land and Resources Use

Traditional and domestic land and resources use in the Project Study Region include a wide range of activities that are undertaken by both First Nation and non-First Nation individuals and families. These include activities that contribute not only to the local economy but in many instances help to maintain a traditional lifestyle associated with deep rooted connections to the land. Activities considered in this section include trapping, hunting, fishing, collection of plants, timber harvesting, and recreation activities. Those activities considered as VCs, or with anticipated Project-related effects (particularly in the Route Study Area), are described in greater detail (where feasible) than activities that are unlikely to be affected.

Trapping

Trapping is a way of life, with strong cultural roots and social ties, and it is considered the foundation on which the nation of Canada was built. First Nation peoples were trapping and trading long before the arrival of Europeans, and as the fur trade has evolved over centuries, so have the practices of trapping reflecting increased knowledge and the application of conservation principles (Fur Institute of Canada, 2003). Today, trapping continues to provide a livelihood for many Yukon residents, both women and men alike.

The Yukon is home to 14 furbearing mammals that are trapped for their pelts including beaver, coyote, fisher, coloured fox, Arctic fox, lynx, marten, mink, muskrat, otter, squirrel, weasel, wolf and wolverine. Both First Nation and non-First Nation trappers are required to follow the regulations set forth by Environment Yukon (2005(b)). Trappers are required to report their catch to the government and provide information regarding how it was used; however, this does not occur in all cases. Given that many trappers keep catch information confidential, complete data on trapping is difficult to ascertain. The data available from the Yukon Government represents only partial information and does not present the complete value of trapping to the project area communities.

The trapping data available from the Yukon Government can be found in Table 6.3-2; it is included to provide a rough indication of the types of species trapped and only a rough estimate of the relative volumes of species typically trapped in the Project Study Region. Table 6.3-2 is not to be read as an accurate accounting of the numbers of species trapped on the traplines in the Project Study Region. In fact, for all years the numbers of species trapped may exceed the numbers represented on Table 6.3-2. Factors that may impact on the accuracy of the data include the fact that many trappers do not report their catch or only report the catch that they sell. Table 6.3-2 illustrates that over the years the numbers of species trapped declines dramatically. This may be due to non-reporting of catch or it may reflect, in part, recent changes in the fur market.

Table 6.3-2
Yukon Government Trapping Data for the Project Area Traplines

Year	Beaver	Coyote	Red Fox	Lynx	Marten	Mink	Muskrat	Otter	Squirrel	Weasel	Wolf	Wolverine
1980-1981	33	5	68	217	50	35	40		776	4	2	2
1981-1982	20	3	65	259	73	28	41	2	907	5	2	7
1982-1983	12	8	46	101	118	3	1	1	849	11	2	17
1983-1984	56		21	33	60	5	9	1	1446	3	3	2
1984-1985	23	5	32	65	135	14		1	651	19	3	14
1985-1986	17		14	63	142	6	47		213	30	2	5
1986-1987	24		15	50	150	11	6		354	18	3	12
1987-1988	36	4	10	98	226	11	16	1	663	26	1	3
1988-1989	15		5	120	186	9	54		394	2	1	5
1989-1990		1	2	134	135					2	4	2
1990-1991	12		2	48	26	3			13		2	3
1991-1992	9		7	36	101	6			43	2	1	13
1992-1993		3	3	21	33			1				8
1993-1994	6		6	4	147	4			162	27	2	16
1994-1995	6		14	2	97	4			53	3	7	5
1995-1996	5		8	15	176	2			6	5		7
1996-1997	11		6	20	150	3			83	4	2	7
1997-1998	1	1	6	45	124	3			109		4	7
1998-1999	19	1	3	37	29	1					2	1
1999-2000		1		33	39	1				1	2	4
2000-2001	15	5	10	68	68	6					3	6
2001-2002		1		1								3
2002-2003	16			15							2	2
2003-2004	3		3	12	2						6	6
2004-2005	2		7	23	5						1	

(*Source: Yukon Government, Department of the Environment. Rolled up trapping Statistics 19*)

Notes:
1. Data are the results of reported catches from Registered Trapping Concessions 74, 75, 76, 77, 136, 137, 139, 142, 143, 144, 146, 147, 151, 153, plus four others to help ensure confidentiality.
2. Data are incomplete.

Over 400 Yukoners hold trapping licences. Most of these individuals hold registered trapping concessions and the remainder are trapping assistants. Approximately 50% of Yukon trappers are First Nation members.

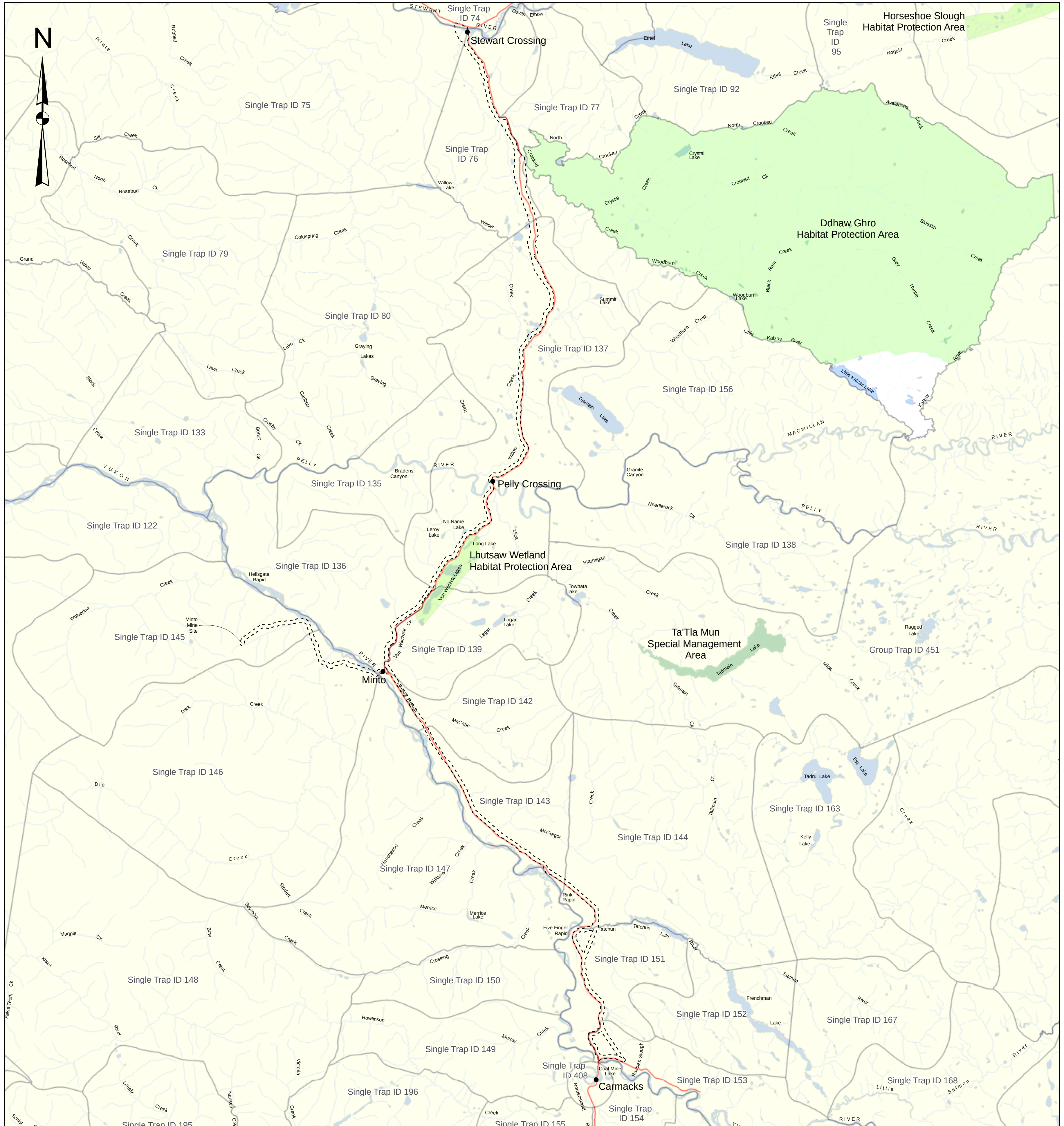
A concession holder is given exclusive rights to harvest furbearing animals in their concession. There are 352 registered trapping concessions in the Yukon and 16 of these are in the general vicinity of the Project. The CS Route Study Area will intersect 11 of these concessions, while the MS Route Study Area will cross three registered trapping concessions (see Figure 6.3-2). Table 6.3-3 provides a list of trapline concessions and their affiliation with relevant First Nations.[10]

Table 6.3-3
Trapline Concessions

Trapline #	Affiliation
153	LSCFN
151	LSCFN
147	LSCFN
146	SFN
145	Non-beneficiary trapline
144	LSCFN
143	LSCFN
142	SFN
139	SFN
136	SFN
137	Non-beneficiary trapline
76	NND
75	NND
74	NND

[10] Trapline concession statistics are held by each trapline holder. The only publicly available data are rolled up statistics which have been included in Table 6.3-2. This data represents only partial statistics as not all trapline holders report details on their trapping activities.

Figure 6.3-2 Trapping Concessions in the Project Area



Carmacks-Stewart/ Minto Spur Transmission Project

YUKON ENERGY

Legend

- Town
- Route Study Area
- Road
- Water Course
- Water Body
- Parks and Protected Areas
- Registered Trapping Concession

Digital Data Source:

Registered Trapping Concession data downloaded (August 2005) from Geomatics Yukon website:
http://environmentyukon.gov.yk.ca/geomatics/envydata.html
Source: Geomatics, Environment, Yukon Government

Parks and Protected Areas data downloaded (January 2006) from Yukon Department of Environment website:
http://environmentyukon.gov.yk.ca/geomatics/govdata.html Source: Geomatics, Environment, Yukon Government

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http://environmentyukon.gov.yk.ca/geomatics/govdata.html Source: Geomatics, Environment, Yukon Government

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Route study area obtained from YEC, 2006.

NTS Sheets 115I, 115P, 105L, 105M
UTM Zone 8 NAD83

Registered Trapping Concessions

Scale: 1:275,000
(when plotted at 24"x28", orginal map on cd provided with final document)

0 2.5 5 10 15 20 25 km

Drawn By: HD
Checked By: DC/NL
Date: August 2006

InterGroup
ACCESS

A typical trapping concession would be held by an individual, although numerous trapping assistants may also trap in the area. Trapping assistants are granted licences through the local area Conservation Officer. In some cases, it is the trapping assistant and not the registered concession holder that undertakes the majority of activity in an area.

It is difficult to determine the level of harvest activity on each concession from year to year and a variety of factors may contribute to fluctuations in activity. Examples that affect trapping activities include:

- limited access to trapping areas due to late freeze-up of water bodies;
- low snow levels making travel difficult;
- wildlife population cycles changing due to weather, or the availability of food; or
- socio-economic conditions such as low fur prices, high fuel costs, better earnings from other opportunities, personal reasons, etc. (Personal communication, Environment Yukon, August 9, 2006).

The wildfire that burned in the area near Pelly Crossing in 1995 had a major effect on the habitat, wildlife and access to trapping areas for several years. One trapper with a concession affected by the fire indicated that he and the other users of the area took three to four years off from trapping; however, after that time certain species started to return to the area. The trapper indicated that moose are beginning to return to the area now, along with various predator species. Other species, like marten, will require more forest re-growth before they reappear (Personal communication, Trapper, August 9, 2006).

A trapper will use a series of trails within their concession and alternate the use of trails from year to year in order to encourage species to return to an area that was previously trapped. New trails may be created to adapt to a change in species movement (Personal communication, Trapping Assistant, July 13, 2006). On average a concession will have 73 kilometres of trapping trails and use an average 38 kilometres of trapping trails in one year (Government of Yukon, 1997). Trails are generally accessible from the highway, although many can also be accessed from local communities. Some trapping trails are dependent on freeze-thaw cycles as they are located across water bodies with no road access.

Trapping activity occurs primarily in the winter months, with open season for each species varying slightly. A summary of the trapping season for each species is provided in Table 6.3-4. Each trapper has their own preference for travel in the winter, with some working their trails by foot or by snowshoe and others relying on snowmobiles. Traplines are also used for other purposes throughout the year. They may act as locations for, or access points to activities such as berry picking, hunting and fishing (Personal Communication, Trapping Assistant, July 13, 2006).

Table 6.3-4
Open Trapping Season by Species

Species	Open Season
Beaver	Oct 1 - May 31
Fisher	Nov 1 - Feb 29
Fox - red, cross, silver	Nov 1 - Mar 10
Fox - arctic	Nov 1 - Mar 31
Lynx	Nov 1 - Mar 10
Marten	Nov 1 - Feb 29
Mink	Nov 1 - Feb 29
Muskrat - S. of Arctic Circle	Oct 1 - May 31
Otter	Nov 1 - Mar 31
Squirrel	Nov 1 - Mar 31
Weasel	Nov 1 - Mar 31
Wolverine	Nov 1 - Mar 10
Wolf	Nov 1 - Mar 10
Wolf - neck snare only	Nov 1 - Mar 31
Coyote	Nov 1 - Mar 10

(Source: Environment Yukon, 2005b)

Trapping is an important activity in the Yukon, with an economic value that has fluctuated from $250,000 to $1 million annually over the past two decades (Government of Yukon, 2005). It is an important source of revenue for many communities, including those which fall within the project area. Many community members that engage in trapping sell their furs to the **Yukon Trapper's Association** (**YTA**). The YTA provides a choice of three auction houses and fur markets for the raw skins and furs that are trapped. As the agent to the three auction houses, the YTA can provide advance money to trappers prior to the sale of their furs. This system can be advantageous to the trapper, especially early in the season, as it provides working capital for trapping supplies, food, fuel, etc.

The international fur market has fluctuated regularly in recent years, with external factors such as the strength of the Canadian dollar and the demand (or lack thereof) for fur in the fashion industry, influencing the overall outcome of a trapping season's cash value. Given that the demand is constantly changing, trapping activities are often geared towards the species that will fetch the best price. A summary of fur prices per species over the past 10 years is provided in Appendix 6E.

Given that fur prices have fluctuated, and in some cases are considered low, a local fur market has evolved in Project Study Region communities over the years. By way of example, many trappers will catch wolves, have them tanned locally, and then deal directly with a buyer or a store, consequently receiving a better price. Many pelts are tanned locally and used for items such as garments, dolls and paintbrushes (Personal Communication, D. Bradley, July 12, 2006). The value of these products is often greater than the price of the pelt alone.

Other uses of the animals trapped vary from trapper to trapper. Some trappers will eat certain species (e.g., beaver, gopher) and many will use the meat as dog food or as bait for future traps. Certain species also have medicinal and cultural values to the First Nations in the region.

The multitude of ways that trapped species are used helps to reinforce the fact that trapping has significance beyond the economic income it provides. It is considered as a significant component of life to many Yukoners. A 1996 survey completed by the Yukon Territorial Government found that 50% of trappers see trapping as a way of life: 37% consider trapping their winter job and 12% view trapping as a form of recreation (Yukon Government, 1997). It is also an activity that is passed on from generation to generation, especially in First Nation communities.

Hunting

Hunting is an activity undertaken by Yukon First Nations, Yukon residents, and non-residents for a host of reasons ranging from subsistence to sport. Recent land claims agreements allow First Nation members to hunt within their traditional territory with no restrictions (such as bag limits or seasonal limitations); although a licence and/or written permission from another First Nation (if the activity takes place in their traditional territory) is required if they choose to hunt outside of their traditional territory. Yukon-residents and non-residents require a licence for hunting and non-residents must be accompanied by a registered Yukon outfitter or a resident holding a Special Guiding Licence. Additionally, written permission for non-First Nation hunters is required for hunting activities on all Category A settlement lands (Environment Yukon, 2005(a)).

The Yukon is divided into a series of Game Management Zones and Game Management Areas. The Route Study Area crosses 3 zones and 6 areas (Figure 6.3-3). Regulations for hunting apply to each zone. The zones are:

- Zone 4: on the east side of the Klondike Highway between Carmacks and Stewart Crossing;
- Zone 3: beginning near Minto and including the area west of the Klondike Highway to Stewart Crossing; and
- Zone 2: the area north west of and including Stewart Crossing.

Each of these zones has licence requirements, seasonal restrictions and bag limits for all non-First Nation hunters. In Zone 4 there are additional restrictions that apply to the Route Study Area; this includes moose hunting restrictions near Ethel Lake and no hunting permitted in the Ddhaw Ghro Habitat Protection Area. Further, there is a voluntary no-hunting request for the Ethel Lake Caribou herd, which includes voluntary compliance on behalf of NND and SFN.

Hunted species across the Yukon can be classified as big game (moose, caribou, grizzly bear, black bear, polar bear, wood bison, mountain sheep, mountain goat, wolves, wolverines and coyotes), small game (snowshoe hare, arctic ground squirrel, porcupine, grouse and ptarmigan), and migratory birds (ducks, geese, rails, coots, sandhill cranes and snipe). Other species not listed are either protected or, in the case of certain small fur bearing animals, could require a trapping licence.

The hunting traditions of First Nation peoples in the Yukon have evolved out of their intimate relationship with the land. It is noted that, "[t]hrough wise use of local resources, the first people of the Yukon were able to feed, cloth, and shelter themselves while developing rich communities and cultures" (Yukon Environment, 2005(a)). While the equipment used for hunting has significantly changed over the past 200 years, the ways in which the harvest is used has remained the same. Wildlife are respected and given thanks and as much of the animal is used as possible, whether it be eaten or otherwise. There is a "general understanding of sharing the resource and people taking only what they (need)" (LSCFN Lands & Resources Department, 2002).

Hunting activities in the Yukon were assessed in the *Hunter Effort Survey* (Department of Renewable Resources and the Yukon Bureau of Statistics, 2000). The survey asked questions to determine what species were hunted and where, how hunting was accomplished, and how much money was spent on the activity. Moose was considered as the most important species to 72% of the hunters surveyed and it was also the most commonly hunted species (by 90% of hunters). While Caribou was hunted by 60% of the hunters surveyed, it was only considered the most important species by 10% of hunters. The methods of hunting depend on the species sought, with almost two-thirds of respondents reporting that they generally used a boat to hunt. Hiking and driving were the hunters' second and third preferred methods. The majority of hunters (86%) hunted with a partner(s), and 83% of that number had intentions to share the animal. The survey found that hunters reported spending an estimated $2.2 million to go hunting, with an average of $610 per hunter.

<u>Fishing</u>

Fishing is a popular activity in the Yukon and includes commercial, domestic, aboriginal and recreational activities. Within the Project Study Region, there are several fish-bearing water bodies which are used regularly. A summary of these water bodies and the species typically fished (according to the Yukon Fishing website) is provided in Table 6.3-5.

Table 6.3-5
Fishing Locations and Species Found in the Project Study Region

Water Body	Species Fished
Tatchun Lake	Northern pike
Tatchun Creek	Arctic grayling, Chinook salmon spawning area in September
McGregor Creek	Arctic grayling, Chinook salmon, Whitefish
McCabe Creek	Arctic grayling, Chinook salmon, Whitefish
Von Wilczek Creek	Northern pike
Crooked Creek	Arctic grayling
Stewart River	Salmon
Pelly River	Arctic grayling, Chinook salmon
Yukon River	Arctic grayling, Chinook salmon
Big Creek	Arctic grayling
Minto Creek	Arctic grayling

(Source: Environment Yukon, Fishing in the Yukon, 2006).

The Tatchun Creek area between the Yukon River and Tatchun Lake is a known chinook salmon spawning area. This creek is closed to all fishing from August 1 to September 30 of each year. The area around the mouth of Tatchun Creek is one of the most popular sport fishing locations in the Yukon Territory, accounting for over 80% of the chinook salmon caught in the Upper Yukon (Yukon Salmon Committee, 2002).

Other fished species in the Project Study Region include Arctic grayling, whitefish, inconnue, burbot, Northern pike (in lakes), and Long-nosed sucker. The Arctic grayling, Long-nosed sucker and the Northern pike generally spawn in the spring and the whitefish spawn in the fall to early winter (Finster, 2003).

Historically, salmon was one of the most important sources of food for the First Nations in the Project Study Region, and fish were traditionally caught in fish traps or by strategically placing fish wheels in large streams and rivers. Fish were then dried and smoked and stored in order to outlast the winter months. (LSCFN Lands and Resources Department, 2002)

Minto, near the current location of Minto Landing, was considered a key dog (chum) salmon camp for the Selkirk people (Government of Yukon, Tourism and Culture, 2002),. The Little Salmon River, the Nordenskiold River and Tatchun Creek were significant locations for fishing by the LSCFN. The mouth of the Stewart River was the site of a traditional fish camp for the NNDFN. As indicated earlier, when the salmon run arrives in late July entire communities vacate and move to fishing camps and cabins.

First Nation members fishing within their traditional territory do not require a fishing licence; however, fishing is subject to regulation by each First Nation. Fishing in areas outside of one's traditional territory requires a licence. Separate rules apply for salmon fishing which is dealt with separately under the Final

Agreement. An example of First Nation led regulations is a Salmon Doo'Li completed by the LSCFN in 2002 (see Reference Materials 6R-8).

It is a common concern among the First Nations in the Project Study Region, and throughout the Yukon, that catch-and-release management of fish stocks can hurt and kill fish (Little Salmon Carmacks First Nation et. al, 2004; Nacho Nyak Dun et. al, 2002). The use of barbless hooks is now recommended by Environment Yukon as per a recommendation based on public consultation from the Yukon Fish and Wildlife Management Board (YFWMB, 2002); however, there are still concerns in First Nation traditional territory, especially with regard to live angling practices. Generally speaking, First Nations feel that fish that are taken should be kept and eaten.

Collection of Plants

In the past, collection of various plants and berries was an important component of the subsistence lifestyle led in the Project Study Region. Plants regularly consumed in the past include certain roots (e.g. bear root), berries (e.g. soapberries, high bush cranberries, blueberries, raspberries), young leaf shoots and mushrooms (Yukon Government, 2002). Today, berries continue to be a commonly harvested plant, with blueberries, raspberries and high bush cranberries topping the list of most commonly consumed (Receveur et. al, 1998). Transmission line corridors were identified as a location for excellent blueberry growing conditions.

Many plants were also used for medicinal purposes by the First Nations in the Project Study Region. For example, white spruce buds, when first grown, can be made into a tea with general antiseptic properties (personal communication, LSCFN member, June 22, 2006). Tea from the bark of high bush cranberry can be used to relieve menstrual and stomach cramps (Yukon Government, 2002). Most of the medicinal plants commonly used in the Project Study Region are commonly found throughout the boreal forest. Much of the information related to the subject today is held as traditional knowledge by the various First Nations.

As wild fires are an inevitable aspect of the Yukon's boreal forests, there is potential to grow the morel mushroom industry in the Project Study Region. Morels tend to grow in abundance in burned areas in the spring following a summer fire. The morel has a steady demand in European and Japanese cuisine and the Yukon stands to become a part of the morel-exporting industry. At present morel pickers come generally from outside of the Yukon, although there is opportunity for local employment and production capacity in the future (Yukon Economic Development, 2005).

Timber Harvesting

The majority of merchantable forests in the Yukon are located south of the 61st parallel (i.e., well south of the Project Study Region), as most of the forested lands north of this line are influenced by cold soils, poor drainage and aggressive fire regimes (Energy, Mines and Resources, 2006d). Thus, there are limited timber harvesting activities within the project area. Maps identifying forest cover within the Project Study Region are located in Appendix 6C.

There are 3 timber (or commercial) permits within the Project Study Region, two of which are considered as active (Personal communication, Forest Management Branch, June 2006). These permits are for volumes less than $1000m^3$ and are aimed to supply local business needs such as firewood sales, saw-milling, house building or other small ventures.

Personal use timber permits are far more common in the Project Study Region. This allows an individual to cut 25 cords of wood for personal use. Typical harvest methods for personal use involve a chainsaw and a pickup truck and many of the burned areas in the Project Study Region are popular harvesting sites (Personal communication, Forest Management Branch, June 2006). Home heating is typically accomplished by fuel wood burning, and as such, personal timber harvesting is a common-place activity. All of the Project Study Region communities have small milling capabilities.

The communities in the Project Study Region expressed interest in having access to the merchantable and fuel-wood timber that would be removed during the construction phase of the Project.

Protected Areas

There are two protected areas and one Park Reserve in the Project Study Region: the Lhutsaw Wetland Habitat Protection Area, The Ddhaw Ghro Habitat Protection Area, and the Jackfish Lake Park Reserve.

The Lhutsaw Wetland Habitat Protection Area is located southwest of Pelly Crossing in the central Yukon. The area covered is approximately 15 km in length and 2.5 km across and consists of a series of freshwater lakes, ponds, and lands. The Lhutsaw Wetland Area was established as a special management area under the Selkirk First Nation Final Agreement, and the management plan for the area delineates a series of recommendations for various land uses in the habitat protection area. It includes the maintenance of both the natural and cultural environment (Selkirk First Nation Government and Government of Yukon, 2006).

The Ddhaw Ghro Habitat Protection Area is an isolated mountain range in the central Yukon covering approximately 1600 km^2 between the Pelly and Stewart Rivers. Meaning “many peaks” in Northern Tutchone, the Ddhaw Ghro area had important cultural and spiritual values to the First Nations in the region. The area has been managed by traditional law for many generations. The Ddhaw Ghro area was identified to become a Habitat Protection Area under the NNDFN and SFN Final Agreements, and a draft management plan is currently under public review. The vision for Ddhaw Ghro is to leave it as a natural area that remains untouched by industrial development (Ddhaw Ghro Habitat Protection Area Steering Committee, 2006).

Jackfish Lake Park Reserve is not a designated parkland area under The Yukon Parks & Land Certainty Act and it is not actively maintained parkland. The Jackfish Lake Park Reserve is located west of the Klondike Highway, approximately 30 kilometres north of Pelly Crossing. It is a 73.8 ha parcel of forested land reserved “for campground purposes”. It is primarily comprised of aspen and spruce and has been reduced from the original 206 ha due to a Selkirk First Nation’s site specific claim to the north. Rough and unmaintained road access is available to Jackfish Lake.

Outdoor Recreation

Residents in the Project Study Region are able to participate in multiple wilderness activities. There are many access points for hiking, snowmobiling, and boating. Additionally, hunting, fishing and trapping activities are still very important components of community life (Yukon Community Profiles, 2004).

Summer is when most people spend time out on the land together in the Project Study Region. When the salmon run occurs in mid-summer most of the residents of Carmacks and Pelly Crossing vacate the community and move to cabins and fish camps near the river.

6.3.2.2 Commercial Land Use

The Project Study Region falls in an area with limited existing commercial land uses. The primary activities considered in this section include tourism, outfitting, commercial fishing, agriculture, mineral and aggregate extraction and oil and gas extraction.

Tourism

Tourists in the Yukon may experience a variety of opportunities ranging from scenic drives, to wildlife viewing, to wilderness canoeing, to visiting historic sites. Visitor exit surveys indicate that the majority of tourists come to view natural attractions, visit museums and historic sites and shop. Other activities include experiencing First Nation Culture, walking/hiking/backpacking, wildlife watching, and gold panning (Department of Tourism and Culture and the Yukon Bureau of Statistics, 2006). Estimated annual tourism revenues in the Yukon exceed $124 million annually and at least 70% of all private sector industries report some level of tourism-related revenue. An estimated 2000 tourism-related jobs exist at approximately 1180 Yukon businesses (Yukon Government, 2000). In the Project Study Region, there are several forms of tourism that contribute to the economy, including recreational touring, wilderness tourism, and outfitting.

The Project Study Region falls within two tourism areas as identified by Yukon Department of Tourism, with the majority of the area falling in the Campbell Region and the Silver Trail Region beginning at Stewart Crossing. Both areas have a long history of mining and are associated with a rich Aboriginal history extending back more than 10,000 years. Both areas are part of scenic driving routes in the Yukon, and account for a large proportion of tourism activities in the area. Further detail on the Campbell and Silver Trail regions can be found in Reference Materials 6R-9. The CS Route Study Area traverses the Campbell Region and terminates at the start of the Silver Trail Region.

Aside from scenic drives, tourists can also experience Yukon's vast wilderness through an assortment of activities. Aside from the campgrounds at Carmacks, Tatchun Creek, Pelly Crossing and Stewart Crossing, the Project Study Region offers opportunities for canoeing, dog sledding and outfitting.

Canoeing primarily takes place on the Yukon River, although the campground at Pelly Crossing is a common exit point for river trips originating further east. The Yukon River's blend of scenery, wildlife and history, ease of access and easy paddling make it the most popular canoe route in the Territory for guided and self-guided river trips. The River has many campsites, visible relics of Yukon's gold rush, river travel history, and visible evidence of ancient and current Yukon First Nation use of the River. Most canoe trips take place between Whitehorse and Dawson (~ 14 days), while shorter trips may start or stop in Carmacks (Personal Communication, Department of Tourism and Culture, May 2006). The MS Route Study Area crosses the Yukon River south of the barge landing at Minto.

Between 1999 and 2004, 13-18 licensed operators guided 225-300 clients on multi-day canoe trips on the Yukon River. Over 25 different companies market Yukon River trips each year. In addition, self-guided travelers rent or bring their own canoes. The Yukon River Survey (Yukon Government, 1997) found that over 60% of river travelers (including Yukon residents) used rental canoes. In 2004, 1,245 tourists rented canoes for their Yukon River trip. From 2000 to 2004, 3-4 operators guided 5-30 clients on multi-day canoe trips on the Pelly River (150-350 user days). Self-guided data is not available (Personal Communication, Department of Tourism and Culture, May 2006).

In the winter, dog sledding offers tourists a unique wilderness experience. The Project Study Region is in the vicinity of a section of the Yukon Quest Trail which, aside from being a world class dog sledding race course, is also open for tourism purposes. The race course covers 1,000 miles between Whitehorse and Fairbanks, Alaska during a two week period in February and has been described as the "Toughest dog sled race in the World" (Yukon Quest International, 2006). The race course varies slightly from year to year and requires a 4-foot wide trail to be set several weeks before the race (Personal Communication, Yukon Quest, June 2, 2006). Nine Yukon-based operators market winter trips along the Yukon Quest Trail (Personal Communication, Department of Tourism and Culture, May 2006). In the Project Study Region the trail follows the west side of the Yukon River between Carmacks and Pelly Crossing, crossing the river north of McCabe Creek. The course then deviates from the general vicinity of the Project and follows the Dawson Overland Trail onwards towards Alaska.

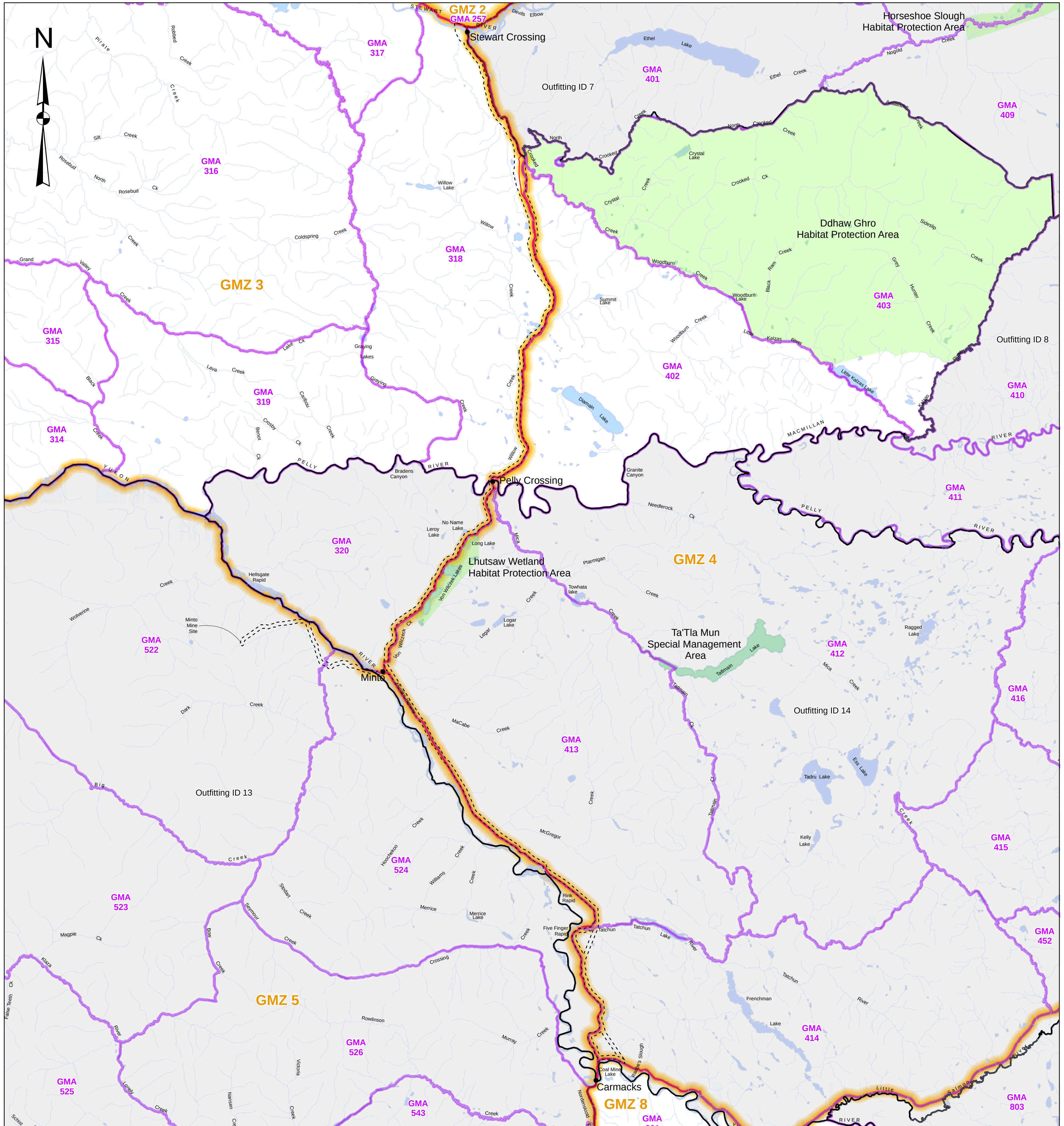
Outfitting

Outfitting is a stable, long term component of Yukon hunting and accounts for a proportion of tourist traffic to the region. Guided trips of non-residents are recorded as far back as 1912. In 1958, the present system of outfitting concessions was established (Yukon Outfitters Association, 2006). There are three outfitting concessions in the Project Study Region:

- Trophy Stone Safaris (generally on east side of Yukon River between Carmacks and Pelly Crossing),
- Mervyn's Yukon Outfitting (generally on west side of Yukon River, including area of the MS development), and
- Rogue River Outfitters Ltd. (generally west side of Yukon River north of Ddhaw Ghro Habitat Protection Area and up to Stewart Crossing).

The location of the outfitting concessions is provided in Figure 6.3-3. A summary of the activities within these outfitting concessions is provided in Table 6.3-6.

Figure 6.3-3 Outfitting Concessions and Game Management Zones and Areas in the Project Study Region



Carmacks-Stewart/ Minto Spur Transmission Project

YUKON ENERGY

Legend

- Town
- Route Study Area
- Road
- Water Course
- Water Body
- Parks and Protected Areas
- Game Management Area (GMA)
- Game Management Zone (GMZ)
- Outfitting Concession

Digital Data Source:

Outfitting Concession data downloaded (July 2005) from Geomatics Yukon website:
http://environmentyukon.gov.yk.ca/geomatics/envydata.html
Source: Geomatics, Environment, Yukon Government

Game Management Area data downloaded (July 2005) from Geomatics Yukon website:
http://environmentyukon.gov.yk.ca/geomatics/envydata.html
Source: Geomatics, Environment, Yukon Government

Parks and Protected Areas data downloaded (January 2006) from Yukon Department of Environment website:
http://environmentyukon.gov.yk.ca/geomatics/govdata.html Source: Geomatics, Environment, Yukon Government

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Route study area obtained from YEC, 2006.

NTS Sheets 115I, 115P, 105L, 105M
UTM Zone 8 NAD83

Outfitting Concessions and Game Management Zones and Areas

Scale: 1:275,000
(when plotted at 24"x28", original map on cd provided with final document)

0 2.5 5 10 15 20 25 km

Drawn By: HD
Checked By: DC/NL
Date: August 2006

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Table 6.3-6
Outfitter's Activities in the Project Study Region

Outfitter	Concession Number	Species Hunted	Other Activities	General methods
Trophy Stone Safaris	14	Stone Sheep, Alaska/Yukon Moose, Mountain Caribou, Grizzly Bear, Black Bear, Ptarmigan, Wolf and Wolverine	Fishing can be found in many lakes and rivers throughout the hunting area.	Hunters fly-in to the camp. Hunts are conducted with one guide assigned to each hunter and are conducted by horseback
Mervyn's Yukon Outfitting	13	Moose, Mountain grizzlies, Wood Bison, Dall sheep and Mountain Caribou.	Mervyn's does not focus on wolf, wolverine and black bears, however any or all of these animals may be seen during the hunt, and are included during regular fall hunts. In addition to hunting, this area has some excellent fishing. Some fishing trips are also offered in the summer.	Hunters will fly-in to the camp and then be guided by horseback.
Rogue River Outfitters Ltd	7	Trophy moose, caribou, grizzly bear, black bear and sheep.	While hunting other big game species, hunters may also have a chance to take a wolf or wolverine. While in the area hunters may also fish for the many species of fish found in the lakes and streams.	Fly-in to the base camp and then hunt by horseback or boat

(Source: Mervyn's Yukon Outfitting, 2006. Rogue River Outfitters, Ltd 2006. Trophy Stone Safaris, 2006)

The Yukon Outfitter's Association indicated that activities undertaken by their members occur largely in remote areas. Hunters come to the Yukon for the experience of being the only party in a given location; the Yukon is also attractive to hunters because the perception of wilderness is paramount. As such, the areas used by the Project Study Region outfitters fall far from the Study Route Area, which parallels the Klondike Highway (Personal communication, Yukon Outfitter's Association, June 7, 2006).

Commercial Fishing

The species of greatest economic importance include the chinook and chum salmon. Fisheries generally target the chinook and chum salmon runs on the Yukon River. The portion of the catch that is allocated to fisheries is dependent upon the size of the salmon run crossing the Yukon/Alaska border. The fishery is regulated by the joint Canada and United States "Yukon River Salmon Agreement". According to the Agreement, "Both countries agree to manage their salmon fisheries to ensure enough spawning salmon are available to meet escapement requirements and to provide for harvests, when possible, according to harvest sharing agreements" (Yukon River Drainage Fisheries Association and the Yukon River Panel, 2005). An important component of this agreement is maintaining salmon habitat in the Yukon River watershed. In the Project Study Region this includes spawning habitat and rearing habitat. Along with the chinook and chum salmon species there are also smaller numbers of coho salmon harvested. Table 6.3-7 provides summarized data on Mainstem Yukon River Harvest for the commercial, domestic, Aboriginal and sport fishery by decade.

Table 6.3-7
Commercial, Domestic, Aboriginal and Sport Harvest Data of Chinook and Chum Salmon

	Canada						
	CHINOOK Mainstem Harvest				CHUM (FALL) Mainstem Harvest		
Year	Commercial Harvest	Domestic Harvest	Aboriginal Fishery	Sport Harvest	Commercial Harvest	Domestic Harvest	Aboriginal Fishery
Total # Harvested							
1961-1970	25,831	n/a	44,661	n/a	22,119	0	29,375
1971-1980	38,824	6,958 [2]	31,659	300 [3]	38,573	14,293 [2]	21,645 [6]
1981-1990	108,709	3,411	68,898	3,350 [4]	238,644	4211 [4]	24,087
1990-2000	74,332 [1]	2,086 [1]	71,845	4,097 [1]	166,647	n/a	24,061
2001-2005	12,582	416	33,534	1,142	33,589	3 [5]	11,733
Overall total	*260,278*	*12,871*	*250,597*	*8,889*	*499,572*	*18,507*	*110,901*
Average Annual							
1961-1970	2,583	0	4,466	0	2,212	0	2,938
1971-1980	3,882	696	3,166	30	3,857	1,429	2,165
1981-1990	10,871	341	6,890	335	23,864	421	2,409
1990-2000	7,433	209	7,185	410	16,665	0	2,406
2001-2005	2,516	83	6,707	228	6,718	1	2,347
overall avg	*5,784*	*286*	*5,569*	*198*	*11,102*	*411*	*2,464*

Notes:
1. 2000 data is missing
2. 1971-1973 data is missing
3. Data is only for 1980.
4. 1998 data is missing
5. Data is only for 2001.
6. 1972 data is missing.

(Source: Yukon River Joint Technical Working Group Database 1977-2004)

The total catch for the commercial and domestic fisheries (U.S. and Canada) has been declining over the last three decades, while the aboriginal fishery has remained fairly stable (Yukon River Joint Technical Committee Data, 1997-2004). There is one commercial fishing licence in the Project Study Region which covers an area upstream of the White River to 800 metres downstream of the confluence of Tatchun Creek and the Yukon River (Personal communication, DFO, July 2006).

The economic significance of commercial Yukon salmon fisheries is estimated to be approximately $126,000 in recent years (Personal communication, DFO, October 10, 2006).

Agriculture

Less than 2% of the Yukon’s total area is suitable for agricultural development due to limitations presented by geography, soils and climate. Soil-based agriculture is largely limited to major river valleys such as the Yukon, Pelly and Stewart rivers. Yukon soils tend to be low in organic material content as well as deficient in nitrogen and phosphorus. The sub-arctic, continental climate limits the number of frost-free days; however, long daylight hours in the summer help to promote rapid summer growth and compensate for the shorter growing season and cooler temperatures (Yukon Agriculture, 2004).

The total area of titled agricultural land in the Yukon is 12,370 hectares. Utilization of this land includes natural lands for pasture (35%), seeded pasture (4%), crops (23%), summer fallow (2%) and various other purposes (36%). Most agricultural applications are located in the vicinity of major communities and over 70% of all farms are located within 100 kilometres of Whitehorse (Yukon Agriculture, 2004).

Immediately adjacent to the CS Route Study Area, there are three applications (which would constitute two parcels of land) (Energy, Mines and Resources, 2006(a)). It is our current understanding that one of the applications located at McGregor Creek is currently being challenged by LSCFN. There is also an agricultural holding listed as an Agreement for Sale, a portion of which falls within the CS Route Study Area near McCabe Creek. Of the active agricultural holdings, there are a variety of agricultural production activities. This includes production of vegetables, forage crops and livestock such as pork, beef, poultry (including eggs) and other special meats (Energy, Mines and Resource, 2006(b)).

Mineral and Aggregate Extraction

The Yukon has a long history of mining activities which have been the cornerstone of the economy since the gold rush of 1896-1898 although prospecting activities date back even further. The territory has experienced several boom-and-bust cycles associated with the rise and fall of metal prices over the years. The Yukon is a mineral-rich area, host to significant deposits of gold, copper, iron, lead, tungsten, zinc, coal and silver. Mining activities in the territory are regulated by the Yukon government, Mineral Resources Branch (Energy, Mines and Resources, 2006). A brief history of mining in the Project Study Region can be found in Reference Materials 6R-9, along with further details on the economic development of the Central Yukon as provided in the Heritage Resources Inventory in Appendix 6H.

The current active claims in the region date back to the early 1970s; however, there is no record of mining, except for gravel and coal, within the Route Study Area. Currently the Tantulus Butte property is licensed by Cash Resources Ltd. and the company lists it as "coal exploration concessions" (Cash Minerals Ltd., 2005). Yukon Geological Survey (2005) lists the deposits as inactive with production shifted to the surface following the 1978 fire (Yukon Geological Survey, 2005, p. 14). It has been reported locally that the coal is still burning underground, and steam, accompanied by strong gases, has been observed escaping from Tantalus Butte in the winter (Personal communication, Carmacks community member, June 22, 2006). It is not clear if the above-ground access to the coal is active or not; however, there has been recent exploration work on Tantalus Butte by Cash Resources Ltd. (Cash Minerals Ltd., 2006). There is also an inactive coal mine called South Tantalus located 2 km SE of Carmacks which is licensed by Archer, Cathro and Associates (1981) Limited (Yukon Geological Survey, 2005 p. 13).

Western Copper Corporation holds "240 quartz claims, quartz claim fractions, quartz leases and quartz lease fractions" in the Dawson Range. This is approximately "38 km northwest of the town of Carmacks" (Cavey, Gunning, and Clegg, 2006, p. 2). This site is accessed from Carmacks 33 km down a gravel road (the Freegold Road) followed by 12 km of exploration road (Yukon Geological Survey, 2005).

The Minto Mine project is owned by Sherwood Copper Corporation. This property is located 76 km NNW of Carmacks in the upper reaches of the Minto Creek watershed; access is facilitated by barge from Minto Landing across the Yukon River to a gravel access road that leads to the mine site.

The Minto claims are anticipated to come into production in 2007 and to benefit directly from Stage One of the Project when it is developed in 2008. The Carmacks Copper mine (Williams Creek claims) is another possible near-term development that could potentially benefit from the CS Project development (subject to development of a 138 kV spur line in future from the Carmacks Copper mine to the CS development in the McGregor Creek area).

There is a small group of six active quartz mining claims between the Minto claims area and the Western Copper claims area called Spring 1-6. The claims are owned by Shawn Ryan, a well known prospector out of the Dawson area (Energy Mines and Resources, 2006(c)).

Table 6.3-8 summarizes other known deposits in the Project Study Region. None of the known mineral reserves are active mines at this time.

Table 6.3-8
Known Mineral Deposits in the Project Study Region

Deposit Name	Mineral	Location	Status	Discovery date
Williams Creek (Carmacks Copper)	Copper, Gold	36 km NNW of Carmacks	EA/licensing stage	1970
Minto	Copper, Silver, Gold	76 km NW of Carmacks	construction and site preparation stage	1971
Nucelus	Gold	61 km NW of Carmacks	active exploration site	1968
Laforma	Gold	48 km NW of Carmacks	inactive past producer	1931
Tinta Hill	Silver, Lead, Zinc, Copper, Gold	43 km NW of Carmacks	active exploration site	1930
Cash	Copper, Molybdenum	79 km NW of Carmacks	Deposit, withdrawn from staking. SFN settlement lands	1969

(Source: Yukon Geological Survey, 2005)

In addition to mineral extraction, aggregate materials are mined throughout the Project Study Region. The Yukon Government Department of Highways has 23 notations related to aggregate materials in the project region (see Reference Materials 6R-9), which are used for a variety of purposes including active gravel quarry pits, stockpiles, reserves and maintenance yards. The First Nations also use various locations for aggregate extraction in their settlement land areas but these locations are not catalogued. The Project will cross seven gravel pits; however, ongoing consultation on route refinement with the Department of Highways will ensure no adverse effects will occur on activities at those locations.

<u>Oil and Gas Extraction</u>

The first recorded active petroleum exploration was in the 1950s. Exploration was ongoing sporadically, until 1981, consisting largely of evaluation of the stratigraphic sections for petroleum prospectivity. Since 1981, no permits have been issued for the Project Study Region. There are currently no active oil or gas developments in the Project Study Region.

Studies of the Whitehorse Trough (see Reference Materials 6R-9) over the last fifty years have indicated that this is an “immature, mainly gas-prone basin containing an estimated 25,000-116,000 million cubic metres (0.9-4.1 Tcf) of gas (although no petroleum wells have been drilled)” (Lowey, 2004). The Whitehorse Trough extends a short distance north of Carmacks where there are known coal deposits. These coal deposits have “potential for gas from coal methane” (Energy, Mines and Resources, 2005). “During 2004 a two dimensional seismic survey was jointly funded by Yukon Geological Survey and

Geological Survey of Canada across the northern part of the Trough. Results from the survey are still pending" (Energy, Mines and Resources, 2005).

6.3.3 Economy

This section considers the economic components and activities in the Project Study Region including the local economy (local employment and training, and local business) and the regional economy (government fiscal flows and utility ratepayers). It addresses the socio-economic components set out in the *Guide to Socio-Economic Effects Assessments*, which states:

> To characterize the relevant economic baseline, the assessor should describe the current economic setting in the project area from the perspectives of a) individuals, b) businesses, and c) government, and in the context of the selected VESECs and socio-economic variables.

The sources of information relied upon include a review of existing data sources and key person interviews. Statistics Canada data presented in tables in this section has been suppressed for confidentiality reasons (see Appendix 6D for detail).

6.3.3.1 Local Economy

Baseline information is provided for two local economy VCs:

- Local Employment and Training
- Local Business

<u>Local Employment and Training</u>

Baseline information on local labour force characteristics are reviewed below, including labour force participation, employment and unemployment, income and education.

The 2001 Census provides limited labour force information regarding the local communities (Carmacks, Pelly Crossing, Stewart Crossing and Mayo) in the Project Study Region. More recent updated information is typically not available for this region.

<u>Labour Force Participation, Employment and Unemployment</u>

Key labour force characteristics[11] in 2001 from the Census are summarized below for the Project Study Region communities (details for each community are provided in Appendix 6F):

[11] The active labour force for the Census is defined by Statistics Canada (2001) as the number of people in the potential labour force who were either employed, or unemployed and looking for work, in the week prior to the Census day. Typically, individuals not considered to be part of the active labour force include full-time students, homemakers, retired workers, seasonal workers in an "off-season" who are not looking for work and individuals with disabilities or illnesses that preclude them from being able to work.

- **Unemployment rate**[12]: averaged about 21.7% in 2001 for these communities (well above the Yukon average of 11.6%) and ranged from 9.3% in Mayo to 26.7-30% in Carmacks and Pelly Crossing and 50% in Stewart Crossing.
- **Employment rate**[13]: averaged about 55% for these communities (well below the Yukon average of 70.6%), and ranged from 64.9% in Mayo to 54-57% in Carmacks and Pelly Crossing and 42.9% in Stewart Crossing. Relatively little work in the area is full-time and year-round, reflecting the lack of long term job opportunities and the seasonal nature of many jobs.
- **Participation rate**[14]: compared to the Yukon average of 79.8%, ranged from 81.6% in Pelly Crossing to 73.8-75.4% in Carmacks and Mayo and 57.1% in Stewart Crossing.

Recent reports from the Yukon Bureau of Statistics (2006) indicate that the unemployment rate across the Yukon is now at 4.9%, and thus well below the 2001 Census estimate of 11.6%. Updated statistics for each community were not available from the Bureau.

Income

Income information for 2000 from the 2001 Census is summarized below for the three major Project Study Region communities (details for each community are provided in Appendix 6F):

- **Median total income per capita**: averaged about $17,600 in these Project Study Region communities (ranging from $16,277 at Pelly Crossing to $19,051 at Mayo), below the overall Yukon average at $26,488.
- **Average earnings (all persons with earnings (e.g., wages or salaries))**: averaged about $22,008 in these Project Study Region communities (ranging from $19,697 at Pelly Crossing to $24,273 at Mayo), below the overall Yukon average at $31,526.
- **Government transfers as % of income**: averaged about 15.6% in these Project Study Region communities (ranging from 16.5% at Pelly Crossing to 14.3% at Mayo), well above the overall Yukon average at 8.6%.

Education

Education level is another factor that influences an individual's participation in the labour force as well as their level of income. Education information from the 2001 Census for the three major Project Study Region communities indicates the following for the population between the ages of 20-34, 35-44 and 45-64 (details on the highest level of schooling completed for various age groups for each community are provided in Appendix 6F):

[12] The unemployment rate is the percentage of person's unemployed in the labour force in the week.

[13] The employment rate refers to the number of persons employed in the week (Sunday to Saturday) and is expressed as a percentage of the population 15 years and over.

[14] The participation rate refers to the labour force available in the week (Sunday to Saturday), and it is expressed as a percentage of the population 15 years of age and over.

- these age groups in these communities have lower education levels than the rest of the Yukon;
- they are also less likely to complete high school, or to achieve a university certificate, degree or diploma; but
- they are more likely to complete college certificate or diploma programs when compared with other Yukon residents. Part of this may be attributed to satellite campuses of Yukon College in each of the communities.
- Generally speaking, females in these communities are more educated than their male counterparts and they are more likely to attain a university education.

Local Business

Baseline information on local industry labour force and the local traditional economy is reviewed below.

Overview of Industry Labour Force

The economy in the Project Study Region is somewhat limited in range of industry employment opportunities. A summary of experienced labour force by industry sector in 2001 (from the Census) is provided for each community in Table 6.3-9.

In Carmacks, Pelly Crossing and Mayo, health, education and other services, which include government, account for the largest proportion of industry labour force. The exception to this is Stewart Crossing, which acts primarily as a service station along the Klondike Highway, with a Yukon Government Department of Highways service yard.

Carmacks acts as one of the few supply stops along the Klondike Highway and it is also becoming a re-supply point for boating trips from Whitehorse to Dawson. This helps to account for a large proportion of people working in the service industry. Government and social services provides the bulk of employment for the people of Carmacks and the LSCFN. Tourism is becoming a sizeable part of the local economy; however, it provides largely seasonal employment opportunities. Mining and mineral exploration also provide various seasonal opportunities (Yukon Community Profiles, 2004). Businesses with licences to operate in Carmacks, in 2006, include Carmacks Towing, Mukluk Manor (bed and breakfast), Berdoe Enterprises, G&A Welding and Cartage, Sunrise Service Centre, Carmacks Development Corporation, THWT Enterprises, Kando Enterprises Ltd, Carmacks Hotel, Tatchun Centre, Gold Panner Restaurant and Roydom Campgrounds among others (Village of Carmacks, 2005).

Pelly Crossing's economy is based on a narrow range of activities, of which government, education and health services provide the majority of opportunities. The main employer is the SFN. It is not uncommon for residents who normally live in Pelly Crossing to move elsewhere for part of the year in order to find work. Fort Selkirk provides seasonal opportunities for employment through restoration and maintenance projects for the historic site and campground. The SFN also owns Minto Resorts at Minto Landing; this is a campground used by tour groups as a rest stop which receives between 10,000-12,000 lunchtime visitors per year (Personal communication, Minto Resorts, August 9, 2006). The types of businesses and services in Pelly Crossing include a gas station, Heritage centre, a seasonal fast food outlet called Penny's, Selkirk Development Corporation and Selkirk Groceries (Yukon Community Profiles, 2004).

As stated earlier, Stewart Crossing acts largely as a highway rest stop and Yukon Government Department of Highways maintenance station, and it has an assortment of businesses geared towards these ends. The businesses and services available in Stewart Crossing include Country Crafts, Crooked Creek Wilderness Tours, Paul Martin Contracting, Stewart Crossing Shell and Whispering Willows RV Park & Restaurant (Village of Mayo, 2006).

Table 6.3-9

Industries in the Project Study Region Communities - Experienced Labour Force (2001)

Industry	**Carmacks**			**Pelly Crossing**			**Mayo**			**Stewart Crossing**		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
Total - Experienced labour force	220	110	105	195	100	95	210	125	85	20	15	10
Agriculture and other resource-based industries	15	10	0	10	10	0	30	20	10	0	0	0
Manufacturing and construction industries	20	20	0	25	25	0	40	35	10	10	10	0
Wholesale and retail trade	10	0	0	10	0	10	10	10	0	0	10	0
Finance and real estate	10	0	0	0	0	0	0	0	0	0	0	0
Health and education	45	0	40	35	10	25	35	10	30	0	0	0
Business services	45	25	15	30	20	15	20	10	10	0	0	0
Other services	85	40	40	85	40	45	65	40	30	10	0	10

(Source: Statistics Canada, 2001a) Note that numbers by industry are rounded in the source to nearest "5"; totals therefore may not add.

In the community of Mayo government services, including First Nation and territorial administration, provide about a third of the employment in the community. Tourism, accounting for 15% of the local employment, is considered as a growing segment of the economy, with options in accommodation, food services, recreation services (such as guiding and outfitting) and retail outlets catering to tourists. Mayo also acts as a distribution centre for mining operations and exploration, although mining does not account for the bulk of employment opportunities (Yukon Community Profiles, 2004). Business and services available in the community include the Bedrock Motel, K.P. Auto, Kris's Small Repairs, Mayo Laundromat, Mayo Bigway Foods, Mayo Petroleum, Mayo Chinese Restaurant, North Star Motel (Village of Mayo, 2006) Ewing Transportation and Wilf's Contracting (Personal communication, Village of Mayo, 2006).

Traditional Economy

Traditional activities continue to be important in the economy and lifestyle of the NTFN, along with many others residing in the communities of Carmacks, Pelly Crossing, Stewart Crossing and Mayo. This includes both traditional activities that result in cash income (e.g., fur sales from trapping as reviewed in Section 6.3.2) and activities that supply local needs (e.g., subsistence from hunting and fishing as reviewed in Section 6.3.2). The social and cultural context of a subsistence economy is discussed further in Section 6.3.4.

Traditionally, the Northern Tutchone group is believed to have followed land use patterns and seasonal economies that consisted of an annual cycle of a wide variety of hunting and trapping activities. In winter, most of the Northern Tutchone would disperse throughout their territory in highly mobile groups to trap fur bearing animals as well as hunt for moose and caribou. In early spring, people dispersed into smaller family groups and continued harvesting and trapping in valley bottoms. Others would move to northern pike spawning grounds at various lakes and streams. Summer would be spent in large fish camps on the Yukon River and its tributaries using fish nets in larger rivers and spears or taps in the smaller streams. Salmon would be dried for winter caches (Gotthardt, 1987). Autumn was an important time for big game hunting as animals were healthy and in prime condition for use in making clothing (McClellan, 1975).

In mid-to-late summer, the Southern Tutchone and Tlingit traders would arrive at trade rendezvous, in locations such a Tatchun Creek, McGregor Creek, McCabe Creek, and VonWilzcek Creek. Tutchone trade goods were tanned moose and caribou hides, goat hides (hair fibres could be used for blankets), furs, animal sinew, large game meat and a variety of fungi. Such items were traded for eulachon grease, shell ornaments, sea weed, various types of clothing or blankets, copper goods and Sitka spruce roots, hats and baskets. European goods also entered the mix during the fur trade era (Gotthardt, 1987; Legros, 1981). (For more details on the history and way of life of the Northern Tutchone people, please see Appendix 6H).

6.3.3.2 Regional Economy

Baseline information is provided for two regional economy VCs:

- Government Fiscal Flows
- Utility Ratepayers

Government Fiscal Flows

Scoping for potential government-related economic effects from the Project focuses on Yukon Government fiscal flows (revenues and expenditures) and local government activities.

The Yukon Government has provided infrastructure funding ($450,000) to date for CS development planning and Yukon Energy has projected that additional Yukon Government funding will be required if the CS development in its entirety is to be developed at this time. The Yukon Government has near-term fiscal revenue interests related to Project capital expenditures and also related to mine sector developments (e.g., Minto mine and potentially Carmacks Copper mine) that would be able to secure lower electricity costs due to the Project (and thus provide higher income tax revenues to the Yukon Government). Longer-term Yukon Government interests relate to developing electric grid connection and extension infrastructure to support ongoing industrial and other economic development in the Project Study Region and to enhance overall WAF and MD system reliability, economic efficiency and flexibility in power supply resource use. The Project will also serve to reduce diesel generation emissions and related ongoing economic leakages from Yukon related to purchase of diesel fuel from outside Yukon, thereby facilitating overall Yukon Government environmental and economic objectives.

Local governments in the Project Study Region are reviewed below. The names and appointment dates for all of the local Mayor and Councils and First Nations' Chief and Councils are provided in Reference Materials 6R-10.

The Village of Carmacks was established as a municipal corporation effective November 1, 1984, by Order–in-Council 1984/309, and it is governed by a Mayor and Council.

The LSCFN gained self-governance in 1997. Through their Land Claim and Self-Government, the First Nation now owns approximately 1,000 sq. miles of land and will receive $15,568,239 over a period of 15 years (Village of Carmacks, 2004; Village of Carmacks, 2005). The LSCFN has returned to a more traditional form of government and now only holds elections for the office of Chief; the members of the Council are selected by the respective Crow and Wolf moieties. Included on the council are an elder and a youth member selected by their respective councils (Council of Yukon First Nations, 2006).

In the case of Pelly Crossing, there is no village council, only the SFN Chief and Council. The SFN concluded its land claim and self-government negotiations in 1997. The First Nation owns approximately 2,900 square kilometres of settlement land and will receive $16,604,860 over 15 years. The SFN has turned to a modified form of traditional government in that the Chief is elected and the councillors are selected by their respective Wolf and Crow clans (Council of Yukon First Nations, 2006).

There is no elected local government in Stewart Crossing. Some community members are a part of NNDFN and are represented by the Chief and Council based in Mayo.

Mayo was incorporated as a village in 1984 and is governed by a Mayor and Council. It is home to many of the members of the NNDFN who have settlement lands in the area. The First Nation was very active in the Land Claims movement and was the first to sign an agreement in 1993. Under the agreement, the First Nation owns over 2,900 square kilometres and will receive $14,554,654 over 15 years. The First Nation has been actively involved in the affairs of the Mayo community, attempting to promote a better, healthier lifestyle for community members (Council of Yukon First Nations, 2006).

Utility Ratepayers

As the major generator and transmitter of electrical power in the Yukon region, Yukon Energy plans for the capacity and energy requirements of all Yukoners, particularly those supplied on the WAF and MD grids.

Under regulations applicable to utility rates for both Yukon Energy and Yukon Electrical (YECL), cost efficiencies in generation and transmission are in principle passed on the ratepayers (rather than absorbed by the utility shareholder) through regulated rates designed to collect sufficient revenues to cover a utility's annual revenue requirement as approved by the YUB. In addition, in any one geographic area in Yukon and for either utility, rate savings to reflect utility efficiencies are generally shared by all residential, general service and industrial ratepayers served by Yukon Energy and YECL throughout Yukon.

At the current time, the Yukon Government funds a Rate Stabilization Fund (RSF) subsidy for most Yukon residential, municipal and general service business electricity ratepayers, and accordingly any utility rate savings at this time also directly benefit the Yukon Government through reduced RSF subsidy costs[15].

Given past shutdowns of major mines on both girds, there is today material surplus hydroelectric generation on both grids (WAF surplus is about 90 GW.h/year, and MD surplus is about 17 GW.h.year, each assessed at long-term average water flows). Unlike many southern jurisdictions with export connections, Yukon Energy cannot secure any economic value from surplus hydroelectric generation capability on the WAF or MD grids (beyond some lower value interruptible secondary sales) since it does not have grid interconnections with external markets. Use of this surplus hydro to supply new firm power loads would therefore provide net added revenues that could directly benefit current ratepayers throughout Yukon (as well as the Yukon Government through reduced RSF costs). Due to rate

[15] The current Order-in Council direction for the RSF (OIC 2005-49) expires on March 31, 2007. The RSF was initiated in 1998 for the period to April 1, 1999, and has been extended by three subsequent OICs. Current RSF costs approximate $4.65 million annually, based on rates in place as of June 2006.

equalization throughout Yukon, all Yukon residential and other non-government ratepayers can potentially benefit from new sales of surplus hydro, even those in diesel-served communities.

Yukon Energy has recently filed a 20-Year Resource Plan (the Resource Plan) with the YUB addressing major electrical generation and transmission requirements in Yukon during the 2006 to 2025 period. Key observations in the Resource Plan include:

1. **Benefits today from past hydro and transmission infrastructure development:** Hydro generation in the Yukon was developed in the past by the Northern Canada Power Commission in response to load developments in Yukon, particularly mine-related loads at Faro, Keno and Whitehorse. Yukon Energy acquired these hydro assets in 1987 as a result of the NCPC transfer. Today, these hydro systems are the key factor causing Yukon power costs to be lower than those found in Alaska or the Northwest Territories. Without such facilities, Yukon utilities probably would have relied almost entirely on diesel generation with its associated higher costs.

2. **Hydroelectric energy surplus:** Without major new industrial loads, the WAF and MD hydroelectric energy surpluses could remain for most of the current 20 year planning period.

3. **Capacity shortfall to meet WAF peak winter loads**: Yukon Energy is facing a shortfall today in WAF generation capacity needed to serve winter peak loads. This shortfall is due to pending retirement of some Whitehorse diesel units, load growth and the adoption of new capacity planning criteria. The Resource Plan Base Case forecasts a near term WAF capacity shortfall in 2012 of 18.7 MW without new mines, and 21.5 MW if the new Minto and Carmacks Copper mines were to be connected by that time to the WAF grid (without the full CS development to interconnect the WAF and MD grids).

4. **Potential new industrial loads**: Potential new industrial development during the next several years may absorb the WAF hydro energy surplus and create opportunities once again to develop new infrastructure. Near term mine development opportunities at Minto and Carmacks Copper are noted as particular opportunities that may occur in the next few years, providing new energy loads that during the life of these two mines could absorb most (but not all) of the current WAF hydroelectric energy surplus. Major industrial customers (load exceeds 1 MW) connected to the integrated power system in Yukon must be charged rates, as a customer class, that are sufficient to cover costs of service to that class (Yukon Government OIC 1995/90).[16] New industrial customers are also in effect required to pay all costs to connect them (including any new transmission) such that existing customers are not adversely impacted by providing connection facilities.

[16] In contrast, under the same OIC, major industrial customer loads not interconnected with electrical service to other customers and served by Yukon Energy or YECL must be charged rates in conformance with contracts between the customer and the utility, and the costs and revenues related to such contracts may not be considered by the YUB when establishing rates for other customers.

There are currently no primary industrial loads on either the WAF or MD grids, though Yukon Energy's Rate Schedule 39 for Primary Industrial customers is available and approved on an interim basis. Yukon Energy also provides electric utility distribution services in and around Mayo, Dawson and Faro (on the MD and WAF grids respectively).

YECL purchases wholesale power supplies from Yukon Energy and provides electric utility distribution services in Whitehorse, Carmacks, Stewart Crossing and various other WAF and MD communities. YECL also serves the Pelly Crossing community (isolated diesel generation community, where YECL provides both generation as well as distribution services).

Firm electricity rates (i.e., rates for service not normally subject to interruption) for residential and general service customers are categorized by government or non-government customers, and hydro grid or diesel[17] sourced generation.

The YUB is directed by OIC 1995/90 to set non-government firm retail rates equal throughout Yukon within each of the residential and general service customer classes without variation between Yukon Energy and YECL customers. This direction is subject to a further direction to set a run off rate block for each of these customer classes for all consumption in excess of a specified level per billing period, such specified level per customer not to be less than 1,000 kW.h/month for residential non-government customers and 2,000 kWh/month for general service non-government customers (these levels of use are typically referred top as first rate block use for each class). The YUB is directed to set run-off rates on the basis of rate design principle to promote economy and efficiency, and separate run-off rates may be allowed for customers in different communities or rate zones. In practice, the result is that Pelly Crossing customers are charged a run-off rate reflecting average incremental diesel generation costs for "small diesel" rate zone communities (based on rates last set for 1997).

Firm rates approved by the YUB for electric utility customers are currently also affected by two rate riders:

- **Rider F (Fuel Adjustment Rider):** Rider F is applicable to all electric service and all customer classes throughout the Yukon, with the exception of Secondary Energy (Schedule 32) and Maintenance Energy (Schedule 40). This rider is to cover cost changes paid by the utilities since the last YUB approval of retail rates due to adjustments in diesel fuel prices from those last approved by the YUB (which currently for YECL was for 1997, and for Yukon Energy was for 2005). An adjustment of 1.28 cents per kWh applied as of June 2006. Reductions in diesel fuel use for utility generation reduce the impact of this rider.

- **Rider J (Revenue Shortfall Rider):** The Revenue Shortfall Rider J was approved in 1998 initially to recover the approved ongoing revenue shortfall resulting from the Faro Mine closure in January of 1998. This rider has fluctuated over time and currently is 14.93% charged to all customers rates, except Industrial Primary and Secondary energy and Rider F.

[17] Only "small diesel rates" apply in Pelly Crossing. Other diesel rates for large diesel generation communities or Old Crow are applicable to areas outside the Project Study Region. Carmacks, Stewart Crossing and Mayo are all now hydro grid communities.

> Absent overall YUB review and adjustment of retail rates, this rider might be expected in future to change in response to YUB review of utility revenue requirements relative to available rate revenues.

As noted earlier, the RSF was established in 1998 by the Yukon Government to subsidize the impact of firm rate increases to residential and general service non-government customers and municipal government customers resulting from closure of the Faro Mine. The RSF provides a Yukon Government subsidy which generally freezes eligible first rate block use electrical bills at a maximum of 9% above January 1997 bill levels.

In addition to the firm rate schedules and subsidies, a rate schedule for interruptible Secondary Energy is available to industrial or general service customers on WAF and MD, based on the availability of surplus hydro on these grids. The rate is available (when surplus hydro generation is available) for space or process heating in areas where surplus distribution system capacity exists at the time the customer is connected and where the customer has an alternative fuel source capable of providing the same quantity of space heating in the event of an interruption to secondary energy supply. The price of this secondary energy is currently set at approximately two-thirds the cost of providing an equivalent amount of heat energy from oil. The price of oil is determined quarterly using the oil price index reported by the Yukon Bureau of Statistics[18]. Secondary energy sales would be interrupted on either grid if and when new industrial loads, or other factors, remove the current hydroelectric energy surplus. Conversely, to the extent that secondary energy remain available, new industrial loads may elect to use this service to reduce fuel purchases for heating loads.

6.3.4 Social Context

This section describes the social context of the Project Study Region, and includes baseline information on people's personal, family and community life. It addresses the requirements set forth in the *Proponent's Guide*, which states:

> Information should focus on providing a background on individuals, families, communities… potentially affected as a result of project area activities.

The social context of the Project Study Region is shaped by many factors that contribute to the quality of people's lives and experiences. Such factors include indicators of economic well-being, physical well-being, social well-being and the environment. Personal, family and community life can be affected by the accumulated impacts of many different Project-related effects and the experience of these changes can vary for individuals, for families and for communities as a whole. The social context describes the following items:

- Social Context Background (Population Demographics and Past Experience with Similar Projects)

[18] Further details available in Yukon Energy Rate Schedule 32 – Secondary Energy, available at: http://www.yukonenergy.ca/customer/commercial/schedules/

- Community and Family Life
- Community Infrastructure and Services
- Recreation and Leisure
- Public Health
- Aesthetics
- Heritage Resources

Sources of information included a review of existing data sources and key person interviews. Certain Statistics Canada data for the specific Project Study Region communities is suppressed for confidentiality reasons (see Appendix 6D for details).

6.3.4.1 Social Context Background

Social context background for the Project Study Region is provided below for the following:

- Population Demographics
- Past Experience with Similar Projects

<u>Population Demographics</u>

The Yukon Bureau of Statistics (2006) indicated that the population of the Yukon Territory, as of December 2005, was 31,587. This is higher than the last Canadian Census report, completed in 2001, which indicated a total of 28,675 inhabitants and slightly lower than was reported by the Bureau in 2005 (31,765). Statistics Canada in 2001 reported that 21.3% of the Yukon population was of Aboriginal decent.

In the Project Study Region, there are four communities identified by Statistics Canada, including the Village of Carmacks, the settlement of Pelly Crossing, the settlement of Stewart Crossing and the Village of Mayo. A summary of these communities' total 1996, 2001 and 2005 populations and number of Aboriginal community members in 2001 is provided in Table 6.3-10. Each of the communities has a significantly higher proportion of Aboriginal people than the remainder of the Yukon. Details on the total registered First Nation members in the Project Study Region are provided in Appendix 6G.

Table 6.3-10
Population Profiles of the Project Area Communities

	Carmacks	Pelly Crossing	Stewart Crossing	Mayo	Yukon
Statistics Canada					
1996	470	240	40	325	30,765
2001	431	328	40	366	28,675
Aboriginal Population Profile					
2001	295	280	15	230	6,545
Yukon Bureau of Statistics					
2005	408	291	n/a	400	31,765

(Sources: Statistics Canada, 1996. Statistics Canada, 2001(a). Statistics Canada 2001(b). Yukon Bureau of Statistics. 2005(a))

Gender distribution in the Project Study Region reflects the distribution of Yukon, with a slightly higher proportion of males to females. Both Carmacks and Pelly Crossing have a younger population than the remainder to the territory, with close to 25%-30% of the population under the age of 15 years. Age and gender distribution for each community is provided in Appendix 6G.

The Yukon Bureau of Statistics (2005(b)) has calculated several population growth scenarios for the territory (see Appendix 6G). The Project will not likely have a material effect on these population projections. Similar projections are not available for the Project Study Region.

- The low-growth scenario (fertility rate decrease of 10%, constant mortality rates, net migration of -300) would suggest that the non-Aboriginal population in Yukon would decrease by 7.3%, and the Aboriginal Population would decrease by 2.4%.
- In the medium growth scenario (fertility rates are constant, mortality rates are constant, and net migration from the territory each year is zero) the non-Aboriginal population in Yukon would increase by 4.2%, while the Aboriginal population would increase by 5.2%.
- The high-growth scenario (fertility rate increases by 10%, mortality rates decrease 10%, and net migration is +300 each year) would increase the non-Aboriginal population in Yukon by 16.3%, and the aboriginal population by 13.0%.

Past Experience with Similar Projects

Communities in the Project Study Region are generally familiar with the WAF and MD grids as operating facilities. Particularly with the WAF grid (which was developed decades ago and is of the same voltage as proposed for the CS development), communities are aware of the facility's image on the landscape, ongoing operation brushing needs, potential firebreak benefits, and other operation attributes.

The most recent experience with construction development similar to the Project was the construction of the MD Project. While NNDFN is the only Project Study Region First Nation community with a direct involvement in the MD Project, the problems encountered throughout the MD project's development have resonated with all of the consulted First Nations as well as with other publics. During the public consultation process, community members have raised concerns related to the construction of the MD project. These are reflected in Section 4.4.1 of the PIP chapter.

The MD project was approved for construction by the Yukon Energy Board of Directors in 2000 and was completed in 2003. The transmission project covered a distance of 223 kilometres between Dawson City and Mayo and was justified on the basis of a long-term reduction of electrical rates through the improved use of the hydro station in Mayo, displacing the use of diesel generation in Dawson City. The initial environmental assessment process and consultations for the MD project had taken place years prior under a screening for the Environmental Assessment and Review Process (EARP) in 1992 and later by a Canadian Environmental Assessment Act (CEAA) screening (as it pertained to The Department of Indian Affairs and Northern Development (DIAND) permitting) after 1995.

A workshop conducted to review the MD project experience found that the First Nations in the area were concerned with "the lapse of time between the environmental impact assessment of the project and its actual construction, communication about the consultation on the project, the type and timing of the issuance of permits and authorizations for the project and trespass issues" (W.J. Klassen and Associates Ltd., 2002).

The problems encountered in the implementation of the MD project were those most frequently cited in the public consultation. These included instances where trespassing occurred on First Nation lands, lack of clarity in advance as to where the route was going, issues related to the timber permit released for the MD project and unsatisfactory design of the line. The most commonly cited community concerns related to the effects of the ROW created by the transmission line. In many instances, it was felt that the buffer between the MD project ROW and the road ROW was inadequate leaving the remaining vegetation susceptible to weathering. Additionally, the proximity of the MD ROW to the road was thought to create a corridor for wildlife that was easily accessible to the opportunistic hunter.

In general, the most recent planning and construction experience the Project Study Region communities had with a similar project was not positive. One NGO consulted summarized the situation in saying that the Mayo-Dawson experience has resulted in a lack of public confidence in Yukon Energy. Yukon Energy has responded to these concerns with a number of measures, including the MOU to guide planning of the Project (including the route selection process) with the NTFN communities in the Project Study Region

6.3.4.2 Community and Family Life

Traditionally, the Northern Tutchone society organized itself on a number of levels. Regional groups of five to ten nuclear families sharing close kinship ties and occupying a certain geographic area would share a common chief. Although not living together throughout the year, these groups would stay in close contact, meeting for social and economic functions. Within the greater society, people divided themselves into moieties (or clans) called the *Tsehk'i* or *Handay* for the Crow moiety and *Egay* or *Egunde* for the Wolf moiety. Moieties define how people married, where they could hunt and fish, who they could trade with, and who they could go to for help in times of need (McClellan, 1975). The Crow and Wolf moieties continue to be represented by the First Nation councils in the Project Study Region today.

Each Project Study Region community has an assortment of characteristics that help to define community life. For example, in Carmacks, the LSCFN holds regular community kitchens at the Heritage Hall where youth and elders have an opportunity to interact over a meal. In Pelly Crossing, the traditional game of stick-gambling has been revived and local teams practice and compete in Yukon-wide events. In all of the communities, fishing and hunting camps are a regular activity for people to spend time together on the land.

Aside from some of the examples presented above, the following section presents certain elements, both statistical and anecdotal, that provide some insight to community and family life in the Project Study Region.

Family structure in the Project Study Region communities varies somewhat from the rest of the territory. In each of these communities there are proportionately less people who are married than in the remainder of the territory, while divorce rates are comparable (see Appendix 6G). Living with a common-law partner is more common in these communities than in the rest of the territory and in some of the communities it is more prevalent than marriage. There are a higher proportion of single-parent families in the Project Study Region communities (between 29% and 35%), than in the rest of the Yukon, which has a total of 24% single parents. It is more common for females to be a single-parent than males.

The extended family in First Nation communities plays an important role and the responsibility of caring and nurturing is often extended over a large network of grandparents, aunts, uncles and cousins (Brant Castellano, 2002). Elders are seen as important sources of knowledge and are often consulted on matters affecting the community.

Personal security can be considered by looking at crime statistics for an area. The Yukon Bureau of Statistics provides crime statistics on an annual basis for incidents involving violence, property, drugs and other criminal offences. A summary of these statistics for the Project Study Region communities between 1999 and 2003 is provided in Appendix 6G. With few exceptions, the statistics suggest that crime rates in these communities over the five-year period have been higher than the remainder of the Yukon. On average, the community of Pelly Crossing had the highest rates of reported incidents while the community of Mayo had rates closer to, or lower than, the territorial average.

6.3.4.3 Community Infrastructure and Services

A summary of the facilities available in each of the communities is provided in Table 6.3-11. Carmacks and Mayo have the broadest range of facilities, Pelly Crossing has no hotel and Stewart Crossing has limited facilities due to the small size of the population and overall function of its location.

Table 6.3-11
Facilities in the Project Study Region Communities

	School (up to grade 12)	Health Centre	Hotel	Camp-ground	Store	Gas Station
Carmacks	✔	✔	✔	✔	✔	✔
Pelly Crossing	✔	✔	x	✔	✔	✔
Mayo	✔	✔	✔	✔	✔	✔
Stewart Crossing	x	x	x	✔	✔	✔

(Source: Yukon Community Profiles, 2004)

Carmacks, Pelly Crossing and Mayo all have schools in the community which provide education up to Grade 12. School aged children from Stewart Crossing must travel daily to Mayo for schooling. Additionally, the Yukon College offers remote campuses in all three locations offering classroom space, computers (and internet), televisions, VCRs, small resources libraries and access to distance education. Courses offered include academic upgrading, college preparation, pre-trades training, employment skills, computer skills and locally developed programs (Yukon College, 2005).

Services available in each community such as emergency response, utilities and transportation are summarized in Table 6.3-12. Aside from police services provided by the RCMP, emergency response services for fire and ambulance rely on volunteers. Stewart Crossing must rely on RCMP, fire and ambulance services from Mayo. Hydro power from the WAF or MD grids is provided by Yukon Energy, and it is distributed by YECL in Carmacks and Stewart Crossing (Yukon Energy distributes MD hydro power in Mayo). Pelly Crossing relies on local diesel power supplied and distributed by YECL. All communities have telephone services provided by Northwest Tel and the Yukon Territorial Government recently announced the expansion of cellular services for the entire territory (Yukon Government, 2005). There is no regular bus or air services to any of the communities, although Carmacks, Pelly Crossing and Mayo all have gravel air landing strips. Minto Landing has a grass airstrip.

Table 6.3-12.
Services Available in the Project Study Region Communities

	RCMP	Fire	Ambulance	Power Supply	Telephone	Air services
Carmacks	2 constables	Volunteer	Volunteer	Hydro (WAF)	Northwest Tel	Gravel air strip & helipad. No regular service
Pelly Crossing	1 corporal, 2 constables	Volunteer	Volunteer	Diesel generators	Northwest Tel	Gravel airstrip. No regular service.
Mayo	1 corporal, 2 constables	Volunteer	Volunteer	Hydro (MD)	Northwest Tel	Gravel air strip and terminal building. No regular service. Float plane base.
Stewart Crossing	No	From Mayo	From Mayo	Hydro (MD)	Northwest Tel	No

(Sources: Yukon Community Profiles, 2004. RCMP, 2005. Northwest Tel, 2006)

There are approximately 455 houses located within the Project Study Region communities (Statistics Canada, 2001(a)) (see Appendix 6G for further detail on housing). Further, there are several homes associated with agricultural applications; cottages in the McCabe Creek and Jackfish Lake area and trappers' cabins throughout the Project Study Region.

Recreation and leisure opportunities are other factors that contribute to individual and community well-being. The communities in the Project Study Region have access to an array of recreation and leisure opportunities. Although the communities of Carmacks, Pelly Crossing and Mayo are relatively small in size, there are numerous recreation facilities available in each. For example, in 2004 each community had a curling rink, skating rink, baseball diamond, swimming pool (seasonal) and youth centre (Yukon Community Profiles, 2004).

6.3.4.4 Public Health

Public Health is affected by a complex array of factors related to both medical and non-medical determinants that reflect the overall well-being of the community. Determinants of health are interdependent and can be influenced by things such as income, employment and education, along with social and physical environments, which are discussed in other sections of this chapter. Given the complexity involved in determining the overall well-being of communities, this information presents only an indication of the health status in the Project Study Region. It presents a combination of both medical and non-medical determinants of health. Given the small size of the Project Study Region communities, information is largely available only at a territorial level. Data for individual communities is presented when possible.

Medical Determinants of Health:

- **Death Rate:** The death rate for the Yukon Territory had increased over the last number of years from a rate of 3.9 deaths per 1,000 persons in 1991 to a rate of 4.4 deaths per 1,000 persons in 2001. While this could be indicative of a decrease in population health, it might also be a reflection of an aging population.
- **Life Expectancy:** Life expectancy in the Yukon is lower than the remainder of Canada, at a total of 76.8 years compared to the national rate of 79.5 years.
- **Birth rates:** The birth rate is higher in the Yukon than in the remainder of the country at a rate of 11.2 births per 1,000 persons, compared to 10.5 births per 1,000 nationally (Statistics Canada, 2001(c)).
- **Potential Years of Life Lost (PYLL):** A measure used to quantify premature mortality, or the number of years lost before a person dies before the age of 75. The PYLL is significantly higher in the Yukon, at a rate of 6,513.5 premature deaths per 100,000 people, compared to the national rate of 5,101.5 per 100,000. The rate is markedly higher for males (8,970 per 100,000 compared to a national rate of 6,328.5) and closer for females (3,961.2 per 100,000 compared to 3,862.8 nationally) (see Appendix 6G).
- **Diseases:** Residents of the Yukon surpass Canadian rates for circulatory diseases and respiratory diseases and have rates that are excessively higher for unintentional injuries and suicide/self-inflicted injuries (Statistics Canada, 2001(c))
- **Diabetes:** The prevalence of diabetes in the Yukon remains lower than the rest of Canada, although there has been a slow but steady increase in recent years (see Appendix 6G).

Non-Medical Determinants of Health:

- **Smoking:** Linked to a variety of cancers, heart disease, Sudden Infant Death Syndrome and diabetes. Smoking rates are slightly higher in the Yukon than the remainder of the country, with 29.1% of males and 26% of females reporting being daily or occasional smokers, compared to a national rate of 25% of males and 20.9% (Statistics Canada, 2003).
- **Alcohol:** Implicated in motor vehicle accidents, homicides, suicides, fires and drowning as well as a potential for fetal alcohol spectrum disorders if consumed during pregnancy. Alcohol consumption in the Yukon is only slightly higher than the national average with an average of 2.98 drinks per person per week compared to 2.88 drinks per week across the country. Males drink considerably more than females, at a total of 4.17 drinks per week compared to 2.88 drinks respectively (Yukon Bureau of Statistics, 2000).
- **Physical Activity:** Reported physical activity rates are higher in the Yukon Territory, with 59.6% of people reporting being physically active or moderately physically active during their leisure time. Yukon Females report a slightly higher rate of physical activity at 59.5%, compared to males who report a physical activity rate of 58.9% (Statistics Canada, 2003).
- **Diet:** A study of 10 First Nations across the Yukon, including the communities of Carmacks and Mayo, found that diets were rich in traditional food, resulting in a variety of benefits including a better quality diet, increased physical activity, socio-cultural benefits and economic offsets for the high cost of food in northern communities (Receveur et. al, 1998).

Traditional food consumption was found to be the greatest during the summer, with more than half of the people consuming salmon, trout, whitefish, arctic grayling, spruce grouse, blueberries, raspberries and moose. In the winter months traditional food use decreased, with a lower frequency of consumption reported and only moose and salmon listed as consumed by more than half of the people (Receveur et. al, 1998).

6.3.4.5 Aesthetics

The Project Study Region is located along the Klondike Highway on the Yukon Plateau. Featuring rolling hills, extensive plateaus, several high peaks and deep, broad valleys, the aesthetic character can be experienced from the highways, the rivers and the communities in the area. Several locations have been identified as having particular aesthetic qualities, including the view points at Five Finger Rapids (Figure 6.3-4), Yukon Crossing, and Crooked Creek.

Figure 6.3-4
View at Five Finger Rapids

As a personal construct, the aesthetic value of the Project Study Region overall is difficult to qualify or quantify. Similarly, the perception of wilderness associated with the landscape is difficult to ascertain. Aesthetic values pertain more usefully to specific sites or an area within the Project Study Region that may be affected or visually changed by the Project, as well as the perspectives of specific groups about such sites or areas. Wherever possible, the Project was designed to avoid locations identified as having aesthetic value that communities thought would be adversely affected by the Project.

6.3.4.6 Heritage Resources

Heritage resources are protected and managed under Chapter 13 of the Umbrella Final Agreement and under the *Historic Resources Act*. The heritage resources in the Route Study Area were surveyed for any localities with moderate to high potential for the presence of historic or archaeological sites. A location with elevated potential is considered as a site that is close to a water body and occupies an elevated hill or terrace or well-drained and level habitation surface. For the complete details on the approach taken and results of the *Project Heritage Resource and Impact Assessment*, see Appendix 6H.

A total of 63 locations were tested for the presence of heritage sites, many of which were previously identified stream crossings and potential landform features interpreted by orthographic photos. The test sites were based on all route alternatives, as a preferred route had not been identified at the time of evaluation. Table 6.3-13 to 6.3-16 presents a summary of the positive site locations and their findings. Sites may be one of several categories, including:

1. a site or, an area, place or parcel of land which contains heritage resources;
2. an historic site which contains heritage resources that are greater than 45 years in age and have been abandoned (the historic period beginning with the arrival of the Hudson's Bay Company mid-19th century); and
3. archaeological sites which generally date to before European contact and are found on, or under, the ground surface and consist of the remains of ancient camps, hearths, animal bone and stone tools and debris.

Table 6.3-13
Positive Heritage Site Locations in the Route Study Area
CS Line Segment 1: Carmacks to McGregor Creek

Reporter #	Site Type	Description
CS7	Historic	Coal shoot
CS7A	Historic	Mine adit
CS7B	Historic	Building foundation
CS8	Archaeological	Lithic flaking station, likely a lookout site
CS9	Historic	Various features related to coal mining
KbVa-29	Archaeological	Buried lithic scatters. Likely fish camp.
CS12	Archaeological	Flake scatters on high terrace overlooking valley. Likely look-out site and possible travel route
CSA25	Archaeological	Isolated scatter of lithic flakes on loess and till terrace. Buried context.
CSA26	Historic	Roadway with minor scatter of degraded plank artifacts

Table 6.3-14
Positive Heritage Site Locations in the Route Study Area
CS Line Segment 2: McGregor Creek to Pelly Crossing

Reporter #	Site Type	Description
CSA19	Archaeological	Flake scatter on low terrace. Dense scatter with no formed tools
CSA20	Archaeological	Scatter of lithic tools on high terrace. Lookout and travel camp
CSA21	Archaeological	Scatter of lithic tools on high terrace. Lookout and travel camp
CSA23	Archaeological	Single flake recovered in buried context on high terrace

Table 6.3-15
Positive Heritage Site Locations in the Route Study Area
CS Line Segment 3: Pelly Crossing to Stewart Crossing

Reporter #	Site Type	Description
CSA10	Archaeological	Recovered two lithic flakes in surface. No intact buried remains
CSA15	Archaeological	Lithic flakes. No intact remains. 75% of site disturbed
CSA17	Archaeological	Lithic flaking station, likely lookout site
CSA18	Archaeological	Lithic flaking station, likely lookout site
CSA29A	Historic	Semi-collapse Cabin and 2 plank frame for shack/tent
CSA31	Historic	Dwelling site consisting of plank frame wall tent base. Scattered artifacts.
KeVb-1	Archaeological	Lithic flaking station

Table 6.3-16
Positive Heritage Site Locations in the Route Study Area
Minto Spur Line Segment

Reporter #	Site Type	Description
KdVc-2	Archaeological/Historic	Scatter of lithic tools and flakes, hearths. Known fish camp. Historic remains from Klondike stampede (1896) to the construction of the road (1950’s).

In the Carmacks area, an historic era coal mine site, abandoned in the 1960’s or 1970’s was found, although based on artifacts found may not fall under the Historic Resources Act. Other sites in the area produced isolated scatter of lithic debitage, along with scatters of industrial features related to coal mining.

Between Tatchun Creek and McCabe Creek, several small finds of chert flakes, lithic flakes, and historic wood planks occurred. The Tatchun Creek Campground, assessed in 1992 by the Government of Yukon Heritage Branch, once demonstrated potential for heritage resources (finds of fire cracked rock, flake cores, and deitage), but has since been sealed with gravel pads. The area likely represents the remains of hunting or fishing camps.

Minto Landing is a site of importance in terms of heritage resources, as it was once home to the SFN, now located at Pelly Crossing. The site contains stone tools and flakes, as well as old hearths noted in an eroding piece of riverbank. Scatter of lithics and bone fragments have also been found. Aside from its traditional use as a fishing camp, the area was once a town site that served as a fuel wood stop, road house, store location and Northwest Mounted Police post that were established during the late 1890's after the Klondike gold strike.

In the Von Wilzcek Creek drainage area, several lithic flakes and scatter were found, although most test sites were determined to have limited potential heritage value. In one location, artifacts such as a chert end scraper and flake/blade core brace rejuvenation tablet were found. The moderate amount of artifacts found at this site suggests further archaeological deposits may be present.

Near Pelly Crossing, several sites produced single lithic flakes. Near the Mica Creek drainage system, a trail was checked for archaeological and historic sites, and although none were observed, the area could be considered as a heritage trail as it was used to access areas of economic, cultural, and spiritual importance by the SFN.

South of the Jackfish Lake Park Reserve, a small site with a semi-collapsed log cabin is present. Artifacts suggest that the locality was in use until recently (1980's) and as such will not fall under management criteria of the Historic Resources Act. Similarly, artifacts not considered as historic resources including remains of a plank tent frame, dog houses, and discarded artifacts were found near Stewart Crossing.

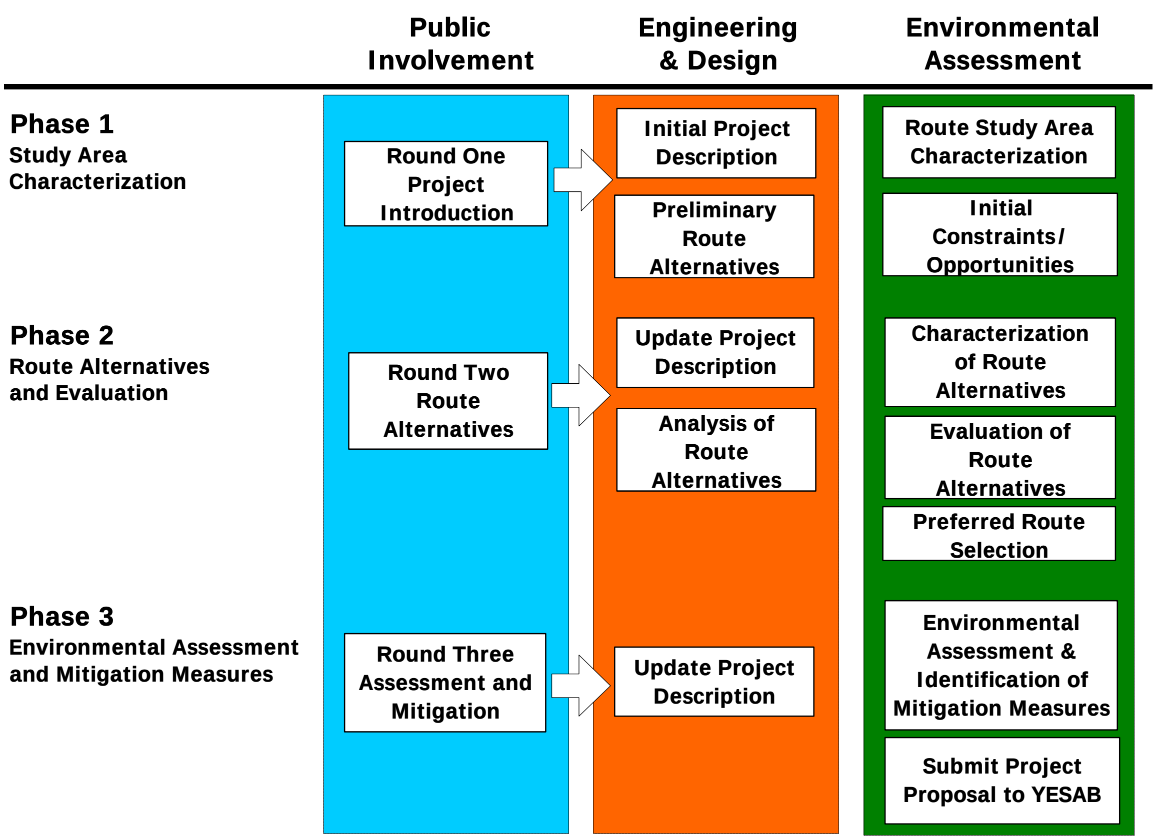
7.0 EVALUATION OF ALTERNATIVE ROUTES

7.1 INTRODUCTION AND APPROACH

This chapter reviews the route selection and evaluation process used to select preferred routes for the proposed CS and MS lines. As described in Chapter 3, an iterative and progressively more detailed analytical approach was used that systematically refines and reduces the route study area in order to discern a preferred route that balances various considerations. A Public Involvement Program (PIP, Chapter 4) was critical to this process and provided feedback from First Nation communities affected by the Project, other interested parties in the Project Study Region, government and the public.

Figure 7.1-1 is an illustration of this process.

Figure 7.1-1
Route Selection and Evaluation Process



The preferred route was determined using an iterative approach co-ordinated with the PIP process. During Round 1 of PIP a Route Study Area[1] was identified and, characterized, including the identification of preliminary opportunities and constraints to routing, and identification of preliminary route options. During Round 2 of PIP, each route option was characterized and then evaluated to identify a preferred route. During Round 3 of PIP, environmental assessment was conducted of this preferred route including identification of mitigation measures. As reviewed in Chapter 4, practical considerations in this iterative process led to considerable overlap of Rounds 2 and 3.

In this route selection process regional and site-specific biophysical and socio-economic features were used to identify and evaluate the viable alternative transmission line routes and to select the preferred route for the Project. In each round of the route selection process, public involvement was integral to the process and provided valuable input to the identification of potential route constraints and opportunities, feedback on initial route options, and input into potential effects and mitigation. Public involvement resulted in a preferred route that minimizes potential Project-related adverse environmental and socio-economic effects, enhances beneficial effects, and satisfies technical and cost requirements. The environmental and socio-economic effects assessment of the preferred route, including the application of mitigative measures to address any impacts and any residual impacts is addressed in Chapter 8.

7.1.1 Routing Objectives, Constraints and Opportunities

The primary objective of the route selection process for the Project is to minimize adverse environmental and socio-economic impacts, enhance beneficial effects, and satisfy technical and cost requirements of the Project. Chapter 3 provides a full review of objectives for the route selection and evaluation process. Overall, the process focuses on balanced consideration of the following elements:

- Biophysical and socio-economic features
- Technical constraints
- Cost considerations
- Routing opportunities

<u>Biophysical and Socio-Economic Features</u>

A primary element of considering route options was the identification of potentially relevant biophysical and socio-economic features found within the Route Study Area. Focus was on identifying opportunities to minimize biophysical and socio-economic disruption and to enhance beneficial effects. Sources for this information included local/traditional knowledge and input during the PIP, technical specialist input, previous experience in similar transmission projects, and specific terrain features of the Route Study Area. Issues and/or features were not weighted or ranked as all were considered to be important. This

[1] The Route Study Area includes conceptual 500 m wide study areas for the CS Project running generally along the Klondike Highway from Carmacks to Stewart Crossing and routing options for the MS Project generally alongside the existing access road to the Minto Mine. The 500 m notational reserve identified in 2004 was identified based on initial terrain analysis undertaken by C. Mougeot in 2000, followed by a Corridor Review and Refinement undertaken by I. A. Hayward in 2001. These studies are included in Appendix 3A and Reference Material 3R-1 respectively.

list provided for early identification of potential sensitive features for the purposes of route options identification and comparison. Potential impacts and mitigation opportunities were then examined during the route evaluation and comparison phase. This information is presented in Table 7.1-1.

Table 7.1-1
Biophysical and Socio-Economic Features
Considered in Alternative Route Identification and Comparison

Biophysical Features	• Terrain units to avoid (i.e. very steep slopes, wetlands) • Key wildlife habitats • Rare and endangered plant and wildlife species • Water bodies and river/creek crossings • Riparian habitat • Special lands and protected areas
Socio-economic Features	• First Nation settlement lands • Existing communities & infrastructure • Designated and valued recreation sites • Known cultural, heritage and archaeological sites • Key canoe or water travel routes • Active and inactive gravel and quarry pits • Mining claims • Agricultural land dispositions • Timber permit areas • Burn areas • Trapping concessions • Northwestel facilities/sites • Dwellings, cabins, cemeteries • Airstrips, existing roads and highway ROW

Technical Constraints

The points of connection for the CS route (Carmacks, Minto Landing, Pelly Crossing and Stewart Crossing), and the MS route (Minto Landing and the Minto mine site), and the intervening terrain between such points are the two basic technical constraints which limit the routing alternatives that may be considered for the Project.

The CS component of the Project must originate at the new Carmacks substation in order to connect with the adjacent WAF transmission line. The other connection points which provide a technical constraint to the Project include:

- the new Minto Landing substation which connects the MS development to the Minto mine site, and potential future power to the Minto Landing community area;
- the new Pelly Crossing substation which provides for future connection of the community of Pelly Crossing to the Yukon Energy grid by YECL; and

- the existing Stewart Crossing substation which will connect the 138 kV WAF and 69 kV MD electricity grids.

Terrain units that must be either avoided or spanned between these connection points provide the second major technical constraint on the Project. Landforms and physiographic characteristics were described using a broad 2 - 4 km area, including the Route Study Area. The terrain analysis mapped, classified, and described terrain units within this expanded region as part of the technical review. In addition to the terrain analysis maps, orthophoto images were taken of the entire Route Study Area (see Chapter 6.2.1 for more detail on terrain analysis). The following terrain features were identified as features to be avoided or spanned in the consideration of route options:

- major water bodies and wetlands;
- very steep slopes (> 60% slope); and
- areas of organic rich material that either contain permafrost, are poorly drained, and/or are prone to flooding.

In addition to terrain features that should be avoided where possible, the terrain analysis also identified terrain features that could result in more costly pole settings and/or increased costs during the construction and operation phases of the Project. Features considered (where relevant) in the development of route options and included:

- organic rich and ice rich, and/or ice rich permafrost material and poorly drained areas
- areas with steep slopes (slopes greater than 40% but less than 60%)
- river crossings

<u>Cost Constraints</u>

Construction and operation cost constraints are typical considerations for any transmission route selection study and were a key factor for route identification and selection in this process. Transmission line construction costs related to route selection and evaluation are assumed to be driven by two key factors:

- total line length – construction costs, and to a lesser extent operation costs, for any given design approach tend to be directly proportional to line length; and
- number of angle structures - where possible, it is preferable to build transmission lines in long straight spans. Deviation from a straight line requires additional tower strengthening to support the overhead wire and has a substantial cost premium over conventional structures used on straight segments of the line.

For comparison of alternative routes, total line length and the number of large angle structures were used as a preliminary proxy for cost. Costs for the CS line length have been assessed using earlier preliminary average cost assumptions (namely, \$130,000 per km for the 138 kV CS line); these costs will be re-assessed during the upcoming design process and are expected to be materially increased. Costs for the 35 kV MS line length are assessed in this chapter at \$85,000 per km. With regard to number of angle structures, the number of such structures is simply noted for comparison of routing alternatives without at this time attempting to estimate specific cost impacts.

Other special features related to routing and mitigation measures will also affect construction costs, e.g. added costs for crossing major rivers and adoption of other special long span sections to cross certain specific terrain features. Analysis of added costs for special long span sections were reviewed in the specific case where different Yukon River crossing options were examined for the MS line; however, these cost features did not otherwise need to be addressed to carry out analysis of route options as these other measures tend to be either required in any event or proposed (without detailed review of options) to address certain noted concerns.

Routing Opportunities

There are several features within the Project Study Region that offer potential routing opportunities for the proposed transmission lines. These include:

- Existing Klondike Highway ROW, an already disturbed corridor
- Existing Minto Mine access road and ROW, an already disturbed corridor
- Recent burn areas
- Large tracts of available Crown land

These features were considered in the identification of alternative routes for the proposed Project.

7.2 DESCRIPTION AND COMPARISON OF ALTERNATIVE ROUTES

7.2.1 Overview of Key Elements to Route Selection Process

The routing process involved the following key elements:

- Identification of Route options
- Comparison and Evaluation of Route options

A brief overview of each element is provided below.

Identification of Preliminary Route Options

Terrain analysis mapping of the broad study area for the CS development along the Klondike Highway was the first step in identifying preliminary route options. Biophysical and socio-economic characteristics in this part of the Project Study Region were identified and incorporated into the identification of a Route Study Area including preliminary route options. These preliminary route options provided a conceptual basis for initiating dialogue with stakeholders and interested publics on the Project.

Round One of the PIP utilized a map of the Route Study Area (see Appendix 7A) for the purposes of introducing the Project to potentially affected First Nations and government departments. Follow-up meetings were held to request specific information from government departments responsible for resource management on Crown Lands (i.e. Environment, Parks, Forestry, Highways etc.).

During Round One of the PIP, an agreement was concluded between the three potentially affected First Nations in the Project Study Region (LSCFN, SFN and NND) and Yukon Energy. The MOU, signed May 1, 2006, described the activities and objectives all parties would work toward to support the development of the Project, including facilitating consultations with Yukon Energy on a detailed route selection process and adopting the conceptual 500 m wide CS Route Study Area generally along the Klondike Highway, and the routing of the MS Route Study Area generally along the existing mine access road.

In April 2006, Yukon Energy mapped the information on the CS Route Study Area (on a series of maps at a scale of 1:50,000), including identified route options, and these were used in the production of the Project's May 2006 Newsletter and during Phase Two of the public consultation process. A map on MS Route Study Area options was subsequently developed for use in consultations and analysis. [2]

Comparison and Evaluation of Routes

Following the initial analysis, the Route Study Area was divided into the following four route segments based on points of connection and/or termination:

- CS Line Segment 1: Carmacks to McGregor Creek
- CS Line Segment 2: McGregor Creek to Pelly Crossing
- CS Line Segment 3: Pelly Crossing to Stewart Crossing
- MS Line Segment: Minto Spur Line (Minto Landing to Minto Mine site)

Analysis of route options then proceeded separately within each of the four above Route Study Area line segments. These same segments are adopted below to review the routing constraints and opportunities in detail.

Regional and site-specific physical, biophysical, and socio-economic features were transcribed onto NTS map sheets of the Project Study Region along with the proposed transmission line routes and alternatives. In Round Two of the PIP, the NTS maps served to identify the major features to be avoided by the transmission line and provided an important visual aid for discussing the route options with the public, including First Nation communities.

Issues and concerns identified by First Nation communities, RRCs, NGOs, resource users, and government departments were incorporated into the analysis. This is described in greater detail below by line segment. A brief description of the line segments between the identified route options is also provided at the beginning of each section to indicate the rationale for routing. To compare the route

[2] These maps were subsequently revised during the consultation process on the determination of a preferred route and have been included in Appendix 4D in their revised form.

specific options more detailed analysis was conducted to consider potential effects on the environment and people, as well as cost and technical factors.

7.2.2 CS Line Segment 1: Carmacks to McGregor Creek

Identification of Route Options

The Route Study Area in the Carmacks to McGregor Creek segment includes four specific route options which were the main focus of public consultation. There are two route options areas:

- **Tantalus Butte area**: Tantalus Butte is the first major terrain feature after the CS line leaves the Carmacks substation. Option 1A goes east of Tantalus Butte while Option 1B goes to the west (along the Klondike Highway route).
- **Tatchun area**: Option 2A goes east of the major elevation located west of the Klondike Highway route that passes by Five Finger Rapids and comes out back at the highway to the east of the Tatchun Creek campground. Option 2B goes west of this elevation and generally alongside the east side of the Klondike Highway route in this area around to Tatchun Creek.

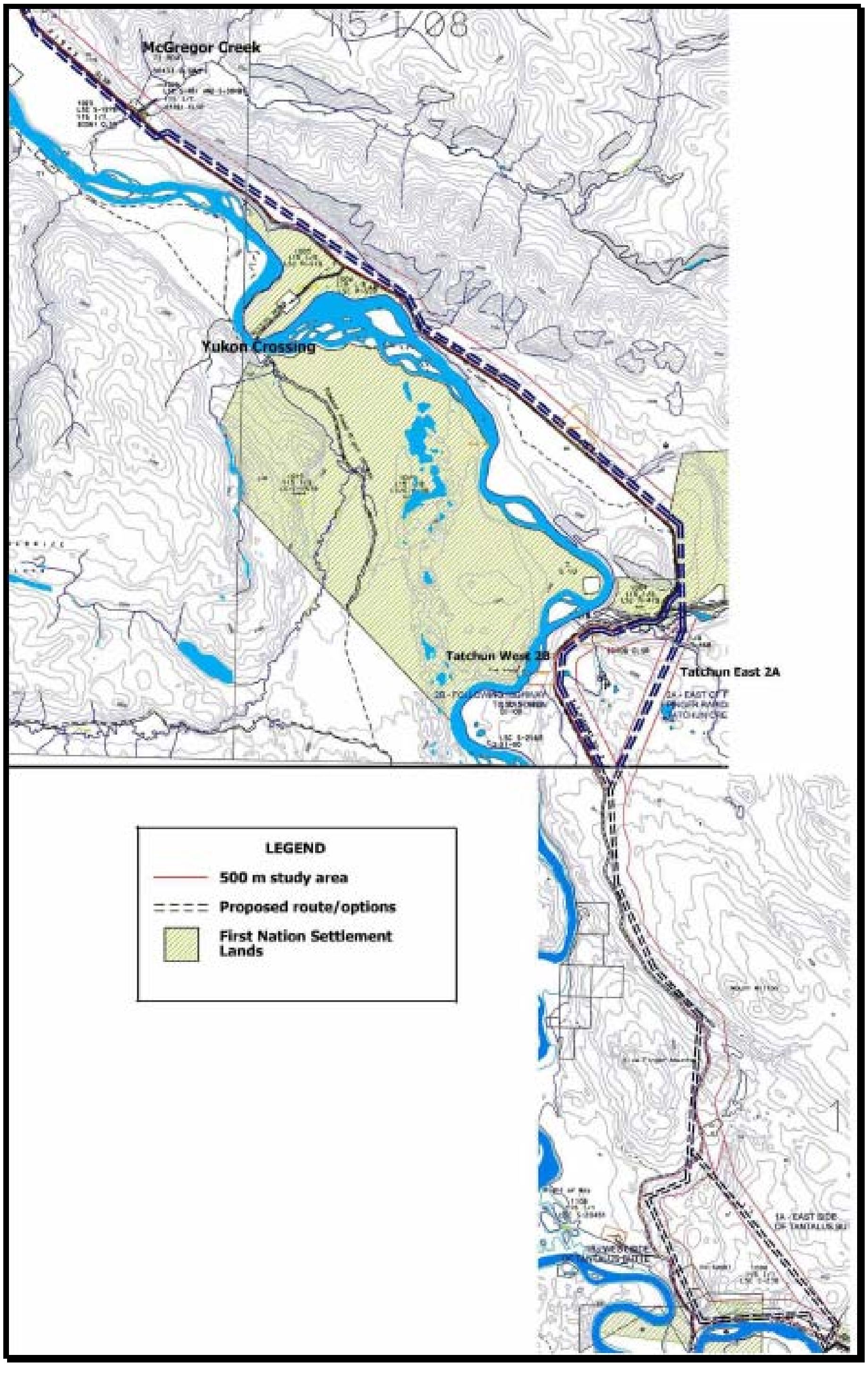
This line segment and route options are illustrated in Figure 7.2-1. The line segment between the route options at Tantalus Butte and Tatchun Creek was routed initially on the west side of the Highway to avoid privately-held property and nearby wetlands north of Tantalus Butte. The proposed line then crosses to the east or non-view side of the Klondike Highway at approximate UTM coordinates 434000 Easting and 6896000 Northing near Mount Milton and stays on the east side up to Tatchun Creek.

After crossing Tatchun Creek, the line segment continues on the east side of the Highway through LSCFN R 38B settlement lands, avoiding very steep terrain between the highway and the Yukon River. The line continues on the east non-view side to avoid aesthetic impacts such as west looking views and a parcel of LSCFN settlement land on the west side of the Highway at Yukon Crossing. Terrain constraints of steep slopes squeeze the transmission line ROW to be in close proximity to the Highway in two locations – immediately south of Yukon Crossing and just south of McGregor Creek.

Additional consultation with LSCFN and SFN regarding views at Yukon Crossing resulted in a refinement of the route at the September 12th Steering Committee meeting. The proposed route has been located up on a bench out of sight of the highway through most of the Yukon Crossing area.

Shortly before McGregor Creek the proposed route crosses to the west of the Highway to avoid two LSCFN members' individual land selections and to be in an optimum location for any future tap connection to the proposed Carmacks Copper mine. Following the September 12th Steering Committee meeting, a refinement in this location ensures that the proposed route crosses the highway far enough south of McGregor Creek so as to cross through a parcel of land which has recently been approved by YG Lands for agricultural use; however the application has been challenged by LSCFN and final resolution on ownership has not been determined at time of filing. This route refinement near a LSCFN trap line also addresses the point raised in the October 4, 2006 letter from Chief Eddie Skookum to David Morrison, President of Yukon Energy (see Appendix 7C). Yukon Energy has had consultation with the applicant on potentially crossing this parcel with no serious concerns having been expressed.

Figure 7.2-1
Carmacks to McGregor Creek Route Options



Comparison and Evaluation of Routes

The four preliminary route options identified in the May 2006 Newsletter and depicted above in Figure 7.2-1 are generally described in Table 7.2-1 below:

Table 7.2-1
Carmacks to McGregor Creek Preliminary Route Options

1A Tantalus Butte East	1B Tantalus Butte West	2A Tatchun East	2B Tatchun West
• Route is straighter, shorter and less costly than 1B • Avoids both privately owned lands and LSCFN settlement lands • Avoids viewpoints from the Yukon River • Crosses trapping concession	• Route is longer, adjacent to the Klondike Hwy. and has more corner towers • Crosses privately owned lands and one parcel of LSCFN settlement land • Potential aesthetic concerns from users of Yukon River • Difficult siting between Hwy and bluffs of Tantalus Butte	• Avoids prime recreational viewing site of Five Finger Rapids • Avoids crossing gravel site • East of Tatchun Creek campground, • Route is straighter, shorter & less costly than 2B • Crosses trapping concession, including cabin location	• Route is in close proximity to Five Finger Rapids and Tatchun Creek campground • Potentially may cross the gravel site • Route is longer, running adjacent to the Klondike Hwy, and more costly with more corner towers than 2A

Analysis of effects on the community for these options focused on the following significant factors: potential impact on resource use (i.e. trapping), potential impact on access to resources, potential impact on views and aesthetics, and potential impact on cultural and heritage sites.

Effects on the environment included potential effects on wildlife and wildlife habitat, effects on types of terrain and effects on vegetation (burned/non-productive areas vs. forest cover).

Effects on Project costs focused on line length and the number of large angle structures, with cost being proportional to line length.

Table 7.2-2 summarizes the comparison of the initial four routing options by the effects on the Project, the environment and on the community.

In reviewing each of these factors below, refinements are introduced for most of the options. These refinements were made in response to consultations and route selection analysis.

Table 7.2-2
Carmacks to McGregor Creek - Comparison of Preliminary Routing Options

	1A Tantalus East	1B Tantalus West	2A Tatchun East	2B Tatchun West
Effects on the Project				
Line length (approximate)	6.4 km	9.2 km	5.0 km	7.4 km
Number of corner towers (approximate)	2	4	2	Minimum 4
Preliminary estimated costs[1]	$ 832,000	$ 1,200,000	$ 650,000	$ 962,000
Effects on the Environment				
Terrain types[2]: - sensitive terrain - stable terrain	• Sensitive (10%) • Stable (90%)	• Sensitive (30%) • Stable (70%)	• Sensitive (30%) • Stable (70%)	• Sensitive (25%) • Stable (75%)
Wildlife[3]	Some winter range habitat for mule deer; potential peregrine falcon nest in Tantalus Butte area; moose habitat to east of corridor	Key winter range & spring fawning habitat for mule deer; potential peregrine falcon nest in Tantalus Butte area; bald eagle habitat near Yukon R	Important furbearing habitat; potential bald eagle habitat	Potential bald eagle habitat; furbearing habitat
Vegetation[4]: - % of burned or non-productive area - % of forest cover	• Burned/non-productive (16%) • Forest cover (84%)	• Burned/non-productive (33%) • Forest cover (67%)	• Burned/non-productive (10%) • Forest cover (90%)	• Burned/non-productive (38%) • Forest cover (62%)
Effects on the Community[5]				
Resource Use: - traplines	Line passes through trapping concession # 153	Line is adjacent to trapping concession #153	Line passes through trapping concession #151 and next to trapper cabin	Line passes through trapping concession #151
Access to resources	Concern expressed that ROW may increase hunter access	Adjacent to Klondike Hwy and existing access trails	Concern expressed that ROW may increase hunting and trapping access, as well as snowmobile access	Adjacent to Klondike Hwy and existing access trails
Aesthetic concerns	No aesthetic concerns	Aesthetic concerns as ROW will be across from Yukon River along Robert Campbell Hwy.	No aesthetic concerns	Aesthetic concerns as ROW may be in close proximity to Five Finger Rapids viewing site; views from Yukon River

	1A Tantalus East	1B Tantalus West	2A Tatchun East	2B Tatchun West
Effects on the Community[5] (Continued)				
Cultural/heritage sites	No known sites within Route Study Area	Three archaeological sites within the Route Study Area (CS7, 8 and9)	Trapper cabin Proximity to salmon fishing camps at confluence of Tatchun Creek & Yukon R – also known heritage site at Tatchun Creek campground	Trapper cabin Proximity to salmon fishing camps at confluence of Tatchun Creek & Yukon R – also known heritage site KbVa-29 at Tatchun Creek campground

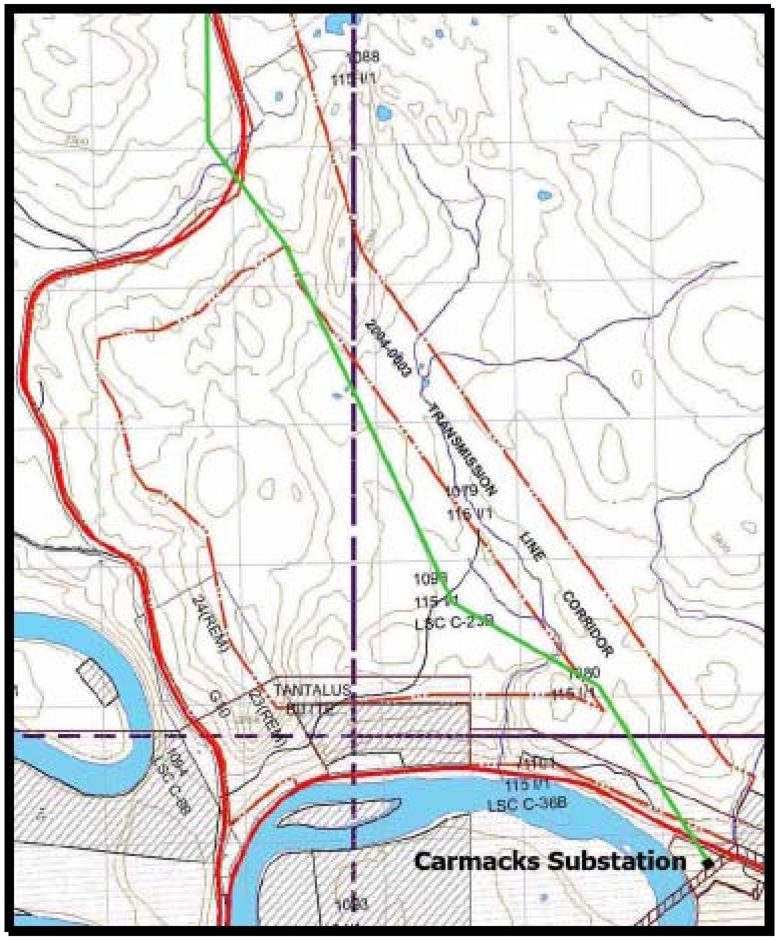
[1] Using a base cost of $130,000 per km for 138 kV line – no consideration of large angle cost differences. [2] Sensitive terrain defined as terrain features to avoid from Mougeot's classification of very steep slopes, very poorly drained terrain such as wetlands, and organic and ice rich terrain; stable terrain refers to well-drained gravelly sand to gravelly loam and bedrock. [3] Analysis is based on Yukon Government Key Wildlife Areas and Issues and Recommended Mitigation from Yukon Government Dept. of Environment, 2002-2003 on earlier Carmacks-Stewart Transmission Line Project. [4] Analysis is based on Estimated Volume Potential map, Forestry Branch April 2006 (approximate % calculations only). [5] Analysis of effects on the community is based on issues identified through First Nation community meetings and discussions with territorial government departments and other publics

Effects on the Project

When the effects of route options for Option 1B and Option 1A are compared and contrasted, Option 1B to the west of Tantalus Butte is expected to be more costly from a Project cost perspective as it is approximately 2.8 km longer than Option 1A and would require two additional corner towers. This Option also crosses or is adjacent to historic coal mining sites. Option 1B would require the negotiation of easements as it would cross several parcels of privately-held land, including a parcel of LSCFN settlement land. This could add further costs to this route option.

In consultation with LSCFN community members on Route Option 1A Tantalus East, concern was expressed over resource harvesting use of the creek area within the proposed route location. A refinement to Option 1A was made to locate the line approximately 500 m to the west to avoid this creek and resource use area. In addition, the route exiting from the substation was altered to parallel an existing access trail to the foot of the slope on the north side of the Robert Campbell Highway. These refinements are illustrated by the **green** line in Figure 7.2-2:

Figure 7.2-2
Route Option 1A Revised Tantalus East

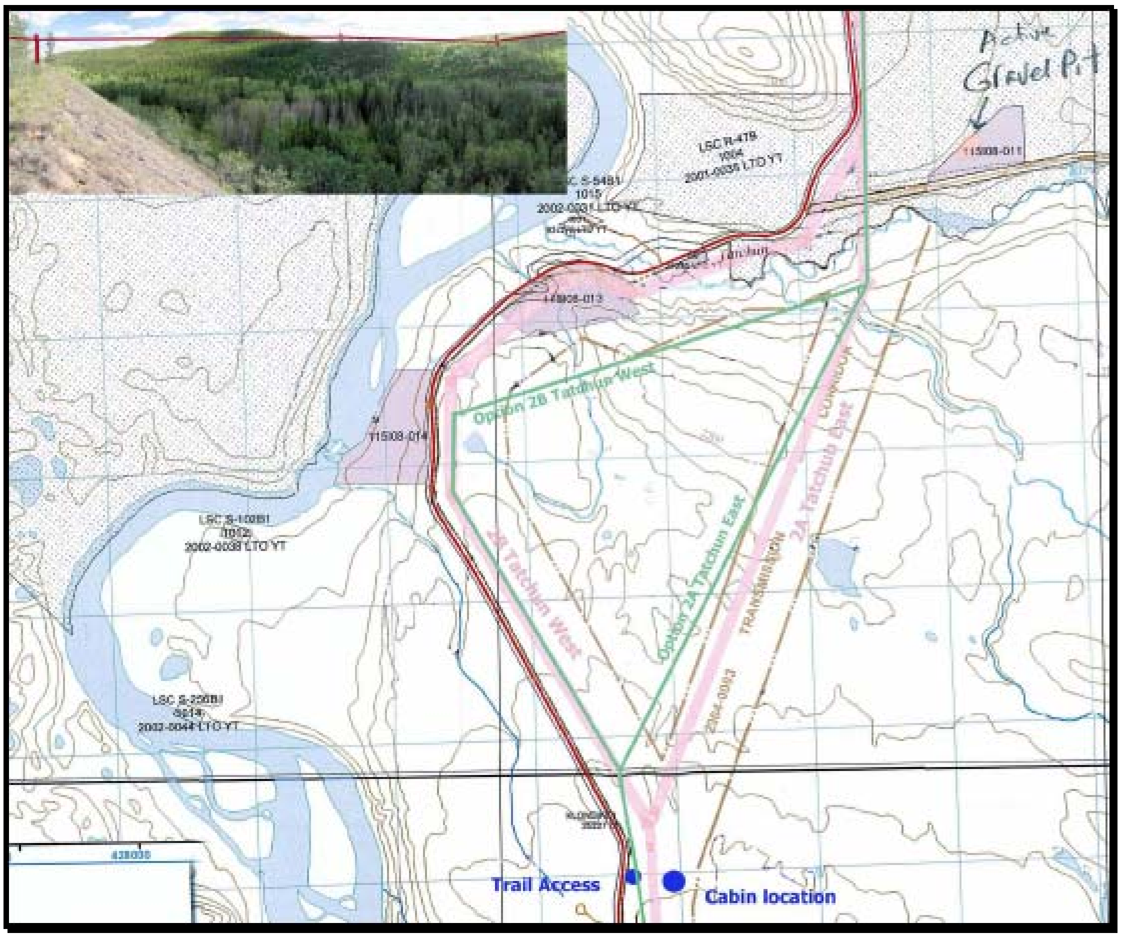


When Option 2A and Option 2B were initially compared in the Tatchun Creek area, the latter option adjacent to the Highway proved less desirable as it would be approximately 2.4 km longer than Option 2A and may require two additional corner towers, further increasing Project cost. However, both options were re-visited after discussions with LSCFN community members and trapline holder #151, who wanted reconsideration of Route 2B in order to avoid a prime trapping area affected by Option 2A, and a review of routing for both options to avoid a trapping cabin.

In addressing each of the Tatchun area options, it has been noted that Trapline holder #151 has a trapping cabin located approximately 100 m from the Klondike Highway (see above Figure 7.2-3 on route refinement) which has resulted in a minor modification of the CS route for all options to avoid this cabin by locating the route between the cabin and the highway. A further refinement was made to Route Option 2A to avoid a resource harvesting area in the vicinity of the small lake (as shown on Figure 7.2-3 below). The Option 2A was modified slightly west of the original alignment.

As requested, Option 2B was re-examined with possible added adjustments to reduce the number of corner towers, and reduce aesthetic impacts. The resulting modified version of 2B Tatchun West ensures a visual buffer between the Klondike Highway and the transmission line ROW by placing the line behind the first bench of land to the east of the highway (see Figure 7.2-3 below). The modified route option would then proceed in a north-easterly direction, crossing the most south-eastern end of the gravel pit. These refinements also incorporate concerns identified by the Department of Highways with regard to crossing their active gravel pit. The line option would intersect Option 2A as it travels north across Tatchun Creek, well to the east of the campground, thus avoiding the heritage site at the campground.

Figure 7.2-3
Modified Route Options 2B Tatchun West and 2A Tatchun East



The modified Option 2B Tatchun West would necessitate greater Project costs than Option 2A as it is approximately 2 km longer, resulting in an additional $260,000 in Project costs over Option 2A Tatchun East**.** East of the Tatchun Creek campground, both route options involve a long span of Tatchun Creek, using the landscape contours to run the line from bluff to bluff, thus avoiding the need for extensive clearing of this segment of the ROW. An example of this approach is illustrated in the photo inset in Figure 7.2-3.

Effects on the Environment

The identification and analysis of Project effects on terrain types was based on terrain analysis conducted by Mougeot GeoAnalysis and aerial photo interpretation by Access Consulting Group. While both Tantalus Butte options provide predominantly stable terrain for routing the line, Option 1A Tantalus East offers superior routing. Both Tatchun options are characterized by 70 to 75% stable terrain and provide for similar project effects on the environment. The remaining areas of sensitive terrain can be spanned for all options.

An assessment of wildlife and key wildlife habitats was based on information provided by the Department of Environment – Key Wildlife Area maps (2006), terrain analysis (2000) and air photo mapping of the area (flown in 2005), and personal communication with key departmental specialists (2006). This information was augmented by input from LSCFN community members which provided insights regarding important wildlife habitat relevant to resource use (i.e., trapping and hunting). Both Tantalus Butte options are in the vicinity of winter range for mule deer and may be in the vicinity of a peregrine falcon nesting location (exact location can not be confirmed); however, both options will avoid key moose and caribou habitat. Tantalus Butte Option 1B would be adjacent to bald eagle habitat. Both Tatchun options are in important small furbearing animal habitat and potential bald eagle habitat.

The assessment of vegetation cover is based on the Department of Forestry mapping of Estimated Volume Potential (April 2006) of the 500 m Route Study Area (in Map Folio on CD). The percent of burned and non-productive land includes built up areas such as roads, gravel sites, and recreation sites while the percent of forest cover includes Low, Medium and High areas of greenwood potential. Although Option 1A Tantalus East has a higher volume of forest cover (84.5% vs. 67% for Option 1B), a significant volume of this falls within the Low potential category and it is not in close proximity to a highway making it less accessible for harvest. Option 2A Tatchun East has a significantly higher percentage of forest cover (90% vs. 62 % for option 2B), with most of that falling within the Low greenwood volume potential. Most of the non-productive forest cover for Option 2B relates to the road, the Five Finger Rapids viewing site and the gravel pit. If the transmission line is located behind the first bench east of the highway in the modified Option 2B Tantalus West, it will be located in similarly Low potential forest cover, with the result that both the east and west options become similar as to effects on vegetation cover.

Effects on the Community

Effects of the Project on the community were identified through the PIP process. This process included community meetings with all three First Nations, meetings and correspondence with government departments, and meetings and correspondence with other publics from April to October, 2006. Resource use by First Nation members is highlighted as being of key concern. Trapline holders had a strong preference for route options that did not cut across their traplines because of the perception that the ROW would cause damage to their trapping activities. Trapline holders of both #151 and #153 preferred that the line follow the Klondike Highway and avoid their trapping areas.

First Nation community members noted that route options Option 1A Tantalus East and Option 2A Tatchun East would provide increased access into trapping and hunting areas and acknowledged that this may have both positive and negative effects. It may prove beneficial to First Nation trappers and hunters by improving ATV or snowmobile access to these areas for hunting and trapping activities; conversely it may open the area up to hunting by non-community members. Concerns in this regard were particularly noted for any of the Tatchun East options, as noted in the October 4, 2006 letter from Chief Skookum to David Morrison (see Appendix 7C).

Wilderness tourism operators, as well as Yukon Government departments of Parks and Culture and Tourism, raised aesthetic concerns with particular emphasis placed on the high-volume Five Finger Rapids viewing area and the Tatchun Creek campground. These concerns are consistent with those identified in 2002-2003 when the then proposed Carmacks-Stewart transmission project was reviewed on a preliminary basis by the Department of Renewable Resources (see Reference Material 7R for a copy of the identified issues). The modified Option 2B was reviewed by Yukon Parks who indicated the option was acceptable if chosen.

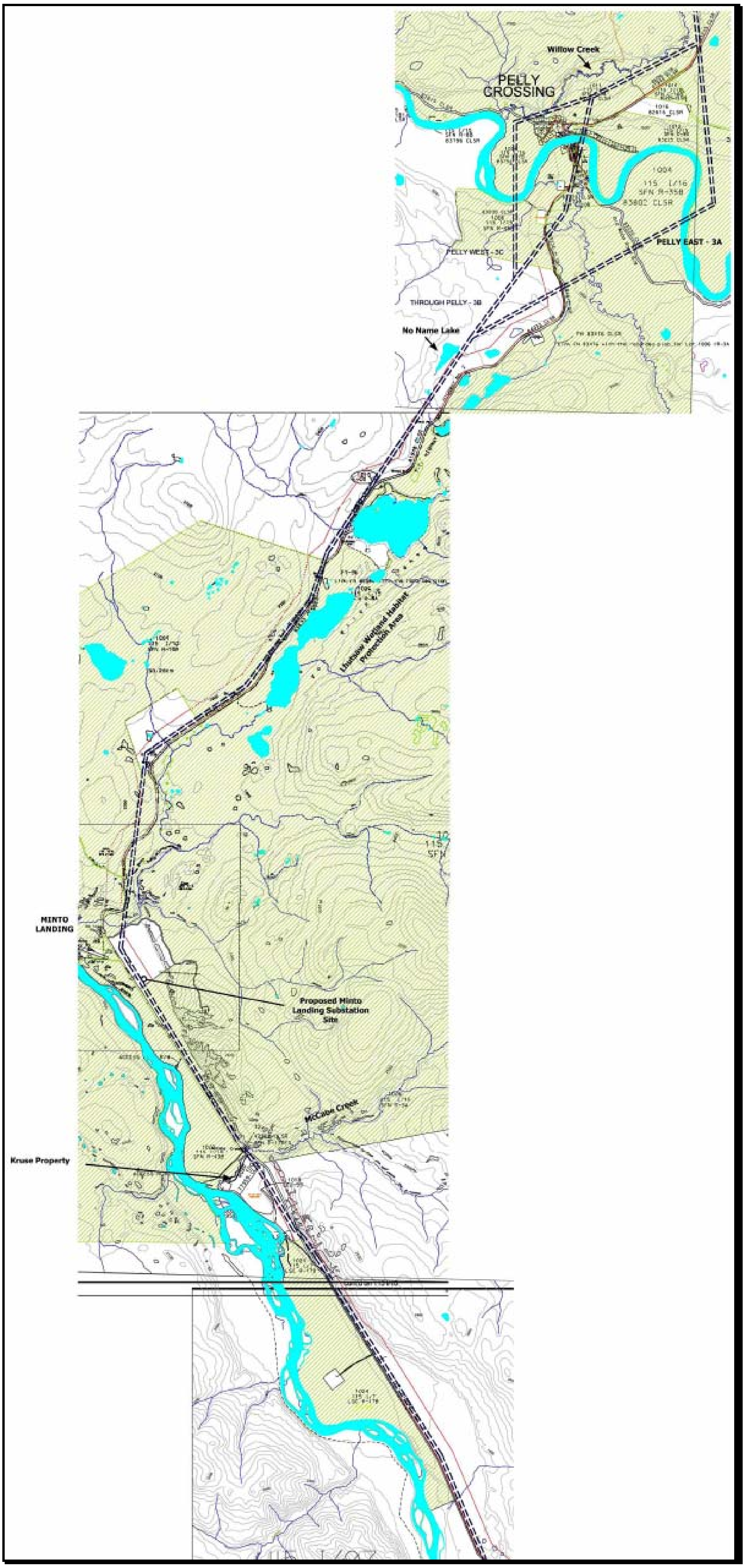
Concerns regarding culture and heritage resources relate to the Tatchun Creek area. This area is a known historical meeting place of Northern Tutchone people and the current location of summer fish camps for LSCFN members. Both Options 2A and 2B are located well to the east of the confluence of Tatchun Creek and the Yukon River and east of the Tatchun Creek campground, thus avoiding identified heritage resources (see Chapter 6.3.4 for discussion on heritage resources at this location).

7.2.3 CS Line Segment 2: McGregor Creek to Pelly Crossing

Identification of Route Options

The characterization of the CS Route Study Area segment between McGregor Creek and Pelly Crossing initially identified three preliminary routing options in and around the community of Pelly Crossing for use in the PIP. These were depicted in the May 2006 newsletter and were used at a Selkirk First Nation community consultation meeting on June 21st. Figure 7.2-4 McGregor Creek to Pelly Crossing Preliminary Route options illustrates this line segment and options as initially presented in the May newsletter.

Figure 7.2-4
McGregor Creek to Pelly Crossing Preliminary Route Options



Since preparing the preliminary route options, considerable discussion has occurred with SFN and others regarding all areas of the CS Route Study Area within this line segment. As reviewed below, two specific additional refinements and/or options have been identified for consideration:

- Route refinements south of McCabe Creek and northward to the Minto Landing substation location; and
- A new route option proposed by SFN for routing much farther away from the west side of the Highway in the vicinity of the Lhutsaw Wetland Habitat Protection Area which is located on the east side of the Highway north of Minto Landing and south of Pelly Crossing.

The line segment between McGregor Creek and the proposed Minto Landing substation was initially routed predominantly on the east side of the Klondike Highway to remain on Crown Land until McCabe Creek and to minimize affect on views (both looking towards the Yukon River, and for viewscapes from the River east). Beyond McCabe Creek, initial routing was immediately adjacent to the Klondike Highway to the Yukon Government EMR reserve lands. The preliminary location of the Minto Spur Substation was made in the south west quadrant of the EMR lands based on the following criteria:

- Need for all-weather/all-season access to the substation site encouraged location close to existing transportation infrastructure.
- Preliminary discussions with Yukon Government Highways encouraged location away from existing gravel quarry operation and potential future use.
- Connection to Minto Spur transmission line encouraged location close to possible Yukon River crossing.
- Anticipated transmission line routing north towards Pelly Crossing identified terrain constraints with routing up Policeman's Hill immediately to north of EMR reserve lands.

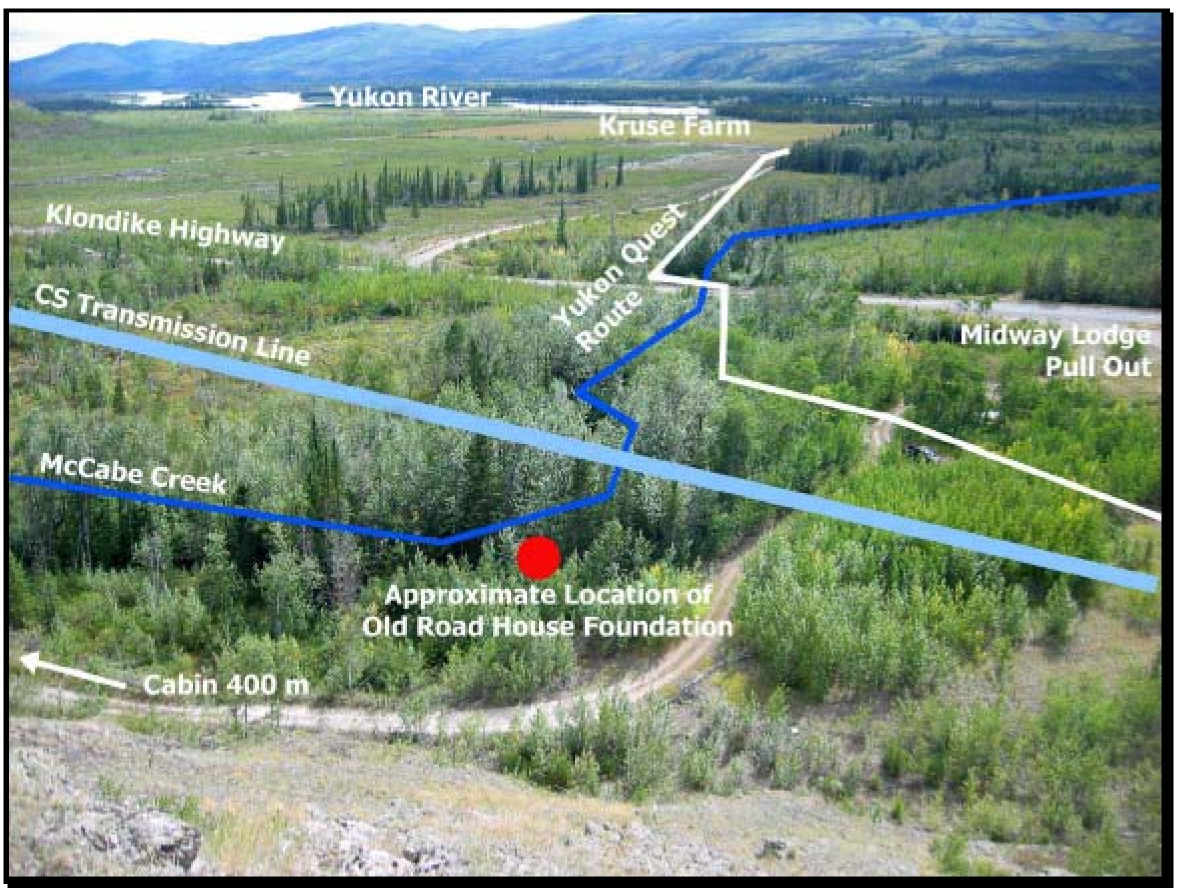
In the vicinity of McCabe Creek, various constraints contribute to limiting the possible routing, and provide a good example of the scope of consideration required in determining preferred routing. Contributing bio-physical and socio-economic constraints include the following:

- Steep slope terrain units to the east limit the ability of the line to be situated back from the Klondike Highway and reduce visual impacts.
- The proximity of private agricultural lands (Kruse Farm) on the west side of the Highway south of McCabe Creek encourages routing to the east side of the highway to avoid easement issues
- FN concerns of visibility of the proposed line from the highway, particularly between McGregor and McCabe creeks
- SFN settlement lands on both east and west sides of the Highway north of McCabe Creek necessitate the need to seek easement for the Project Site Area
- The crossing of McCabe Creek and the relative proximity of the Klondike Highway Bridge crossing
- The abandoned Midway Lodge pull out on the east side of the Highway

- The location of two cottages further upstream on McCabe Creek with access road from the Highway
- The presence of an old coach house foundation on the north east bank of McCabe Creek
- The Yukon Quest trail enters McCabe Creek from the north east bank and crosses under the highway bridge to Kruse Farm.
- The opportunity to route the transmission line along an abandoned coach trail to the east of the Klondike Highway.
- SFN future economic development opportunities identified for the lands immediately west of the Highway (residential sub division) and east of the Highway (possible commercial/industrial use)
- Ongoing SFN interest in SFN R3A settlement land identified for personal fuel wood that lies between the Highway and McCabe Hills.

The photograph in Figure 7.2-5 which was taken from McCabe Hill looking west/south-west shows how some of the constraints and opportunities were considered in identifying route options at this location.

Figure 7.2-5
Example of Routing Through McCabe Creek



Further assessment, including consultation with SFN and LSCFN, resulted in the following route refinement (beyond what is depicted in the earlier Figure 7.2-4) north of McGregor Creek and northward to Minto Landing:

- Routing will be located behind old growth trees where available within an area of up to 200m east from the highway between McGregor and McCabe creeks
- Routing will stay on the east side of the Klondike Highway, cross McCabe Creek to the east of the Yukon Quest Trail and west of the old coach house foundation.
- It will then continue as far east as practical between the base of McCabe bluff and the old Midway Lodge pull-out.
- It will continue between the base of the bluff and the old coach road heading north, continuing to route along the base of the bluff into the EMR parcel of land opposite Minto Landing.

Proceeding from the proposed Minto Landing substation location, the line was originally routed to stay on the east side of the Highway to avoid a grave site on Policeman's Hill and then cross to the west side at approximate UTM coordinates 406000 Easting and 6945000 Northing prior to the Yukon Government gravel reserve to avoid areas of poor drainage and wetland habitat on the east side. The line was to continue to stay on the west side of the Klondike Highway to avoid the Lhutsaw Wetland Habitat Protection Area; this is a large parcel of protected habitat with a series of lakes previously known as the Von Wilczek Lakes. A large section of the area on the west of the Highway is SFN settlement land R10B block and land located away from the road has been identified as land for commercial logging by Northern Tutchone companies. Only fuel wood for personal use may be cut near the road.

Contributing technical, bio-physical and socio-economic constraints for this portion of the segment proceeding north from the Minto Landing substation location and to the west of the Lhutsaw Wetland Habitat Protection Area include the following:

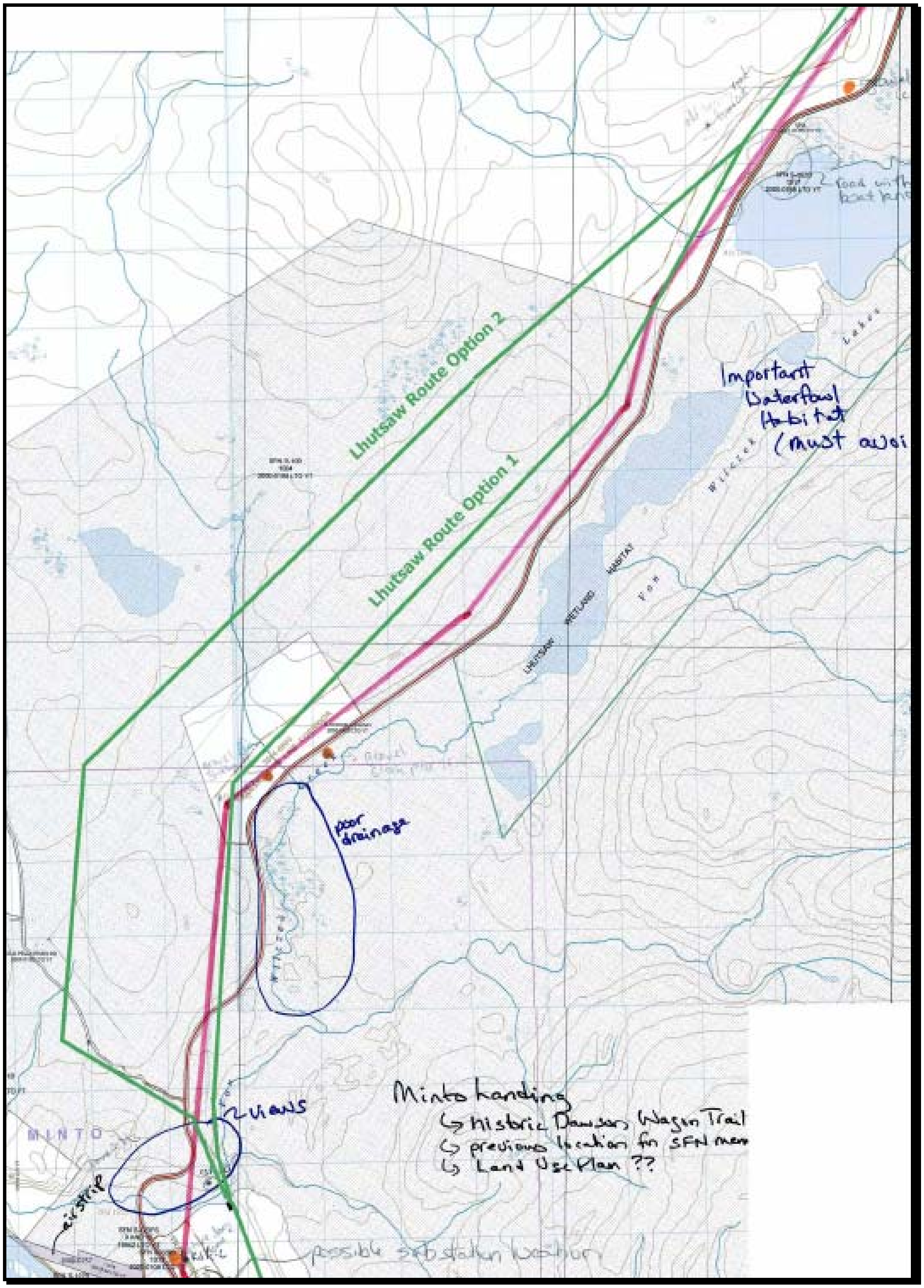
- **Construction Cost**: As described in Section 7.1.1, key technical constraints in route selection relate to overall line length and need for angle structures, both of which influence total construction costs.
- **Construction and Operation**: Transmission construction costs are also influenced to a lesser degree by the terrain and distance from existing transportation infrastructure. The more difficult the terrain and/or distance from existing roads, the more the need for temporary access trail development for construction and maintenance.
- **Lhutsaw Wetlands**: any route alternative must avoid this wetlands area. The Łútsäw Wetland Habitat Protection Area Management Plan recently approved (May 2006, see Table 2.7-1) by SFN and the Yukon Government, documents that "any linear development should occur within the Klondike Highway right-of-way corridor and be preferably on the west side of the highway". SFN has also expressed preference of maintaining the pristine nature of the broader Lhutsaw Wetlands region.
- **Wildlife Effects**: Route options that contribute to habitat fragmentation are less preferable than alternatives which minimize such effects.

- **Resource Use**: Route options that encourage or enhance access to new areas may be less preferable than alternatives that maintain current level of access (at least as regards concerns about access by new parties not currently engaged in resource use in the area).
- **Aesthetic Effects**: SFN has raised specific concerns about the visual impact of the Project Site Area from the Highway in the vicinity of this wetlands area. Alternatives that minimize or avoid this visual impact are preferable for SFN compared to other alternatives that do not avoid this visual impact.
- **SFN Settlement Lands**: Routing must cross SFN R10 B block of settlement land. Route options that minimize the amount of settlement land required are generally preferable to other alternatives, except in areas where SFN has particular interests to increase the use of its lands.

Following further assessment, including consultation with SFN members, refinement of routing through the area between the Minto Landing substation and the Lhutsaw area resulted in two additional "interior" route options being identified further away to the west from the Klondike Highway as follows (additional options in **green** in Figure 7.2-6).

- The Route to continue northwards from the Minto Landing substation location, then cross Von Wilczek Creek to the east of Policeman's Hill, follow a rise to a point east of the Klondike Highway in the vicinity of the Old Pelly Coach Trail.
- **Lhutsaw Route Option One** (refinement from preliminary route): turn north and cross the Highway towards the EMR land parcel and gravel reserve, keeping 300 – 400 m to the west of the Highway. The route option would continue behind the gravel reserve and then proceed northeast following the highway maintaining a sufficient buffer where practical (possibly greater than 100 m) to visually separate the transmission line ROW from the Klondike Highway. Upon reaching Crown Lands, the route would continue as mapped above in the preliminary route.
- **Lhutsaw Route Option Two** (new option proposed by SFN for consideration): turn north and cross the Highway, then continue in a westerly direction, south of Old Pelly Coach Trail. The route option would continue west until it passes south of an existing stand of conifers. It would then turn north and then west to travel behind a large hill approximately 3 km west of the Klondike Highway. The route option would continue NNW, just west of the edge of the EMR reserve lands and then continue in a parallel fashion roughly 2 km west of the Klondike Highway through the SFN R10 B block of settlement land until crossing onto Crown Land. It would then angle back towards the Klondike Highway and continue northwards as mapped in the preliminary route.
- Upon leaving R10B settlement land (opposite Lhutsaw Lake) the line for both options remains on the west side of the highway on Crown Land until south of Pelly Crossing.

Figure 7.2-6
Lhutsaw Area Route Options



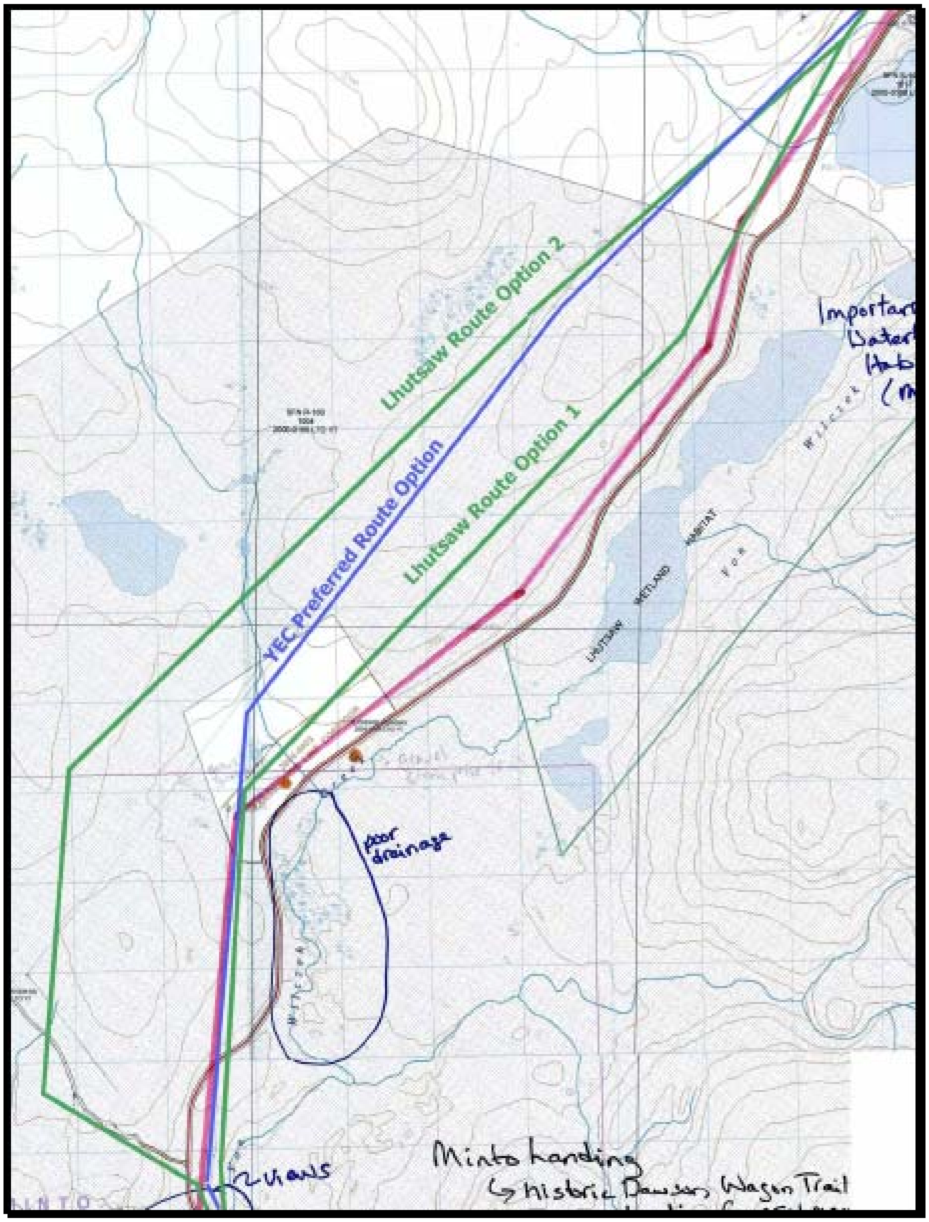
A brief comparison of Lhutsaw Route Option Two over either the preliminary proposed route or Lhutsaw Route Option One above concludes as follows:

- Option 2 is approximately two to two and a half km longer than the preliminary proposed route or Option 1.
- Option 2 increases capital cost requirements as more poles and wire are needed – in the range of $250,000 to $400,000 for additional line length costs without considering other cost factors noted below.
- Option 2 would require a greater number of large angle towers, thus increasing further the overall cost of the route relative to the preliminary proposed route or Option 1.
- Terrain is marginally less preferable for Option 2 compared with Option 1 which may further increase overall construction and maintenance costs.
- More forested area for Option 2 would require clearing for construction and brushing for maintenance (approximately six to seven and a half hectares of additional area relative to Option 1).
- Option 2 would require development of some temporary access trails which raises access management concerns regarding non-utility use of the ROW (note though that an apparent SFN objective is for SFN use of this ROW as a trail).
- Option 2 would involve higher operation and maintenance costs than Option 1.
- Option 2 would increase habitat fragmentation for wildlife compared with Option 1 (Mark O'Donoghue, the regional biologist for YG Environment, has raised the concern over developing new access routes too far away from existing transportation routes).
- Option 2 slightly reduces the potential visual impact of the Project Site Area from the Highway compared with Option 1 because of the greater separation distance.

These route options in the Lhutsaw area were considered by Yukon Energy and SFN during consultation in late August and early September. At the September 12th, 2006 Steering Committee meeting with NTFN members (see Appendix 4D), Yukon Energy indicated they could not support a need for the additional major line length and cost increases associated with Lhutsaw Route Option 2.

A further compromise "interior" route option was provided by Yukon Energy (the **blue** line labelled YEC Preferred Route in Figure 7.2-7) for the area between the Minto Landing substation and the Lhutsaw area to address concerns identified through the consultations, which would move Option 1 on Figure 7.2-6 further back from the highway, including to the west of Lhutsaw Hill, to avoid visibility from the highway as requested; in addition, as requested, the line in the Von Wilczek/Lhutsaw Creek area was adjusted further to the west away from the terraced bank (i.e., no less than 100 m from the terraced edge along the creek for the 1200 m or so that the route is closest to the creek) to avoid an important wildlife corridor and an important source of heritage resources. This refinement would also serve to discourage future development along this stretch of the highway through SFN R10 settlement lands. In the October 4, 2006 letter from Chief Darin Isaac to David Morrison, President of Yukon Energy (see Appendix 7C), SFN states that it is not in a position to declare this refinement to be their preference and suggests further consultation on these options through SFN settlement lands in this portion of the CS route be conducted concurrently with the YESAA process, without causing a delay in the filing of this Project Proposal Submission.

Figure 7.2-7
Refinements to Lhutsaw Area Route Options



<u>Comparison and Evaluation of Route Options at Pelly Crossing</u>

The three preliminary route options around Pelly Crossing identified in the May 2006 newsletter and depicted above in Figure 7.2-4 McGregor Creek to Pelly Crossing, are generally described in Table 7.2-3.

The three initial routing options in the vicinity of Pelly Crossing were compared based on noted effects on the Project, effects on the environment and effects on the community. These initial comparisons are summarized in Tables 7.2-3 and 7.2-4.

Based on these comparisons and ongoing discussions with SFN, further options were developed to address routing of the CS development in the vicinity of Pelly Crossing and a preferred option was selected.

Table 7.2-3
Pelly Crossing Preliminary Route Options

3A Pelly East	3B Through Pelly Crossing	3C Pelly West
• This option avoids privately owned land and existing community infrastructure within the community, including the campground, road pullout, and airstrip • Avoids crossing the Pelly River near the community • Longest line length but fewer corner towers	• Would face various infrastructure constraints within the community including crossing through a housing development on the north side of the river, and would be in close proximity to the airstrip • Shortest length however requires more corner towers and crosses steep terrain on North side of river	• Avoids privately owned land and existing infrastructure within the community but residences Pelly Farm Road might be affected. • Terrain constraints of steep slopes, crossing of Willow Creek and the floodplain on the north side of the Pelly River would require additional engineering feasibility • Shorter line length than 3A but with greatest number of corner towers

Table 7.2-4
Pelly Crossing - Comparison of Preliminary Route Options

	3A Pelly East	3B Through Pelly Crossing	3C Pelly West
Effects on the Project			
Line length	14.0 km	12.5 km	13.5 km
Number of corner towers (approximate)	2	3	4
Preliminary estimated costs[1]	$ 1.82 M	$ 1.62 M	$ 1.76 M
Effects on the Environment			
Terrain types[2]: - sensitive terrain - stable terrain	• Sensitive (20%) • Stable (80%)	• Sensitive (25%) • Stable (75%)	• Sensitive (32%) (Greatest concern is Willow Creek area) • Stable (68%) (note: excludes floodplain on north side of Pelly R. in above)

	3A Pelly East	3B Through Pelly Crossing	3C Pelly West
Effects on the Environment (Continued)			
Wildlife[3]	Moose habitat Small fur bearing animal habitat Fishing in Pelly River	Some moose and small fur bearing animal habitat	Wetland/waterfowl habitat along Willow Creek (salmon spawning in Creek) Moose habitat, calving habitat Small fur bearing animal habitat Fishing camps; and nets in Pelly River
Vegetation[4]: - % of burned or non-productive area - % of forest cover	• Burned/non-productive (0%) • Forest cover (100%) This is primarily aspen, with a section of old growth white spruce along Mica Creek; and small amounts of black spruce and poplar throughout	• Burned/non-productive (5%) (community area) • Forest cover (95%) This is a mixture of aspen south and north of Pelly, including within the community; and balsam poplar between the proposed substation and Old Wood Road	• Burned/non-productive (0%) • Forest cover (100%) This is a mixture of mainly aspen south of the Pelly River; balsam poplar and white spruce north of the Pelly River to Willow Creek; black and white spruce along Willow Creek; and aspen north of the Klondike Highway.
Effects on the Community[5]			
Resource Use: traplines	Line passes through trapping concession # 137 and cuts through prime trapping areas	Line passes through trapping concessions # 137	Line passes through trapping concession # 137, close to trapper's home
Access to resources	Concern expressed that ROW may increase hunter access to moose Concern expressed over access to Granite Canyon site	No concerns over access to resources	Concern expressed over access to Willow Creek, an area SFN would like to protect
Aesthetic concerns	No concerns	Community did not like the line passing through their community Proximity to road pull out and vistas looking south over Pelly River and community	Willow Creek Proximity to housing on north side of Pelly River and views
Cultural/heritage sites	Community concerned over proximity to gravesites. Crosses a traditional Northern Tutchone trail that follows Mica Creek.	One known archaeological site (KeVb-1) considered of little or no interpretive value.	New archaeological site identified (CSA10), however considered of little or no interpretative value

[1] Using a base cost of $130,000 per km for 138 kV line – . no consideration of large angle cost differences [2] Sensitive terrain follows Mougeot's classification of very steep slopes, very poorly drained terrain such as wetlands, and organic and ice rich terrain; stable terrain refers to well-drained gravelly sand to gravelly loam and bedrock. [3] Analysis is based on Key Wildlife Map areas and Issues and Recommended Mitigation from Yukon Government Dept. of Environment, 2002-2003 on earlier CS transmission line project. [4] Analysis is based on Forest Cover mapping, Forestry Branch April 2006 – estimated volume potential is not calculated by Yukon Government Forestry on First Nation Settlement Land. [5] Analysis of effects on the community is based on issues identified through First Nation community meetings and discussions with territorial government departments and other publics.

Effects on the Project

Option 3A Pelly East is the longest route option in terms of line length but would be the simplest to construct. However, due to proximity to Granite Canyon, important fishing areas and graveyards near the community this option was eliminated at the June 21st meeting by SFN members.

Option 3B through Pelly (as originally drawn) was also eliminated at the June 21st meeting due to the community's desire to avoid having the line run directly through Pelly Crossing. This left route 3C Pelly West as the remaining initial conceptual route alternative.

Although Option 3C avoids the community, it is longer, will require the most number of corner towers and will navigate the most difficult terrain. This may increase costs above those indicated in Table 7.2-4. Option 3C also has the added concern of potentially affecting a housing development on the north side of the Pelly River in the vicinity of the Pelly Farm Road. In addition to issues identified by the community, and included in the table above, Yukon Energy identified various engineering challenges associated with the Pelly West alternative, including potential difficulties accessing the transmission line and substation for construction and maintenance, areas of poor drainage or susceptibility to flooding, and the potential need to cross Willow Creek twice.

Effects on the Environment

Both options 3A and 3B have similar amounts of stable terrain. Option 3C Pelly West includes sensitive terrain in the vicinity of Willow Creek which is an important wetland area to the community as well as a fish-bearing stream. Option 3C Pelly West would also cross a floodplain between the Pelly River and the Pelly Farm Road. Additional engineering feasibility studies would be required to cross the Willow Creek area.

An assessment of key wildlife habitats shows that there are no particular habitat concerns with regard to any of the above options. Wildlife habitat information was subsequently augmented through discussions with SFN members who indicated that the entire area is important moose habitat and small fur bearing animal habitat that is important for trapping. Option 3C also includes important wetland habitat. The Pelly River is used on an annual basis for summer fishing camps; consequently, the crossing location would need to be cognizant of key community fishing locations.

Vegetation cover throughout this area is fairly uniform as this area is not part of the 1995 Minto Burn. The forest cover is a mixed forest with aspen the predominant species. All three options include aspen, balsam poplar and white spruce stands. Option 3A Pelly East is the only option that traverses an older growth forest of white spruce (greater than 80 yrs. old).

Effects on the Community

Effects on the community were primarily identified in consultation with SFN, who conducted door to door surveys and held a community workshop on June 21st. At this meeting Options 3A and 3B were eliminated. Attention then focussed on Option 3C for further refinement and study.

After further examination of aerial photos and maps and taking into consideration issues identified in the community, Figure 7.2-8 was drafted to provide additional conceptual route refinements of Option 3C Pelly West. These options for the route at Pelly Crossing reflect the issues identified by both the community and Yukon Energy and are sensitive to the mutual concern about the effects that longer access trails may have on the landscape. These access trails may benefit local access; however, they may detrimentally open up an area to increased hunting pressure and contribute to the fragmentation of wildlife habitat. Locating the transmission line ROW at a significant distance from the Klondike Highway also substantially increases construction, operation and maintenance costs and would require several new access trails.

Overall, Figure 7.2-8 sets out the following two sets of new options for a route west of Pelly Crossing:

- **Pelly West Options A and B** (green lines in Figure 7.2-8) – from either new substation location option noted in the figure, the route would angle northwest and then cross the Pelly River. Options were then noted for routing the line on the north side of the river.
- **Pelly West Option C** (blue line in Figure 7.2-8) – this option was developed to avoid concerns with the Willow Creek area identified as sensitive habitat by the community and the Selkirk Renewable Resources Council. This option avoided fishing areas and fish camps west of Pelly Crossing, reduced access and habitat fragmentation in areas south and west of the community, and provided better access for construction and maintenance of the line.

Pelly West Options A and B (**green** lines in Figure 7.2-8): Associated issues included:

- Line is longer but removed from community and would have reduced visual impact
- ROW would create a new access route in a previously undisturbed environment, including the need for temporary access trails for construction and maintenance
- ROW would require spanning a small stream and some wetland areas south of the Pelly River, and a longer span across the Pelly River away from identified fishing camp locations
- North of the Pelly River the ROW would create a long access route in an undisturbed lowland forest area that historically has formed part of the Pelly River flood plain
- On the north side of the Pelly River, there are two routing options:
  - The first option crosses Pelly Farm Road, travels along a road ROW and in behind residential properties, then up the bluff north of Pelly Crossing. This option would forgo the requirement to cross Willow Creek twice which the community identified as preferential due to its cultural and fisheries importance. The ROW would cross between Willow Creek and five residences located along the Pelly Farm Road, as well as several access trails into the Willow Creek area. The ROW would likely encroach on these lands.

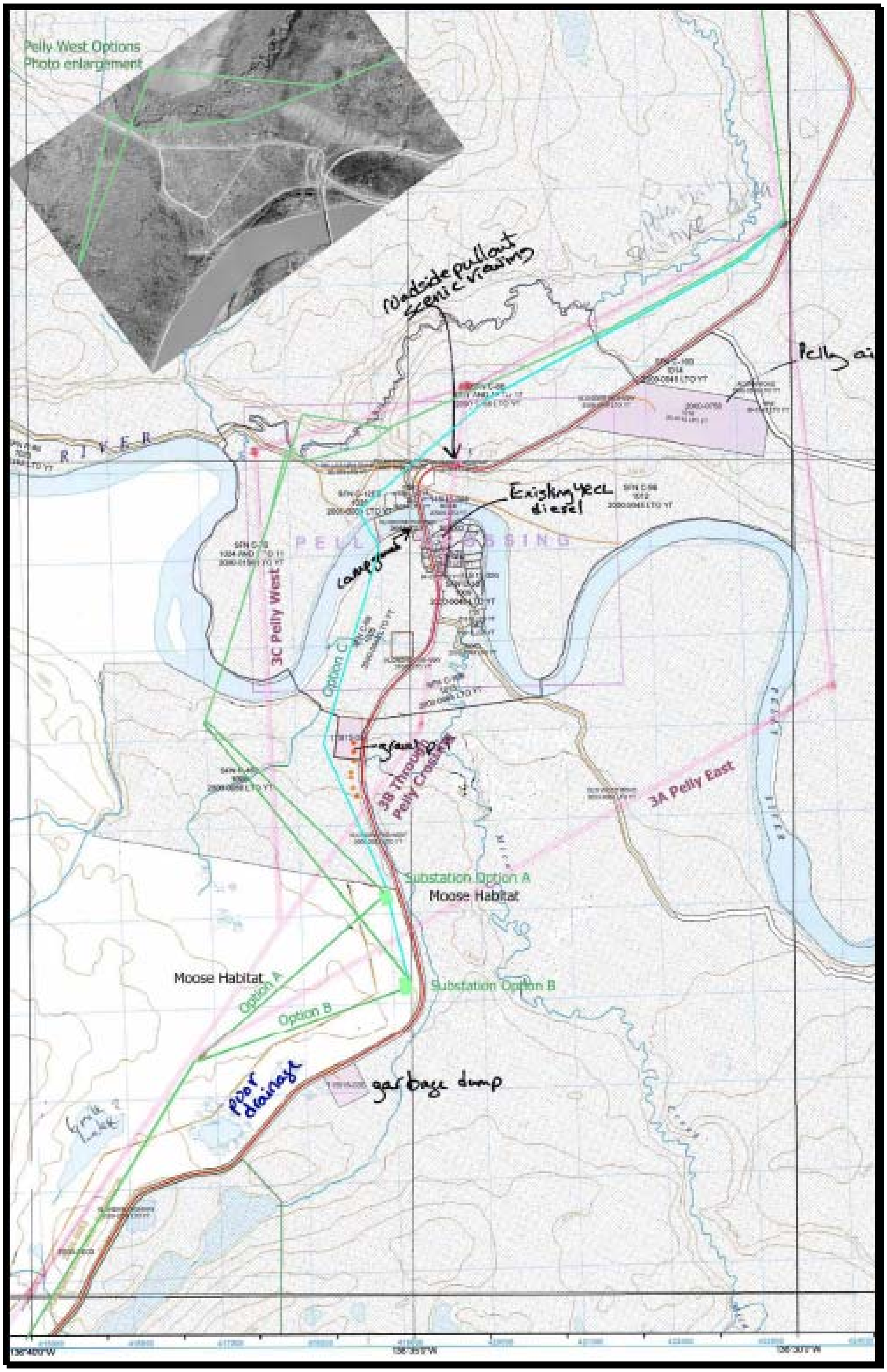
- The second option crosses Pelly Farm Road and then Willow Creek, turns east and crosses Willow Creek again to angle up the bluff north of Pelly Crossing. This option would require two crossings of Willow Creek and construction of a temporary access trial into the area north of Willow Creek for ROW and line construction. Although likely visible from the residences, it would avoid the residential land parcels along Pelly Farm Road.
- Both options would keep a 1,000 m distance west of Pelly airstrip.

Pelly West Option C (**blue** line in Figure 7.2-8): Issues associated with this route option included:

- Easier access from existing Highway, shorter and/or fewer access trails for construction and maintenance; shorter total transmission length but more corner towers
- Avoidance of Willow Creek and involves less wetland area to cross
- Less access to undisturbed areas, reduces wildlife (especially moose) habitat fragmentation
- Visually set back from the road after the gravel pit, minimizes visual concerns from community
- Seeks to reduce impact on residential land parcels off the Pelly Farm Road north of Pelly River
- Pole setting in vicinity of Pelly Farm Road and Klondike Highway intersection requires attention.

These options were discussed at the community meeting on August 9th. Community members, including some who lived in residences along the Pelly Farm Road, expressed concern about either of the western options and asked that they be removed. Community members also expressed renewed interest in considering an option that went closer through Pelly Crossing.

Figure 7.2-8
Pelly Crossing Route Refinements

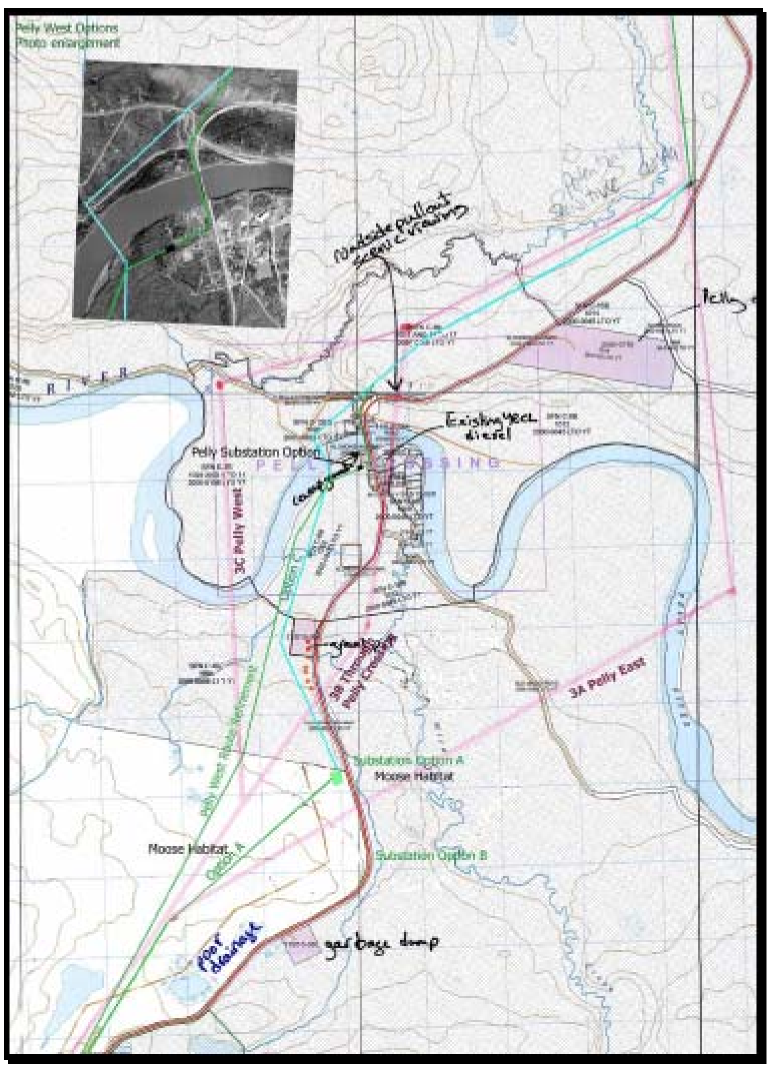


During follow-up meetings with SFN representatives throughout August and early September, a route refinement of Pelly West Option C was developed, incorporating future economic development interests of SFN and a river crossing adjacent to the existing YECL crossing.

At the September 12th Steering Committee meeting, a revised location of the Pelly substation was identified by SFN, with the substation to be located on land immediately to the west of the SFN Lands Department equipment yard. In addition, the route south of Pelly Crossing was adjusted to simplify the route from No Name Lake north to the substation location (see Appendix 4D).

The final proposed route alignment is shown in Figure 7.2-9 ("Pelly West Route Refinement" in **green**), and shows optimization of community interests, technical constraints, and environmental considerations.

Figure 7.2-9
Pelly West Route Refinement



7.2.4 CS Line Segment 3: Pelly Crossing to Stewart Crossing

Identification of Route Options

The Route Study Area for the CS segment between Pelly Crossing and Stewart Crossing had initially identified two route options around Jackfish Lake Reserve and two route options west of Stewart Crossing.

Figure 7.2-10 Pelly Crossing to Stewart Crossing Route Options illustrates this line segment.

In reviewing the route along this line segment, a number of specific refinements were identified at various points. These are reviewed as well below. As with earlier segments, the review proceeds from south to north along the route.

Comparison and Evaluation of Route Options

Terrain constraints and cost efficiency of long tangent lines from Pelly Crossing north to Jackfish Lake Park Reserve result in the proposed route being located on the west side of the Klondike Highway, across SFN settlement lands R-01B. Two preliminary route options identified in the May 2006 newsletter focused on Jackfish Lake Park Reserve. Option 4A to the East has the route crossing to the east side of the Highway and avoids the Park Reserve. Option 4B to the West traverses the Park Reserve and could lead to recreational and aesthetic concerns.

The Yukon Parks Department and Tourism and Culture, on review of the alternatives, expressed preference for Option 4A; crossing the highway to the east and avoiding the need to traverse the Jackfish Lake Park Reserve. In addition, SFN members have cottages on the north side of Jackfish Lake; thus, route option 4B was eliminated.

SFN representatives expressed interest in preserving, where practical, the amount of settlement lands that were required for the Project Site Area, including the lake to the south of Jackfish Lake. A route refinement to accommodate this request, as well as avoiding the entire Park Reserve would require a re-alignment to cross to the east side of the Highway at the gravel reserve (immediately north of SFN R-2B land); and continue on the east side to the north of the Park Reserve, crossing back to the west side at the southern end of SFN R 14B settlement land.

This Jackfish Lake Park Reserve route refinement is illustrated by the **green** line labelled Jackfish Lake Option 4C in Figure 7.2-11.

Figure 7.2-10
Pelly Crossing to Stewart Crossing Route Options

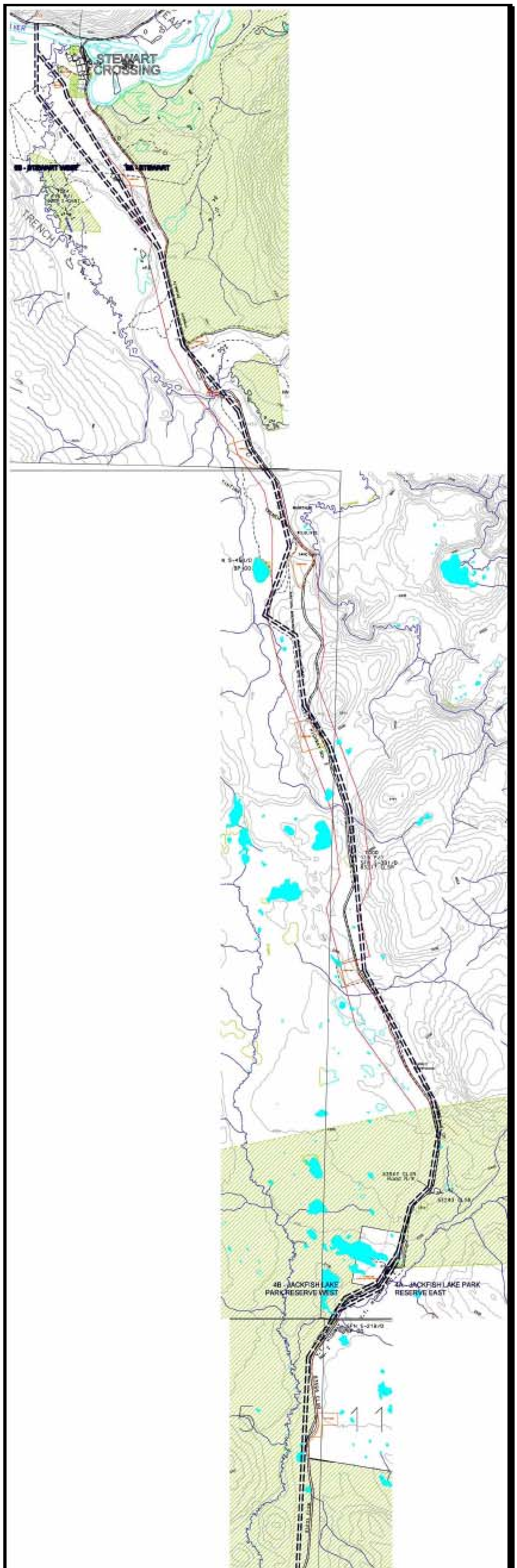
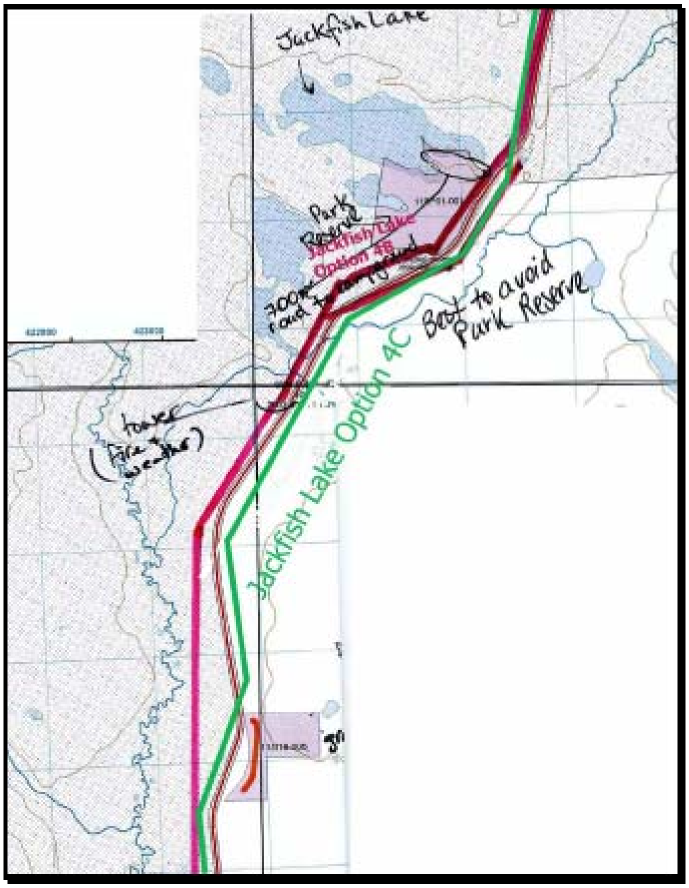


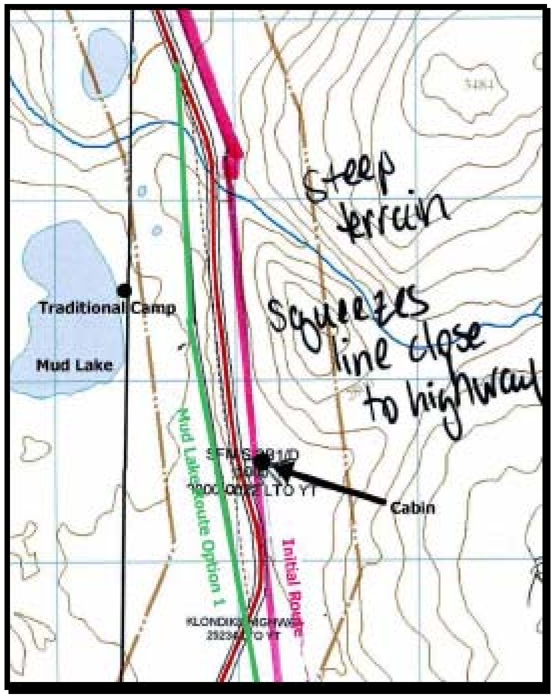
Figure 7.2-11
Jackfish Lake Park Reserve Route Refinement



After leaving Jackfish Lake Park Reserve the proposed route follows along the west side of the Klondike Highway for approximately 4.5 km, crossing to the east side at the northern extent of SFN R 14B block. The route remains on the east side thus avoiding a gravel site and wetland areas on the west side, for approximately 8.6 km. The line then crosses to the west side at approximate UTM coordinates 425000 W and 7000600 N to avoid an individual SFN land selection parcel (SFN S-3B1/D) and existing trapper's cabin. The line continues on the west side to avoid steep slopes for approximately 3.5 km, crossing back to the east at approximately 424700 W and 7003600 N.

This route refinement to avoid SFN S-3B1/D (Cabin), titled Mud Lake Route Option, reflects August 2006 consultation with SFN and is illustrated in Figure 7.2-12 below (**green** line).

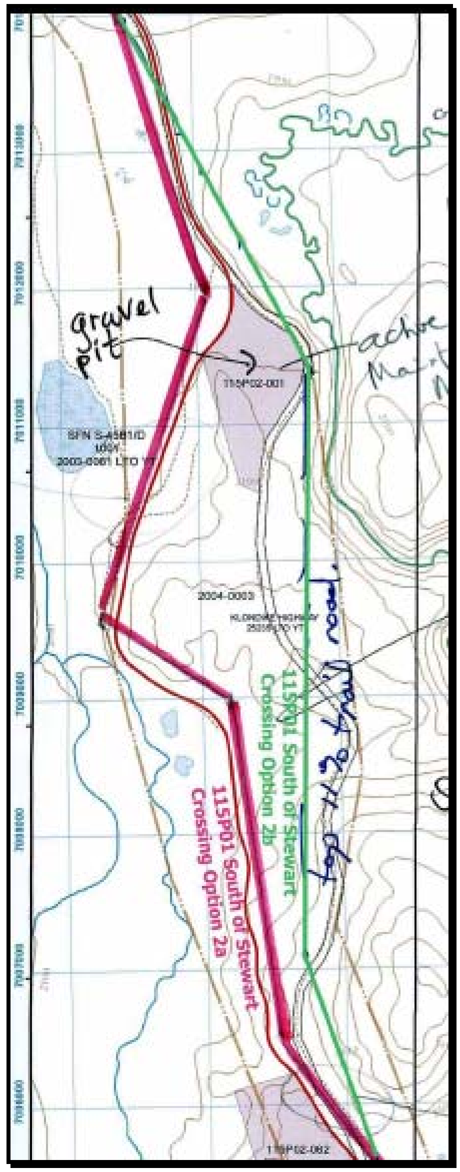
Figure 7.2-12
Route Refinement to Avoid SFN S-3B1/D (Cabin)



The proposed route line after the Mud Lake Route Option remains on the east side of the Klondike Highway for approximately 10.3 km, including incorporation of a route refinement along Top of 11% Trail Road. This route refinement, suggested during the PIP process with NND, avoids poorly drained/permafrost terrain at the bottom of 11 Percent Hill, is shorter in total length, has fewer corner towers, and involves straighter tangent spans, avoiding several sharp highway turns (see **green** line, Figure 7.2-13).

The route will generally remain 100 m west of Crooked Creek in the vicinity of Ddhaw Ghro Habitat Protection Area (where feasible) to avoid any potential heritage resources near Crooked Creek.

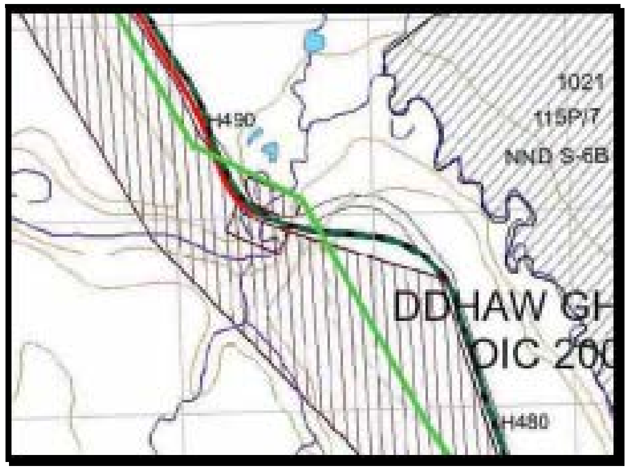
Figure 7.2-13
Route Refinement at Top of 11% Trail Road



At Crooked Creek, the preliminary route considered technical constraints such as terrain challenges as well as socio-economic concerns reflected in the Klondike Highway pull-out. In consultation with SFN and NND, several route refinements at this crossing were discussed. These consultations focused on optimizing the crossing of Crooked Creek, avoidance of boggy terrain, avoidance of cultural and heritage resources to the west of the highway, and minimizing the visual impact of the transmission line at this crossing.

The result of these discussions is the refined route in the South Crooked Creek Crossing area shown by the **green** line on Figure 7.2-14 below.

Figure 7.2-14
South Crooked Creek Crossing Route Refinement



North of Crooked Creek the proposed route crosses back to the west side of the highway to avoid NND R12 B settlement lands, staying in close proximity to the highway to avoid a section of poor drainage/boggy terrain.

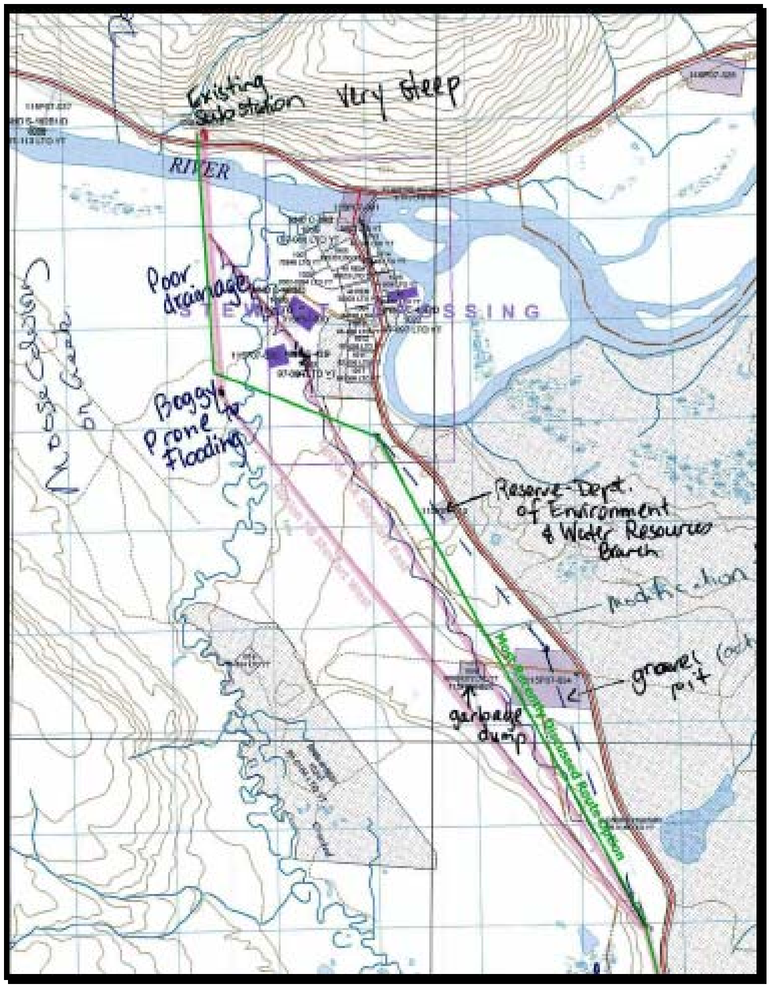
At Stewart Crossing the proposed route is sited directly into the existing substation on the north side of the Stewart River, avoiding housing and community infrastructure adjacent to the highway. Two preliminary route options were identified in the May 2006 Newsletter and are generally described in Table 7.2-5 below:

Table 7.2-5
Stewart Crossing Preliminary Route Options

5A Stewart East	5B Stewart West
• Slightly shorter line length • Stays adjacent to the 500 m Route Study Area • Crosses poorly drained and boggy areas • In close proximity to NND housing and settlement lands • Requires further ground-truthing and terrain analysis	• Further west than 5A, outside the 500 m Route Study Area • Avoids NND housing and settlement lands • Crosses poorly drained and boggy areas • Requires further ground-truthing and terrain analysis

At a July 4th meeting with NND, Option 5A East was modified to continue adjacent to the highway for a longer distance, before turning west to avoid NND housing in Stewart Crossing, connecting to Option 5B West routing after crossing Crooked Creek. This is illustrated in the following Figure 7.2-15 as the **green** line.

Figure 7.2-15
Modification of Stewart Crossing Route Options



The following section focuses on the analysis of effects on the Project, environment, and community of Options 5A (modified) and 5B, following the same criteria as previous sections. This comparison is summarized in Table 7.2-6 below.

Table 7.2-6
Stewart Crossing - Comparison of Preliminary Route Options

	5A Stewart East (modified)	5B Stewart West
Effects on the Project		
Line length	9.8 km	9.52 km
Number of corner towers (approximate)	2	1
Preliminary estimated costs[1]	$ 1.27 M	$ 1.24 M
Effects on the Environment		
Terrain types[2]: - sensitive terrain - stable terrain	• Sensitive (16%) • Stable (84%)	• Sensitive (21%) • Stable (79%)
Wildlife[3]	Moose habitat – some calving areas along Crooked Creek in small northern section	Moose habitat – some calving areas along Crooked Creek
Vegetation[4]: - % of burned or non-productive area - % of forest cover	Area not burned – mixture of white spruce, aspen and balsam poplar – good timber potential according to NND staff	Area not burned – mixture of white spruce, aspen and balsam poplar – good timber potential according to NND staff
Effects on the Community[5]		
Resource Use: - traplines	Route passes through trapping concessions # 76, and a small section of #74 at the substation site	Route passes through trapping concessions # 76, and a small section of #74 at the substation site
Access to resources	Provides easier access to fuel wood and merchantable timber due to proximity to highway Close to existing access trails	Further away for fuel wood gathering and/or harvest of merchantable timber
Aesthetic concerns	Preferred route by NND Land Department; no aesthetic concerns	No concerns
Cultural/heritage sites	Crooked Creek is an important creek to NND – possible heritage sites; NNDFN will assist in identifying preferred crossing location	Crooked Creek is an important creek to NND – no sites identified

[1] Using a base cost of $130,000 per km for 138 kV line – no consideration of large angle cost differences. [2] Sensitive terrain follows Mougeot's classification of very steep slopes, very poorly drained terrain such as wetlands, and organic and ice rich terrain; stable terrain refers to well-drained gravelly sand to gravelly loam and bedrock. [3] Analysis is based on Key Wildlife Areas map and Issues and Recommended Mitigation from Yukon Government Dept. of Environment, 2002-2003 on earlier CS transmission line project. [4] Analysis is based on Forest Cover map, Forestry Branch April 2006 (note: Greenwood potential mapping not available for this area). [5] Analysis of effects on the community is based on issues identified through First Nation community meetings and discussions with territorial government departments and other publics.

Effects on the Project

Both options are very close in total line length. Option 5A (modified) would be slightly longer and have one additional corner tower making it slightly more costly to construct; however, this was initially identified as a preferred route by NND.

<u>Effects on the Environment</u>

Option 5A (modified) has slightly more stable terrain (5% more) due to its proximity to the Klondike Highway and its distance from Crooked Creek lowlands. While no key wildlife areas were identified, moose habitat is found throughout the entire area and some moose calving occurs in locations along Crooked Creek. (Personal communication, NND staff, July 4, 2006). The area is predominately a mixture of white spruce, aspen and balsam poplar providing good potential for fuel wood harvesting and some potential for merchantable timber harvesting.

<u>Effects on the Community</u>

Both options cross and affect the same two trapping concessions, with Option 5B traversing a more undisturbed/more open trapping area in concession #76. The trapping assistant on trapline #76 felt that the increased access for trapping that would be provided would be a positive effect. Although both options provide access to fuel wood and merchantable timber, NND Lands Department staff noted that Option 5A (modified) was preferable as proximity to the Highway allowed easier access to the timber. Neither route option presented aesthetics concerns.

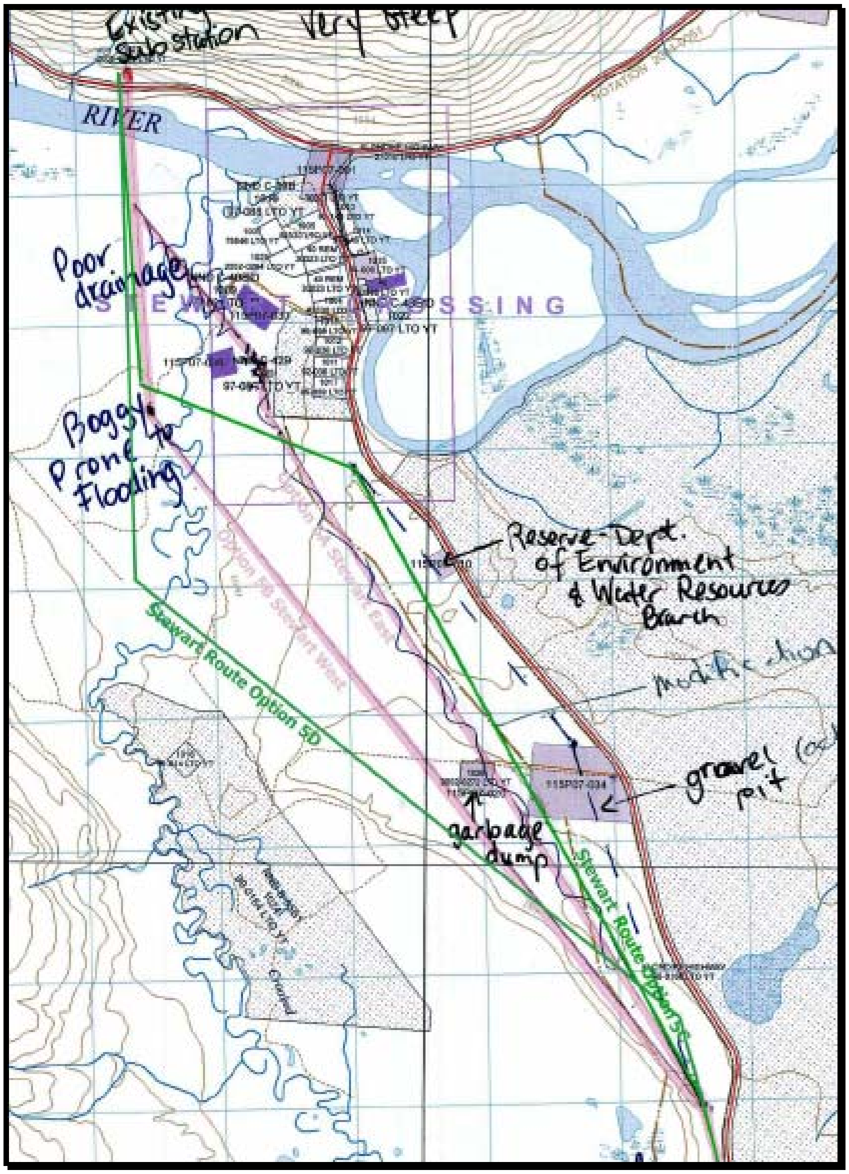
Historically, the Crooked Creek area was a favoured fishing, trapping and hunting area for NND members and both options have the potential for encountering unknown cultural/heritage sites. NND members agreed to ground truth the area to identify an optimal crossing location of the Creek taking both terrain and heritage values into consideration. NND members ground truthed the Crooked Creek area in August 2006 and concluded:

- Upon greater investigation of Crooked Creek, it was apparent that it is a meandering creek bed prone to frequent channel shifting and flooding, particularly closer to confluence of Stewart River
- The area in the vicinity of Option 5B Stewart West and Crooked Creek was too low and was in fact flooded the entire summer precluding further field work, and would not be suitable for a transmission line ROW crossing
- Land to the south of Option 5B was at a higher elevation, provided a more optimal creek crossing, and followed a ridgeline from the Klondike Highway west
- Access from the dump road (all season) and Old Dawson Trail would provide good opportunities for construction and operation access trails.

This resulted in a modification of Option 5B Stewart West to that illustrated in Figure 7.2-16 in **green** and labelled as “Stewart Route Option 5D”.

Following further discussion, Option 5D Stewart West was selected as the preferred route in this area.

Figure 7.2-16
Stewart West Modified Option 5B (Option 5D)



7.2.5 Minto Spur Line Length: Minto Landing Substation to Mine Site

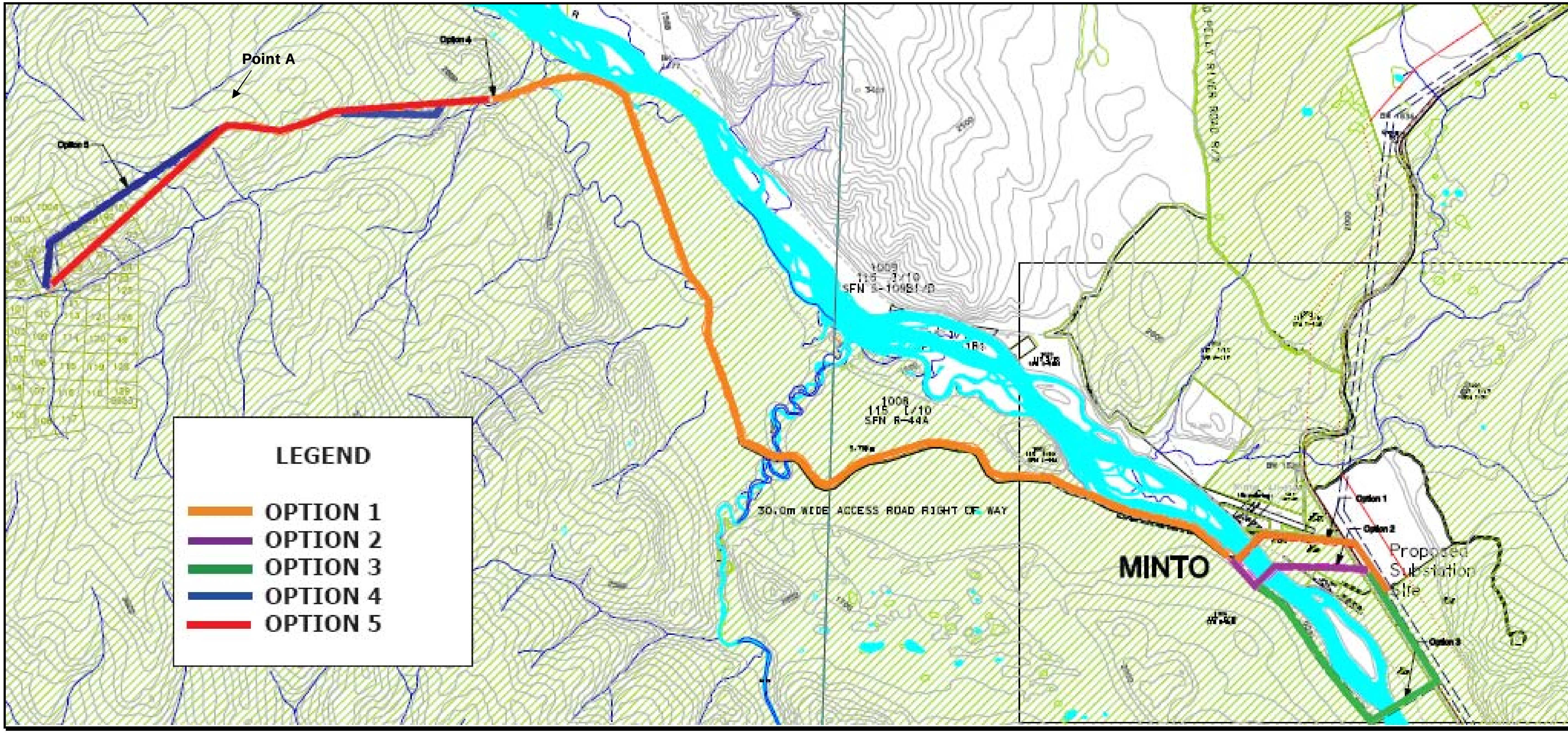
Identification of Preliminary Route Options

The 35 kV MS line will generally follow the existing mine access road from the west shore of the Yukon River in the vicinity of the existing barge landing and out to the mine site. Alternatives for the MS route involve three key focal areas:

- The location of the Minto Spur Substation within the EMR reserve lands in the vicinity of Minto Landing (on the east side of the Highway)
- Route options to connect the MS line from the substation to the west side of the Yukon River, including the Yukon River crossing locations; and
- Route options generally from Minto Creek west to the Minto Mine site.

Figure 7.2-17 shows the five preliminary route options identified for the MS route.

Figure 7.2-17
Minto Spur Line Preliminary Route Options



Comparison and Evaluation of Preliminary Route Options

There were three initial MS route options in the Minto Landing area to cross the Yukon River (Options 1, 2 and 3) and two alternatives from Minto Creek west into the mine site (Options 4 and 5).

All of these five preliminary MS route options are presented in Table 7.2-7 below:

Table 7.2-7
Minto Spur Line Preliminary Route Options

Option 1 adjacent to Minto Landing	**Option 2 South of Minto Landing**	**Option 3 New Barge Landing**	**Option 4 Minto Creek direct**	**Option 5 Minto Creek North**
• Route is shorter & connects directly across to mine access road • Keeps utilities & infrastructure together • Provides shortest future distribution to community • Runs adjacent to known heritage resources sites	• Route is approximately the same length as option 1. • Avoids impact on existing community • Provides next shortest future distribution to community • In vicinity of heritage resource site • Aesthetic concern -crosses Yukon River in new area, in sight of Minto Resort • Route must travel about 700 m along forested west shore of Yukon River to connect to access road • Route travels through unburned forest on east shore.	• Longest & most costly route & would require under-building line south and then west approximately 2.5 km to a new crossing of the Yukon River, then roughly 3 km along south shore of Yukon River in forested area to connect with access road • Furthest future distribution point to community • Crosses Yukon River in new unburned area where there is no existing activity	• Route is on north side of access road on high ground, crosses access road and runs in straight spans to Point A, then runs southwest, directly into mine site • Crosses more contour lines • Encounters low-lying , permafrost area near mine site	• Route is on north side of access road on lower ground, crosses access road and runs straight to Point A, then uses the contour of the land to run south west into the mine site, with one angle tower for height advantage • Uses height advantage of landscape • Avoids permafrost in valley bottom

Analysis of effects follows the same criteria as for previous Line Segments. Table 7.2-8 summarizes the results of the comparison of the above MS preliminary routing options.

Table 7.2-8
Minto Landing to Minto Mine - Comparison of Preliminary Routing Options

	Option 1 adjacent to Minto Landing	Option 2 South of Minto Landing	Option 3 New Barge Landing	Option 4 Minto Creek Direct	Option 5 Minto Creek North
Effects on the Project					
Line Length	4.0 km	4.5 km	8.5 km	5.3 km	5.8 km
Number of corner towers (approximate)	3	3	4	5	6
Preliminary estimated costs[1]	$ 340,000	$ 382,500	$ 722,500	$ 450,500	$ 493,000
Effects on the Environment					
Terrain types[2:] - sensitive terrain - stable terrain	• Sensitive (0%) • Stable (100%)	• Sensitive (0%) • Stable (100%)	• Sensitive (0%) • Stable (100%)	• Sensitive (10%) • Stable (90%)	• Sensitive (10 %) • Stable (90%)
Wildlife[3]	Migrating waterfowl & birds use the Yukon River as a major migration corridor – t-line crossing a concern Proximity to bald eagle aeries	Migrating waterfowl & birds use the Yukon River as a major migration corridor – t-line crossing a concern	Migrating waterfowl & birds use the Yukon River as a major migration corridor – t-line crossing a concern	General moose habitat (no key habitat) Small furbearing animal habitat	General moose habitat (no key habitat) Small furbearing animal habitat
Vegetation[4:] - % of burned or non-productive area - % of forest cover	• Burned/non-productive (100%) • Forest cover (0%)	• Burned/non-productive (98%) • Forest cover (2%)	• Burned/non-productive (50%) • Forest cover (50%)	• Burned/non-productive (98%) • Forest cover (2%)	• Burned/non-productive (98%) • Forest cover (2%)
Effects on the Community[5]					
Resource Use: -traplines	Option passes through trapping concession # 142	Option passes through trapping concessions# 142 and 147	Option passes through trapping concessions # 142 and 147	Option passes through trapping concessions # 146 and 145	Option passes through trapping concessions # 146 and 145
Access to resources	No concerns	No concerns	No concerns	No concerns	No concerns

	Option 1 adjacent to Minto Landing	Option 2 South of Minto Landing	Option 3 New Barge Landing	Option 4 Minto Creek Direct	Option 5 Minto Creek North
Effects on the Community[5] (Continued)					
Aesthetic concerns	SFN community members expressed concern over proximity to their cultural gathering site, and having the line through the community	ROW will be adjacent to south shore of Yukon River, reducing value of viewscape	ROW will be adjacent to south shore of Yukon River, reducing value of viewscape	No concerns identified	No concerns identified
Cultural / heritage sites[6]	In close proximity to historical and heritage resources in community of Minto Landing. Known archaeological site at west end of airstrip (KdVc-1), and at site of old campground south of the access road (KdVc-2)	ROW will be adjacent to Minto Resorts, a SFN owned facility. Known archaeological site in the vicinity is KdVc-3	No concerns identified	No concerns identified	No concerns identified

[1] Using a base cost of $ 85,000 per km for 35 kV line – no consideration of large angle cost differences [2] Sensitive terrain follows Mougeot's classification of very steep slopes, very poorly drained terrain such as wetlands, and organic and ice rich terrain; stable terrain refers to well-drained gravelly sand to gravelly loam and bedrock and as mapped on the Air Photo Interpretation maps by ACG. [3] Analysis is based on Key Wildlife Areas map and Issues and Recommended Mitigation from Yukon Government Dept. of Environment, 2002-2003 on earlier CS transmission line project. [4] Analysis is based on Forest Cover and burn mapping, Forestry Branch April 2006 (approximate % calculations only). [5] Analysis of effects on the community is based on issues identified through First Nation community meetings and discussions. [6] Based on Minto Area Archaeology and History, Greer, 1994.

Effects on the Project

MS Route Options One and Two are very similar in length and require the same number of corner towers. Option Three south of Minto Landing was initially dropped from further discussions due to its length, that it has twice as many corner towers, and would result in higher distribution costs to service the Minto Landing community in the future.

Options Four and Five are very similar in terms of length and corner towers. After additional ground truthing, the best option appeared to be remaining on the north side of the access road (first part of

Option Four) and then approaching the mine site along Option Five from the north, which is along higher ground and avoids possible permafrost areas in the valley bottom.

Effects on the Environment

There are no identified sensitive terrain areas indicated on the air photo interpretation mapping found in the MS route options and there is no significant difference between the options regarding sensitive and stable terrain.

All options include moose and salmon spawning habitat according to the draft Minto community plan. MS Route Options One, Two and Three require a crossing of the Yukon River which is a major migration corridor for a variety of waterfowl and a key habitat for bald eagle. The Option One crossing at the existing barge landing would isolate disruptive activities such as movement and noise in one location. Option Two, although only approximately 0.5 km longer than Option One, is routed through unburned lands to the south of Minto Landing and this area has been identified by SFN for possible future residential development. SFN members initially commented that Option Two would transect the land further and the preference would be to have the route adjacent to the existing Minto Landing access road. Options Four and Five do not pass through any key wildlife habitat areas.

MS Route Options One, Two, Four and Five are routed primarily through the 1995 Minto Burn area and there is no appreciable difference in terms of vegetation cover. Approximately half of the Option Three route cuts through forested areas on either side of the Yukon River. Stands of aspen, white spruce and black spruce occur on the south-western shore.

Effects on the Community

MS Route Option One passes through one trapping concession located in a predominantly burned and already disturbed area at Minto Landing. Option Two passes through two trapping concessions, which have been mostly burned except in and around Minto Resorts. Option Three passes through two trapping concessions with parts of the route in trapping habitat. No concerns were identified regarding access to resources.

Some SFN members expressed concern about Option One as they felt the line was too close to their cultural gathering site near the existing barge landing on the east shore of the Yukon River. Other SFN members expressed an interest in pursuing Option One as they felt it would facilitate opportunities to develop the Minto Landing area in the future, especially for residential homes. Options Two and Three include sections along the west shore of the Yukon River and would be visible from Minto Resorts. No aesthetic concerns were identified for the options approaching the mine site.

Minto Landing has been the historical gathering place of Selkirk First Nation people for hundreds of years. There are also historical sites related to Yukon history of the Dawson Wagon Trail associated with the Gold Rush and a Northwest Mounted Police Post. As identified in the Heritage Resource Inventory, there are three known archaeological and historic sites in the Minto Landing area. MS Route Option One is in the vicinity of site KdVc-1; and MS Route Option Two is in the vicinity of KdVc-2 site, which according to earlier archaeological investigations lies along the river bank (Minto Explorations Ltd. and Sheila Greer, 1994,). MS Route Option Three avoids all currently identified heritage sites. Options Four and Five have no known identified heritage sites.

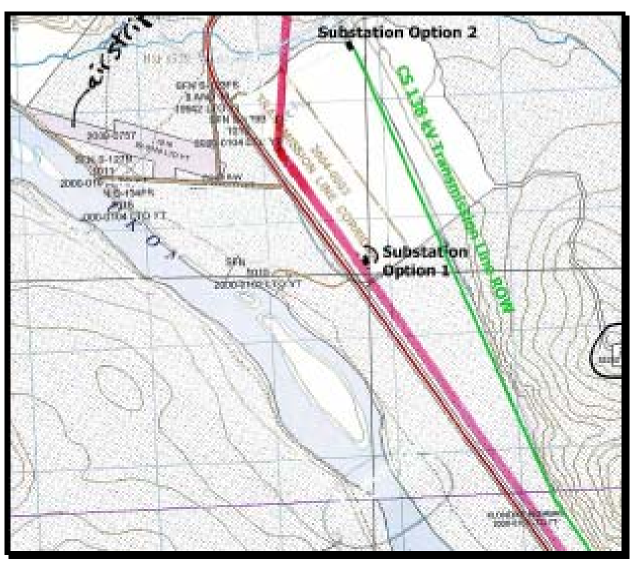
Comparison of Substation Location Options

The location of the Minto Spur substation is influenced by the following variables (see two options in Figure 7.2-18):

- Location of the CS route – route refinements resulted in locating CS line along the base of the bluff to the east at the easterly portion of the EMR reserve lands
- Location of the MS route – route constraints of the airstrip, Klondike Highway, gravel pit and heritage resources in the Minto Landing vicinity
- Terrain features – substation location is preferable on level, well-drained land. Such terrain is prevalent throughout the EMR reserve lands
- All-weather, all-season connection availability to Klondike Highway (substation maintenance)
- Yukon Government Highways interest in connecting to the grid and preference to preserve the land reserve for future development by minimizing disturbance.

Based on consideration of these variables and discussions with Yukon Government Highways, a preferred substation location that includes all-weather road access was identified in the north-east corner of the EMR reserve property adjacent to the preferred CS route (see Substation Option 2 in Figure 7.2-18). Substation Option 1 was not considered further based on Yukon Government highways interest in connecting to the grid and its distance from the preferred CS route.

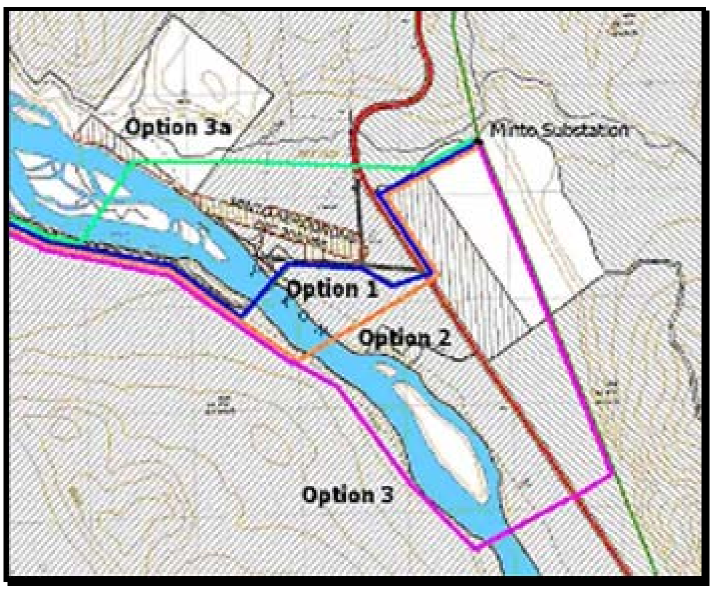
Figure 7.2-18
Minto Landing Substation Location



Additional MS Route Refinements

Upon resolution of the Minto Substation location, MS route options were further refined to reflect exiting from the substation and EMR reserved land to the intersection of the Klondike Highway and the Minto access road. From that point, three revised options in the vicinity of Minto Landing were discussed with SFN. In addition, at the September 12th Steering Committee meeting, Option 3a was identified by SFN for further discussion. This option exits the EMR reserve in the north, crosses north of the Minto Airstrip, and parallels the south bank of Von Wilczek Creek to the Yukon River. The route then crosses the Yukon River to the west bank using two spans of the river, locating the pole structures/towers on islands within the river channel. Figure 7.2-19 illustrates all the various revised options in the vicinity of Minto Landing:

Figure 7.2-19
Minto Spur Development Revised Route Options: Yukon River Crossing



Contributing technical, socio-economic and bio-physical constraints, and opportunities involved in the assessment of the Minto Landing route options include the following:

Yukon Energy – Technical Elements in Line Feasibility Requirements

- Shorter spans are preferable to longer spans of Yukon River
- Options that have fewer corner towers are preferable
- Technical feasibility of placing towers on islands in Yukon River unknown (Option 3a) but general preference is to have options that clear span the river and avoid potential ice jamming conditions or flooding

Minto Explorations – Cost Considerations (responsible for Minto Spur costs)

- Preference for Option 1 and 2 over Option 3
- Cost sensitivity – options that are less expensive are preferable

SFN – Grid power access to community, Minto Landing heritage sites, aesthetics, others:

- Current interest in connecting to grid power (current residences and Minto Resorts)
- Avoid Annual Gathering meeting site in vicinity of existing barge landing
- Avoid fish camps located on east bank of Yukon River
- Restrict development of Minto Landing
- Limit development on west bank particularly in non-burned area to help maintain viewscape
- Limit development on east bank in non-burned area between Minto Landing and Minto Resorts
- Community development plan for this area has not been developed

Yukon Government – airfield, highways, and heritage interests

- Avoid airstrip – runway approach and clearance requirements provided
- YG Highways has interest in connecting to Project in consideration for use of the reserved land for location of the Minto Substation (include preference for proposed substation location)

Environmental and heritage interests

- Avoid identified archaeological sites at Minto Landing (KdVc-1 and KdVc-2) and near Minto Resorts (KdVc-3). Mouth of Von Wilczek Creek identified as traditional fish camp.[3] Potential for additional heritage resources along Von Wilczek Creek – requires further investigation
- Avoid eagle and falcon eyries (Option 1, 2 and 3a)
- Migratory bird route along Yukon River (all options). Longer river spans are less preferable than shorter spans
- Avoid migratory bird/waterfowl nesting sites as well as possible moose calving habitat on Yukon River islands (Option 3a)
- Avoid Von Wilczek Creek riparian zone habitat and movement area (Option 3a)

A revised analysis of effects, following similar criteria as previous line segments, was conducted for these MS options at Minto Landing. Table 7.2-9 summarizes these results.

[3] See Supporting Reference Material 6R-11 - Minto Area Archaeology and History. Prepared for Yukon Heritage Branch, 1994.

Table 7.2-9
Minto Landing – Comparison of Revised Routing Options

	Option 1 Adjacent to Minto Landing	**Option 2 South of Minto Landing**	**Option 3 New Barge Landing**	**Option 3a Von Wilczek Creek**
Technical				
Line Length (km)[3]	6.8	7.0	7.3 to 10.7	5.0
Corner Towers	6	3	4	4
Cost – Transmission Line[1]	$578,000	$595,000	$620,000 to 910,000	$425,000
Added Cost – Yukon River Crossing[1]	375 metres $338,000	300 metres $270,000	280 metres $252,000	950 metres [Technical feasibility concerns - see text] $855,000
Cost – Total [1]	$916,000	$865,000	$872,000 to 1,162,000	$1,280,000
Environmental / Socio-economic				
- Terrain	All three options follow stable terrain			Follows in vicinity of Von Wilczek Creek
- River Crossing	All three options cross at comparatively narrow sections of Yukon River			Most complex, need use of channel islands, two spans
- Forest Cover	All within area previously burned.	Unburned area north of Minto Resort and on west bank of Yukon	Unburned area south of Minto Resort and on west bank of Yukon	Creek area and island crossing both unburned areas
- Land Tenure	YTG – 38% SFN – 62%	YTG - 36% SFN – 64%	YTG – 20% SFN – 80%	YTG – 65% SFN – 35%
– Wildlife	- Eagle/Falcon aeries - Migratory bird route	- Unburned forest habitat - migratory bird route	- Unburned forest habitat - migratory bird route	- Eagle/Falcon aeries - Von Wilczek Creek habitat corridor - nesting site
- Social/Cultural	- Archaeological (KdVc 2) - Cultural (AG Site) - Fish Camps	- new development on west bank reduces aesthetic	- development on west bank reduces aesthetic (much greater impact than Option 2)	- Archaeological (KdVc 1) - Von Wilczek mouth - Fish Camps
SFN Grid power[2]	Low Cost	Low Cost	High Cost	High Cost

1. Assumes a basic construction cost for Minto Spur (to be paid by Minto Ex) averaging $85,000 per km for 35 kV line, with special added costs averaging $900 per metre for Yukon River crossings. No specific consideration of large angle cost differences; exclusion of these factors likely underestimates costs for both Option 1 and Option 3a. Option 3 costs show range depending on substation location (lower number assumes substation relocated - higher number assumes no substation relocation, but also does not consider cost savings for under-build portion along CS line).
2. Added costs (not paid by Minto EX or YEC) to connect Minto Landing residences and other local customers. Options 1 and 2 route bring the line into the area of current residences and the Minto Resort, and facilitate future development access in these areas to

grid power (line would be retained in these areas after mine closes). Option 3, and Option 3a, would require separate lines to be developed and paid for to connect current residences and the Minto Resort as well as future development (the Minto Mine line would be removed when mine closes); local service distribution costs increased if Option 3 assumes relocation of substation.

3. Line length distances from substation adjacent to CS line to a common point along Minto Spur route on west side of Yukon River and west of Option 3a

Based on the evaluation of MS route options described above for the Minto Landing area, as well as further consultation with SFN representatives, the following conclusions were reached:

- Option 3 involves a high cost both in terms of construction and in terms of future access to grid power by local customers in the community of Minto Landing. In addition, Option 3 is only practical with the development of a new barge crossing and access road approximately 3.5 km upstream of the existing service.
- Option 3a analysis concluded that it is not technically feasible to effectively cross the Yukon River with Option 3a. Although Option 3a overall offers the shortest distance from the Minto Substation, technical issues associated with the Yukon River Crossing and its proximity to the airstrip preclude its further consideration. Crossing the river at these locations downstream from Option 1 necessitates placing towers on the channel islands in the Yukon River. River clearance requirements and landing approach regulations place restrictions on where the towers can be located and force them to be placed at river crossing locations that are either not feasible or too far downstream to merit further consideration.
- Option 1 provides a route adjacent to previously disturbed right of way and crossing at a location already used for transportation. This option would also provide Minto Landing community with ready access to power in the event the area develops. It is the potential future development in the Minto Landing area that also has raised the most concerns about its impact on future development in the Minto Landing area and on heritage values.
- Option 2 is very similar to Option 1, but travels further upstream (about 800 m), north of Minto Resorts. This option moves the line away from community interests but could be considered for future development, and places the line in proximity to individuals wanting to connect to the grid right away. It also stays clear of identified archaeological sites.

In the October 4, 2006 letter from Chief Darin Isaac to David Morrison, President of YEC, SFN indicated that both Options 3a Von Wilczek Creek and Option 3 New Barge Landing have been abandoned, and that the focus for further consultation will be for a route in the vicinity of Options 1 and 2. SFN has indicated they would prefer to have this continuing consultation occur concurrently with the YESAA review process, without causing a delay in the filing of this Project Proposal Submission.

7.3 OVERVIEW OF PREFERRED ROUTES

The final selection of a preferred route balances minimizing adverse biophysical and socio-economic impacts with satisfying technical and cost requirements for the Project. In areas where the proposed route crosses First Nation settlement lands, every effort was made to ensure routing was in agreement with the respective First Nation concerns and future plans for the area. It is recognized that the route selection process is intended to resolve a defined route relative to identified material options, and that within the resulting route final placement of the precise right-of-way and specific poles will be determined during the final construction process in accordance with the EPP and mitigation commitments as reviewed in Chapter 8

A description of the general preferred route at the identified route alternative locations follows by line segment. A photo mosaic of aerial photos with a preferred route overlaid on the photos can be found in Appendix 7B. In addition, much of the preferred route was determined immediately after the September 12th Steering Committee meeting. Maps produced that reflect the Meeting outcomes (but not the further modifications since that time) are found in Appendix 4D. In particular, it is understood that the NTFN and Yukon Energy will continue to discuss workable and mutually satisfactory measures that would restrict access to the Project right-of-way in sensitive areas, particularly by persons other than NTFN citizens.

CS Line Segment 1: Carmacks to McGregor Creek

At Tantalus Butte the preferred route is a modified Option 1A Tantalus East. Based on the analysis, this routing provides the best balance between technical and cost requirements, environmental concerns and community concerns. In response to LSCFN community concerns, the modified route is located at the foot of the Butte, an already disturbed environment from past coal mining activities, and is aligned to avoid resource use habitat and wetlands found further to the east. It does not cross privately-owned property or First Nation settlement lands and remains on Crown Land, avoiding the need for easement negotiations with LSCFN or others.

In the vicinity of Tatchun Creek, Yukon Energy's preferred route is a modified Option 2A Tatchun East. In response to LSCFN community concerns, particularly those of the trapline holder in this area, the route was refined to be located closer to the Klondike Highway to increase the distance between the ROW and the vicinity of the trapper's cabin. The route then turns north east having been refined to avoid valued resource harvesting areas (including the lake east of the route). The route then connects with the original Option 2A, proceeding towards Tatchun Creek. Yukon Energy has noted LSCFN concerns about possible unwanted access that may occur into this area during ongoing Project operations as a result of the new ROW for the route. Yukon Energy has committed to work collaboratively with LSCFN over the next few months to identify and assess specific access management approaches for the route through this area, which could include further limited route refinements south of Tatchun Creek as per the October 4, 2006 letter from Chief Skookum to David Morrision (see Appendix 7C). This consultation with LSCFN will work towards developing an access strategy that will minimize opportunities for unwanted access in a manner that meets the requirements of LSCFN.

The route crosses Tatchun Creek well east of the campground using long spans stretching from bluff to bluff. This approach incorporates aesthetic concerns by avoiding extensive clearing of this portion of the ROW, and avoids possible conflict with use of the campground and heritage sites in the vicinity of Tatchun Creek.

Approaching McGregor Creek, in response to LSCFN concerns, the preferred route crosses the highway at a point slightly further south than was proposed after the September 12th Steering Committee meeting.

CS Line Segment 2: McGregor Creek to Pelly Crossing

As previously described, consultation with LSCFN and SFN representatives resulted in CS route refinements in the vicinity of Yukon Crossing, McGregor Creek and McCabe Creek to accommodate various interests. Routing between McCabe Creek and Minto Landing was also adjusted in consultation with the SFN. These CS route refinements are reflected on the maps in Appendix 4D and the photo mosaic in Appendix 7B, as well as the discussion in the above Route Segment section.

To address potential heritage resources along Von Wilczek Creek, the preferred route north of Minto Landing includes a CS route refinement 100 m to the west of Von Wilczek Creek on the east side of the Klondike Highway. The CS route then proceeds north to the EMR reserve, where the route then turns north east to parallel the Klondike Highway approximately 1 km inland throughout SFN R10 settlement lands, thus remaining west of Lhutsaw Hill. This is reflected on the maps in Appendix 4D and the photo mosaic in Appendix 7B. As noted earlier in this chapter, SFN has stated that it is not in a position to declare this option in the Lhutsaw area to be their preference (i.e., SFN has expressed its continued interest in Lhutsaw Route Option 2).

As the CS route exits the SFN R10 settlement land block, it angles back towards the Klondike Highway, remaining on the **east** side to avoid any concerns with the Lhutsaw Wetland Habitat Protection Area. In the vicinity of No Name Lake the route departs from the Klondike Highway north towards the Pelly River, then east to the Pelly Substation, located on land immediately to the west of the SFN Lands Department equipment yard. To accommodate potential concerns for heritage resources along the east bank of the Pelly River (west of the community), the line will be located at least 100 m from the bank. The CS route crosses the Pelly River to the west of the bridge and continues northward following the original proposed route.

CS Line Segment 3: Pelly Crossing to Stewart Crossing

The option at Jackfish Lake Park Reserve was determined early in the consultation process. Yukon Department of Parks and Tourism and Culture expressed the importance of routing the line on the east side of the Highway so it did not cut through the Park Reserve. There are no material differences in terms of technical or cost requirements, so Option 4A East of the Highway was selected. Subsequent to this finalization, SFN identified an interest in having a small route refinement incorporated to reduce transmission line ROW on settlement lands. This resulted in the CS route crossing to the east side of the Klondike Highway immediately north of the gravel pit, well to the south of Jackfish Lake Park Reserve, and remaining on the east side of the highway until north of the Park Reserve. This is reflected in the final preferred route as depicted in Appendix 4D and on the photo mosaic in Appendix 7B.

Minor route refinements were also identified between Jackfish Lake Park Reserve and Stewart Crossing and resulted in avoiding a trapper's cabin, optimizing the route around 11 Percent Hill including remaining

100 m west of Crooked Creek at the Ddhaw Ghro Habitat Protected Area, and optimizing the southern crossing of Crooked Creek. These refinements are all reflected on the maps in Appendix 4D and photo mosaic in 7B.

At Stewart Crossing, Stewart Route Option 5D was selected based on consultation with NND and the fact that it minimized effects on people and the environment. Technically this option proved more feasible than other options due to construction on higher ground and avoidance of boggy, flood-prone terrain. Environmental concerns were also very similar for the various options, with routing across Crooked Creek being the most important environmental factor in route selection. The other key factors in selecting this Option were the proximity to existing access trails, avoidance of NND community infrastructure, and the ease of access to merchantable timber for First Nation fuel wood and business. This option is also the preferred choice of NNDFN.

Minto Spur Line Segment: Minto Landing to Minto Mine Site

Sherwood Copper and SFN had generally agreed to routing the MS line along the mine access road. This agreement was also reflected in the May 2006 MOU between all three Northern Tutchone First Nations and Yukon Energy.

At the Minto Mine site the terrain and technical requirements to avoid permafrost areas in low-lying valleys were critical factors determining the preferred route. This led to a selection which combined the first half of Option 4 on the north side of the access road along Minto Creek with the last section of Option 5 which remains on high ground and angles into the mine site from the north, staying on top of ridges. These options make the best use of landscape contours and reduce the impact on permafrost-prone environments.

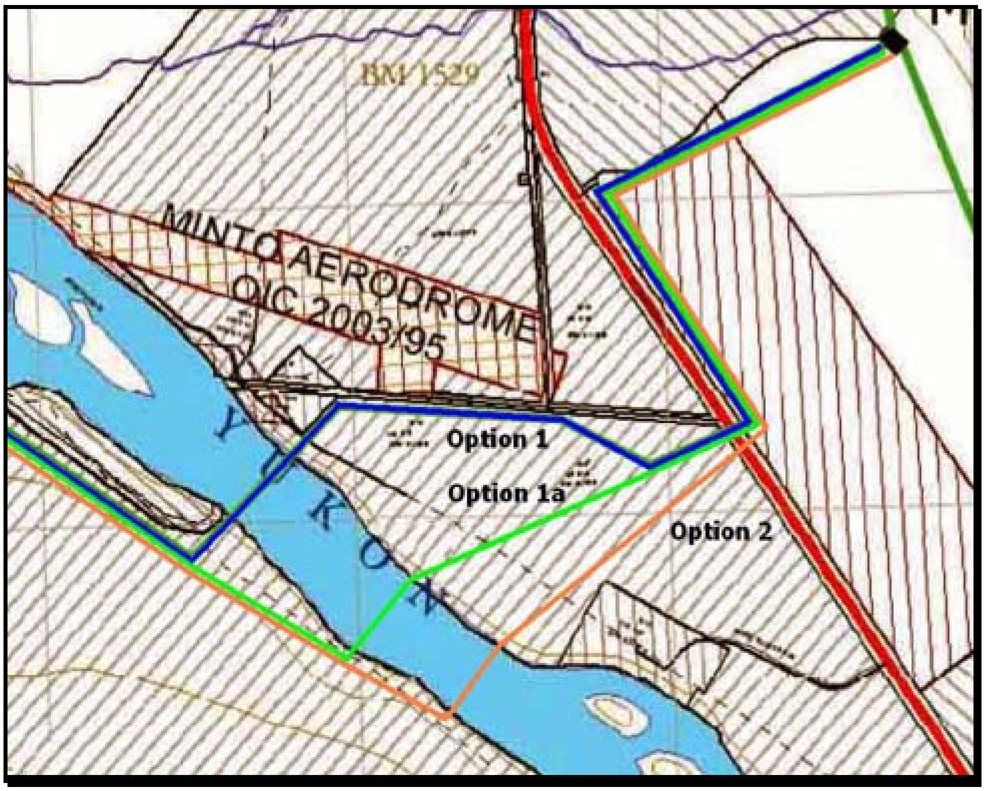
All MS route options to cross the Yukon River in the Minto Landing area cross SFN settlement land and were discussed with SFN members at several opportunities. Option 3a (the most northern option) was eliminated as not being technically feasible; it also was a relatively high cost option that presented a number of other potential concerns. Option 3 (the most southern option) was eliminated due to cost factors, effects on the environment (mainly wildlife and forested areas), the absence of any current agreement to develop a new barge landing in this area, and the future cost of higher distribution costs to service the Minto Landing community. Options 1 and 2 are similar in terms of technical and cost requirements and reflect no material difference in terms of effects on the environment. SFN has confirmed a preference for a route in the vicinity of Options 1 and 2.

Ultimately, the decision on a specific MS Yukon River crossing option in the vicinity of Options 1 and 2 will be based on what route the community wants to see, the need for future distribution of electric power to serve the Minto Landing community, other land use in the Minto Landing area, the interests of affected tenants and trappers, the best way to protect and manage identified heritage resources and values, and the best way to provide for the presence of both the MS spur line and Minto mine access in the general area on an ongoing basis.

Consideration of these factors resulted in Yukon Energy proposing Option 1a south of the Minto Landing access road and existing barge landing to be considered in further consultation with SFN during the YESAA review process.

Figure 7.2-20 illustrates this additional proposed route (shown in **green** as Option 1a) through Minto Landing and across the Yukon River, in conjunction with the other two options previously noted.

Figure 7.2-20
Preferred Minto Landing Route



8.0 ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS ASSESSMENT

Chapter 8 provides an assessment of the effects of the Project, focusing on the following:

- Overview of Approach
- Environmental Effects and Mitigation
- Socio-economic Effects and Mitigation
- Other Effects (effects of environment on the Project, effects of accidents and malfunctions)
- Residual Effects and Determination of Significance (environmental and socio-economic effects of the Project)
- Environmental Protection and Monitoring

8.1 OVERVIEW OF APPROACH

Chapter 8 provides an assessment of the environmental and socio-economic effects of the Project to determine whether, after the implementation of mitigation measures, the Project is likely to result in significant adverse residual effects (including significant adverse cumulative effects) on identified VCs. The assessment proceeds on the basis of the preferred route (see Section 7.3) based on completion of the route selection and evaluation process as described in Chapter 7.

The effects assessment in Chapter 8 builds on the framework established in earlier chapters, including:

- The assessment approach as reviewed in Chapter 3, and in particular Section 3.2 (route selection and evaluation process), Section 3.3 (assessment framework), Section 3.4 (cumulative effects assessment approach) and Section 3.5 (determining the significance of residual effects).
- The public consultation and involvement program (PIP) as described in Chapter 4.
- The Project scope as determined in Chapter 5.
- Scoping of the assessment as provided in Section 3.3.1 (geographic and temporal study boundaries for Project effects), Section 3.4 (current and future projects included in cumulative effects assessment) and Chapter 6 (determination of environmental and socio-economic VCs based on effects pathways for the Project, public consultation and involvement and other factors as noted).
- Baseline conditions for the selected VCs without the Project, as reviewed in Chapter 6.
- Mitigation measures through alternative ways of designing, undertaking or operating the Project that would avoid or minimize adverse environmental or socio-economic effects (or enhance beneficial effects), including construction and operation and decommissioning measures based on best practices as set out in Chapter 5 and careful routing of the Project as described in Chapter 7.

As reviewed in Chapter 3 (Section 3.3.1), Project effects on baseline conditions are predicted separately for each environmental and socio-economic VC by comparing (a) “what would be expected without the Project” (the baseline), and (b) “what would be expected with the Project”.

As reviewed in Chapter 6 (Section 6.3), there are three main pathways for effects from the Project on VCs:

- **Project-related direct and indirect changes to the biophysical environment**: Changes to the biophysical VCs (land, water and air environments and associated terrestrial and aquatic life) result from Project-related activities such as construction, operation and maintenance, and in the case of the Minto Spur line, decommissioning. Biophysical environmental changes can also be linked indirectly to subsequent socio-economic effects (e.g., resource use, economic and social changes).

- **Project-related direct socio-economic effects**: Changes to socio-economic VCs (resource use, economy and social context) result directly from the Project (e.g., direct local employment and expenditures on local business during Project construction, operation or decommissioning, supply of lower cost grid electricity supplies to displace diesel electricity generation during Project operation, and aesthetics changes resulting from the Project's presence that affect people).

- **Overall effects on people and communities**: All of the specific socio-economic effects from the Project through different pathways accumulate on the affected people and communities. The results can be described as overall resource use effects, economic effects and social effects on specific individuals, families, industrial sectors, governments, communities, or other groups of people.

Residual environmental and socio-economic effects are examined for all phases of the Project's life-cycle from construction to operation and maintenance activities and, for the MS development, to the decommissioning of certain MS facilities. Both positive and adverse environmental and socio-economic effects are considered, along with the potential effects of the environment on the Project, and the potential effects of accidents and malfunctions.

The assessment focuses on effects of the Project that are considered "likely" to occur. Based on the approach set out in Chapter 3, the expected effects of Project activities are assessed for each environmental or socio-economic VC, focusing initially on the expected geographic extent, duration and magnitude of each effect.

The Project effects for any environmental or socio-economic VC may fall within three distinct geographic areas and for the purpose of assessing their significance may be measured as either low, medium, or high, based on the described geographic ranges:

- **Project Site Area: Low Geographic Extent**
  This describes the ROW and footprint areas needed for the Project construction and operation. The Project Proposal describes a preferred route area that typically reflects (as regards level of definition at this time) up to about a 100 metre width within which the Project Site Area will be located with ROW requirements of 60 metres for the CS line and 30 metres for the MS line (plus any added ROW or land acquired for substation sites).

Most of the Project effects confined to the Project Site Area stem from the actual physical work performed in the ROW during construction and maintenance activities, as well as the physical presence of a long-term ROW.

- **Project Study Region: Moderate Geographic Extent**
  This describes a broader Project Study Region for examining environmental and socio-economic effects and is defined as the portion of the Northern Tutchone Planning Region between Carmacks and Mayo that is generally in close proximity (e.g., 30 to 50 km) to the Klondike Highway and the existing access road from the Klondike Highway to the Minto Mine Site (see Figure 2.2-1).

  The maximum geographic extent of most environmental and socio-economic effects is expected to be included in the Project Study Region. Within this Project Study Region, the Route Study Area represents the much smaller local region examined to assess route alternatives (i.e., 500 metre corridors identified along the Klondike Highway for the CS development and a somewhat smaller corridor generally along the Minto access road for the MS development).

  Most environmental effects of the Project that extend beyond the Project Site Area, but are confined to the Project Study Region, result from noise, fumes, smoke and other by-products of construction work in the ROW that move beyond the ROW area or that might affect the activities of VCs such as small furbearing mammals and ungulates that move over larger distances in areas near the ROW and Route Study Area. It is anticipated that most Project effects which extend beyond the Route Study Area will not encompass the whole of the Project Study Region.

- **Beyond the Project Study Region: High Geographic Extent**
  This is the area beyond the Project Study Region that covers the entire Yukon Territory. It is anticipated that no likely adverse environmental or socio-economic effects of the Project will impact on this broader region outside of the Project Study Region. However, some positive socio-economic effects are expected to extend to this broader region.

Two broad categories are considered for the duration of effects related to Project activities for the purpose of assessing the significance of effects within any of the above three geographic area:

- **Short-term effects (low duration)** tend to last not much longer than the specific construction, maintenance or decommissioning activities undertaken, and for the purpose of assessing significance of effects, are considered to be of low duration. These effects are related to the brief construction activities in each part of the Project Site Area (brushing, clearing, construction of new facilities), the subsequent infrequent brief maintenance activities in the new ROW (mainly clearing and brushing maintenance, usually recurring every seven to ten years while the facilities remain), and the subsequent brief decommissioning and removal activities for parts of the MS transmission line.

- **Long-term effects (high duration)** tend to be related to the ongoing existence of new transmission ROW and facilities in the Project Site Area (e.g., the CS facilities are expected to remain indefinitely and the MS facilities are expected to remain for at least ten years), and the future removal of certain parts of the MS ROW (which will allow over time for the affected areas to be restored). For the purpose of assessing significance of effects, long-term effects are considered to be of high duration.

Within the context of the above geographic area and duration categories, three categories for the magnitude of effects (level of detectability) are considered for the purpose of assessing the significance of effects related to Project activities:

- **Low magnitude effects** are unlikely to be detectable or measurable, or are below established thresholds of acceptable change.
- **Moderate magnitude effects** could be detectable within the normal range of variation with a well designed monitoring program, or are below established thresholds of acceptable change.
- **High magnitude effects** would be readily detectable without a monitoring program and outside the normal range of variation, or exceed established thresholds of acceptable change.

Mitigation measures to manage or to avoid adverse effects are described in Sections 8.2 and 8.3 where relevant for each VC.

Significance for the Project's effects on any VC is determined using the approach and criteria set out in Chapter 3 (Section 3.5) based on scientific analysis of ecosystem effects as well as TK, local knowledge, socio-economic research and professional judgement. Any deficiencies in the information base about potential effects have been noted and are addressed further in Section 8.5 Environmental Protection and Monitoring.

Certain investigations and monitoring programs will be developed as part of the final detailed engineering design and/or as part of clearing, construction, operation or decommissioning activities. For example, investigation and monitoring of site-specific archaeological resources or site-specific rare and endangered plants and vegetation will occur during clearing and construction phases of the Project.

After completion of the YESAA screening assessment process and decisions on environmental approvals, an EPP will be finalized prior to the start of clearing and construction activities to set out the specific impact management and mitigation measures (as well as regulatory terms and conditions) to be applied by field staff and contractors in order to minimize residual impacts of the Project.

8.2 ENVIRONMENTAL EFFECTS AND MITIGATION

Section 8.2 provides assessment of Project effects and mitigation measures with regard to three groups of environmental VCs:

- Physical Environment
- Terrestrial Environment
- Aquatic Environment

The Project is expected to have both positive and adverse environmental effects in the Project Study Region.

Potential short-term environmental effects relating to construction, maintenance and decommissioning activities include:

- Disruption of sensitive soils, wetland and riparian zones, and the vegetative mat from vehicles, equipment and the placement of poles and other structures in the Project Site Area
- Possible contamination of sensitive soils, wetlands and riparian zones due to fuel spills
- Possible disruption or removal of rare plants in the Project Site Area
- Reduction in air quality in the Route Study Area due to fumes from vehicles and smoke produced by slashing and burning
- Scattering of wildlife species and their temporary avoidance of the Route Study Area due to noise and disruptions caused by vehicles and equipment

Potential long-term environmental effects relating to the existence of permanent structures such as poles, conductors and substations, and maintenance of a permanent ROW with regard to the CS transmission line include:

- Permanent loss of vegetation and wildlife habitat areas where substations are located
- Intrusion of exotic species that thrive in edge environments or along roadways and which may crowd out native species in the Project Study Area
- Loss of habitat for some species due to creation of edge environment in the ROW and improved habitat for other species that prefer an edge environment along the ROW or that will benefit from a travel corridor
- Habitat fragmentation and the creation of a new or enhanced barrier for some species where the ROW is either immediately adjacent to the Klondike Highway and other previously disturbed areas, or well away from existing road corridors
- Increased pressure from opportunistic hunting on certain species due to the creation of new access points for maintenance along the ROW
- Increased pressure on certain species due to the creation of a travel corridor that may be used by predatory species such as wolves and coyotes for hunting
- Increased mortality for migratory waterfowl and other birds due to line strikes in Project Site Area

Decommissioning of the Minto Spur line will have short-term adverse environmental effects when certain portions of the line and structures are removed; however, decommissioning is expected to dissipate over time the above long-term effects due to the initial creation of the MS ROW as the MS Project Site Area returns to pre-Project conditions.

The primary means of mitigating both short-term and long-term Project environmental effects has been through the process of careful route selection to avoid sensitive ecosystems and critical habitat areas, and to minimize habitat fragmentation effects. For all VC's, route selection is expected to ensure that the magnitude of effects is low as the most sensitive ecosystem areas have been avoided. For most species, the Project Site Area will intersect only small parts of their total habitat area, avoiding critical habitat and consequently affecting a low proportion of the species' habitat and population. Treed or vegetative buffers between the new ROW and the Klondike Highway are provided where feasible to minimize new habitat fragmentation effects and to provide protective cover for affected mammals.

Where it is feasible, further mitigation will be provided by timing Project activities in the ROW to occur outside of sensitive times for both ecosystem-types and species thereby further reducing the magnitude of Project related environmental effects on selected VCs. In order to mitigate the severity of impacts on sensitive terrain and on wetland environments and riparian zones, construction, maintenance and decommissioning activities for such areas will be timed to occur where necessary in winter under frozen conditions. To minimize disruptions on certain species activities will be timed where feasible to occur outside of rutting, calving, denning or mating periods.

Yukon Energy's EMS Manual (see Reference Materials 5R-1) sets out standard construction and maintenance best practice for transmission line systems; it is ISO 14001 compliant and reviewed and updated on a regular basis. This manual is referenced in this Chapter as Yukon Energy's EMS. For all Project activities the relevant portions of the Yukon Energy's EMS will be followed to assist in mitigation of Project environmental effects. These include:

- Yukon Energy's EMS best practices for Emergency Response (includes fuel spills)
- Yukon Energy's EMS best practice for ROW Brushing (includes timber salvage and access)
- Yukon Energy's EMS best practice for ROW Maintenance (includes access)
- Yukon Energy's EMS best practice for Water Bodies, Wetlands and Stream Crossings.
- Yukon Energy's EMS best practice for Permafrost
- Yukon Energy's EMS best practice for Heritage Resources

Decommissioning activities will adhere to the decommissioning practice recommendations set out in Section 5.10 in Chapter 5 of this Project Proposal.

Most Project environmental effects will be site-specific occurring within the Project Site Area, and typically only in certain segments or parts of the Project Site Area. Environmental effects extending beyond the Project Site Area are for the most part short-term in duration and related to construction, maintenance and decommissioning activities in the ROW that produce noise, fumes and smoke that may be felt outside the Project Site Area. Such effects are categorized as impacting the Project Study Region. There are no Project effects on the environment that are expected to have a discernable magnitude outside the Project Study Region.

Effects of the Project on environmental VCs in the Project Study Region are generally not expected to combine with other relevant future actions that will occur in the Project Study Region (see Assessment Approach, as described in Chapter 3). Such future projects and activities are assumed to include the proposed Carmacks Copper Mine in the Williams Creek area and YECL distribution lines connecting to the CS substations at Pelly Crossing and Carmacks (see Section 3.4.4), as well other forestry, mining, or other projects for which proposals have been submitted to YESAB (see Table 3.4-1).

8.2.1 Physical Environment

As reviewed in Chapter 6 (Table 6.2-1 and Section 6.2.1), Project environmental effects are examined for the following VCs relating to the physical environment:

- Sensitive Terrain
- Air Quality

8.2.1.1 Sensitive Terrain

During construction, maintenance and MS decommissioning activities, the transmission infrastructure and ROW may cross areas of sensitive terrain resulting in rutting on steep slopes, wetlands or permafrost areas. Slope damage may occur due to the heavy equipment used when undertaking activities within the ROW, and rutting or the removal of soil fixing vegetation may facilitate the erosion of colluvial material on slopes. Brushing and clearing of the ROW at the time of construction and every seven to ten years thereafter may result in the disturbance of sensitive terrains such as permafrost soils or wetlands. During construction, maintenance and decommissioning activities accidental fuel spills may occur which may cause site-specific damage to soils in the Project Site Area.

Route selection has avoided many identified sensitive terrain units. The terrain analysis set out in Appendix 6A-1-1 to 6A-1-9 identifies 21 units of sensitive terrain which will be intersected by the CS transmission line ROW, and three units of sensitive terrain that lie adjacent to the CS transmission line ROW. These sensitive terrain units are listed by the NTS map sheet in Table 8.2-1, which sets out the sensitive soil type, the location of the sensitive terrain unit and a description of the mitigation strategies to address adverse environmental effects.[1]

[1] As identified in Mougeot Terrain analysis mapping, there are a number of lesser magnitude additional site-specific locations such as small wetlands, ice-rich permafrost soils and slopes which are not included in Table 8.2-1.

Table 8.2-1
Sensitive Terrain Location and Mitigation

NTS Map Sheet	Sensitive Soil Type	Sites	Mitigation
CS Line Segment 1: Carmacks to McGregor Creek			
115 I/01	OW (organic-rich, poorly drained material)	5 very small, localized sites	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands & Stream Crossings, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, minimize and repair rutting, strategic pole placement with rock filled barrels for pole support where necessary.
115 I/01	VS:R (very steep slope, mainly in colluvium covered bedrock or rock	1 site opposite the Ambrose Farm	Mitigation will include spanning and strategic pole placement. Repair rutting, disturbance of vegetation mat and soil-fixing vegetation will be minimized.
115 I/08	VS:G (very steep slope, mainly in gravelly soil) Tatchun Creek crossing	5 very small, localized sites south & north of Tatchun Creek 3 sites north of Tatchun Creek are adjacent to ROW	Mitigation for these 5 sites will include spanning and strategic pole placement to take advantage of contour height. • Repair rutting, disturbance of vegetation mat and soil fixing vegetation will be minimized. • Construction timing during frozen ground conditions will be used in areas that cannot be spanned. These 3 sites have been avoided in route selection. No further mitigation is required.
CS Line Segment 2: McGregor Creek to Pelly Crossing			
115 I/10	VS:R-VS:G (see above)	Approximately 2 km long area south of McCabe Creek	Steep terrain restricts the ROW in close proximity to the Klondike Highway. Mitigation will include aligning the ROW as close to the Highway as possible to avoid the steep slopes.
115 I/10	VS:G and creek crossing	North of the Minto substation location along Von Wilczek Creek for 1.6 km.	CS line ROW will be routed in low-lying valley to avoid steep slopes and heritage resources in the vicinity. • Repair rutting, disturbance of vegetation mat and soil fixing vegetation will be minimized. • Construction timing during frozen ground conditions will be used in areas that cannot be spanned.
115 I/10	VS:R	In SFN R10 B, opposite Lhutsaw Wetland (1.5 km)	Routing through some steep terrain – mitigation will include: • Strategic pole placement • Repair rutting, disturbance of vegetation mat and soil-fixing vegetation will be minimized.
115 I/15	OW and small creek crossing	Pelly Crossing – small, site-specific area where ROW is adjacent to the Yukon River west of the gravel pit.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands & Stream Crossings, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
CS Line Segment 3: Pelly Crossing to Stewart Crossing			
115 P/01	OZ-OWZ/G (organic-rich with ice-rich permafrost; poorly drained areas, some over gravel)	Small site-specific area about 24 km north of Pelly	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands & Stream Crossings and in Permafrost areas, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.

NTS Map Sheet	Sensitive Soil Type	Sites	Mitigation
115 P/01	OZ	Very small site-specific area immediately north of SFN R14 B, about 30 km north of Pelly	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices in Permafrost areas, • minimize disturbance of vegetation mat and removal of soil fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock filled barrels for pole support where necessary.
115 P/01	OW	Very small, site-specific area approximately 43 km north of Pelly Crossing on the east side of the Klondike Highway.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
115 P/07	OWZ (organic-rich, ice-rich and poorly drained area)	Crooked Creek crossing at bridgehead	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, and in Permafrost areas, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
115 P/07	OW	Crooked Creek crossing, 3-4 km south of Stewart R.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
115 P/07	OW:FA (organic and/or silt, poorly drained and subject to regular flooding)	On the south bank of the Stewart River.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
Minto Spur Line Segment			
115 I/11	OWZ and Permafrost OW:FA and stream bed movement	Minto Creek crossing Big Creek crossing on the north side of the Minto Mine Access road.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, and in Permafrost areas, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.

Where sensitive terrain areas cannot be avoided access to such areas will be controlled during construction, maintenance and decommissioning activities in order to mitigate damage due to rutting of soil and disturbance of soil-fixing vegetation. Further, where route selection has been unable to avoid areas of sensitive terrain, construction and decommissioning will be timed to occur in winter in order to minimize disturbance of the vegetative mat and permafrost soils. On steep slopes, wetlands or permafrost areas where there is the potential for rutting, the ruts will be levelled or filled-in to avoid erosion or damage to the permafrost subsoil. This practice will occur in all phases of the Project. Any site-specific damage due to accidental fuel spills will be mitigated through adherence to Yukon Energy's best practise for fuel spills.

With regard to brushing and clearing during construction and maintenance, the vegetation will be cut with 30 cm of plant material left standing in order to adhere to Yukon Energy's EMS best practices for permafrost soils (as adopted from the *Yukon Highway Standard for Minimal Disturbance Clearing*). Generally, ROW maintenance is expected to occur in seven to ten year cycles. This infrequent brushing will allow vegetation to re-grow in the ROW and help to insulate any sensitive permafrost areas. ROW maintenance in wetland areas will follow a similar practice and adhere to Yukon Energy's best practices for Water Bodies, Wetlands & Stream Crossings and ROW maintenance. Steep slopes will require little maintenance for vegetation control as there is typically little to no vegetative growth on steep slopes. Where brushing in wetland areas is required, it will be carried out in winter months using hand-clearing methods or light equipment.

With regard to construction, maintenance and decommissioning activities, any residual adverse effects due to the disruption of sensitive terrain are expected to be low in magnitude, of short-term duration and be limited to the Project Site Area.

8.2.1.2 Air Quality

The baseline presented in Chapter 6 notes that the primary activities having an adverse effect on air quality in the Project Study Region are vehicular traffic on the Klondike Highway (which is more pronounced in the summer) and home heating (oil and wood burning in the winter). With regard to the Project, construction, operation and maintenance, and decommissioning activities will have an adverse affect on air quality due to emissions and dust produced by transportation vehicles and machinery, as well as smoke and other emissions produced by the burning of slash during any required brushing and clearing activities. However, once the Minto Spur line is complete, operations at the Minto mine will shift from diesel generation to the use of grid power which will have a positive effect on emissions and reduce the production of GHG's in the MS Project Study Region.

Any adverse effects of emissions created during construction, maintenance and decommissioning activities will be mitigated by observing and applying routine maintenance and standard emission controls for all equipment and vehicles involved in Project activities. Slash burning will follow Yukon Energy's EMS Manual on best practices for timber salvage.

Adverse effects due to emissions from the Project are expected to be of a lesser magnitude during maintenance activities than during construction but all Project-related emissions during the life of the Project are expected to be low magnitude and short-term in duration for the Project Study Region.

It is expected that the Project will have a positive effect on CO_2 emissions and greenhouse gases produced in the Project Study Region since operations at Minto mine and Pelly Crossing will have the opportunity to shift from diesel power to grid power. For instance, at Minto mine, a shift from diesel power to grid power would result in approximately 23,000 tonnes per year of reduced CO_2 emissions during the mine's life.

In essence, the long term presence of this Project will contribute to the Government of the Yukon's long term climate change goals through reducing the volume of greenhouse gases discharged and providing current diesel users and future developments in the Project Study Region with an alternative to diesel and the ability to shift to a renewable energy resource.

This positive effect will relate primarily to the effect on Minto Mine site emissions and be low in magnitude and of moderate-term duration, lasting until the MS transmission line is decommissioned. In the event that the Carmacks Copper Mine is developed and also connected to the CS development, during the life of this mine additional direct positive effects will occur on air quality in the Project Region compared to what would occur if the Carmacks Copper Mine power needs were to be supplied through on-site diesel generation.

8.2.2 Terrestrial Environment

As reviewed in Chapter 6 (Table 6.2-1 and Section 6.2.2), Project environmental effects are examined for the following VCs relating to the terrestrial environment:

- Vegetation
  - Vegetation
  - Rare Plants
- Mammals
  - Mule Deer
  - Moose
  - Woodland Caribou (Ethel Lake and Tatchun herds)
  - Small Furbearing Mammals
- Birds
  - Migratory Waterfowl
  - Peregrine Falcon

8.2.2.1 Vegetation

Most Project related effects on vegetation will result from the brushing and clearing activities undertaken during the construction and maintenance phases of the Project; however, there will also be minor disturbances to vegetation during decommissioning of the MS transmission line as equipment traverses the ROW to remove conductor and pole structures. Adverse effects during construction will include the removal of under-story vegetation and disturbance of the vegetative mat, as well as damage to and removal of timber. Soil disturbance and the creation of a permanent ROW may promote the intrusion of exotic species such as sweet close, perennial sow-thistle, Canada thistle, and common tarsy, which are known to exist within the Project Study Region and thrive in roadway environments.

Route selection was the primary means of mitigating adverse effects on vegetation, where it was feasible the process focused on avoiding areas with merchantable timber stands as well as those few areas with identified medium or high estimated volume potential. The route selected often passes through non-productive areas and areas recovering from previous forest fires. In particular, the area around Minto Landing is still recovering from a forest fire that occurred in 1995.

The selected route also passes through areas of wetland or riparian zones. Additional mitigation provides for the large wetland areas and major creek crossings to be spanned. In these areas, or in areas where it is possible to span lengths from ridge to ridge, little or no vegetation will be cleared or disturbed.

When the terrain over the entire route is taken into consideration the actual areas of disruption and the amount of vegetation that will be removed is considerably smaller than the area of the total transmission line ROW. With regard to the CS transmission line, a corridor of approximately 172 km in length, with a typical cleared 30 metre wide ROW[2], would initially indicate approximately 516 hectares of disturbed or removed vegetation. However, the ROW selected is composed of:

- 63 % forest cover (vegetative cover, including forest, grassland and shrubs);
- 37 % not sufficiently recovered areas (e.g., areas burnt in previous forest fires);
- 13% non-productive land; and
- 5% wetlands.

With regard to the MS transmission line, a corridor of approximately 27 km in length, with a cleared 15 metre wide ROW[3] would result in approximately 40.5 hectares of disturbed or removed vegetation; however, much of the area surrounding the proposed transmission line has been burnt and is still recovering from previous forest fire activity and is considered to be insufficiently regenerated land. The effect of construction, operation and maintenance and decommissioning activities in previously disturbed areas around MS line are consequently expected to be very low in magnitude.

Project substations are to be built next to existing disturbed areas, including:

- an airport, highway and existing 138 kV transmission line (Carmacks);
- a gravel pit (Minto Landing);
- a yard area used by SFN adjacent to the Pelly Crossing community (Pelly Crossing); and
- adjacent to the expansion of an existing substation and 69 kV transmission line (Stewart Crossing).

Construction at each of these substation locations will require the permanent removal of any trees, shrubs and ground cover which will result in long-term permanent impacts on any vegetation; however, the amount of disturbance is expected to be site-specific and low in magnitude relative to the overall Site Study Area and Project Study Region.

[2] The CS ROW for the 138 kV line will typically be cleared to about 30 m; however, where needed, clearing may be up to 40 m (see Chapter 5, Section 5.5).
[3] The MS ROW for the 35 kV line will typically be cleared to about 15 m; however, where needed, clearing may be up to 20 m (see Chapter 5, Section 5.5).

For Project-related activities equipment will be used that minimizes disturbance to vegetation and to the vegetative mat (at ground level), including rotary mowers, hydro axes and swampers. Hand clearing methods will be used where required in sensitive areas such as locations in proximity to wetlands and riparian zones. Efforts that minimize the removal of under story vegetation and disturbance to the vegetative mat will also mitigate the intrusion of exotic species due to soil disturbance. No defoliants or herbicides will be used at any phase in the life of the Project.

Yukon Energy's EMS best practices for ROW maintenance will be followed, and where it is necessary, construction, maintenance and decommissioning activities will be timed to occur in the winter months, under frozen and snow covered conditions, in order to reduce impacts on sensitive terrain. It is expected that brushing and clearing maintenance activities will only be required at seven to ten year intervals, and in the interim vegetation will be allowed to re-grow throughout the length of the ROW. The frequency and extent of brushing and clearing activities will depend on the extent of re-growth and will include the removal of danger trees that may pose a threat to the transmission line. During maintenance activities the ROW will be monitored for invasive species and any invasive species discovered will be removed.

Short-term effects due to the removal or disturbance of vegetation during construction, operation and maintenance and decommissioning will generally be low in magnitude and confined to the Project Site Area.

Construction and the maintenance of a permanent ROW will require the permanent changes to vegetation, resulting in the creation of an edge environment that will endure for the life of the Project and that may promote the intrusion of invasive species in the Project Site Area. The edge environment effects will be long-term in duration but with monitoring and mitigation (including the removal of invasive species) any residual adverse effects on vegetation are expected to be low in magnitude.

8.2.2.2 Rare Plants

Adverse effects on rare plant species are only likely to occur, if at all, during the construction phase of the Project where rare plants may be disturbed or removed and thereby affect future propagation. No rare plant species have been found within the CS Route Study Area or the MS Route Study Area at this time; however, mitigation measures will be undertaken to avoid any potential adverse effect on rare plant species.

For the CS Route Study Area, any sites with the potential for rare plant species have been identified in the Vegetation Maps set out in Appendix 6C. The maps indicate that there are no areas with potential for rare plants located in the MS Route Study Area as the majority of area has been previously disturbed by fire.

Prior to brushing and clearing activities during the construction phase, a rare plant survey will be completed which will focus on the site-specific potential rare plant areas identified in the Vegetation Maps in Appendix 6C, and species identified in Table 6.2-4. Any rare plant species or communities identified will be flagged in the field and brought to the attention of construction workers. These flagged areas will be avoided entirely and will not be brushed or cleared; hand-clearing and strategic pole placement will be used to ensure that any identified rare plants are not disrupted. The locations of rare plants will then be mapped to ensure that subsequent maintenance activities take a similar level of caution and avoid the area. Substations have been located in areas with very low potential for rare plant occurrence; however, if rare plants are encountered during site preparations the measures outlined above will be followed.

Since rare plants have not been identified in the Route Study Area and any site-specific areas that are identified will be flagged and avoided, adverse impacts on rare plants due to construction activities in the Project ROW are expected to be low in magnitude. Any residual adverse effects on rare plants due to disturbance or removal during Project construction are also expected to be short-term in duration and to occur only within the Project Site Area.

8.2.2.3 Mammals

Mammals in the Project Study Region may be affected by short-term effects due to Project related activities that may cause mammals to avoid the Route Study Area and adjacent areas during the period of Project activities and by long-term effects that result from the existence of a permanent ROW in the Project Site Area.

The existence of a permanent ROW may contribute to habitat fragmentation for certain species, creating new or enhanced barriers across which some species may display restricted movement. There are two ways in which the ROW may adversely impact on wildlife in this regard:

- **Adjacent to Highway or other existing corridor**: Where ROWs combine, (i.e., Project ROW and Klondike Highway) the combined cleared area may adversely restrict the movement of certain species such as small furbearing mammals and woodland caribou, while the wider open corridor may attract other species such as moose and mule deer that may become vulnerable to opportunistic hunting. In this regard, a vegetative buffer, where feasible, of at least 30 metres between the new ROW and any existing highway corridor is expected to mitigate such effects, reducing the expanded barrier impact and providing a vegetative screen between the highway and animals moving along the ROW.

- **Well away from Highway or existing corridor:** In contrast, where a new ROW is placed too far from the existing highway (e.g., over 150 metres or more away) and is also located in previously undisturbed areas there may be adverse effects due to the creation of a new barrier and consequent new adverse habitat fragmentation effects. This may increase habitat fragmentation and also provide new access trails into the previously undisturbed area that may be used for hunting, increasing pressure on certain species.

With regard to the issue of increasing the adverse effects of a barrier along the Klondike Highway, there are only a few instances where the CS Project ROW will pass within less than 30 metres distance from the Klondike Highway or other major existing corridor. Most of these areas occur where the Project ROW crosses the highway or where steep terrain provides no other acceptable options.

- **For CS Segment 1 (Carmacks to McGregor Creek)** there are four areas where the ROW will cross the Klondike Highway, and only roughly 6% of this line segment ROW will be less than 30 metres distance from the highway. In contrast, roughly 50% of this CS route segment ROW will be located within 30 to 150 metres of the highway, and 23% will be located within 150m to 500 metres of the highway.

- **For CS Segment 2 (McGregor Creek to Pelly Crossing)**, there are 2 areas where the ROW will cross the Klondike Highway and only roughly 5% of this line segment ROW will be less than 30 metres distance from the highway. Roughly 34% of this CS route segment ROW will be within 30 to 150 metres of the highway and 19% will be within 150 to 500 m of the highway.

- **For CS Segment 3 (Pelly Crossing to Stewart Crossing)**, there are 8 areas where the ROW will cross the Klondike Highway and roughly 8% of the ROW will be less than 30 metres distance from the Klondike Highway. Roughly 57% of this CS route segment ROW will be within 30 metres to 150 metres of the Klondike Highway and 19% will be within 150 to 500 metres of the Klondike Highway.

In contrast to the CS route, about two-thirds of the MS ROW is within less than 30 metres distance from the existing mine access road, and only about 10% of the MS ROW is within 30 to 150 m of this access road. The barrier effects in this instance, however, are greatly reduced compared to CS development, adjacent to the Klondike Highway (due to the reduced ROW needed for both the road and the transmission line with the MS development as compared to the CS development).

There are a few specific areas where the CS route diverges well away from following the Klondike Highway and where there may therefore be adverse effects on wildlife due to habitat fragmentation:

- **In CS Segment 1 - Carmacks to McGregor Creek:** roughly 21% of this CS ROW segment is more than 500 m distance from existing highway corridors. Key areas affected are:
  - Where the ROW goes east around Tantalus Butte (other established access currently exists into many parts of this area)
  - Where the ROW approaching Tatchun Creek goes well east of the Highway (this area currently is generally undisturbed except for trapping activity)

- **In CS Segment 2 – McGregor Creek to Pelly Crossing:** roughly 42% of this CS ROW segment is more than 500 m distance from the existing Klondike Highway. Key areas affected are:
  - Where the ROW approaches the Minto Spur substation (other established access currently exists into this area)
  - Where the ROW enters areas west of the Highway in the vicinity across the Highway from the Lhutsaw Wetland Habitat Protection Area (this area currently is generally undisturbed)
  - Where the ROW approaches Pelly Crossing (this area to the west of the Highway currently is generally undisturbed except for trapping activity)

- **In CS Segment 3 - Pelly Crossing to Stewart Crossing:** roughly 17% of this CS ROW segment is more than 500 m distance from the existing Klondike Highway. Key areas affected are:
  - Shortly after the ROW crosses the Pelly River, a small area is affected
  - Where the ROW goes east of the Highway along Top of 11% Trail Road
  - Where the ROW goes to the west of Stewart Crossing (major parts of this area have currently established access)

The MS route, which generally passes through the area of the 1995 fire burn, moves more than 150 metres from the Minto Mine access road in only a few locations. Aside from brief excursions near the Yukon River crossing and the Minto Creek crossing, these locations occur between Minto Creek and the Minto Mine site where the line avoids turns in the road and particularly during the last segment of the line coming directly into the Minto Mine site. It is not considered likely that the specific portions of the MS route beyond 150 metres from the road will have any material impact on habitat fragmentation in this area.

Effects due to the existence of a long-term ROW will be long-term in duration. In the case of the CS development, these effects are considered to be permanent. In the case of the MS ROW, most of the line is planned to be decommissioned (potentially as soon as within ten years after operations commence at the Minto Mine site).

8.2.2.4 Mule Deer

Chapter 6 has noted that mule deer habitat mapping is not available for the full extent of their range. Occasional observations suggest a range that includes infrequent use of areas to the east of the Yukon River between Carmacks and Minto Landing, possibly extending north up to Stewart Crossing. These observations suggest sporadic expansion of habitat but do not imply a continuous distribution over the entire area; therefore, the assessment has focused on key habitat areas for mule deer within the Route Study Area which are restricted to the south slope of Tantalus Butte in CS Line Segment 1.

Noise and fumes from equipment and crews, and smoke from slash burning may cause mule deer to temporarily avoid the Route Study Area during construction and maintenance activities. The existence of a permanent ROW may also provide hunters with increased access to mule deer. A permanent ROW will provide some benefits to mule deer as the periodic brushing and clearing activities required every seven to ten years throughout the life of the Project will create browse or new vegetative growth preferred by mule deer. The ROW will also provide a travel corridor for mule deer.

Route selection for the CS line has sought to identify critical mule deer habitat areas that run adjacent to, and slightly within, the eastern boundary of southern parts of the Route Study Area. Any effects from MS decommissioning activities will be negligible as route selection has placed the MS transmission line outside of key mule deer habitat. Where it is feasible to do so, activities will be timed to avoid calving and rutting seasons in the southern extremity of the CS line.

In order to mitigate any adverse effects due to increased access along the ROW a no-hunting policy will be imposed upon construction, maintenance and decommissioning crews. Yukon Energy's EMS best practices for ROW maintenance will also be followed. Where it is feasible and necessary to do so berms of trees and rocks may be placed across any ROW access trails to discourage access into this area. A vegetative or treed buffer will also provide cover from opportunistic hunters and other predators in most areas where the ROW runs adjacent to the Klondike Highway.

Key areas for mule deer within the Project Site Area are restricted to the south slope of Tantalus Butte and only a small portion of the project ROW will intersect mule deer habitat in this vicinity. Adverse effects due to the noise, fumes and smoke created by construction and maintenance activities are expected to be low in magnitude and short-term in duration within this part of the Project Study Region. While maintenance activities will recur, they are only expected to occur at seven to ten year intervals.

The effects of a permanent ROW will have long-term positive and negative impacts on mule deer. The creation of browse and a travel corridor will have positive, long-term effects for mule deer in the southern parts of the Project Study Region, while also providing long-term access for opportunistic hunters in small areas along the ROW. Both the positive and adverse effects are expected to be low in magnitude and will only affect a small part of the total mule deer range.

8.2.2.5 Moose

During construction, maintenance or decommissioning activities there will be an adverse effect on moose where noise produced by people and equipment will cause moose to avoid the Route Study Area. The creation a permanent ROW for the CS transmission line will also provide increased access for opportunistic hunters which may increase hunting pressure on the moose populations in certain areas along the ROW. A permanent ROW will also benefit moose by providing browse in recently cleared areas, as well as the creation of a travel corridor for moose to roam.

The magnitude of Project effects on the moose population throughout the Project Study Region is expected to be low as route selection of the line and substations has avoided all known critical calving habitat. The amount of moose habitat affected by the Project is very small and site-specific in comparison to overall moose habitat in the Project Study Region and consequently any adverse effects on moose are expected to be low in magnitude and Project Site-specific. There are no known calving locations within the Route Study Area with the exception of possible locations at Crooked Creek (CS Line Segment 3: Pelly Crossing to Stewart Crossing). Where it is feasible, during Stage 2 disruptive activities will be timed to occur outside of sensitive calving periods that occur between mid-May and mid-June.

To mitigate the adverse effects of increased hunting pressure due to access provided along the ROW, Yukon Energy's EMS best practices for ROW access will be adhered to and there will be a no-hunting policy for construction, maintenance and decommissioning personnel. A vegetative or treed buffer will be provided between the ROW and the Klondike Highway in most areas to act as a protective cover for the moose and reduce opportunistic hunting.

The short-term adverse effects on moose due to noise and fumes from construction, maintenance and decommissioning activities are expected to be low in magnitude since the amount of moose habitat affected by such activities will be small and site-specific.

Long-term adverse effects created by increased access for opportunistic hunters are expected to affect a small part of the Project Study Region since only a small part of the ROW will intersect moose habitat; with mitigation measures, only limited access will be provided to the ROW. While adverse effects will persist for the lifetime of the ROW, and be long-term in duration, they are expected to be low in magnitude since only a small portion of the moose population and habitat in the Project Study Region is likely to be affected.

8.2.2.6 Ethel Lake Woodland Caribou Herd

Project effects on the Ethel Lake caribou herd are restricted to fringe areas of the herd's habitat in the vicinity of Crooked Creek (located in CS Line Segment 3: Pelly Crossing to Stewart Crossing). The majority of the Ethel Lake herd's habitat is east of the Project in this area, in the regions near Ethel Lake and the Ddhaw Ghro Habitat Protected area. Chapter 6 notes, however, that there has been some recent winter range extension of the herd west across the Klondike Highway to the west into the Willow Creek Wetland Complex (WKA 987) which may result in small numbers of the herd crossing the CS Line Segment 3 ROW in this area during the period from October through April. There will be no Project effects on this herd from other parts of the CS transmission line outside this specific area or from the MS transmission line or any CS or MS substations during any phases of the Project.

Members of this herd may temporarily avoid areas of their range that are intersected by the CS transmission line due to noise and other disturbances created by people and vehicles undertaking construction and maintenance activities. The creation of a permanent ROW may increase hunting pressure on the herd by providing increased access for opportunistic hunters and increasing mobility along the ROW for other predators such as wolves, foxes and coyotes. The existence of a permanent ROW well away from existing road corridors may also contribute to new habitat fragmentation in some areas and serve as a possible barrier to caribou movement.

Route selection has avoided the critical habitat for this herd which is located to the east of the CS Project Route Study Area. Although there has been some anecdotal evidence of recent winter range extension across the Klondike Highway and west into the Willow Creek wetland complex, the actual numbers of caribou spotted have been small and only one caribou has been spotted in the vicinity recently. It is expected that any winter extension of the herd into this area west of the Highway is only sporadic in nature. It is thus expected that any effects on this caribou herd due to disturbances from Project construction or operations in the area of Crooked Creek will be minimal as this area is not part of the herd's normal range and caribou do not frequent the area with any constancy.

The route selected in this part of CS Line Segment 3 has placed the transmission line near previously disturbed areas along the Klondike Highway, while generally maintaining a vegetative buffer of at least 30 metres in order to reduce any impacts from habitat fragmentation. The presence of a vegetative or treed buffer is expected to reduce adverse effects where the new ROW may otherwise act as a barrier to infrequent crossings of the Klondike Highway by members of the herd.

The route crosses the Klondike Highway three times in the area between Top of 11% Trail Road (where the route is on the east side of the Highway) and north of crossing Crooked Creek (where the route ends up on the west side of the Highway). Measures to mitigate adverse effects of increased access for opportunistic hunting along the ROW will include the adoption of a no-hunting policy for construction and maintenance personnel, as well as the continuance of voluntary no-hunting restrictions on the Ethel Lake Caribou Herd. Where it is feasible, off-road access to the ROW at these road crossings will also be restricted by using physical barriers such as berms of roots, stumps, and trees. Mitigation measures will also adhere to Yukon Energy's EMS best practices for access.

Since only a small portion of the herd's total range is affected, any Project effects on the Ethel Lake caribou herd due to disruptions caused by construction and maintenance activities will be low in magnitude and short-term in duration in the vicinity of Crooked Creek.

Long-term adverse effects on the Ethel Lake caribou herd due fragmentation and increased hunting pressure caused by the creation of a permanent ROW are restricted to the vicinity of Crooked Creek which is only a small portion of the herd's range; as a result, the effects will be low in magnitude since only a small portion of the herd population and habitat in the Project Study Region is likely to be affected.

8.2.2.7 Tatchun Woodland Caribou Herd

Project effects on the Tatchun caribou herd are restricted to CS ROW areas from around Tatchun Creek north to the vicinity of the Lhutsaw Wetland Habitat Protection Area and include very small portions of the MS transmission line ROW in the vicinity of Minto Landing. As outlined in Chapter 6, winter range use of Minto Landing and areas west of the Klondike Highway near the Lhutsaw Wetland Habitat Protection Area has declined in post-fire years, and the Tatchun Caribou herd is only expected to use this area infrequently.

Noise produced by equipment and crews may cause the Tatchun Caribou herd to avoid the affected area during Project construction or maintenance activities while large open corridors may also become a barrier to herd movement. There may also be an adverse effect on the herd as the transmission line ROW and access trails will provide increased access and mobility for hunters and wildlife predators (i.e., wolves and coyotes) and thus increase hunting pressure on this herd.

Route selection has avoided critical habitat such as calving and post-calving areas and rut areas which are located well to the east of the Route Study Area. While the preferred route in the vicinity of Tatchun Creek and in the vicinity of the Lhutsaw Wetland Habitat Protection Area will intersect some winter range for this herd, the amount of habitat affected by the line ROW is very small in relation to the herd's overall habitat; consequently, any impacts of the Project on the herd are expected to be low in magnitude. Since the Tatchun herd's range does not include the MS line ROW to the west of the Yukon River, MS decommissioning activities are not expected to have any effect on the Tatchun herd.

A vegetative or treed buffer of at least 30 metres between the Klondike Highway and the line ROW is planned for about 95% of the CS route areas potentially affecting the Tatchun caribou herd (Tatchun Creek area and north through the areas in the vicinity of the Lhutsaw Habitat Protection Area), and will act in this area as protective cover to reduce the impact of the ROW as a barrier to possible infrequent crossings of the Klondike Highway by members of the herd.

The CS route area potentially affecting the Tatchun caribou herd includes three crossings of the Klondike Highway and two areas where the route may create new habitat fragmentation barriers by being more than 500 metres from the Highway.[4] Adverse effects on the herd due to the existence of a permanent ROW and access trails which may provide increased access and mobility for hunters and wildlife predators (i.e., wolves and coyotes) will be mitigated through the adoption of a no-hunting policy for construction personnel, adherence to Yukon Energy's EMS best practices for access and, where it is feasible and necessary, off-road access may also be restricted with physical barriers such as berms of roots, stumps, trees and rocks.

While the preferred route intersects a portion of the winter range for this herd, the amount of habitat affected by the line ROW is very small in relation to the herd's overall habitat. Since only a small portion of the herd's total range is affected, Project effects on Tatchun caribou herd due to disruptions caused by construction and maintenance activities are expected to be low in magnitude and short-term in duration.

Effects caused by the creation of a permanent ROW will be long-term in duration and restricted generally to the Route Study Area portion of the Project Study Region; however, since Project effects on the Tatchun caribou herd are restricted to a small portion of the herd's total range, they are expected to be low in magnitude and to affect only a small portion of the herd population and habitat in the Project Study Region.

8.2.2.8 Small Furbearing Mammals

The Project will have both positive and adverse effects throughout all phases of the Project on the various small, furbearing mammals found throughout the Project Study Region. Noise, fumes and the presence of equipment and crews may cause furbearers to avoid the Route Study Area during construction and ROW brushing and clearing maintenance activities that are expected to recur every seven to ten years. The construction of substations will permanently alter any existing furbearer habitat in the Project Site Area where they are located. Decommissioning of the MS line will cause minor disturbance to furbearer habitat when equipment and crews travel the ROW to remove conductor and structures.

Clearing and maintaining a ROW will increase habitat for species that prefer an open, low-vegetation environment; however, the ROW may also create an edge effect whereby predatory species (such as coyote, fox and wolf) may use the cleared ROW for hunting furbearing prey. The existence of a cleared ROW well away from existing road corridors may also contribute to new habitat fragmentation in some areas.

[4] There are three areas where the CS route is more than 500 metres from the Klondike Highway: (a) where the ROW approaching Tatchun Creek goes well east of the Highway, (b) east of the Highway in the vicinity of the MS substation, and (c) where the ROW enters areas west of the Highway in the vicinity across the Highway from the Lhutsasw Wetland Habitat Protection Area. Only the first and last of these areas, however, are likely to create any material new habitat fragmentation impacts that merit consideration in this assessment.

Route selection has been used to avoid known critical habitat areas for furbearers and mitigate most of significant impacts on furbearing species. The route selected avoids important wetland habitats which should mitigate adverse effects on species such as the beaver, muskrat, mink and river otter. Route selection through previously burned areas and avoidance of mature forest will mitigate impacts on species such as the Red fox and lynx. Wherever possible, the route selection process has generally placed the Project transmission lines along previously disturbed areas, such as the Klondike Highway and the Minto Mine access road, in order to mitigate effects due to habitat fragmentation. Substations have also been located in, or adjacent to, previously disturbed environments and wetlands generally have been avoided.

A vegetative or treed buffer will be provided in most areas where the ROW lies adjacent to the Klondike Highway in order to mitigate adverse effects due to habitat fragmentation and provide protective cover for furbearing species. As noted earlier, only a very small portion of the CS ROW (less than 9% through each of the three line segments) is less than 30 metres distance from the Klondike Highway or other major road corridor. Similarly, where possible, a vegetative buffer will be maintained around substations. When it is possible, disruptive Project-related activities will be timed to occur outside of spring mating and denning periods. Yukon Energy's EMS best practices for ROW clearing and maintenance will be followed.

Short-term adverse effects due to disruptions and noise caused by construction, maintenance and decommissioning activities will affect small furbearers in the Route Study Area within the Project Study Region; however, since route selection has avoided most critical habitat for small furbearing mammals the magnitude of these effects will be low in magnitude.

The creation of a permanent ROW and the permanent loss of habitat areas due to the construction of substations will have long-term adverse effects on some furbearers; however, site selection has avoided critical habitat and the amount of potential habitat lost is relatively very small compared to the surrounding Project Study Region. Thus, adverse effects are expected to be restricted generally to the Route Study Area portion of the Project Study Region and to be low in magnitude, affecting only a small portion of the small furbearer habitat and population within the Project Study Region.

8.2.2.9 Birds

Migratory Waterfowl

The Project's lines and substations do not cross any significant nesting sites for species of migratory waterfowl.

The Yukon, Pelly and Stewart rivers are known migration corridors for waterfowl. Project effects on migratory waterfowl during operation and maintenance of the lines are expected to be most pronounced at river crossings where there is the greatest potential for migratory waterfowl to strike Project infrastructure.

Since suitable wetlands along the MS Project Site Area are scarce, there are no expected significant effects on waterfowl habitat due to the MS Project. It is expected that effects requiring attention and mitigation measures will occur in the immediate vicinity of Minto Creek. Once the MS Project has been decommissioned, it is expected that the MS Project Site Area will return to pre-Project conditions over time and with the removal of the transmission conductors and poles (including the Yukon River crossing), any potential hazard to migratory waterfowl from bird strikes will end.

Careful route selection has ensured that the CS transmission line ROW avoids critical habitat for waterfowl, which is primarily focused around the Lhutsaw Wetland Habitat Protection Area. Mitigation measures to reduce potential mortality hazards due to line strikes will include locating the transmission lines at river crossings close to existing infrastructure such as bridges in a parallel horizontal configuration (just below the bridge's superstructure elevation where feasible) and installing effective visibility markers (as per Transport Canada regulations) along the conductors at all river crossings. Where it is feasible, construction activities will also be timed to avoid spring nesting season.

Short-term effects due to construction, operation and decommissioning activity disruptions such as noise and fumes will be low in magnitude since the CS and MS Transmission Line ROW have avoided critical habitat for waterfowl and only a small portion of the total population should be affected. The adverse effects due to the maintenance of a permanent CS ROW, poles and conductor are expected to be long-term but within a small portion of the Project Study Region in the vicinity of the Route Study Area and low in magnitude. Since the MS Project Site Area has little suitable wetland habitat, MS Project effects on waterfowl habitat are expected to be very low in magnitude and site-specific in the immediate vicinity of Minto Creek.

Peregrine Falcon

As reviewed in Chapter 6, there are potential sites in the Route Study Area for Alpine raptors north-east of McCabe Creek and general bald eagle and Peregrine falcon habitat along the MS line near the Yukon River crossing and in the vicinity of Minto Creek.

During the construction, operation and maintenance and MS decommissioning phases of the Project, there may be adverse effects on Peregrine falcons in the relevant areas such as noise produced by equipment and crews during brushing and clearing, line construction and decommissioning activities. This effect may cause Peregrine falcons to temporarily avoid the area. During the operation and maintenance phase of the Project there may also be adverse effects on Peregrine falcons through collisions with conductors and/or poles.

Route selection has mitigated the effects of disruptions and noise due to construction and maintenance activities that may cause Peregrine falcons to avoid the Route Study Area; consequently, the proposed lines and substations will not be located in known Peregrine falcon critical habitats or near known eyries. In addition, construction will be timed to avoid spring nesting season for all birds and raptors, including the Peregrine falcon. Any adverse effects due to collisions with conductors and poles throughout the life of the Project will be mitigated through the use of conductor markings (as per Transport Canada regulations) at the three river crossings which will reduce the potential for bird strikes.

During the operation and maintenance phase of the Project there may be indirect positive effects resulting from the creation of the ROW that Peregrine falcons may preferentially use for hunting. As this is determined to be a positive effect, no mitigation is required.

Since route selection has avoided all critical habitat and known eyries for the Peregrine falcon, any short-term Project effects due to disruptions caused by construction and operation activities are expected to be low in magnitude due to the small numbers of this species that may be affected.

Long-term residual adverse effects due to the maintenance of permanent structures and conductors in the Project Site Area are expected to be confined to small portions of the Project Study Region in the vicinity of some parts of the Route Study Area and, since the route is located outside of critical habitat areas, few Peregrine falcons are expected to be adversely effected. MS decommissioning will eventually remove potential effects of the Project involving the Minto Landing area, Yukon River crossing, and the MS ROW west of the Yukon River. Overall, long-term adverse effects onPeregrine falcons due to collisions are also therefore expected to be low in magnitude.

8.2.3 Aquatic Environment

As reviewed in Chapter 6 (Table 6.2-1 and Section 6.2.3), Project environmental effects are examined for following VCs relating to the aquatic environment:

- Riparian Zones and Wetlands
- Salmon and other Fish Species

8.2.3.1 Riparian Zones and Wetlands

The CS line will cross numerous small creeks, in addition to Tatchun Creek, McGregor Creek, McCabe Creek, Von Wilczek Creek, Willow Creek and Crooked Creek. The CS transmission line ROW will also cross the Pelly and Stewart Rivers. The MS transmission line ROW will cross Big Creek, Minto Creek and the Yukon River at Minto Landing. Most adverse Project effects on wetlands will occur during brushing and clearing activities undertaken with regard to construction and maintenance activities. Brushing and clearing will occur every seven to ten years, enabling some vegetation to re-grow in wetland areas. Decommissioning of the MS transmission line will result in minor disturbance to vegetation adjacent to the Big Creek and Minto Creek wetland areas. During construction, maintenance and decommissioning activities accidental fuel spills may occur which may cause site-specific damage to riparian zones or wetland areas.

Route selection where feasible has avoided known wetland habitats along the Route Study Area and in small, site-specific locations where wetland areas cannot be avoided, mitigation will include spanning the identified wetlands and ensuring pole structures are placed on firm ground. During ROW clearing and line construction, all creeks and rivers will be spanned with sufficient height and width to avoid any direct effect on the riparian zones alongside these water bodies.

Specifically, between Carmacks and Pelly Crossing on the CS line, there are two small wetland locations which will be spanned to avoid any adverse effects. There are four small wetlands between Pelly Crossing and Stewart Crossing which will be spanned, as well as one wetland area associated with Crooked Creek which includes a series of oxbow wetlands associated with old stream beds which will be spanned.

On the south bank of the Stewart River, the line will be constructed in an area of periodic flooding, which will require strategic pole placement, the use of rock-filled barrels where required for stability, construction timing during frozen conditions and hand clearing where required to protect riparian vegetation and to minimize vegetation and soil disturbance.

The MS transmission line will cross two wetland areas at Big Creek and Minto Creek. Big Creek will be spanned; the Big Creek area north of the bridge is associated with a broad floodplain and route selection has avoided the meandering creek bed to the south of the bridge, locating the structures on firmer ground. The Minto Creek crossing is in an area of organic-rich soils and the creek will be spanned using neighbouring ridges to avoid clearing in the creek's wetland.

Additional forms of mitigation to be employed where necessary include timing construction, maintenance and decommissioning activities in such areas to occur under frozen conditions in winter months, the identification and flagging of ROW clearing limits prior to construction, and using hand clearing of riparian vegetation in order to minimize the disturbance of the vegetative mat. All clearing of danger vegetation within 30 metres of the high water mark will be done by hand and will follow DFO's guidelines for Overhead Line Construction and Riparian Areas and Re-vegetation. Yukon Energy's EMS best practices for Water Bodies, Wetlands and Stream Crossings will also be followed. Any site-specific damage due to accidental fuel spills will be mitigated through adherence to Yukon Energy's best practise for fuel spills.

Since route selection has avoided most wetlands and riparian zones and any wetlands or riparian areas within the Project Site Are will be spanned, effects of construction, operation and decommissioning activities on riparian zones and wetlands are expected to be low in magnitude and short-term in duration.

8.2.3.2 Salmon and other Fish Species

The Project Study Region includes rivers and creeks which are considered fish-bearing for salmon populations of Chinook and Chum. As Chapter 6 outlined, these salmon species are an important domestic, sport, and commercial resource for First Nation members, local residents and visitors to the Region. Many community members expressed concerns over potential Project effects on salmon and salmon habitat.

The Project will be built with no in-stream construction. As noted above, all rivers and creeks will be spanned, and riparian habitat will follow strict DFO Operational Statements for vegetation clearing and line construction. DFO laws and regulations prevent the harmful alteration, disruption or destruction (HADD) of fish habitat under Section 35(1) of the Fisheries Act. Yukon Energy will follow DFO's Operational Statement on Overhead Line Construction, and DFO's Riparian Area and Re-vegetation guideline in order to comply with the Fisheries Act.

By adhering to the above laws, operational statements and guidelines, this Project is not expected to have any adverse effects on salmon for any phase of the Project. No further mitigation is required.

8.3 SOCIO-ECONOMIC EFFECTS AND MITIGATION

Section 8.3 provides assessment of Project effects and mitigation measures with regard to three groups of socio-economic VC:

- Resource Use
- Economy
- Social Context

The Project is expected to have both positive and adverse socio-economic effects in the Project Study Region.

Many effects relate to a short-term construction period when the ROW and substation areas will be brushed and cleared within the Project Site Area, as well as a similarly short-term construction period when the infrastructure components (i.e., poles, conductors and substation equipment) are assembled and built in the same area. Similar effects of less magnitude will occur during the infrequent, short-term ROW maintenance activities (usually every seven to ten years); during operation of the Project there will also be positive economic effects due to surplus grid hydro power displacing diesel-fuel generation in the Project Study Region.

Potential short-term socio-economic effects relating to Project construction, periodic maintenance (expected once every 7 to 10 years) and MS decommissioning activities include:

- Trappers' inability to access traplines and local hunters' inability to hunt while construction, maintenance and decommissioning activities are underway due to safety concerns for crews.
- Disruptions from Project activities during construction, maintenance and decommissioning will cause wildlife to avoid trapping areas.
- Removal of valued plant species during construction, maintenance and decommissioning activities.
- Greater berry producing potential for some plants in first few years following brushing and clearing activities required for construction and ROW maintenance.
- Opportunities for timber salvage in ROW during the construction phase.
- Construction, maintenance and decommissioning activities may impact on the perception of wilderness and consequently tourism and local aesthetics.
- Local employment and local businesses will benefit from employment income due to required site preparation and clearing activities required for construction and ROW maintenance, as well as opportunities for demolition labour and hauling with regard to decommissioning.
- The wider regional economy will experience small benefits to government fiscal flows; Yukon Government costs will be incurred to the extent that government funding is provided to assist in development of the Project.

Potential long-term socio-economic effects relating to operation of the Project's facilities and the existence of a permanent ROW with regard to the CS transmission line include:

- Access points along the ROW that will provide increased access for trapping, hunting, plant collection, timber salvage for fuel wood harvesting and outdoor recreation for both local community members and for people from outside the community.
- Trapping and hunting resource use may be affected by environmental effects of the Project, including any barrier created for small furbearing mammals where the ROW runs immediately adjacent to the Klondike Highway.
- A transmission line ROW will impact on the perception of a wilderness environment and consequently tourism and local aesthetics.
- The availability of low cost grid power in the Project Study Region will facilitate near term utility ratepayer cost savings throughout Yukon due to the sale of surplus hydroelectric grid generation.
- Access to lower cost rates will provide cost savings for the Minto Mine operations and other future mining developments in this region that can utilize the Project's facilities to gain access to grid power; local Project Study region residents and communities may also benefit from access to hydro grid power rates.
- Yukon Government fiscal flow cost savings will be expected to occur to the extent that the RSF subsidy of ratepayers continues during Project operations.
- Positive regional socio-economic effects are expected in the long-term due to the development of electric grid connection and extension infrastructure that may support ongoing industrial and other economic development in the Project Study Region and enhance overall WAF and MD system reliability, economic efficiency and flexibility in power supply resource use.

Decommissioning of the Minto Spur transmission line will have short-term positive and negative socio-economic effects due to activity in the MS Project Site Area when certain portions of the line and structures are removed. There will be short-term disruptions to resource use in this site area and the adjacent vicinity due to activity by work crews in the ROW (although the incremental effect of MS removal may be minimal relative to concurrent decommissioning of other Minto Mine facilities); however, there will also be short-term employment opportunities arising from demolition work, hauling and other tasks required to decommission and remove parts of the MS transmission line. Any adverse effects of decommissioning activities will be mitigated through adhering to the decommissioning practices set out in Section 5.10 of the Project Proposal Submission. Decommissioning is expected to dissipate, over time, the long-term effects due to the initial creation of the MS ROW as the affected part of the MS Project Site Area returns to pre-Project conditions.

The primary means of mitigating both short-term and long-term adverse Project socio-economic effects has been through the process of careful route selection to avoid key areas of traditional resource use and heritage sites as well as viewscapes that are important to local aesthetics and the tourisms industry, and where feasible, to provide appropriate vegetative buffers between the new ROW and the Klondike Highway. Additional VC-specific mitigation measures will be applied where necessary, including timing of construction and maintenance activities, prior notice to local residents and resource users of such Project activities, monitoring of site activities to prevent disruption of heritage resources, cooperative planning with local First Nations and resource users to limit undesired access to the ROW, and compensation to trappers whose trapline infrastructure and/or productivity is directly affected by Project construction.

For all Project activities the relevant portions of the Yukon Energy EMS best practices set out in Reference Materials 5R-1 will be followed to assist in mitigation of Project environmental and socio-economic effects. These include:

- Yukon Energy's EMS best practices for Emergency Response (includes fuel spills)
- Yukon Energy's EMS best practice for ROW Brushing (includes timber salvage and access)
- Yukon Energy's EMS best practice for ROW Maintenance (includes access)
- Yukon Energy's EMS best practice for Water Bodies, Wetlands and Stream Crossings
- Yukon Energy's EMS best practice for Permafrost
- Yukon Energy's EMS best practice for Heritage Resources

Decommissioning activities will adhere to the decommissioning practice recommendations set out in Section 5.10 in Chapter 5 of this Project Proposal.

Due to mitigation adopted, adverse socio-economic effects on the Project Study Region due to the construction and operation and decommissioning of the Project are expected to be low in magnitude and specific to parts of the Project Site Area. No adverse socio-economic effects are expected to be discernable beyond the Route Study Area and most such effects will be specific to the Project Site Area.

Construction, maintenance and decommissioning activities in the ROW will have positive socio-economic effects on local employment and the local economy, as well as short-term and low magnitude impacts on government fiscal flows in the Project Study Region.

Long-term socio-economic effects resulting from biophysical effects caused by the existence of the permanent ROW will be restricted to the Project Site Area; such as effects due to increased access for local resource users as well as for resource users from outside the Project Study Region, effects on harvesting of plants or timber salvage in the ROW, any electrical effects, and effects on aesthetics. Due to mitigation, any adverse socio-economic effects due to such impacts related to the permanent ROW are expected to be low in magnitude and confined generally to the Route Study Area.

Throughout the operations phase of the Project there will be positive regional socio-economic effects due to the development of electric grid connection and extension of infrastructure that may support ongoing industrial and other economic development in the Project Study Region and enhance overall WAF and MD system reliability, economic efficiency and flexibility in power supply resource use. Increased system reliability and the potential to attract and serve new industrial loads will also tend to benefit utility ratepayers as well as government fiscal flows.

Effects of the Project on socio-economic VCs in the Project Study Region are expected to combine with other relevant future actions that will occur in the Project Study Region (see Assessment Approach, as described in Chapter 3). Such future projects and activities are assumed to include the proposed

Carmacks Copper Mine in the Williams Creek area and YECL distribution lines connecting to the CS substations at Pelly Crossing and Carmacks (see Section 3.4.4); in contrast, the Project's effects are not considered likely to combine with effects of other forestry, mining or other projects for which proposals have been submitted to YESAB (see Table 3.4-1).

As noted in Chapter 6 (Section 6.3), effects on socio-economic VCs can be interpreted by people according to their past experience with transmission projects such as the Mayo Dawson Transmission Project, as well as on their current way of life and how they perceive their way of life will be in the future (i.e. how the change of building a new transmission project will fit with their current way of life and community today, and their goals and aspirations for improving their community tomorrow). The Mayo Dawson experience, for example, has helped guide the current Project Proposal route selection and PIP processes to be done differently, with meaningful and timely consultation with affected communities receiving a high priority.

8.3.1 Resource Use

As previously identified in Table 6.3-1 and Section 6.3.2, the socio-economic VCs identified for assessment of the Project for Resource Use include:

- Traditional and Domestic Land and Resource Use
  - Trapping
  - Hunting
  - Fishing
  - Collection and Use of Plants,
  - Timber Harvesting
  - Protected Areas
  - Outdoor Recreation
- Commercial Land Use
  - Tourism
  - Outfitting
  - Agriculture
  - Mining
  - Aggregate Sites

Commercial Fishing and Oil and Gas Extraction were not included as part of the socio-economic effects assessment as it has been determined that the Project has no effect on these activities. Since creeks and rivers will be spanned and no structure will be placed in creek beds or river beds there will be no adverse effects on fish or on fishing resulting from the construction, operation or decommissioning of the Project. There are no active oil or gas developments in the Project Study Region.

8.3.1.1 Traditional and Domestic Land and Resource Use

The MOU between Yukon Energy and the NTFN provides for consultation on the Project route selection to identify and address the potential environmental impacts and potential socio-economic impacts and benefits of the Project and related activities, including impacts on affected traplines owned by NTFN citizens, and to identify the best ways to enhance benefits and to avoid, mitigate or compensate for negative effects. Yukon Energy committed in the MOU to strive to avoid direct impact on trapline improvements owned by NTFN citizens, including such improvements not located on settlement lands.

Further, to avoid issues with final route construction and related land use, such as those experienced with the recent Mayo-Dawson Transmission Project construction, Yukon Energy committed in the MOU:

- To proceed with its construction of the Project line, if approved, within a pre-identified specific final route and access corridor (this Project Proposal sets out Yukon Energy's proposed final route in this regard); and
- To employ or sponsor the NTFN employment of one or more project monitors whose duties, among other things, shall be to ensure on-site that the Project line, as it is constructed, is at all times located in compliance with the approved final route and access corridor and to bring forthwith to the attention of the NTFN and Yukon Energy for action any departure or proposed departure there from.

<u>Trapping</u>

The CS transmission line will intersect 11 trapping concessions and the MS transmission line will cross 3 trapping concessions. The disruptions caused by Project construction, recurring maintenance and decommissioning activities are each expected to have short-term effects on the ability of these trappers to access their traplines and to earn an income from trapping activities. Experience from other jurisdictions indicates that wildlife will also temporarily avoid the areas in proximity to the ROW during construction activities. Project related effects on trapping will be most pronounced during initial brushing and clearing activities of the proposed Project ROW and, to a lesser extent, the substations.

The PIP process identified a longer term concern; if the transmission line ROW was immediately adjacent to the Klondike Highway, it would be more difficult for small furbearing animals to cross the ROW areas for the combined road and transmission line. This concern was identified by members of the First Nations, the Renewable Resource Councils, and the YG regional biologist. Aside from this specific concern, clearing and maintaining a ROW will increase habitat for small furbearing species that prefer open, low-vegetation environment; however, the ROW may also create an edge effect whereby predatory species (such as coyote, fox and wolf) may use the cleared ROW for hunting furbearing prey. The existence of cleared ROW well away from the current road corridors may also contribute to new habitat fragmentation in some areas. (See Section 8.2.2.8)

Access created by the line ROW provides both positive and adverse ongoing effects on trapping. The ROW will enable trappers to access their trapline more easily by ATV, snowmobile or on foot; however, the ROW may also enable others to access these areas.

A key component of mitigation has been the utilization of route selection process to avoid specific trapping areas and/or trapline infrastructure (e.g., cabins). The new or expanded substations avoid key trapping areas and have been located adjacent to existing or future infrastructure such as the Klondike

Highway, airstrips, an aggregate site, an existing substation, and a cleared site within the Pelly Crossing community.

Further discussions with individual trappers will occur prior to start of construction. Where it is required and where it is feasible, the Proponent will provide assistance to trappers during the construction phase to relocate their traplines and/or cabins. Compensation will also be provided for a fixed period of time for potential loss of income due to disruptions caused by construction. Details regarding trapper compensation are to be addressed by the Proponent with the NTFN as part of the Project Agreement pursuant to the MOU. Trappers will be given advance notice of construction and will be provided with a schedule for construction activities.

In order to address the concern that locating the transmission line ROW adjacent to the Klondike Highway would impede the ability of small furbearing animals to cross, where it is feasible a vegetative buffer of at least 30 metres is being incorporated into the Project design in most areas where the ROW runs adjacent to the Klondike Highway[5]. For the MS transmission line, the ROW generally will be shared with the mining road allowance; however, the road receives a lower volume of traffic than the highway. Further, the road ROW and MS transmission line are each smaller than the ROW for the highway and the CS transmission line, and the MS transmission line will be decommissioned in most areas when the Minto mine closes.

To mitigate any adverse effects due to the Project ROW providing increased access for opportunistic hunters, the Proponent will adhere to Yukon Energy's EMS best practices for ROW access, and will also consult with the regional **Resources Management Officer (RMO)**, the local First Nations and affected trappers to examine additional measures such as appropriate methods to restrict undesired access to the ROW in trapping areas.

Short-term residual adverse effects on trapping whereby disruptions from Project construction, maintenance and decommissioning activities affect trappers and cause animals to avoid trapping areas will be mitigated primarily through route selection to avoid specific trapping areas and infrastructure, as well as through the other measures noted. These short-term effects are therefore expected to be low in magnitude and specific to the Route Study Area in close proximity to the Project Site Area.

The long-term residual adverse effects on trapping due a cleared footprint contributing to wildlife habitat loss, a cleared ROW increasing access for trappers and opportunistic hunters and from habitat fragmentation and the creation of a potential barrier along the Klondike Highway, will be mitigated primarily through route selection to avoid the most sensitive areas, to provide appropriate vegetative buffers in many areas, and to locate permanent structures such as substations adjacent to previously disturbed areas. Other mitigation measures will also be adopted, including consultations on appropriate ways to restrict undesired access to the ROW in trapping areas. Accordingly, based on these considerations, any long-term adverse effects on trapping activities are expected to be low in magnitude and specific to the Project Study Region in close proximity to the Project Site Area.

[5] See Section 8.2.2.2. Only a very small portion of the CS ROW (less than 9% through each of the three line segments) is less than 30 metres distance from the Klondike Highway or other major road corridor.

Hunting

For activities undertaken with regard to construction, maintenance and decommissioning of the MS transmission line, there will be direct adverse effects on the people who hunt in the immediate Project Site Area, and an indirect effect on hunting in adjacent areas. Hunting will be restricted when construction, operation and decommissioning activities are undertaken due to safety concerns for crews undertaking Project activities and the availability of wildlife in certain areas may be affected during construction and maintenance of the line ROW, as noise, fumes and smoke from construction equipment and burning of the brush piles will cause wildlife to avoid the area temporarily.

The existence of a permanent ROW will result in additional site-specific areas being accessible for hunters where access in the past may have been limited. This may be a positive effect for some local hunters, but may also be seen as a negative effect by local hunters if it leads to increased access to these areas by non-local hunters.

Mitigating the effects of construction and operation activities has included route selection of the transmission line ROW to avoid critical wildlife habitat and locating substations adjacent to existing infrastructure or previously disturbed areas. In addition, a vegetative buffer is provided in most areas between the ROW and the existing highway.

Prior to construction and maintenance brushing activities, advance notification will be provided to local communities to ensure hunters are aware of construction and maintenance activities in their local area. For safety reasons, hunting by construction personnel will not be allowed. Measures designed to mitigate adverse impacts of increased access to non-local, opportunistic hunters include following the Proponent's EMS best practices for ROW access and consultation with community members, local First Nations and the regional RMO to implement access restrictions and control measures where deemed appropriate.

Short-term adverse effects on hunting activities in local communities caused by wildlife scattering from the Route Study Area due noise, fumes and smoke produced by construction, operation and decommissioning activities will be low in magnitude. Adverse effects on hunting during such short-term periods of activity are expected to diminish with distance from the ROW and be confined to the Route Study Area in the vicinity of the Project Site Area.

Long-term effects on local hunting due to increased access to areas adjacent to the transmission line ROW will have both positive and negative effects in the Project Study Region. Adverse effects are expected to be low in magnitude since mitigation will restrict undesired access to the Project ROW, and be confined to the Project Study Region in the vicinity of the Project Site Area.

Fishing

The waterways within the Project Study Region are productive for chum and Chinook salmon, Arctic grayling, whitefish, inconnue, burbot, Northern pike (in lakes), and Long-nosed suckers. The salmon species are a significant part of the local culture, economy and diet for the NTFN people.

While fishing has been an issue of concern for First Nations, government and other public organizations, the Project will not be conducting any in-stream work. Where it is necessary, any line-stringing activities across creeks or rivers will occur by stringing the line by helicopter and/or by working in the riparian zone under frozen ground conditions (such as rivers and at Tatchun Creek). All fisheries guidelines for creek and river protection will be followed to ensure there is no increase in sedimentation or loss of riparian quality. Spanning creeks and rivers will occur with minimal hand clearing (removal of danger trees) within 30 metres of creeks and rivers in order to maintain the integrity of the riparian zone (Yukon Energy's EMS, Section C.4.3, #4, Section C.4.8, #1; DFO Pacific Region Operational Statement: Overhead Line Construction, v.2, 2006). Avoidance, Project timing and adherence to DFO guidelines will result in the needed mitigation.(See also Section 8.2.3)

Accordingly, based on the mitigation measures to be adopted, it is expected that there will be no detectable residual adverse effects on fishing as a result of Project construction, operation or decommissioning activities.

Collection of Plants

Throughout the Project Study Region the local residents gather berries for sustenance and other plants for medicinal purposes. Route selection has endeavoured to avoid all known and important traditional resource use sites along the route. Some of these plant collection areas have been identified and will be avoided; however, although community members were involved in the route selection process, not all traditional plant gathering areas have been identified by local residents for this Project Proposal as they wish to keep this knowledge within the community.

Some of the identified plant gathering areas used by local residents may be impacted by Project-related activities such as the removal of valued plant species during construction and during the brushing and clearing required for both construction and for maintenance activities that are to recur every seven to ten years. The existence of a permanent ROW will increase access to certain berry picking areas for members of the community but may also provide access to traditional plant gathering areas for others outside the community. Some areas have the potential to produce more berries in the first few years following any brushing and clearing work required for construction and maintenance activities (Berkes and Davidson-Hunt, 2005); over the long-term brushing activities that will be required every seven to ten years are expected to encourage the growth and production of berry producing plants.

During construction, maintenance and decommissioning activities, Yukon Energy's EMS best practices for access will be followed. Additionally, over the operational life of the CS transmission line any adverse effects due to ROW brushing and clearing will be mitigated through timing when such activities will occur, providing notice of such activities to communities, and using equipment designed to minimize damage. Measures designed to mitigate adverse impacts of increased access to non-local, opportunistic plant gatherers include following the Proponent's EMS best practices for ROW access and consultation with community members and local First Nations on the implementation of access restrictions and control measures where deemed appropriate.

Short-term adverse effects due to disruption of berry producing plants and medicinal plants resulting from construction, maintenance and MS decommission activities will be restricted to the affected Project Site Area and be low in magnitude since route selection has avoided most important resource use sites. Ongoing ROW maintenance will also have short-term positive effects as brushing and clearing activities undertaken every seven to ten years will stimulate growth of berry producing plants.

Long-term effects due to the existence of a permanent ROW will be positive and negative in the Project Site Area as access along the ROW will provide access to resource use areas for both community members and for others outside the community. Since route selection has sought to avoid key traditional resource areas, and additional measures will be considered to restrict undesired access where appropriate, the magnitude of Project effects on plant collection is expected to be low and specific to certain Project Site Areas.

Timber Harvesting

As reviewed in Chapter 6, the vast majority of timber harvesting that occurs in the Project Study Region is for fuel wood that is consumed by local communities that rely on wood for home heating. There are currently four active permits within the Project Study Region and all of these permits expire before the end of 2006; however, additional permits may be issued in the fall of 2006 for seasonal fuel wood cutting.

The CS transmission line ROW and related access trails could improve access for local residents involved in fuel wood harvesting. There has been some discussion with the YG Forestry office regarding utilization and timber permitting for the pockets of medium to high density stands of timber in the proposed Route Study Area. This could increase the level of utilization and reduce the amount of material that will need to be burned along the Project Site Area during the initial construction phase brushing and clearing.

The MS transmission line is predominantly sited through the 1995 Minto Burn area. Accordingly, opportunities for timber salvage along the MS transmission line are considered rare due to the extensive nature of the Minto Burn and the prohibitive distance that fuel wood would have to be hauled from the Minto Creek area.

Route selection for the CS transmission line ROW has avoided significant fuel wood harvesting areas that have been identified by local communities. Additional mitigation will include following the Proponent's EMS best practices for timber salvage with regard to construction activities for both CS transmission line ROW, the MS transmission line ROW, and the required substations. It is also expected that the Project Agreement with the NTFN will address local community access to timber salvaged from Project construction.

The short-term effects of timber salvage in the Project Site Area during construction will be positive and low in magnitude.

Long-term positive effects due to the existence of a permanent ROW will include increased access to timber harvesting opportunities in the Route Study Area adjacent to the ROW. These effects will also be low in magnitude.

<u>Protected Areas</u>

There are three designated protection areas and one recreation site in the Project Study Region. The protection areas are the Lhutsaw Wetland Habitat Protection Area, the Ddhaw Ghro Habitat Protection Area and Jackfish Lake Park Reserve. The recreation site is the Five Finger Rapids viewing area.

Each of these four areas have been avoided during the route selection process by placing the proposed transmission line on the opposite side of the Klondike Highway from the protected area or site. This was the primary form of mitigation and in conjunction with maintaining a vegetative buffer between the line ROW and site results in no Project-related effects being expected on these protected areas.

<u>Outdoor Recreation</u>

Chapter 6 outlines the multiple outdoor recreation and wilderness activities available to residents in the Project Study Region in addition to hunting, fishing and other resource use activities already noted. Concerns have been expressed over possible conflict with regard to construction activities and the use of recreational sites, especially the Tatchun Creek campground.

Local camp sites and other special outdoor recreation areas, including such sites in the Tatchun Creek area, have been avoided by the route selection process for the Project. A 30 metre vegetative buffer will also be used in many areas where the ROW runs adjacent to the Klondike Highway. Maintenance activities will also be timed to occur outside of periods when the campground is in use. Improved access resulting from the new ROW during operation of the Project may provide positive outdoor recreation effects for some local residents.

The short-term effects of Project construction and maintenance activities on outdoor recreation will be low in magnitude and site-specific given route selection to avoid local campsites and timing to avoid peak campground use. Overall, it is expected that there will be long-term low magnitude positive effects on outdoor recreation due to improved access to areas for recreational activities.

8.3.1.2 Commercial Land Use

<u>Tourism</u>

The Yukon Interior region is perceived as a wilderness environment by many residents and visitors alike. The Klondike Highway and the three rivers in the Project Study Region are used as tourism corridors. The majority of tourist traffic follows the Klondike Highway from Whitehorse to Dawson City and beyond, while the Yukon, Stewart and Pelly Rivers are used for boating and wilderness tourism. This river tourist activity is generally of a very small scale in comparison to the Highway traffic.

Communities in the Project Study Region benefit from the tourism industry by providing fuel, food, attractions and accommodations; however, this infrastructure is minimal within the Project Study Region. Concerns have been raised that the perception of wilderness environment that the tourism industry in the area relies on will be altered by short-term construction, maintenance and MS Project decommissioning activities, and that the long-term presence of a transmission line ROW will visually impact tourism by adversely affecting the perception of wilderness. In this context, completion of decommissioning of the MS transmission line which restores the affected area to Pre-Project conditions over time would be perceived as removing a potential negative long-term effect that would otherwise occur.

Part of the CS Project Site Area and MS Project Site Area may intersect the Yukon Quest Trail, or create alternative travel areas for the Yukon Quest race in low snowfall years.

The adverse effects of the Project on visual impacts have been primarily mitigated through careful route selection; however, the visual impact (both real and perceived) that the new transmission line will have on tourism will be further mitigated by:

- timing many construction, maintenance and decommissioning activities to occur during the off season (i.e. winter months);
- using at least a 30 metre vegetative buffer between the Klondike Highway and the Project ROW wherever feasible;
- avoiding key scenic views (i.e. line ROW on the opposite side of the Highway to the views, and behind benches or hills); and
- creating indirect access through treed barriers, if necessary and where feasible.

Additional mitigation will include following YEC's EMS best practices on access trails.

Measures to mitigate adverse impacts where the ROW intersects with the Yukon Quest Trail will include timing construction to avoid activities immediately prior to, and during, the race (mid-February) in those specific areas of concern and providing advanced notification to the Yukon Quest organization to coordinate activities during this time period. Guards will also be installed on guy conductors, as outlined in the Proponent's EMS manual on best practices (Appendix 5a, Section C.4.9). Short-term effects on the Yukon Quest due to construction and maintenance activities in the Project ROW and long-term effects due to the presence of a permanent ROW will be low in magnitude and occur within a localized area of the Project Site Area.

Short-term adverse effects of Project construction, maintenance and decommissioning activities on the perception of wilderness and consequently tourism are expected to be low in magnitude since route selection (including the use of a vegetative buffer in many areas) is expected to reduce impacts on the perception of wilderness at key viewing areas in the Project Study Region. Long-term adverse effects on the perception of wilderness and tourism due the existence of the permanent transmission line ROW will similarly be low in magnitude for the Project Study Region since route selection has avoided placing the transmission line in key viewing areas and a vegetative buffer will screen the line from key viewscapes in many areas.

Outfitting

Chapter 6 provides details on the types of activities associated with the three outfitting concessions in the Project Study Region. Outfitting accounts for a portion of tourist traffic in the Region for guided hunting and fishing trips. As a result of the route selection process, these outfitting activities take place largely in remote areas, well outside the Route Study Area where Project construction, maintenance and decommissioning activities will be concentrated.

Based on the above considerations, the Project construction, maintenance and decommissioning activities will have no detectable effects on outfitting activities. Accordingly, no further mitigation is required.

Agriculture

There are several agricultural land holdings and applications in the Project Study Region. Through route selection, all of the active agricultural land holdings will be avoided.

Only one agricultural land application that is in process, and has been challenged, will be crossed along its eastern edge immediately south of McGregor Creek on the west side of the Klondike Highway. Due to the fact that the application is under challenge it is unclear at this time whether an easement will be required. If the challenge is successful, the land will revert to Crown land; conversely, if the application is successful there will be restrictions on hunting and trapping activities in the area of that land holding (and in surrounding areas) which will reduce the CS ROW impacts on these resource use activities. Yukon Energy may need to arrange an easement with the land holder upon completion of the agricultural land application; however, it is possible that the brushing and clearing activities may actually benefit the land holder since no clearing has been done on this property. Mitigation includes route selection and negotiation as required with the agricultural land lease holder leading to an easement which is in keeping with Yukon Energy's current practices

Mining

Sherwood Copper's Minto Mine will be provided with lower cost hydroelectric grid power as a result of construction of the first stage of the Project: the CS line from Carmacks to Pelly Crossing and the MS line from the Minto Substation to the mine site. The availability of grid power will reduce overall mine operating costs[6].

Within the Project Study Region there are additional mineral exploration activities, mining claims, and the proposed development of the Carmacks Copper Mine. In the event that the Carmacks Copper Mine is developed, it will likely arrange for its own transmission spur line access at 138 kV to the CS line near McGregor Creek (and thereby secure material reductions at the mine for on-site diesel-fuel generation capacity as well as operations costs). The existence of the Project will facilitate future benefits for other mining developments in the Project Study Region.

[6] This is addressed further under Economy (Utility Ratepayers).

In summary, there is expected to be a long-term positive low to moderate magnitude benefit from the Project on mining that develops in the Project Study Region.

<u>Aggregate Sites</u>

There are 23 aggregate sites along the Route Study Area. Of these, 18 are active and 7 may be crossed by, or are immediately adjacent to, the CS transmission line. An active aggregate site may only be using a portion of the designated land.

Yukon Energy has engaged in discussions with Government of Yukon Department of Highways with regard to gaining access to, establishing infrastructure on (MS Substation and pole placement), and spanning aggregate sites with Project transmission lines. As a consequence of the noted discussions, the CS transmission line has been routed to avoid areas of particular concern, such as locations where equipment may be active and identified significant quarry sites. In addition, the MS substation location has been selected in part to facilitate providing power access (as requested by Highways) to the adjacent aggregate site. Yukon Energy will acquire the necessary permits and easements as required to enable the transmission line to cross any aggregate site.

With mitigation any residual effects of Project construction on aggregate sites are expected to be low in magnitude and short-term in duration in a few specific parts of the Project Site Area. Any residual effects of Project operation and maintenance activities on aggregate sites are expected to be low in magnitude and of long-term duration in the Project Site Area.

In summary, during all Project phases residual effects of the Project on aggregate sites are expected to be negligible.

8.3.2 Economy

As previously identified in Table 6.3-1 (Section 6.3.3), the socio-economic VCs identified for assessment of the Project on Economy include:

- Local Economy
  - Local Employment and Training
  - Local Business
- Regional Economy
  - Government Fiscal Flows and
  - Utility Ratepayers

8.3.2.1 Local Economy

Local Employment and Training

Brushing and clearing crews will be sourced locally for the Project from NTFN[7], and trucking/hauling is also expected to be sourced locally. The number of crews that will be working simultaneously on brushing and clearing has yet to be finalized, but Stage One may include up to four crews of five workers each, working for a period of about 1.5 months, in addition to trucking and hauling (see Section 5.8.2). Somewhat smaller employment opportunities may be associated with subsequent Stage Two ROW preparation activities.

Since no companies within Yukon are known to have the capacity and expertise in transmission line construction to bid on the Project, the CS transmission line and MS transmission line construction workforce is expected to be sourced from specialized businesses from outside of the territory (see Section 5.8.3); however, a small number of labourer positions and trucking/hauling services may be sourced locally for line construction.

Substation clearing and site preparation will be sourced locally, and substation building construction may be sourced locally as well, depending on the building specifications. Site preparation crew size is expected to be small (likely between five to ten people) and the work is expected to be concurrent with ROW clearing and to take up to three months for each Stage (see Section 5.8.4). Installation of substation equipment will be sourced from outside the territory.

Yukon College representatives have met with Yukon Energy during the PIP (Round Two) to discuss potential training opportunities related to Project construction. Training and skill development is expected to be minimal, but may include workplace safety and first-aid.

Wages for local labour are expected to conform to the Yukon Territorial Government Fair Wage Schedule, current to the latest published update at the time of construction. Effective April 1, 2006 wages for the occupations expected to be utilized in construction are as follows:

- Category A Class: paid at $26.63 per hour
  - Linesperson (electric)
- Category B Class: paid at $23.87 per hour
  - Heavy Equipment operator (bulldozer, grader, loader, scraper or equivalents)
  - Truck Driver (heavy – ten ton Gross Vehicular Weight and up)
- Category C Class: paid at $21.18 per hour
  - Truck Driver (three to ten ton Gross Vehicular Weight)
- Category D Class: paid at $19.21 per hour
  - Labourer

[7] As per the MOU (between YEC and NTFN) provisions to provide NTFN business entities with the opportunity to provide on a sole source basis all route clearing and brushing activities required by the Project. The MOU also provides NTFN business entities with the opportunity to participate in the open competition for the contract to construct the Project powerline, and provides qualified NTFN citizens the opportunity and preference to be employed by Yukon Energy's contractors for the Project.

Detailed work plans and worker requirements are not yet available, but the above local construction positions will be short-term and non-repeatable. The small scale and short-term nature of local employment opportunities precludes any meaningful multiplier analysis. No indirect job creation is expected and crowding out is not expected to be a concern given the high unemployment rates observed in Project Study Region.

ROW preparation activities during construction of the Project will have short-term positive effects on local employment that are low in magnitude.

During the operational phase of the Project there will be low magnitude short-term positive effects on local employment and training. Normal operation and maintenance will be handled by existing Yukon Energy staff; however, occasional brushing and clearing activities required to maintain the CS transmission line ROW are expected to recur every seven to ten years and will be sourced locally from NTFN resulting in short-term employment for a small number of labourers. Opportunity for training and skills development is expected to be limited. The small scale, intermittent nature of these effects and the long time interval between local employment opportunities precludes any meaningful multiplier analysis, and no indirect job creation is expected.

Decommissioning of portions of the MS transmission line may have low magnitude and short-term positive effects on local employment as local employment opportunities for demolition, general labour and hauling/trucking may arise. Work plans and details for decommissioning work are not yet available, though it is anticipated that the labour force will be drawn locally. The employment effects will be short-term and non-repeatable in nature.

In summary, the Project's effects on local employment are expected to be positive, very small in magnitude, and short-term in duration during each of the various phases..

Local Business

Effects of the Project on the local NTFN traditional economy are reflected in the assessment of effects on resource use (see Section 8.3.1.1, Traditional and Domestic Land and Resource Use).

Local NTFN businesses are expected to be directly employed in the brushing and clearing, and local trucking/hauling businesses are also expected to be directly employed in the brushing and clearing and line construction phase of the Project. Businesses providing services ancillary to construction, such as lodging, meals and fuel, are also expected to see small positive effects. These businesses are not expected to encounter supply constraints as construction will occur primarily during the winter months and outside of peak tourist season. No new business creation is expected and crowding out is not expected to occur.

The bulk of construction materials, poles and transmission conductors are to be sourced from outside the territory as no suppliers within the territory are known to carry transmission line materials. Construction materials for buildings at the substation sites may be sourced locally but the substation equipment will be purchased outside the territory.

There are expected low magnitude short-term effects on local businesses associated with the infrequent brushing activities and consequent demand for services ancillary to operation and maintenance of the substations. Local NTFN businesses are expected to be contracted for the brushing work over the life of the transmission line and some nominal amount of spending on fuel, meals and supplies associated with brushing and substations maintenance will occur. There is not expected to be any new business creation and no crowding out is expected.

During the decommissioning of the MS line, local contractors may be sourced to conduct demolition and site clean-up for the transmission line. Details for decommissioning work are not yet available and it is unclear where the decommissioning labour force would be sourced from. Indirect effects may result from demand for services ancillary to decommissioning such as fuel and supplies, meals and lodging.

Work plans and details on construction will be finalized only after the detailed design and tendering have been completed. The small scale and short-term nature of these effects precludes any meaningful quantitative or multiplier analysis.

In summary, the Project's effects on local businesses are expected to be positive, very small in magnitude, and short-term in duration during each of the various phases.

8.3.2.2 Regional Economy

The Project is expected to provide regional economic benefits within the Project Study Region and the broader Yukon region. The MOU between Yukon Energy and NTFN provides a framework for understanding and assessing these benefits.

The MOU states that the establishment of the Project is expected to provide the following beneficial effects in this regard:

a) enhance the continued economic viability of the Minto Mine now under development within SFN settlement land;
b) improve conditions for other economic activity in the NTFN region;
c) enable electricity to be supplied to households and communities in the NTFN region on a more reliable and less expensive basis; and
d) enable Yukon Energy to achieve better utilization of its existing generation facilities by facilitating sales of otherwise surplus hydro-electric power and enable Yukon Energy to better manage system-wide electricity supply and demand as between the WAF and MD systems.

The MOU more specifically commits that the CS Project route, to the extent practicable, shall be situated in the immediate vicinities of Minto and Pelly Crossing (which is currently served only by diesel fuel generation) and Stewart Crossing so as to be most conducive to the community development and other land use plans and priorities of the affected NTFN.

The MOU in addition sets out an understanding that the Project will be implemented so as to enable power to be delivered, by way of the Project, to residential and commercial customers in the Minto

Landing area and to the community of Pelly Crossing, at the same time and as part of the same stage of the Project which enables power to be delivered to the Minto Mine.

More specific assessments of effects on two specific VCs (government fiscal flows and utility ratepayers) are provided below.

Government Fiscal Flows

As reviewed in Section 6.3.3.2, the Yukon Government (YG) has near-term fiscal revenue interests related to Project capital expenditure funding and also related to mine sector developments (e.g., Minto mine and potentially the Carmacks Copper mine) that would be able to secure lower electricity costs due to the Project (and thus provide higher tax revenues to the YG). In the case of SFN, cost savings for the Minto mine due to the Project are similarly expected to provide increased royalty income yields. Longer term YG interests relate to developing electric grid connection and extension infrastructure to support ongoing industrial and other economic development in the Project Study Region and to enhance overall WAF and MD system reliability, economic efficiency and flexibility in power supply resource use. This would include securing reductions in use of diesel fuel generation with related reductions in ongoing emissions and economic leakages from the Yukon. No estimates with regard to the magnitude of these YG and SFN benefits have been made at this time.

In the event that the YG extends the current Rate Stabilization Fund (RSF) subsidy (see Section 6.3.3.2), YG fiscal flows will also benefit from utility rate savings resulting from the Project. No estimate has been made of the potential magnitude or duration of such potential YG cost savings.

YG infrastructure funding is expected to be required if the CS development in its entirety is to be developed at this time. Yukon Energy has proposed YG funding of $10 million be committed (2005$), with $5 million for Stage One costs and the balance for Stage Two costs. No YG commitments have been made to date with regard to such construction-related funding.

In addition to the above effects, construction of the Project is expected to have positive effects on government fiscal flows which are low in magnitude and short-term in duration. Such effects will be one-time and be non-repeatable. Local NTFN, territorial and federal governments will be affected. Nominal increases in tax revenues are expected through increased income tax revenues, sales tax revenue, and business taxes. The Project is not expected to impose any material added expenditure burdens on local governments or the NTFN. Any specific additional NTFN benefit opportunities will be addressed in the Project Agreement to be concluded later this year.

Operation of the CS and MS lines is expected to have residual positive effects on government fiscal flows that are very low magnitude and long-term in duration. Such effects will be of moderate frequency throughout the life of the Project. Nominal increases in income and sales taxes are expected as a result of brushing and clearing which will recur every five to ten years. Local governments may also have increased revenues from grants in lieu or property taxes paid through the life of the Project by YEC on any land owned by YEC for substations. .

Nominal increases in income and sales tax revenue expected to result from the decommissioning activity will be positive, low in magnitude and short-term in duration. Such effects will be one-time and non-repeatable in nature.

Utility Ratepayers

As reviewed in Section 6.3.3.2, benefits are expected to be realized by all utility ratepayers when a new major industrial load or other currently diesel-served utility loads join the WAF grid.

The Stage One CS and MS development enables new firm Yukon Energy utility sales of surplus WAF hydroelectric generation to the new Minto mine (and provides the basis for YECL to connect to the Pelly Crossing community currently served by diesel generation), involving little to no incremental utility generation costs. Excluding consideration of any Project costs borne by Yukon Energy (i.e., costs not funded by YG or the Minto Mine), the present value of ratepayer net benefits from connection of the Minto mine and Pelly Crossing to grid power has been estimated at $11.3 million[8]. The addition of the Carmacks Copper mine load, if and when this occurs, has been similarly estimated to yield further utility ratepayer net benefits having a present value of $9.4 million.[9] These rate net benefits serve to lower the revenue requirement to be collected from existing ratepayers. These benefits are contingent on the new mine load being realized, as well as other assumptions in the Resource Plan as to WAF Base Case forecast loads and supply developments.

The new industrial customers will also benefit from access to lower cost hydro electricity, securing cost savings through displacing the need to retain and operate significant on-site diesel generation.[10] By way of example, operating cost savings for the Minto Mine would likely exceed $3 million/year of grid power use while the Carmacks Copper mine operating savings would likely approach $5 million/year[11]. Each industrial customer will be fully responsible for all capital, operating and decommissioning costs related to any spur transmission line connecting the mine to the CS development as well as its related substation facilities. The LOI for the Minto mine also provides for additional levels of funding contribution by the mine towards the CS development (with potential rebate of such funding based on actual power purchases by the mine over the mine life).

Connecting the existing Mayo-Dawson (MD) and Whitehorse-Aishihik-Faro (WAF) grids is expected to increase firm electricity capacity for WAF, and lead to near term capital cost deferrals of up to $4.5 to

[8] Estimates are net of assumed rebates to the Minto mine and are subject to assumptions laid out in Yukon Energy Corporation Submission, 20-Year Resource Plan Supplement, Tab 2, pp. S2-14 (e.g., assumed power requirement at Minto Mine of about 24.5 GW.h/year and mine life of about 8 years)

[9] Ibid, page S2-13 (net of assumed rebates) which indicates net benefits of $20.7 million for serving the power needs of the two mines and Pelly Crossing.

[10] The mine customers are expected to retain sufficient on-site diesel generation to meet emergency needs.

[11] Each customer would also secure capital cost savings, either through avoiding capital costs for material on-site diesel generation facilities (in the case of Carmacks Copper mine), or through being able to remove or otherwise use surplus on-site diesel generation facilities (in the case of the Minto Mine). Yukon Energy is reviewing with Sherwood Copper cost-effective opportunities for Yukon Energy to utilize the surplus on-site diesel generation facilities to assist in meeting WAF near term capacity planning requirements. The cost savings assessments exclude any potential added benefits these industrial customers might secure from use of interruptible secondary sales energy from the WAF grid.

$5.4 million. The connection is also expected to result in avoided diesel energy generation costs of up to $4.7 million in present value to 2025[12]. These benefits are contingent upon Stage Two of the Project being undertaken, to fully integrate the two existing grids.

The financial obligation of the utility (Yukon Energy) for the Project on behalf of ratepayers will not extend beyond the amount that would be otherwise required to increase system capacity and reliability through increased diesel generation or other investments and costs. The Proponent is examining ways whereby some of the expected utility ratepayer benefits will be used to fund a portion of the Project costs.

Increased use of surplus hydroelectric generation on either WAF or MD as a result of the Project may lead to curtailment of secondary energy sales (particularly during peak winter periods when diesel generation could be needed to meet peak system loads); this effect will become material when and if the Carmacks Copper mine begins operation as a utility customer connected to the WAF grid.

Finally, Stage One development of the Project will facilitate YECL connection to the Pelly Crossing substation, thereby enabling YECL on a long-term basis to displace its reliance on diesel generation to serve this community. This change would remove from the community the noise and fumes associated with this diesel generation, and would also enable utility customers in Pelly Crossing to be charged “hydro” zone rates (rather than “small diesel” zone rates), thereby securing lower run-off electricity rates (see Section 6.3.3.2).

Operation of the Project will have a moderate positive effect on existing utility ratepayers, and future industrial ratepayers, during the period when major industrial mine loads are connected to the CS development. This positive effect will extend to all Yukon ratepayers (i.e., it will extent beyond the Project Study Region) and is expected to be long-term for the CS transmission line and to continue for six to ten years for the MS transmission line.

8.3.3 Social Context

As previously identified in Table 6.3-1 and Section 6.3.4, the socio-economic VCs identified for assessment of the Project on Social Context include:

- Community and Family Life
- Community Infrastructure and Services
- Public Health
- Aesthetics
- Heritage Resources

[12] Estimates are subject to certain assumptions laid out in Yukon Energy Corporation Submission, 20-Year Resource Plan Supplement, Tab 2, pp. S2-9. In particular, the estimates assume no other new mine loads on either the MD or WAF systems during the planning period.

8.3.3.1 Community and Family Life

Project effects on community and family life in the Project Study Region relate primarily to the effects on peoples' ability to pursue a traditional lifestyle during all phases of the Project. These local effects will arise in the Project Site Area when the ROW is cleared and the line is constructed. This type of Project Site Area effect will be repeated, to a lesser magnitude, during the required brushing and clearing activities undertaken during the maintenance phase of the Project, and again during any decommissioning phase activities for the MS transmission line.

As reviewed earlier (see Section 8.3.1.1), access created by the existence of a permanent ROW will have long-term positive and adverse effects on the pursuit of traditional lifestyle activities. The ROW will enable community members to access areas where traditional activities can be undertaken more easily by ATV, snowmobile, or on foot; however, the ROW may also enable others from outside the community to access these areas.

The route selection process has involved the NTFN directly, as described in Chapters 4 and 7, and has made every effort to avoid adverse effects on specific traditional use areas as a key component to mitigation. Mitigation has also included aligning the transmission line adjacent to an already disturbed environment such as the Klondike Highway in the case of the CS transmission line and the Minto Mine Access road for the MS transmission line. As indicated under Resource Use (Section 8.3.1.1), the Proponent will also provide assistance to trappers during the construction phase to relocate their traplines and/or cabins if needed and feasible and will also provide compensation for potential loss of income due to construction disruption for a fixed period of time.

To mitigate adverse effects arising from increased access the Proponent will follow their EMS best practices for ROW access and will incorporate consultation with community members and First Nations, where relevant, on desired barriers to access during the operation and maintenance phase of the Project.

The new or expanded substations avoid key traditional use areas and have been located adjacent to existing or future infrastructure or previously disturbed areas. Effects will be long-term as the footprint is cleared and removed from current use but they will be low in magnitude and extent in relation to the available land for traditional use activities in the Project Study Region as well as areas in the vicinity of each substation.

There will be both adverse and positive effects of the Project on the ability to pursue a traditional lifestyle during construction, maintenance and MS decommissioning; however, it is expected that any adverse effects will be short-term in duration and occur primarily within the Project Site Area. Since route selection has sought to avoid key traditional use areas and has placed structures near already disturbed environments where possible, effects of the Project on traditional use areas and traditional lifestyles are expected to be low in magnitude.

8.3.3.2 Community Infrastructure and Services

There will be no adverse effect on local schools or other infrastructure and services as there is no anticipated influx of residents to the Project Study Region due to the nature of employment opportunities, nor any direct effects on specific community facilities.

There will likely be a low positive effect on Yukon College as training opportunities may be offered to local community members in anticipation of employment during brushing and clearing of the line ROWs and preparation of the substation sites.

There may be a minor adverse effect during Project construction and decommissioning phases on community health centres due to job site accidents. In addition adherence to Workplace Health and Safety regulations for all construction workers, may require job safety training be available through local Yukon College programs. No further mitigation is required.

The Project will facilitate the future distribution of hydroelectric grid power to the community of Pelly Crossing (i.e. through future YECL distribution of lower voltage power). This will, in turn, facilitate the community displacing the use of diesel power, and provide access locally to "hydro zone" power rates which may reduce power costs for some community facilities and services (i.e., those consuming more than about 2,000 kwh/month).

8.3.3.3 Public Health

Overall, the Project is not expected to have any detectable effects on the determinants of public health (as reviewed in Section 6.3.4.6).

Normal safe practices will be followed during all Project activities, as regards both Project workers and other potential users of the affected site areas. During the construction and operation phases of the Project, guy conductors associated with pole structures will be equipped and maintained with guy guards to assist people in visually identifying conductors along the ROW. Safe practices will be followed with regard to marking of all river crossings. Yukon Energy's EMS Manual on best practices for line maintenance will also be observed. No detectable electrical effects on human health are expected from the operation of the Project (see Section 5.9.4).

8.3.3.4 Aesthetics

The Project Site Area is within a Project Study Region perceived by both visitors and residents as having a wilderness setting, with many significant viewscapes off the Klondike Highway (i.e., views of the Yukon River at a variety of locations, views looking back down valleys near Pelly Crossing and Crooked Creek, etc.).

Route selection has been the primary means of mitigating adverse impacts on aesthetics.

Mitigation measures relating to route selection will ensure the least possible visual impact of each river crossing within the Route Study Area. The proposed MS line will cross the Yukon River in a location in close proximity to where there is existing infrastructure (i.e., the existing barge landing), which will minimize the visual impact of this infrastructure. The Stewart River crossing will be situated to the west of the existing Klondike Highway bridge, with a direct route into the existing substation. The Pelly River crossing location will be located just west of the Klondike Highway bridge and the existing distribution lines.

The visual impact (both real and perceived) the new CS transmission line will have on aesthetics will also be mitigated by avoiding recognized viewing locations and viewscapes, including those identified through the PIP (i.e. where feasible the transmission line ROW will be located on the opposite side of the Highway to viewing locations and behind benches or hills). A 30 metre vegetative buffer between the Klondike Highway and the transmission line ROW will also be incorporated wherever it is feasible. Infrequent brushing and clearing activities will be timed to avoid peak times when people are using the Highway and river systems. Where it is feasible and if necessary, indirect access to the transmission line ROW will also be provided through treed barriers. Additional mitigation will include following maintenance best practices in the Proponent's EMS Manual on access trails. Decommissioning of the MS transmission line will follow practices outlined in Chapter 5, Section 5.10 of this document.

With the application of mitigation measures residual adverse effects on aesthetics due to short-term construction, maintenance and decommissioning activities are expected to be low magnitude and restricted to parts of the Route Study Area in close proximity to the Project Site Area. Long-term effects stemming from the existence of a permanent ROW will be mitigated through route selection and the use of vegetative buffers and treed barriers, and as a result, any long-term adverse effects on aesthetics are expected to be low in magnitude restricted to parts of the Route Study Area in close proximity to the Project Site Area.

Decommissioning of the MS transmission line is expected to return the MS Project Site Area to pre-Project conditions over time and restore the aesthetics of the viewscape related to views from the Yukon River within the Project Study Region.

8.3.3.5 Heritage Resources

Construction of the CS transmission line and all CS substations will avoid all known heritage sites, but the CS Route Study Area will be in the vicinity of heritage resource sites at Tatchun Creek and north of Minto Landing (i.e. the Policeman Hill area). The Route Study Area may intersect the following sites where artefacts may potentially be found:

- At Lhutsaw Creek Terrace in CS line segment 2, immediately north of the Minto Sub location, the CS transmission line will cross the Von Wilczek Creek and travel along a terrace as it heads north. Since artefacts have been found along Policeman's Hill, it is likely that artefacts may be found in this vicinity. To address this, route selection has placed the CS routing 100 metres or more from the terrace edge. Further, a heritage inventory of the final design route through this area will be conducted prior to construction to ensure that any heritage resource not adversely affected by the Project.

- At Pelly Crossing in CS line segment 2, the routing through town and adjacent to the Pelly River will bring the CS transmission line near valuable areas for artefacts. This routing has been suggested by SFN, and in part, reflects their perspective that this is not an area of comparative heritage value. At this location, the CS transmission line route will be at least 100 m back from the bank edge. In areas where this is not possible and where the area has not been previously disturbed, a heritage inventory will be completed prior to construction to ensure that any heritage resource are not adversely affected by the Project.

- At 11 Per Cent Hill and Crooked Creek crossing in CS line segment 3, the transmission line routing will follow the old road in the vicinity of Crooked Creek which raises potential for presence of artefacts. Crooked Creek crossing has been identified by NND as the best route option to mitigate possible heritage resources on west side of the bridge. Mitigation will include spanning of Crooked Creek, if feasible, in order to avoid heritage resources and issues with regard to poor terrain. With regard to 11 Per Cent Hill, the route will be placed at a distance from any possible terraces adjacent to Crooked Creek that have increased probability of heritage resources. The Project Site Area will be monitored during construction phase to ensure that any heritage resources are not adversely affected by the Project.

- At Stewart Crossing, the route selected was preferred by NND because it was further away from the community and any potential interference with cultural concerns. Higher ground at this location is also more suitable for a creek crossing. Because the route is located further back from the community, there is a reduced likelihood of effects on heritage resources and no further investigations are currently warranted; however, the creek crossing will be monitored during construction to verify this conclusion.

With regard to the MS route area, the Minto Landing site is the only road accessible riverboat timber fuel replenishing site in the Yukon and has substantial regional FN value due to the fact that it was a meeting place in the past. The Heritage Branch also considers the site to have interpretive value. It is considered that there may be an adverse effect at the Minto Landing site if the MS line is located in this area as the placement of poles and cables may adversely affect the interpretive value of the location in the future since development may be encouraged around this area. The MS transmission line crossing the Yukon River (as well as the MS facilities on the west side of the river) will be a temporary structure that will exist for the life of Minto Mine; the river crossing and the line on the west side of the river will be decommissioned following the practices established in Chapter 5, Section 5.10 of this document.

Mitigation measures related to the potential inadvertent discovery of unknown heritage sites during the Project ROW brushing and clearing activities includes adherence to Yukon Energy's EMS best practices for Heritage Resources, as well as flagging any newly discovered sites. Upon discovery of any new heritage sites, construction activity in proximity to the site will cease until the Lands Inspector indicates work can proceed. In areas where there is known high potential for heritage resource discovery, the Project EPP will recommend an archaeologist be present during ROW brushing and clearing activities. This is of particular concern in the Minto Landing area where the MS transmission line will intersect the Minto Landing community and be adjacent to two known heritage sites. Any adverse effects will be mitigated through the above listed measures.

During the operation and maintenance phase of the Project, heritage sites adjacent to the transmission lines may be affected. Mitigation measures will include adherence to Yukon Energy's EMS Manual on best practices for access. There are no expected Project effects on heritage resources related to operation and maintenance of the substations, or decommissioning of the MS transmission line.

Construction and maintenance effects of the Project on heritage resources are expected to be short-term and relate to activities undertaken in the Project Site Area. Route selection has avoided known heritage site areas and adherence to Yukon Energy's EMS Manual on best practices for Heritage Resources is expected to ensure that any effects on artefacts discovered in or adjacent to the Project Site Area will be low in magnitude and not significant.

8.4 OTHER EFFECTS

8.4.1 Effects of the Environment on the Project

In environmental assessment practice, the effect that the environment will have on the project is often considered as part of the environmental assessment and appropriate measures are applied to ensure that there will be no significant adverse effects in this regard. During the operational phase of the Project, for example, potential effects of the environment on the Project can occur as a result of ice storms, high wind events, forest fires and flooding.

Yukon Energy designs its transmission lines to meet or exceed the current CSA standard for overhead transmission systems. Current design practice involves the analysis of atmospheric weather data (i.e., wind, ice, wind/ice combination, etc.) Analysis of these weather factors provides the line design criteria used in determining strength requirements for structures, conductors, hardware and insulators. Design components are chosen to provide for a 50-year return period (i.e., meaning the line might fail once in a 50 year period due to climatic events [wind and ice]).

At some point, a forest fire could have an impact on Project transmission line structures. The potential likelihood of structure failure is low with the poles located within a cleared transmission line ROW and past experience with forest fires along the WAF line; however, it is possible that transmission line outages might be caused by insulator flashover as a result of ionization of the surrounding air due to smoke and ash from an intense forest fire.

Where applicable, potential flooding impacts are considered in the final design of transmission line structures; however these types of impacts are not typically a concern. Flooding is considered a concern only in those circumstances where a transmission line is routed through an area prone to floods such as the Big Creek area. In this location flood-prone areas are avoided by placing the poles on higher ground and spanning low lying areas. In areas of high water table or areas that are subject to flooding, structures can be erected on pile foundations to provide structural stability in the event of a flood. These circumstances are typically avoided through the route selection process; thus, it is not expected that the Project will be impacted in any significant way by flooding.

It has been suggested that the impact of climate change and its potential effects on the boreal forest ecosystem may result in a long-term increase in the number of extreme weather events (i.e., forest fire hazards, flooding, ice storms), an increase in infrastructure maintenance requirements due to the gradual change in permafrost (e.g., potential instability at structure foundation locations), and potentially more erratic water regimes resulting from more frequent or extreme weather events. Changes in forest composition and density as a result of climate change may directly or indirectly affect rainfall and snowmelt run-off rates. However, based on current information and projections, it is not presently expected that climate change will have a significant effect on the proposed CS Transmission Line and MS Transmission Line during their life cycle.

Yukon Energy monitors changes in the regional climate of the Project Study Region using climate information which includes measurements of temperature, precipitation and wind speed provided by the Meteorological Service of Canada. In addition, Yukon Energy monitors research work from the scientific community, in the area of global climate change, to assess the degree at which climate change is occurring in the Project Study Region as well as the overall WAF and MD grid areas.

An ongoing challenge to the scientific community is to determine the degree to which global climate is changing due to anthropogenic (manmade) causes such as increased greenhouse gas concentrations in the atmosphere as opposed to natural causes such as volcanic and solar activity. Yukon Energy will continue to monitor the capability of Global Climate models and Regional Climate models from the perspective of being able to duplicate climate change within the current climate regime. Once these models are calibrated to predict current climate regimes, they can be used with confidence to predict future climate trends and they may potentially be able to predict the frequency and magnitude of extreme events in the Project area (e.g., severe storms, wind events, ice storms).

8.4.2 Accidents and Malfunctions

YESAA[13] and the YESAB Guides (Reference Materials 1R-2) require that significance of accidents or malfunctions be considered as part of the environmental and socio-economic effects assessment. In this assessment, possible accidents and malfunctions with regard to the Project were considered and appropriate mitigation is planned to be applied to ensure there would be no significant adverse environmental effects in this regard.

During construction and operation of the transmission lines and the substations, spills of hazardous materials could occur during re-fuelling of equipment or due to failure of station components. Soil contamination (which affects soil productivity) could potentially occur when a hazardous substance is spilled or leaked. Where contaminants enter ground water, there is a risk to public health and safely, as well as potentially adverse impacts on wildlife populations and habitat. The magnitude and duration of any potential effects of accidental spills depends upon the nature of the material spilled, the quantity spilled, the location of the spill, and the time of year when the incident occurs.

[13] Section 42(1)(c) of YESAA sets out that an examination is required of the significance of environmental or socio economic effects of the project or existing project that have occurred or might occur in or outside Yukon, including the effects of malfunctions or accidents.

Construction under frozen ground conditions during the winter, where required or otherwise adopted, will facilitate the containment and recovery of any spilled material and reduce the potential effects on soils, watercourses and groundwater. Standard environmental protection practices, as described in Yukon Energy's EMS (Resource Materials 5R-1) and Job Site Spill Contingency Plan, Reporting Procedures (Resource Materials 5R-2) commit Yukon Energy to store fuel, lubricants and other potentially hazardous materials within dedicated storage areas in work camps and marshalling yards. Dedicated areas would be located away from any sensitive features and would provide spill containment, any necessary bermed storage areas, and spill response. Any products transferred from storage sites to work areas would not exceed the daily requirement. Yukon Energy also requires its contractors to have an emergency response plan in place that is consistent with Yukon Energy's EMS and spill response procedure.

Adherence to Yukon Energy's environmental protection practices and any additional specific mitigation measures identified as a condition of license approval, or in development of the EPP, will further minimize the potential impact of accidents or malfunctions on soil, wildlife or aquatic resources. Any potential adverse effects in this regard would likely be short-term and reversible.

As noted above, Yukon Energy designs its transmission lines to meet or exceed the current CSA standard for overhead transmission systems. Structures, insulators and hardware are selected to minimize the risk of failure. Regular patrols of the transmission lines are undertaken to ensure potential problems are identified and rectified in advance of a failure or malfunction.

8.5 RESIDUAL EFFECTS AND DETERMINATION OF SIGNIFICANCE

The approach for determining the significance of residual adverse effects has been set out in Chapter 3, Section 3.5.1. The assessment summarizes more detailed analysis provided in sections 8.2 and 8.3, including consideration as to how effects of the Project are expected to combine with other relevant future actions that will occur in the Project Study Region (See Chapter 3, Section 3.4).

For this assessment, the key criteria used initially to determine the potential significance of adverse Project residual effects were:

- Magnitude of the effect (level of detectability of effect, i.e., low, moderate or high)
- Duration of effect (short-term/ low and long-term/ high have been focused on in the assessment)
- Geographic or socio-economic extent of the effect (Project Site area/ low, beyond Project Site Area but within Project Study Region/moderate, and beyond Project Study Region/ high)

Additional criteria, such as frequency of effect, reversibility of effect and ecological/ socio-economic context or resilience, were only considered where an initial ranking based on magnitude, duration and geographic or socio-economic extent determines that there may be "potentially significant" effects or "significant effects" on the VC's selected for study.

Potentially adverse residual effects that are likely were initially ranked based on the above criteria and then their likely significance was rated based on the following definitions set out in greater detail in Section 3.5.1 of Chapter 3:

- To be "significant" effects must be long-term (high) duration, large (high) magnitude, and extend beyond the Project Study Region (high geographic or socio-economic extent)
- To be "potentially significant", and merit further review, effects are either:
  - Low in extent and high in both magnitude and duration
  - Moderate in extent and either high in magnitude (regardless of duration) or moderate in magnitude and high in duration
  - High in extent and moderation or high in magnitude (regardless of duration)
- Not Significant/ low effects are either:
  - Low in magnitude, regardless of duration or extent, or
  - low in extent and not high in both magnitude and duration, or
  - short-term or moderate in duration and not high in magnitude or extent

Both environmental and socio-economic residual effects related to the Project were initially assessed based on the above-noted criteria.

It was determined that most adverse Project residual effects were short-term (low duration) related to activities undertaken during construction, brief periods during operation and maintenance or during decommissioning (in the case of the MS Project). Long-term (high duration) adverse Project effects were typically related to the existence of a permanent CS Project ROW. For the MS Project, ongoing effects during operation may be considered to be potentially only medium term (moderate duration) as the transmission line and infrastructure will be removed when the mine closes (which may occur after about ten years of Project operation).

Route selection resulted in likely adverse residual effects that are expected to be of low magnitude for all VC's as the most sensitive habitat areas, resource use areas and viewscapes were avoided; for all sensitive environments and wildlife species, the Project Site Area intersected only small parts of the total ecosystem-type or habitat area avoiding critical habitat and consequently affecting a minimal proportion of the terrain-type or the affected species' total numbers.

For both environmental VC's and socio-economic VC's, most of the adverse residual effects are expected to be specific to the Project Site Area and are not expected to extend past the Route Study Area within the overall Project Study Region. No likely adverse effects of the Project are expected to extend beyond the Project Study Region.

Generally, the short-term residual effects, due to activities undertaken with regard to Project construction, operation and maintenance and decommissioning, will be low in magnitude and only extend, at most, as far as the Project Study Region (medium extent). Long-term effects related to the existence of a permanent Project ROW are generally expected to be low in magnitude and generally confined to the Project Site Area (low extent).

No adverse residual effects are expected to be high magnitude and no adverse residual effects are expected to extend beyond the Project Study Region. Any long-term adverse residual effects expected to extend beyond the Project Site Area within the Project Study Region are expected to be of low magnitude. Based on these conclusions, no residual adverse effects of the Project are initially ranked as “potentially significant” or “significant”.

Since an examination of Project residual effects on VC’s based on the criteria of magnitude, duration and geographic extent found no “potentially significant” or “significant” effects on VC’s, it was not necessary to consider additional criteria such as frequency, reversibility or ecological or socio-economic context (resiliency).

Based on these conclusions, the Project is not expected to have any likely significant adverse residual environmental or socio-economic effects.

The following section summarizes the residual effects that the Project will have on the environmental and socio-economic VC’s that have been studied and the measures designed to mitigate impacts, before determining the significance of residual effects for each VC. The nature and extent of adverse residual effects associated with the Project are described generally in the following subsections, together with a rationale as to why the effects are considered insignificant.

8.5.1 Environmental Residual Effects

8.5.1.1 Physical Environment

This section summarizes the estimated residual effects of the Project on the physical environment in the Project Study Region (see Section 8.2.1). The assessment looks at the short-term and long-term effects that the Project is expected to have on sensitive terrain and on air quality. The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of residual effects are assessed and summarized in Table 8.5-1.

Table 8.5-1
Summary of Residual Effects and Significance on Physical Environment

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Biophysical VCs: Physical Environment			
Sensitive Terrain (steep slopes (VS:R),poorly drained soils (OWZ) and permafrost)			
Short-term construction, maintenance and decommissioning activities	Project-related activities such as the use of heavy equipment may cause slope damage; rutting and/or the removal of soil fixing vegetation may contribute to erosion.	• Route selection to avoid sensitive terrain. • Timing construction to occur in winter and/or strategic pole placement • Use specialized equipment to minimize disturbance of the vegetative mat , the removal of soil-fixing vegetation and rutting on steep slopes. • Where rutting occurs on steep slopes, wetlands or permafrost area ruts will be levelled or filled in to avoid erosion or damage to permafrost sub-soil. • Yukon Energy's EMS best practices for ROW maintenance • Follow practices outlined in Chapter 5, sections 5.10.3, 5.10.4 and 5.10.5 to negate impacts.	Short-term, Project Site Area and Low Magnitude **Low (-)** **Not Significant**
	Accidental fuel spills	• Follow Yukon Energy's EMS best practices for fuel spills	Short-term, Project Site Area and Low Magnitude. **Low to Negligible (-)** **Not Significant**
Air Quality			
Short-term construction, maintenance and decommissioning activities	Machinery emissions and creation of dust could affect air quality in the immediate area.	• Proper emissions controls installed on equipment and routine maintenance performed. • Timing of construction activities	Short-term, Route Study Area, Low Magnitude. **Low (-)** **Not Significant**
	Emissions from burning of slash.	• Yukon Energy's EMS best practice for timber salvage will be followed.	Short-term, Project Study Region, Low Magnitude. **Low (-)** **Not Significant**
Presence of long-term transmission project	The Minto Mine operations, likely Pelly Crossing, and potentially other mines such as Carmacks Copper will shift from diesel electricity generation to WAF grid surplus hydro-electricity.	• Substantial reduction in use of diesel generator and consequent emissions will result in fewer adverse air emissions (including fewer GHG emissions).	Long-term, Project Study Region, Low to Moderate Magnitude. **Low to Moderate (+)** **Not Significant**

With regard to the impact of the Project on sensitive terrain during the construction, operation and maintenance and the decommissioning phases of its lifecycle, it is anticipated that any adverse residual effects will be short-term and site-specific. Careful route selection has resulted in a ROW that avoids most sensitive terrain in the Route Study Area and where it has not been possible to completely avoid sensitive terrain (such as steep slopes and poorly drained soils) construction has been timed to occur in winter and mitigation measures have been adopted which minimize disturbance to the vegetative mat. Decommissioning practices outlined in Chapter 5 Section 5.10.3, 5.10.4 and 5.10.5 will be adhered to in order to reduce impacts during the MS decommissioning process. The residual adverse effects of construction, operation and maintenance and decommissioning activities on the sensitive terrain are therefore expected to be low, short-term, site-specific and not significant.

With regard to the impact of activities undertaken during construction, operation and maintenance and decommissioning on air quality, it is anticipated that there will be some positive and negative effects which will be short-term and occur primarily within Route Study Area portions of the Project Study Region. Emissions from vehicles and the burning of slash that will negatively impact on air quality will be mitigated through use of proper emissions controls and routine maintenance on equipment, the application of dust suppression measures near communities and adherence to Yukon Energy's EMS best practices. When the Minto Mine, as well as Pelly Crossing, shift from diesel generation to surplus grid hydro electricity, it is expected that there will be positive residual effects due to the reduced production of diesel generation air emissions (including GHG's) in the Project Study Region. It is expected that with the application of mitigation, residual effects on air quality will be both positive and negative, low to moderate (in the case of positive reductions in diesel generation emissions) and not significant.

8.5.1.2 Terrestrial Environment

This section summarizes the short-term and long-term residual effects that the Project is expected to have on the terrestrial environment in the Project Study Region (see Section 8.2.2). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of residual effects are assessed and summarized in Table 8.5-2.

Table 8.5-2
Summary of Residual Effects and Significance on Terrestrial Environment

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Biophysical VCs: Terrestrial Environment			
Vegetation			
Short-term construction, maintenance and decommissioning activities	Merchantable timber and vegetation will be removed or may be damaged during clearing, construction maintenance, and decommissioning activities.	• Route selection avoids merchantable timber stands. • Minimize removal of under story vegetation and disturbance of vegetative mat. • Use of rotary mowers for brush where practical, and minimize the use of heavy equipment in sensitive areas through hand clearing • Yukon Energy's EMS best practices for ROW maintenance will be followed • No use of herbicides or defoliants. • Time decommissioning to occur in winter.	Short-term, Project Site Area, Low Magnitude. **Low (-)** **Not Significant**
Long-term presence of permanent ROW	Soil disturbance in ROW and the existence of a ROW or cleared perimeters around substations could create an unnatural forest edge and promote the intrusion of exotic species.	• Control through brushing and clearing activities. • Yukon Energy's EMS best practices for access will be followed • Monitoring ROW for invasive plant species and taking appropriate action	Long-term, Project Site Area, Low Magnitude. **Low (-)** **Not Significant**
Long-term decommissioning of MS Project	Natural re-growth of MS Project Site Area after decommissioning is complete	• no mitigation is required	Long-term, Project Site Area, Low Magnitude. **Low (+/-)** **Not Significant**
Rare Plants:			
Short-term construction, maintenance and decommissioning activities	Rare plants may be disturbed or removed during construction activities affecting future propagation.	• Site specific locations identified as having potential for rare plants will be surveyed prior to construction. • Hand-clearing will be used if rare plants are identified. • Strategic pole placement to avoid areas harbouring rare plants if identified.	Short-term, Project Site Area and Low Magnitude. **Low (-)** **Not Significant**
Mammals (Mule Deer, Moose, Ethel Lake Woodland Caribou, Tatchun Woodland Caribou, Small Furbearers)			
Short-term construction, maintenance and decommissioning activities	Mammals may temporarily avoid the affected Route Study Area due to noise and fumes produced by equipment and people and smoke from slash burning.	• Route selection avoids critical habitat. • Where feasible and/or necessary timing construction and maintenance in specific areas to avoid rutting and calving periods or spring denning. • Adherence to Yukon Energy's EMS best practices for ROW maintenance.	Short-term, Project Study Region and Low Magnitude **Low (-)** **Not Significant**

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Mammals (Mule Deer, Moose, Ethel Lake Woodland Caribou, Tatchun Woodland Caribou, Small Furbearers) (cont.)			
Long-term presence of a permanent ROW	Creation of browse and travel corridor for large mammals, and habitat change (affect different mammals differently – some small species prefer an open area)	• No mitigation is required	Long-term, Project Study Region (mainly in parts of Route Study Area), and Low Magnitude. **Low (+/-)** **Not Significant**
	Habitat fragmentation and possible barrier to mammal movement Edge effect and increased predator mobility (predatory species could preferentially use the corridor for hunting)	• Route selection has placed transmission line near previously disturbed areas such as along the Klondike Highway. • Vegetative buffer along the Klondike Highway and Project ROW to act as protective cover and to reduce impact of new ROW as a barrier • Adherence to Yukon Energy's EMS best practices for ROW access	Long-term, Project Study Region (mainly in parts of Route Study Area), and Low Magnitude **Low (-)** **Not Significant**
	Potential for increased hunting pressure from new access	• Policy for no-hunting by construction and maintenance crews. • Adherence to Yukon Energy's EMS best practices for ROW access • Continuance of voluntary no-hunting restrictions on Ethel Lake Caribou Herd. • Where feasible, restrict off-road access with physical barriers (roots, stumps, trees, rocks) • A vegetative buffer from Highway for protective cover	Long-term, Project Study Region (mainly in parts of Route Study Area) and Low Magnitude **Low (-)** **Not Significant**
Long-term decommissioing of MS Project	Natural growth of indigenous vegetation in the MS ROW to pre-Project conditions (affect moose and small furbearers).	• No mitigation is required.	Long-term, parts of MS portion of Project Study Region, and Low Magnitude **Low (+)** **Not Significant**
Migratory Waterfowl			
Short-term construction, maintenance and decommissioning activities	Migratory waterfowl may temporarily avoid the area due to noise produced by equipment and people.	• Route selection avoids key habitat and nesting sites • Timing construction to avoid nesting season. • Transmission lines at river crossings will be located close to existing infrastructure in a parallel horizontal configuration.	Short-term, Project Study Region and Low Magnitude. **Low (-)** **Not Significant**
Long-term presence of permanent ROW	Migratory waterfowl may collide with conductors, poles, and related structures at river crossings. Potential loss of habitat in wetland areas.	• Use wire structure markings in proximity to known migratory route where feasible. • Transmission lines at river crossings will be located close to existing infrastructure in a parallel horizontal configuration.	Long-term, Project Study Region and Low Magnitude **Low (-)** **Not Significant**

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Migratory Waterfowl (continued)			
Decommissioning of MS project.	Removal of lines and poles will eliminate the obstacles for flight paths and return project site area to pre-project conditions.	• No mitigation is required	Long-term, Project Study Region and Low Magnitude. **Low (+)** **Not Significant**
Peregrine Falcon			
Short-term construction, maintenance and decommissioning activities	Peregrine falcons may temporarily avoid the area due to noise produced by equipment and people.	• The proposed transmission line corridor will not travel through known Peregrine falcon eyries or within Peregrine falcon WKA's.	Short-term, Project Study Region and Low Magnitude. **Low (-)** **Not Significant**
Long-term presence of permanent transmission ROW	Bird mortality through collision with conductors and/or poles.	• Conductor and structure markings will be used in areas frequented by peregrine falcon, including river crossings, in order to reduce potential for bird strikes.	Long-term, Project Study Region (MS Route Study Area) and Low Magnitude. **Low (-)** **Not Significant**
	ROW will produce edge effect and Peregrine falcons may preferentially use corridor for hunting	• No mitigation is required	Long-term, Project Study Region and Low Magnitude. **Low (+)** **Not Significant**

Most adverse effects on the terrestrial environment due to construction, maintenance and decommissioning activities in the ROW will be short-term in duration and site-specific in extent, or in the case of the effects of noise and fumes, will extend beyond the Project Site Area, but remain within the Route Study Area. Effects on the terrestrial environment due to the existence of a permanent ROW will be long-term in duration but confined to parts of the Route Study Area within the Project Study Region Due to route selection and other mitigation, all of the long-term or short-term effects of the Project on the terrestrial environment are expected to be low in magnitude and not significant.

Effects on vegetation and rare plants will generally be short-term and site-specific. Such effects will be mitigated through efforts to minimize the impacts of construction activities on the vegetative mat, on under story and other sensitive areas, and mitigation will include timing construction where required to occur in winter in order to minimize impacts, as well as the use of hand clearing in sensitive areas or where rare plants are located. It is anticipated that residual adverse effects on vegetation and rare plants will be low in magnitude and not significant.

With regard to wildlife such as furbearers, ungulates and birds, there will be short-term disturbances due to construction, maintenance and decommissioning activities in the ROW caused by noise produced by people and equipment, as well as disturbances due to emissions from vehicles and the burning of slash. These short-term effects may be felt over the Route Study Area within the Project Study Region; however, route selection has avoided critical habitat and nesting areas, and where feasible activities will be timed to avoid critical lifecycles stages for the selected VC's such as nesting, rutting, mating, calving and denning periods which will minimize the magnitude of effects. It is expected that adverse residual effects of construction, maintenance and decommissioning activities in the ROW on these terrestrial VC's will be low in magnitude and not significant.

There will be long-term effects on terrestrial VC's in the Project Study Region due to the existence of a permanent ROW, which will require the permanent removal or restriction of certain vegetation and which may increase stress on wildlife due to the increased access provided to hunters and also due to the creation of a travel corridor which may be used by predators such as wolves and coyotes. There will be both positive and negative effects as a permanent ROW will create an edge environment which may facilitate growth of certain species (including potential invasive vegetation species), as well as a travel corridor that may be preferred by some species while removing areas of habitat preferred by other species. A permanent ROW may also contribute in some areas to habitat fragmentation in the Project Study Region.

Route selection has avoided areas of critical habitat and in most cases only minimal numbers of the total wildlife species population will be affected by long-term effects of a permanent ROW in the Project Site Area. Further mitigation will include:

- Imposing a no-hunting policy on construction, maintenance and decommissioning personnel undertaking project-related activities throughout the life of the Project
- Application of Yukon Energy's EMS best practices with regard to ROW access
- Where feasible, creating barriers at access points using rocks, trees and other available materials
- Where feasible, a vegetative buffer of at least 30 metres will provide cover for wildlife in areas where the route runs parallel to the Klondike Highway and mitigate the effects of habitat fragmentation
- Where feasible, transmission lines and substations have been placed near previously disturbed areas

With regard to migratory waterfowl and Peregrine falcons, there will be long-term and site-specific effects stemming from the existence of permanent transmission line structures which may contribute to bird mortality due to collision with conductors. Route selection has avoided critical nesting sites and any additional adverse effects due to accidental line strikes will be mitigated through conductor and structure marking (e.g., as per Transport Canada regulations at river crossings). Where it is possible, lines will be constructed near existing infrastructure and parallel to existing barriers. Decommissioning of the Minto Spur transmission line will eliminate potential hazards to migratory water fowl and Peregrine falcons and reduce bird mortality in the MS Project Site Area where the area is expected to return to pre-Project conditions over time. Given critical habitat has been avoided and that only a small portion of the total migratory waterfowl and Peregrine falcon populations in the Project Study Region are expected to be affected, adverse effects on these VCs are expected to be low in magnitude and not significant.

In summary, it is expected that adverse residual effects on the terrestrial environment VCs due to the existence of a permanent ROW and transmission line structures will be low in magnitude and not significant.

8.5.1.3 Aquatic Environment

This section summarizes the short-term residual effects that the Project is expected to have on the aquatic environment in the Project Study Region (see Section 8.2.3). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of residual effects are assessed and summarized in Table 8.5-3.

Although it has been determined that the Project will have no adverse effects on Salmon, it has been included in the Residual Effects Tables for the Aquatic Environment due to a clearly expressed public concern with regard to any adverse effects that the Project may have on this valued resource in the Project Study Region.

Table 8.5-3
Summary of Residual Effects and Significance on Aquatic Environment

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Biophysical VCs: Aquatic Environments			
Riparian Zones and Wetlands			
Short-term construction, maintenance and decommissioning activities	Possible disturbance of wetlands, or riparian zones during construction activities.	• Route selection to avoid wetlands and riparian zones • Strategic pole placement to avoid sensitive wetlands • Hand clearing within 30 m of wetlands and riparian zones • Clearing limits will be flagged • Timing Project-related activities to occur in winter • Minimize disturbance of vegetative mat in and around wetland and riparian zones • Application of Yukon Energy's EMS best practices for ROW maintenance • Yukon Energy's EMS best practices for water bodies, wetlands and stream crossings will be followed • Follow DFO's Operational Statement on Overhead Line Construction • Follow decommissioning practices outlined in Chapter 5, Section 5.10 of this document	Short-term, Project Site Area and Low Magnitude. **Low(-)** **Not Significant**
Salmon			
All Phases	There will be no adverse Project effects on salmon due to no in-stream construction	• No mitigation is required. • All work in vicinity of salmon-bearing water bodies will adhere to DFO's Operational Statement on Overhead Line Construction	**NA**

Activities undertaken during construction, operation and maintenance, and MS decommissioning may possibly disturb riparian zones, wetlands and wetland plant species. The route selection process has sought to avoid riparian zones and wetland environments where feasible, and pole placement has tried to avoid disturbing wetland sites. Construction, operation and decommissioning activities will be timed to occur in winter where required to minimize adverse impacts on riparian zones and wetlands and the activities undertaken will strive to minimize disturbance to the vegetative mat around wetlands. Given that the careful route selection avoids most sensitive sites and timing will further minimize adverse effects on any riparian zones and wetland environments, it is expected that the magnitude of Project effects on riparian zones and wetlands will be low and not significant

Further mitigation of Project effects will include hand-clearing to be used within 30 metres of wetland areas to minimize disturbance to wetland plant species. Yukon Energy's EMS best practices for water bodies, wetlands and stream crossings will be adhered to in order to mitigate any other possible adverse effects on wetlands. Mitigation for maintenance activities will also include the application of Yukon Energy's EMS best practices for ROW maintenance.

It is anticipated that any adverse effects on riparian zones and wetlands will be short-term in duration and occur within the Project Site Area. Since most sensitive sites have been avoided, and where possible activities will occur under frozen conditions, the residual adverse effects due to the Project are expected to be low in magnitude and not significant.

8.5.2 Socio-Economic Residual Effects

8.5.2.1 Resource Use

This section summarizes the long-term and short-term residual effects that the Project is expected to have on resource use in the Project Study Region (see Section 8.3.1). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of residual effects are assessed and summarized in Table 8.5-4.

Table 8.5-4 excludes the following two resource use VCs where route selection has resulted in no residual effect being expected (see Section 8.3.1):

- Protected Areas
- Outfitting

Table 8.5-4 focuses on specific effects pertaining to specific resource use VCs. In addition, the MOU between Yukon Energy and NTFN commits Yukon Energy (in order to avoid issues that arose in construction of the Mayo-Dawson Transmission Project) to proceed with construction within a pre-identified specific route and access corridor and to ensure that one or more project monitors are engaged during construction to ensure on-site, amongst other things, that the Project as it is constructed is at all times located in compliance with the approved final route and access corridor.

Table 8.5-4
Summary of Residual Effects and Significance on Resource Use

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Socio-Economic VCs: Resource Use			
Trapping and Hunting			
Short-term construction, maintenance and decommissioning activities	Ability to trap or hunt in the vicinity if the ROW and Route Study Area will be affected during construction, maintenance and decommissioning activities (includes restrictions due to safety concerns for construction and maintenance crews) Wildlife may temporarily avoid the area.	• Avoidance of traplines and critical habitat where feasible during route selection • Trapper compensation for construction period disruptions • Trapper and local community notification of work schedule • Maintenance procedures will follow Yukon Energy's EMS best practices	Short-term, Project Study Region and Low Magnitude. **Low (-)** **Not Significant**
Long-term presence of permanent ROW	Improved access to transmission ROW and adjacent areas	• Yukon Energy's EMS best practices for ROW access will be followed • Consultation with the RMO's, First Nations and trappers regarding access restriction and control measures	Long-term, Project Study Region and Low Magnitude. **Low (+/-)** **Not Significant**
Long-term decommissioning MS Project	Dissipation of MS Project effects in ROW and natural re-growth of vegetation and wildlife habitat over time	• No mitigation is required	Long-term, Project Site Area and Low Magnitude **Low (+)** **Positive Significance**
Fishing			
All phases.	Concerns expressed by community members over protection of fish habitat	• No in-stream work and adherence to DFO's Operational Statement on Overhead Line Construction and Riparian Areas and Re-vegetation • Line stringing by helicopter for rivers and at Tatchun Creek where it is necessary • Minimal hand clearing of danger vegetation within 30 m of riparian areas	Short-term, Project Site Area, and Negligible Magnitude **Negligible (n)** **Not Significant**
Collection of Plants			
Short-term construction, maintenance and decommissioning activities	Potential removal of some valued plant species including medicinal plants.	• Route selection to avoid plant collection areas where feasible • Timing when activities in ROW occur • Notice to communities prior to activity in ROW • Equipment to minimize damage to vegetation	Short-term, Project Site Area and Low Magnitude **Low (-)** **Not Significant**
	Brushing and clearing in ROW may encourage growth of berry producing plants.	• Equipment designed to minimize damage to vegetation	Short-term, Project Site Area and Low Magnitude **Low (+)** **Not Significant**

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VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Collection of Plants			
Long-term presence of permanent ROW	Increased Access for community members and others to berry picking areas within and adjacent to the ROW	• Yukon Energy's EMS best practices for access will be followed	Long-term, Project Site Area and Low Magnitude **Minor (+/-)** **Not Significant**
Decommissioning MS Project	Project effects in MS ROW will dissipate and vegetation will re-grow to a natural state over time	• No mitigation is required	Long-term, Project Site Area and Low Magnitude. **Low (+)** **Not Significant**
Timber Harvesting			
Short-term construction, maintenance and decommissioning activities	Opportunities for collection of merchantable timber and fuel wood will be realized	• Route selection will follow Yukon Energy's EMS best practices for timber salvage	Short-term, Project Site Area and Low Magnitude **Low (+)** **Not Significant**
Long-term presence of permanent ROW	Permanent ROW will increase access to timber harvesting areas adjacent to the transmission lines.	• Yukon Energy's EMS best practices for access will be followed	Long-term, Project Study Region and Low Magnitude. **Low (+)** **Not Significant**
Outdoor Recreation			
Short-term construction, maintenance and decommissioning activities	Concerns expressed over conflict with use of recreational sites, particularly Tatchun Creek campground	• Route selection has avoided known campground sites • Timing construction and maintenance activities to avoid season when campground is in use • A vegetative buffer will be left between the Highway and the ROW	Short-term, Project Site Area and Low Magnitude **Low (-)** **Not Significant**
Long-term presence of permanent ROW	Improved access for outdoor recreation activities adjacent to the ROW	• No mitigation is required	Long-term, Project Site Area and Low in Magnitude **Low (+)** **Not Significant**
Tourism			
Short-term construction, maintenance and decommissioning activities	The perception of a wilderness environment may be altered by construction, maintenance and decommissioning activities	• Route selection and timing of construction and maintenance activities to avoid tourist season • Where feasible a vegetative buffer will be left between the Highway and the ROW	Short-term, Project Study Region and Low Magnitude. **Low (-)** **Not Significant**
	Possible disruption of Yukon Quest activities	• Where feasible avoid activities in specific sections of ROW immediately prior to and during race period • Advance notification to Yukon Quest of activities in ROW	Short-term, Route Study Area and Low Magnitude. **Low (-)** **Not Significant**

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Tourism			
Long-term effects due to presence of permanent ROW	Diminished perception of wilderness due to periodic visibility of Project structures, including crossing of Yukon River	• Maintenance of vegetative buffer	Long-term, Project Study Region and Low Magnitude. **Low (-)** **Not Significant**
	ROW may intersect Yukon Quest trail	• Guards will be installed on guy conductors	Long-term, Project Site Area and Low Magnitude **Low (-)** **Not Significant**
Decommissioning of MS Project	Removal of MS Project structures adjacent to and across the Yukon River will restore viewscape	• No mitigation is required	Long-term, Project Site Area and Low Magnitude **Low (+)** **Not Significant**
Outfitting			
All Phases	No residual effect	• Not required	No socio-economic effect
Agriculture			
All phases	CS ROW south of McGregor Creek is along Highway edge of current agricultural land use application	• Route selection avoids or minimizes use of agricultural parcels	Long-term, Project Site Area and Low Magnitude **Low (-)** **Not Significant**
Mining			
Presence of long-term transmission project.	Existence of Project infrastructure will facilitate future mining development in Project Study Region	• No mitigation is required	Long-term, Project Study Region, and Low Magnitude **Low to Moderate (+)** **Positive Significance**
Aggregate Sites			
Short-term construction, maintenance and decommissioning activities	Construction of ROW and pole structures within or adjacent to aggregate sites may affect aggregate operations. Periodic brushing activities within or adjacent to aggregate sites may affect aggregate operations	• Avoidance of aggregate sites where feasible • Consultation with Highways on timing and procedures • obtaining necessary permits • Will follow Yukon Energy's EMS, best practices	Short-term, Project Site Area and Negligible Magnitude **Low (n)** **Not Significant**

There will be short-term adverse effects on resource use due to Project-related activities in the ROW during construction, operation and maintenance as well as decommissioning related to the MS transmission line.

Most of the adverse effects on resource use due to Project-related activities in the ROW will be mitigated through route selection to avoid traplines and trapline infrastructure, hunting areas, potential rare plant sites and to minimize interference with the aesthetics of the landscape and the perception of a wilderness environment that is an essential aspect of the tourism industry. Route selection has also been used to enhance positive effects of the ROW for increasing access to timber stands for harvest and wood fuel consumption. Route selection to avoid key sites, reduce impacts on wildlife critical to trapping and hunting, and protect aesthetics is expected to ensure that the magnitude of adverse effects on resource use will be low for all VCs studied.

Where complete mitigation of adverse effects through route selection has not been possible, other measures will also be used to further mitigate any adverse effects including the application of any relevant Yukon Energy EMS best practices, notice to and consultation with communities, First Nations, regional RMOs and relevant government departments with regard to the particular activities to be undertaken.

The residual adverse effects due to Project construction, maintenance and decommissioning activities are expected to be short-term and not to extend past the Project Study Region for all resource use VC's. Adverse short-term effects on resource use VCs are expected to be low in magnitude and not significant.

Long-term Project effects on resource use due to the creation of a permanent ROW will be both positive and adverse. The maintenance of a ROW will provide increased access to certain areas along the ROW; however, such increased access will be available to community members as well as those outside the community. There will also be long-term effects due to the diminished perception of wilderness in areas where Project structures are visible.

Route selection has minimized these long-term adverse effects through avoiding key community resource use areas and traplines and by avoiding key viewscapes and viewing locations. Where route selection has not completely avoided resource use areas, access will be controlled to the extent feasible by applying Yukon Energy's EMS best practices for ROW access and through consultation with local affected interests. Effects on the perception of wilderness and consequently tourism will also be further mitigated through the use of a vegetation buffer where feasible to screen the transmission lines from view.

It is expected that residual adverse long-term effects on resource use VCs of the presence of a permanent ROW will extend beyond the Project Site Area within the Project Study Region and will be low in magnitude and not significant.

8.5.2.2 Economy

This section summarizes the short-term and long-term residual effects that the Project is expected to have on the economy in the Project Study Region (see Section 8.3.2). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of these effects are assessed and summarized in Table 8.5-5.

Table 8.5-5 summarizes effects on specific economy VCs. It is also relevant to note that the MOU between Yukon Energy and NTFN sets out broad regional economic and development benefits that are expected to result from the Project (see Section 8.3.2.2).

Table 8.5-5

Summary of Residual Effects and Significance on the Economy

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Socio-Economic VC's: Economy			
Local Employment and Training			
Short-term construction, maintenance and decommissioning activities	Job skills acquired through employment and training may be applied to other employment opportunities	• MOU provisions for clearing contracting; potential Yukon College training	Short-term, Project Study Region and Low Magnitude **Low(+)** **Positive Significance.**
	Employment of local people for construction, maintenance and decommissioning work	• No mitigation is required	Short-term, Project Study Region and Low Magnitude **Low(+)** **Positive Significance.**
Local Business			
Short-term construction, maintenance and decommissioning activities	Local businesses will benefit from infrequent maintenance activities, including secondary spending within the communities	• No mitigation is required	Short-term, Project Study Region and Low Magnitude **Low (+)** **Positive Significance**
Government Fiscal Flows			
Short-term effects due to construction, maintenance and decommissioning activities	Fluctuations in government revenues due to short-term activities YG costs to extent provide infrastructure funds to Yukon Energy for CS Project	• No mitigation is required	Short-term, Yukon Territory and Canada, and Low Magnitude **Low (+/-)** **Not Significant**
Long-term effects due to presence of a permanent transmission project	Continued direct and indirect tax and royalty revenues Savings in YG ongoing RSF costs so long as RSF continues	• No mitigation is required	Long-term, Project Study Region and Yukon Territory and Canada, and Low Magnitude **Low (+)** **Positive Significance**
Utility Ratepayers			
Long-term presence of a permanent transmission Project	Continued opportunity for firm industrial sales, contributing to utility revenues and cost savings for mine operations. Continued increased WAF and MD system reliability, economic efficiency and flexibility in power supply resource use	• No mitigation is required	Long-term within Yukon Territory and Low to Moderate Magnitude. **Low to Moderate (+)** **Positive Significance**

During periods of the Project's life where the construction, maintenance and decommissioning activities are required, there will be short-term and positive residual effects on the economy due to increased local employment, increased local business spending, and increased government fiscal flows. These positive, effects are expected to be low in magnitude. Adverse effects on Yukon Government fiscal flows will occur to the extent that YG provides infrastructure funding to the Project.

The long-term effects of the Project infrastructure on the Project Study Region include low positive impacts on government fiscal flows due to continued direct and indirect tax revenues stemming from the operation and maintenance of transmission lines and substations, as well as positive impacts on utility ratepayers due to increased system reliability, efficiency and flexibility, and the increased opportunities for firm industrial sales that will enhance the utility's revenues.

Increased system reliability and the potential to attract and serve new industrial loads will also tend to benefit utility ratepayers (both the specific mine customers and all other Yukon ratepayers) as well as government fiscal flows. These positive effects will be long-term with regard to the Carmacks-Stewart line and are expected to continue for about six to ten years for the MS line (reflecting the expected potential operating life of the Minto Mine). These positive long-term effects of the Project transmission infrastructure and substations will be low to moderate in magnitude.

8.5.2.3 Social Context

This section summarizes the short-term and long-term residual effects that the Project will have on social context in the Project Study Region (see Section 8.3.3). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of these effects are assessed and summarized in Table 8.5-6.

Table 8.5-6
Summary of Residual Effects and Significance on Social Context

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Socio-Economic VCs: Social Context			
Community and Family Life			
Short-term construction, maintenance and decommissioning activities	Ability to enjoy traditional lifestyle may be affected during construction, operation and decommissioning activities	• Route selection to avoid known traditional use areas where feasible, and be adjacent to existing disturbed environment • Yukon Energy's EMS best practices • Trapper compensation	Short-term, Project Study Region and Low Magnitude. **Low (-)** **Not Significant**
Long-term presence of permanent ROW	Improved access to the ROW area	• Yukon Energy's EMS best practices and consultation with local communities on access restrictions	Long-term, Project Site Area, and Low Magnitude. **Low (+)** **Not Significant**
Community Infrastructure and Services			
Short-term construction, maintenance and decommissioning activities	Yukon College may have increased enrolment from community workers seeking training opportunities in anticipation of employment	• No mitigation is required	Short-term, Project Study Region and Low in Magnitude. **Low (+)** **Not Significant**
	Increased stress on community health centres due to job site accidents	• Adherence to Workplace Health and Safety regulations. • Job safety training through Yukon College programs may be available	Short-term, Project Study Region and Low Magnitude **Low (-)** **Not Significant**

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Long-term presence of permanent ROW	Grid power at Pelly Crossing, displacing diesel power and reducing power costs for some community facilities and services	• No mitigation is required	Long-term, Project Study Region and Low Magnitude. **Low (+)** **Not Significant**
Public Health			
Long-term presence of a permanent ROW	Safety concerns with guyed conductors as hazard to snowmobile use within ROW	• Will follow Yukon Energy's EMS best practices on line maintenance (installation of guards on guy conductors)	Long-term, Project Site Area and Low Magnitude **Low (-)** **Not Significant**
Aesthetics			
Short-term construction, maintenance and decommissioning activities	Disruption of local wilderness environment and views	• Avoidance of key viewscape locations • Creation of a vegetative buffer where feasible • Locating river crossings near existing infrastructure	Short-term, Project Study Region and Low Magnitude. **Low (-)** **Not Significant**
Long-term presence of permanent ROW	Changed landscape	• Route selection and maintenance of vegetative buffer	Long-term, Project Study Region and Low Magnitude **Low (-)** **Not Significant**
Heritage Resources			
Short-term construction activities	Potential inadvertent discovery of unknown heritage sites along the ROW.	• Route selection has avoided known heritage sites • Yukon Energy's EMS best practices for Heritage Site Identification and Avoidance will be followed • Archaeologist present during construction in areas with high potential for heritage resources	Short-term, Project Site Area and Low Magnitude. **Negligible** **Not Significant**

Short-term effects on social context VCs caused by the Project will result from disruptions due to construction, maintenance and decommissioning activities in the ROW that cause wildlife to scatter or that impact on vegetation in the area and may interfere with traditional community and family life activities in the Route Study Area. Activities and the presence of people and equipment may also have short-term impacts on aesthetics. There may also be short-term impacts on heritage resources through the discovery of artefacts in the ROW.

Route selection has avoided, where feasible, key resource use areas (including heritage resource sites) and viewscapes. Project substations have also been located near previously disturbed areas. Where the route traverses near areas where artefacts may be found Yukon Energy's EMS best practices for Heritage Site Identification and Avoidance will be applied. It is expected that with route selection, short-term Project adverse effects on community and family life, heritage resources and other social context VCs will be low in magnitude and not significant.

There may be long-term positive and negative social context VC effects with regard to increased access to traditional use areas along the ROW for community members and for others from outside the community, as well as long-term impacts on the perception of wilderness and aesthetics in the Route Study Area due to the presence of a permanent transmission line ROW. It is expected that careful route selection and the use of a vegetative buffer where feasible to screen the transmission line ROW will mitigate adverse effects due to changes in the landscape and alterations to the perception of wilderness environment. In addition, Yukon Energy's EMS best practices will also be applied with regard to access and maintenance.

Long-term residual adverse effects on social context VCs are expected to occur within the Project Study Region. It is expected that any residual effects on social context VCs in the Project Study Region stemming from the long-term presence of a transmission ROW in the Route Study Area will be low in magnitude and not significant; in the case of the MS ROW, long-term effects will be gradually reversed in most areas after the line is decommissioned.

8.6 ENVIRONMENTAL PROTECTION AND MONITORING

The Executive Committee is required to consider the need for any monitoring of environmental or socio-economic effects of any project or activity conducted in Yukon under Section 42(2)(a). Such monitoring may ensure the implementation and success of any required mitigation measures undertaken. Monitoring and follow-up also helps to determine the accuracy of any assumptions made with regard to the project during the assessment, as well as test the accuracy of any predictions made regarding the project's effects subsequent to the completion of the project and the commencement of operations. Such follow-up monitoring may also help to detect any unanticipated project effects and determine whether any additional mitigation is required to ensure that no significant adverse effects result from the operation of the project.

Most of the mitigation adopted in the assessment relates to route selection, and thus offers a high degree of certainty. In addition, specific external monitoring of this element will also be provided as noted in the MOU with NTFN. Similar clarity and certainty is provided for the extensive additional mitigation measures set out as part of Yukon Energy's EMS best practices, standard DFO requirements in sensitive riparian areas, seasonal controls committed on certain construction activities, and specific design measures adopted for the facilities as required in certain areas. On certain measures, such as future access management control measures, processes have been set out to work as needed with other parties to establish appropriate arrangements. Overall, the nature of the proposed Project activity and the related assessment predictions are such as to require only minimal consideration of additional monitoring or follow up measures to determine the accuracy of any assumptions made with regard to the Project during the assessment, to test the accuracy of any predictions made regarding the Project's effects, or to detect any unanticipated Project effects and determine whether any additional mitigation is required to ensure that no significant adverse effects result from the operation of the Project.

Consistent with best practices to direct in-field construction and maintenance activities, an EPP for the Project will be developed after receipt of final regulatory approvals and prior to the start of clearing and construction activities. Yukon Energy is committed to an environmental protection and monitoring program which will extend through all phases of the project's construction, operation and maintenance, and decommissioning.

8.6.1 EPP and Monitoring Approach

The EPP will encompass the following goals with respect to construction, operations and maintenance and decommissioning activities:

- Facilitate mitigation of environmental effects throughout the full-life cycle of the Project by providing construction and maintenance personnel with clear instructions on mitigation measures to be implemented (based on the commitments in this Project Proposal as well as any additional requirements resulting from regulatory approvals and permitting) and on the appropriate lines of communication and means of reporting to be followed;
- Incorporate issues and concerns identified in the PIP process;
- Identify modifications to construction methods or schedules, summarize environmental sensitivities and mitigative actions, and list emergency response plans and reporting protocols, including mitigation of potential hazards to public safety;
- Provide specific information on waste management practices to be utilized during the construction phase of the Project, including all liquid and solid wastes generated; and
- Monitor clearing and construction practices to ensure that the work proceeds in accordance with the EPP.

8.6.2 EPP and Monitoring Plans

The EPP will play a critical role in ensuring no significant adverse effects result from the Project and will be used for the following purposes: to ensure protection of the environment; to ensure that all personnel exercise due diligence in carrying out activities; and to evaluate the effectiveness of measures used to prevent or minimize environmental effects. The following monitoring programs will be established for the project:

- Compliance monitoring;
- Baseline monitoring; and
- Environmental effects monitoring.

8.6.2.1 Compliance Monitoring

An environmental compliance monitoring program will ensure that commitments made to regulatory authorities and others are implemented through all phases of Project development. Activities in each phase are subject to relevant legislation, regulation and guidelines, as well as to commitments made in the Project Proposal and the subsequent EPP.

Pre-construction monitoring will be undertaken in order to help mitigate any potential avoidable environmental site-specific impacts during the construction phase of the project. This will include a botanical/rare plant survey along the ROW, focusing on site-specific areas with the greatest potential for rare species. Locations of rare plants found and measures for mitigation will be specified in the EPP. For heritage resources, ongoing management of potential heritage resource sites (consistent with the commitments in the Project Proposal) will include construction on-site monitoring by an archaeologist at specific sites considered to be of high potential archaeological value.

8.6.2.2 Environmental Effects Monitoring

Under YESAA effects monitoring is defined as the monitoring of environmental and socio-economic effects, or of the effectiveness of mitigative measures. Section 42(2)(a) of YESAA sets out that the Executive Committee must take the need for effects monitoring into consideration.

The objectives of the environmental effects monitoring are to assess the accuracy of any predictions made in the Project Proposal concerning potential effects. Overall, as noted above, the nature of the proposed Project activity and the related assessment predictions are such as to require only minimal consideration of additional monitoring or follow up measures to determine the accuracy of any assumptions made with regard to the Project during the assessment, to test the accuracy of any predictions made regarding the Project's effects, or to detect any unanticipated Project effects and determine whether any additional mitigation is required to ensure that no significant adverse effects result from the operation of the Project.

Following construction and clean-up activities, a post-construction inspection of the proposed transmission facilities will be undertaken to identify any potential problems and a post-construction inspection report will be prepared. Both aerial and ground surveys will be used to conduct the inspection. If problem areas are noted, site-specific rehabilitation programs will be identified in the inspection report, implemented, and the problem areas will be monitored.

Monitoring during the operations and maintenance phases of the Project will continue and will be conducted through routine aerial and ground patrols. General environmental conditions will continue to be monitored.

9.0 ACKNOWLEDGEMENT AND CERTIFICATION

The information submitted in this Project Proposal is required for the purpose of conducting a screening under the Yukon Environmental and Socio-economic Assessment Act. I acknowledge that, pursuant to section 119 of the Act, a copy of this Project Proposal will be placed on a public register and be available to any member of the public to review.

I understand that misrepresenting or omitting information required for the evaluation may cause delays in the screening or render the recommendation invalid.

I certify that the information provided is true and correct to the best of my knowledge and belief.

October 5, 2006

David Morrison
President & CEO
Yukon Energy Corporation

Date

10.0 GLOSSARY AND REFERENCES

10.1. GLOSSARY OF ACRONYMS AND TERMS

10.1.1 List of Acronyms

ASL:	Above Sea Level
BC:	British Columbia
C:	Celsius
CCME::	Canadian Council of Ministers of the Environment
CEA:	Cumulative Effects Assessment
CEAA:	Canadian Environmental Assessment Agency
COSEWIC:	Committee on the Status of Endangered Wildlife in Canada
CPAWS:	Canadian Parks and Wilderness Society
CS:	Carmacks-Stewart Transmission Project
CSA:	Canadian Standard Association
CWS:	Canadian Wildlife Service
CWQI::	Canadian Water Quality Index
dBA:	A-weighted decibels
DFO:	Department of Fisheries and Oceans
EA:	Environmental Assessment
EARP:	Environmental Assessment and Review Process
EIA:	Environmental Impact Assessment
EIS::	Environmental Impact Statement
EMF:	Electric and magnetic field
EMS:	Environmental Management System
EMR:	Energy Mines and Resources
EPP:	Environmental Protection Plan
FISS:	Yukon Fisheries Information Summary System
FN:	First Nation
G:	Government
GHG::	greenhouse gas
GIS::	Geographic Information System
GPS:	Global Positioning System
GWh:	Gigawatt hours
Ha:	hectares
HEB:	Oceans Habitat & Enhancement Branch
HPW:	Department of Highways and Public Works
IJC:	International Joint Commission
Km:	kilometre
kV:	kilovolt
KWA:	Key Wildlife Areas

LOI:	Letter of Intent
LSCFN:	Little Salmon/Carmacks First Nation
m:	metres
MD:	Mayo-Dawson
MOU:	Memorandum of Understanding
MS:	Minto Spur Transmission Project
NGO:	Non-government organizations
NND:	Nacho Nyak Dun First Nation
NOx:	Nitrogen Oxides
NTFN:	Northern Tutchone First Nations
NTS:	National Topographic Systems
OCP:	Official Community Plan
OP:	Other Public
PIP:	Public Involvement Program
PPA:	Purchase Power Agreement
Project Proposal:	Project Proposal Submission
Proponent Guide:	Proponent Guide to Information Requirements for Executive Committee Project Proposal Submissions
PYLL:	Potential Years of Lost Life
the Resource Plan:	20 Year Resource Plan
RFP:	Request for proposals
RMO:	Resource Management Officer
ROW:	Right-of-Way
RRC:	Renewal Resource Council
RSF:	Rate Stabilization Fund
SARA:	Species at Risk Act
SEEA:	Socio-Economic Effects Assessment
SFN:	Selkirk First Nation
Sherwood Copper:	Sherwood Copper Corporation
Study Team:	Environmental Assessment Study Team
TDS:	total dissolved solids
the Project:	Carmacks-Stewart/Minto Spur Transmission Project
TK:	Traditional Knowledge
TSS:	total suspended solids
USGS:	United States Geological Survey
UTM:	Universal Transverse Mercator Co-ordinate System
VC:	Valued Component
WAF:	Whitehorse-Aishihik-Faro grid
WKA:	Wildlife Key Areas
WTAY:	Wilderness Tourism Association of the Yukon
YCS:	Yukon Conservation Society
YECL:	Yukon Electrical
YESAA:	Yukon Environmental and Socio-Economic Assessment Act
YESAB:	Yukon Environmental and Socio-Economic Assessment Board
YTA:	Yukon Trappers Association

YG: Yukon Government
YUB: Yukon Utilities Board
Yukon Energy: Yukon Energy Corporation

10.1.2 List of Terms

Aboriginal community: A community where most of the residents are Aboriginal (i.e., Indian, Métis, Inuit or other Aboriginal Peoples) and that has a separate form of government, provides some level of service to its residents, and has clear community boundaries.

Access road: Any road leading to the transmission line ROW or a substation.

Access trail: Any trail used for construction, operation and maintenance of the transmission line ROW or a substation.

Active labour force: All persons 15 years of age and over, who were either employed or unemployed and looking for work in the week prior to the Census day. Typically, those not considered to be part of the active labour force include full-time students, homemakers, retired workers, seasonal workers in an "off-season" who are not looking for work, and individuals with disabilities or illnesses that preclude them from being able to work.

Adaptive management: Involves the implementation of new or modified mitigation measures over the life of a project to address unanticipated environmental effects. The need for the implementation of adaptive management measures may be determined through an effective follow-up program.

Adverse effects: Negative effects on the environment and people that may result from a proposed project.

Aesthetic: Pertaining to a sense of beauty. Judgments of aesthetic value are sensory, emotional, and intellectual.

Aggregate: Gravel; crushed rock used in construction.

Alluvial: Pertaining to, contained in, or composed of, alluvium; relating to the deposits made by flowing water; washed away from one place and deposited in another; as, alluvial soil, mud, accumulations, deposits.

Alternative means of carrying out a project: The various technically and economically feasible ways, other than the proposed way, for a project to be implemented or carried out. Examples include other project locations, different routes and methods of development, and alternative methods of project implementation or mitigation.

Alternatives to a project: The functionally different ways, other than the proposed project, to meet the project need and achieve the intended purpose. For example, if a need for greater power generation has been identified, a proposed project might be to build a new power generation facility. An alternative to that project might be to increase the generation capacity of an existing facility.

Artifact: An object produced or shaped by human craft, especially a tool, weapon, or ornament of archaeological or historical interest.

Assessment: An evaluation by a designated office, a screening by the executive committee or a review by a panel of the Yukon Environmental and Socio-economic Assessment Board established by Section 8 of YESAA.

Auger: A machine having a rotating helical shaft for boring into the earth.

Authorization: A licence, permit or other form of approval that is issued or given by:

(a) the Governor in Council, a government agency, an independent regulatory agency or a municipal government, or

(b) a first nation under its final agreement or a first nation law, but does not include an access order issued under the Yukon Surface Rights Board Act or a consent given by a first nation for access to settlement land in circumstances where an access order could be issued under that Act.

Baseline: Past and current conditions in which a Valued Component exists or has existed.

Berm: Structures, generally made of earth, used to control erosion and sedimentation by reducing the rate of surface runoff. The berms either reduce the velocity of the water, or direct water to areas that are not susceptible to erosion, thereby reducing the adverse effects of running water on exposed top soil.

Biodiversity: The existence of a wide range of different species in a given area or during a specific period of time.

Board: The Yukon Environmental and Socio-economic Assessment Board established by Section 8 of the Yukon Environmental and Socio-Economic Assessment Act.

Breeding bird survey: Standardized surveys conducted during the breeding season for a given area whereby observers record the number of birds seen or heard along a travel route.

Brush: Includes trees, snags, stumps, shrubs, bushes and vines less than 12.5 cm in diameter measured at 30 cm above the highest ground contacting the base of the tree.

Buffer: An area between two different land uses that is intended to resist, absorb, or otherwise preclude developments or intrusions between the two use areas.

Bus: The heavy-duty, rigid connector that connects the circuit breakers or fuses to the incoming power.

Category A settlement land: Settlement Land where a Yukon First Nation has equivalent to fee simple title to surface and sub-surface rights. This means a Yukon First Nation has the right to use the surface of the land and the right to use what is below the surface such as minerals and oil and gas. A First Nation also has exclusive hunting rights on Category A Settlement Land. A First Nation retains aboriginal title on Category A lands.

Category B settlement land: Settlement Land where a Yukon First Nation has rights equivalent to fee simple to the surface of the lands only. There is no right to mines and minerals other than gravel and top soil (referred to as Specified Substances). The Yukon public continues to have access to Category B lands for fish and wildlife harvesting. A First Nation retains aboriginal title on Category B lands.

Centreline: A line that bisects a right-of-way into equal parts.

Chert: A compact rock consisting essentially of microcrystalline quartz.

Colluvium: The name for loose bodies of sediment that has been deposited or built up at the bottom of a low grade slope or against a barrier on that slope, transported by gravity. The deposits that collect at the foot of a steep slope or cliff are also known by the same name.

Commissioning: To put into active service.

Community knowledge: Information held by community members, such as farmers, hunters, fishers and naturalists, who are familiar with the environment in a specific geographic area. Community knowledge may be used in the environmental assessment of a proposed project. For example, fish harvesters in a specific area may know where the best “fishing spots” are, and therefore may contribute to identifying potential fish habitat.

Compliance monitoring: A broad term for a type of monitoring conducted to verify whether a practice or procedure meets the applicable requirements prescribed by legislation, internal policies, accepted industry standards or specified terms and conditions (e.g., in an agreement, lease, permit, license or authorization). Mitigation monitoring is one type of compliance monitoring.

Conductor: Any material that will readily carry a flow of electricity. In the context of transmission lines, each of the three wires comprising a circuit is referred to as a conductor.

Confluence: The point of juncture of two or more streams (or other waterways).

Conservation: Any various efforts to preserve or restore the earth’s natural resources, including such measures as: the protection of wildlife; the maintenance of natural prairie grasses, wetlands or wilderness areas the control of air and water pollution and the prudent use of farmland, mineral deposits, and energy supplies.

Contaminant: A form of pollutant or substance that may directly or indirectly damage humans or the environment.

Corona: An electrical discharge, frequently luminous. Corona occur on transmission lines and sub-station components, including insulators, conductors, lines, cable terminations, bushings, and transmission line surge arresters, and can indicate faulty equipment.

Corridor: A narrow tract of land forming a passageway

Council: The Council for Yukon Indians or any successor to it or, in the absence of a successor, the first nations named in the schedule to the Yukon First Nations Land Claims Settlement Act.

Course of action: The action that a responsible authority may or may not take in relation to a project as a result of the environmental assessment decision.

Cover: Vegetation such as trees or undergrowth that provides shelter for wildlife.

Crawler tractor: A vehicle with tracks instead of wheels. The tracks spread the weight of the vehicle across a larger area, resulting in a lower ground pressure compared to wheels. This makes them very well suited for use on soft ground, mud and snow.

Critical habitat: As defined in the Species at Risk Act, "critical habitat" means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species.

Crown Corporation: A state-controlled company or enterprise.

Cumulative effects: The likely effects of the project in combination with the likely effects of other past, existing and future projects and activities. To be considered a cumulative effect, the other past, existing and future projects being considered in the assessment must affect a VC that is also being affected by the principal project; in this way the projects act cumulatively upon a valued component.

Danger tree: Any tree outside the specified clearing boundaries determined by Yukon Energy's Representative to be a hazard to the security of the transmission system.

dBA: A-weighted decibels, though originally intended for the measurement of low-level sounds, are not commonly used for the measurement of environmental noise and industrial noise.

Dead-end structure: Transmission line towers made of heavier gauge steel that equalize stresses on the conductors and which are normally located at angle points and large spans.

Debitage: Lithic debris and discards found at the sites where stone tools and weapons were made.

Decision body: Under YESAA this refers to:

(a) A first nation, if the project is to be located wholly or partly on its settlement land and
   (i) the first nation has the power under the Yukon First Nations Self-Government Act or under its final agreement to issue an authorization that is required for the project to be undertaken,
   (ii) the first nation is a proponent of the project, has the power to grant an interest in land that is required for the project to be undertaken or has received an application for financial assistance for the project, or

(iii) no decision document is required for the project from any federal agency or the territorial minister;

(b) the territorial minister, if any territorial agency, municipal government or territorial independent regulatory agency

(i) has the power to issue an authorization that is required for the project to be undertaken,

(ii) in the case of a project to be located wholly or partly on non-settlement land, is a proponent of the project, has the power to grant an interest in land that is required for the project to be undertaken or has received an application for financial assistance for the project, or

(iii) is responsible for the administration of mines and minerals in category B or fee simple settlement land or Tetlit Gwich'in Yukon land, where the project involves a right to work those mines and minerals;

(c) any federal agency that

(i) has the power to issue an authorization that is required for the project to be undertaken,

(ii) in the case of a project to be located wholly or partly on non-settlement land, is a proponent of the project, has the power to grant an interest in land that is required for the project to be undertaken or has received an application for financial assistance for the project, or

(iii) is responsible for the administration of mines and minerals in category B or fee simple settlement land or Tetlit Gwich'in Yukon land, where the project involves a right to work those mines and minerals;

(d) the federal minister, if the project is to be located wholly or partly on non-settlement land, no other federal agency is a decision body under paragraph (c) and

(i) the territorial minister is not a decision body, or

(ii) the territorial minister is a decision body and

(A) the Governor in Council has the power to issue an authorization that is required for the project to be undertaken, or

(B) a federal independent regulatory agency is a proponent of the project, has the power to issue such an authorization or has received an application for financial assistance for the project; or

(e) the federal minister, if the project is to be located wholly on settlement land and

(i) the Governor in Council or a federal independent regulatory agency has the power to issue an authorization that is required for the project to be undertaken, or

(ii) a federal independent regulatory agency has received an application for financial assistance for the project.

Decision document: A decision document issued by a decision body under section 75, 76 or 77 of YESAA.

Decommission: To take out of active use (typically involves the dismantling and removal of the original structure(s) and associated facilities).

Deflection: A deviation or a specified amount of deviation from a given point.

Demographic: Information pertaining to human population dynamics, including the size, structure and distribution of populations, and how populations change over time due to births, deaths, migration and ageing. Demographic analysis can relate to whole societies or to groups defined by criteria such as education, nationality, religion and ethnicity.

Density: The number of individuals in relation to the space in which they occur.

Designated office: An office maintained under subsection 22(1) of YESAA.

Determination of significance: Taking into account the implementation of appropriate mitigation measures, a conclusion about whether adverse environmental effects are likely to be significant. The significance of adverse environmental effects is determined by a combination of scientific data, regulated thresholds, standards, social values and professional judgment. For example, the ecological context of a project may be a determinant of whether likely adverse effects are significant.

Direct effect: The initial, immediate effects caused by a specific activity. This may include:

- a change that a project may cause in the environment; or
- a change that the environment may cause to a project.

Direction or nature of the effect: positive, neutral, or negative/adverse; in the case of socio-economic effects, as noted in the YESAB Guides, effects may at times be considered to be both positive and negative.

Distribution system: The wood poles, conductors, and transformers that deliver electricity to customers. It transforms higher voltage to lower voltage, usable levels.

Disturbance : A disruption in the normal functioning of an organism or system.

Domestic Resource Use: The harvest of natural resources for personal use or consumption (i.e., not sold).

Drainage basin: A region of land where water from rain or snowmelt drains downhill into a body of water, such as a river, lake, dam, estuary, wetland, sea or ocean. Each drainage basin is separated topographically from adjacent basins by a ridge, hill or mountain, which is known as a water divide or sometimes a watershed.

Duration of the effect: How long the effect would last. Effects may be considered low, moderate or high. Low effects are short term, lasting less than one year or not materially beyond the duration of the construction phase or the decommissioning phase of the Project. Moderate effects are medium term, lasting from 1 to 10 years or no more than one-generation span of the species affected. High effects are long term, lasting more than 10 eyras or more than one generation of the species affected or lasting throughout a major portion of the operations phase of the Project.

Easement: The permission or right to use a defined area of land for a specific purpose such as transmission line rights-of-way.

Ecodistrict: Integrated map units characterized by relatively homogeneous physical landscape and climatic conditions. Subdivisions of an ecoregion.

Ecological or Socio-Economic Context: The sensitivity to environmental or socio-economic disturbance, capacity to adapt to change. This may be ranked as low, moderation or high; where ranked low, the VC is resilient to imposed change, where ranked moderate the VC has some capacity to adapt to imposed change and where ranked high the VC is fragile and has low resilience to imposed change.

Economic leakage: The fraction of money which is not re-spent in the circular flow of money through the economy. Leakages typically include personal savings and the purchase of imported goods.

Ecoregion: An integrated map unit characterized by a unique combination of landscape physiography and ecoclimate. Subdivisions of an ecozone.

Ecosystem: A functional unit consisting of all living organisms (plants, animals, microbes, etc.) in a given area, and all non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be any size (e.g., a log, pond, forest) but always functions as a whole unit.

Ecozone: Areas of the earth's surface representative of very generalized ecological units that consist of a distinctive assemblage of physical and biological characteristics.

Effects monitoring: The monitoring of environmental and socio-economic effects, or of the effectiveness of mitigative measures.

Elevation: An indication of the vertical distance of a point above or below sea level, expressed in metres.

Emission: A substance discharged into the air; the giving off of gases from industrial processes or engine exhaust from transport vehicles.

Employment Rate: The proportion of individuals in the active labour force that have a job. This includes all persons working for wages or salaries, all self-employed persons (with or without paid help) working in their own business, farm or professional practice, and all persons working without pay on a family farm or business during the reference week.

Endangered: As defined by COSEWIC: a species facing imminent extirpation or extinction.

Environment: The components of the Earth and includes:

(a) air, land and water;
(b) all layers of the atmosphere;
(c) all organic and inorganic matter and living organisms; and

(d) the interacting natural systems that include the components referred to in (a) to (c).

Environmental component: Fundamental element of the physical, biological or socio-economic environment, including the air, water, soil, terrain, vegetation, wildlife, fish, birds and land use that may be affected by a proposed project, and may be individually assessed in the environmental assessment.

Environmental Management System (EMS): Part of an organization's overall management practices related to environmental affairs. It includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining an environmental policy. This approach is often formally carried out to meet the requirements of the International Organization for Standardization (ISO) 14000 series.

Environmental monitoring: Periodic or continuous surveillance or testing, according to a predetermined schedule, of one or more environmental components. Monitoring is usually conducted to determine the level of compliance with stated requirements, or to observe the status and trends of a particular environmental component over time.

Erosion: Physical and chemical breaking down and transportation of geologic material.

Executive committee: The executive committee of the Board established by section 8 of YESAA.

Existing project: An activity that has been undertaken or completed and that, if proposed to be undertaken, would be subject to assessment under section 47 of YESAA.

Eyrie: Variant of aerie, and referring to the nest of a bird of prey, typically built at high altitude.

Fauna: The animal life of a region.

Federal minister: With regard to YESAA this means the Minister of Indian Affairs and Northern Development, unless another member of the Queen's Privy Council for Canada is designated by the Governor in Council as the federal minister for the purposes of this Act.

Fee simple settlement land: Land that is, or is to be treated as, fee simple settlement land, as referred to in the definition "settlement land". Settlement Land owned under the same form of fee simple title as is commonly held by individuals who own land. For example, buying an individual lot in a subdivision will normally be held in fee simple title.

Feller buncher: A piece of forestry machinery equipped with an attachment that cuts trees in place. It consists of a standard heavy equipment base with a tree-grabbing device furnished with a circular saw or a shear - a pinching device designed to cut small trees off at the base. The machine then places the cut tree on a stack suitable for a skidder or forwarder, or other means of transport (yarding) for further processing.

Final agreement: A final agreement within the meaning of the Yukon First Nations Land Claims Settlement Act or the agreement contained in Appendix C to the Gwich'in Agreement.

Financial assistance: A payment, loan or loan guarantee, but does not include:

(a) a refund, remission, reduction or deferral, or any other form of relief from the payment, of a tax, duty or fee, other than relief provided by law to permit the undertaking of an activity specifically named in the law;

(b) assistance for anything done preliminary to a project, such as a feasibility study, that does not have effects on the environment; or

(c) assistance for an environmental or socio-economic study undertaken in relation to the assessment of a project, except a study that itself comprises a project.

Firm power: Power (electricity) that must be supplied as agreed under contract, even under adverse conditions.

Fish Habitat: Spawning, nursery, rearing, food supply and migration areas upon which fish depend

First Nation: A Yukon First Nation, within the meaning of the Umbrella Final Agreement, and includes the Gwich'in Tribal Council, in relation to consultation, or the Tetlit Gwich'in, in relation to any other matter.

Flora: The plant life of a specific area or locality.

Flow: Motion characteristic of fluids (liquids or gases); any uninterrupted stream or discharge.

Fluvial: Refers to all topics associated with the flow of water. Fluvial usually refers to rivers, streams and sometimes through flow, overland flow and percolation. It may also refer to glaciers and oceans, though these are usually known as glacial, oceanic and coastal.

Footprint: The surface area occupied by a structure or activity.

Fragmentation: See Habitat Fragmentation.

Frequency of the effect: Refers to how often an impact would occur, and may be ranked as low, moderate or high. Low frequency means the effects would never occur, occur once or seldom occur. Moderate frequency means the effect would occur occasionally. High frequency means the effe**ct would** occur continuously, on a regular basis or at regular intervals.

Furbearer / furbearing mammals: Referring to those mammal species that are trapped for the useful or economic value of their fur.

Generating Station: A generating station is a structure that produces electricity. It can be run many different ways, including by burning coal or natural gas, or by using water (hydro) power. If it uses water, the station will normally be a dam, with turbines inside.

Geographic or socio-economic extent of the effect: May be ranked as low, moderate or high. Where there is a low geographic extent the effect extends only within the Project footprint or Project Site Area; for socio-economic effects this includes residents and activities in the Route Study Area other than communities. Where there is a moderate geographic extent the effect extends beyond the footprint and is within the Project Study Region; for socio-economic effects the effects would extend to a moderate number of people within a definable group in this region. Where there is a high geographic extent the effect extends beyond the Project Study Region and is within Yukon, or extends outside Yukon. For socio-economic effects the effect may extend to a major portion of a definable group of people, e.g., a major portion of specific communities.

Geographic Information System (GIS): A computerized information system which uses geo-referenced spatial and tabular databases to capture, store, update, manipulate, analyze, and display information.

Geomorphic: Of or resembling the earth or its shape or surface configuration.

Gigawatt: A Gigawatt is the unit of electrical power equivalent to one billion watts or one million kilowatts.

Glacial till: Till is an unsorted glacial sediment. Glacial drift is a general term for the coarsely graded and extremely heterogeneous sediments of glacial origin. Glacial till is that part of glacial drift which was deposited directly by the glacier. It may vary from clays to mixtures of clay, sand, gravel and boulders.

Glaciofluvial: Pertaining to the meltwater streams flowing from wasting glacier and especially to the deposits and landforms produced by streams.

Glaciolacustrine silts: Sediments pertaining to, derived from, or deposited in glacial lakes.

Government agency: A federal agency or a territorial agency.

Government fiscal flows: The composition and level of government revenues and expenditures. Revenues are generally collected through direct and indirect taxation or bond issuance, and expenditures typically include operations, capital investment and transfers.

Greenhouse gas: Gaseous components of the atmosphere that contribute to the "greenhouse effect". Some greenhouse gases occur naturally in the atmosphere, while others result from human activities. Naturally occurring greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Certain human activities, however, add to the levels of most of these naturally occurring gases.

Grid power: An electrical power transmission system over a large area is often referred to as the grid. Redundant paths and lines are provided so that power can be routed from any power plant to any load center, through a variety of routes, based on the economics of the transmission path and the cost of power. Power that is supplied from such a system is referred to as grid power.

Groundwater: The portion of sub-surface water that is below the water table, in the zone of saturation.

Guy wires: A metal wire used to aid stability in tall structures. It is attached to the structure on one end and the ground on the other.

Habitat: The area or environment where an organism or ecological community normally lives or occurs. It is the space uniquely suited to required functions (e.g., breeding) through the arrangement of food, water, shelter, and cover.

Habitat fragmentation: The process of environmental change resulting from the emergence of discontinuities in an organism's preferred habitat. Habitat fragmentation can be caused by geological processes that slowly alter the layout of the physical environment or by human activity such as land conversion, which can alter the environment on a much faster time scale.

Habitat Protection Area: An area identified as requiring special protection under Yukon's Wildlife Act. It is an area where disturbance to wildlife, or to the plants on which it depends, could lead to the decline of a species or population. It may be an area where a wildlife species is concentrated at certain times of year, a habitat type that is rare in the Yukon or a site that is particularly fragile. Habitat Protection Areas can provide the buffering and linkage of core protected areas described in the Yukon Protected Areas Strategy.

Hand clearing: clearing vegetation in sensitive areas using tools carried by hand such as chain saws, brush saws, axes or similar equipment.

Heavy equipment: That type of machinery used in clearing operations, such as skidders, crawler tractors, loaders and tree shears and does not include hand-held equipment or vehicles approved for travel on access roads.

Hectare (ha): A metric unit of square measure equal to 10,000 square metres or 2.471 acres.

Herbicide: A product used to destroy or inhibit plant growth.

Heritage resource:

(a) a moveable work or assembly of works of people or of nature, other than a record only, that is of scientific or cultural value for its archaeological, palaeontological, ethnological, prehistoric, historic or aesthetic features;
(b) a record, regardless of its physical form or characteristics, that is of scientific or cultural value for its archaeological, palaeontological, ethnological, prehistoric, historic or aesthetic features; or
(c) an area of land that contains a work or assembly of works referred to in paragraph (a) or an area that is of aesthetic or cultural value, including a human burial site outside a recognized cemetery.

Heritage site: A heritage site is a location where a landmark of natural or cultural importance is legally protected. Heritage resources in the Yukon are protected under the *Historic Resources Act* and are defined as (i) historic sites, (ii) historic objects, and (iii) any work or assembly of works of nature or human endeavour that is of value for it archaeological, palaeontological, pre-historic, historic, scientific, or aesthetic features.

Hiab: Hiab, or Hydrauliska Industri AB, is a Finnish manufacturer of loader cranes, demountable containers, forestry cranes, truck-mounted forklifts and tail lifts. The term in some countries is used as a synonym for loader cranes of any make (as is the case here).

Hydroelectric power: Hydroelectric power is electricity harnessed from the energy of moving or falling water. Most hydroelectric power comes from the potential energy of dammed water driving a water turbine and generator.

Hydrology: The science dealing with the properties, distribution and circulation of water.

Hydrograph: Hydro (meaning water) and graph (meaning chart) refers to a record of discharge (flow) in a stream or river through time.

Ice jamming: Melting ice becomes trapped in narrow reaches of the river resulting in flooding upstream.

Impact: A positive or negative effect of a disturbance on the environment or a component of the environment.

Indirect effect: A effect caused by a given action but occurring later in time or further removed in distance.

Infrastructure: The basic features needed for the operation or construction of a system or community (e.g. roads, utilities etc.).

Insulators: An insulator is a material or object which contains no movable electrical charges. When a voltage is placed across an insulator, no charges flow, so no electric current appears.

Interested publics/ other publics: Any person or body having an interest in the outcome of an assessment, for a purpose that is not frivolous or vexatious, and includes:

(a) the Fish and Wildlife Management Board established under the Umbrella Final Agreement, in relation to a project that is likely to affect the management and conservation of fish or wildlife or their habitat;
(b) the salmon subcommittee of the Fish and Wildlife Management Board, in relation to a project that is likely to affect the management and conservation of salmon or their habitat; and
(c) a renewable resource council established under a first nation's final agreement, in relation to a project that is likely to affect the management and conservation of fish or wildlife or their habitat within the traditional territory of that first nation.

Intermontane plain: Geographic term referring to a largely area of land, with generally low relief, located between mountains.

Invasive Species: noxious weeds or other vegetation which are not native to a particular habitat. These species may be harmful to the existence of other plants or may be unwanted, wild or feral plants that may be harmful to human, animal or property.

Journeyman: A tradesman who may well have completed an apprenticeship but is not yet able to set up his or her own workshop as a master.

Kilovolt (kV): A volt is the unit of electrical force or potential that causes a current to flow in a circuit. One kilovolt (kV) is equal to 1,000 volts.

Kilowatt (kW): The unit of power equivalent to 1,000 watts.

Kilowatt Hour (kWh): The unit measure of electrical power equivalent to use of 1,000 watts for a period of one hour (e.g., ten 100-watt light bulbs switched on for one hour would use one kWh [or 1,000 watts for one hour]).

Kinnikinnick: Common term for bearberries, or three species of dwarf shrubs adapted to arctic and sub-arctic climates.

Lacustrine: Of, pertaining to, or inhabiting lakes.

Labour Force Participation Rate: The labour force available in the week (Sunday to Saturday) expressed as a percentage of the population 15 years of age and over.

Land Use Permit: A Land Use Permit allows you to do a specific activity over a specified period of time. It does not give you any exclusive rights or tenure to the land.

Letter of Intent (LOI): A document outlining an agreement between two or more parties before the agreement is finalized.

Likelihood: The degree of certainty of an event occurring. Likelihood can be stated as a probability.

Lithic: An artifact consisting of stone

Magnitude of effect: The level of detectability of effect, which for the purposes of assessment may be described as low, moderate and high. Effects described as low are unlikely to be detectable or measurable, or are below established thresholds or acceptable change; for some environmental assessments this means that less than 5% of the VC population or area is affected. Effects described as moderate could be detectable within normal range or variation with a well designed monitoring program, or below established thresholds of acceptable change. For some environmental assessments, from 5-10%of the VC population may be affected. Effects described as high would be readily detectable without a monitoring program and outside normal range of variation, or exceeds established thresholds of acceptable change. For some environmental assessment, greater than 10% of the VC population may be affected.

Marshalling area or yard: An open area used to stock-pile, store and assemble construction materials.

Megawatt (MW): A watt is the unit used to measure electric power. A megawatt (MW) is 1,000,000 watts.

Memorandum of Understanding (MOU): A legal document describing an agreement between parties.

Merchantable: A tree or a stand of trees that has reached maturity (rotation age and/or size) and is suitable and/or ready for harvest.

Mitigation (mitigative measures): measures for the elimination, reduction, or control of adverse environmental or socio-economic effects, which include:

(a) Avoiding effects altogether by not taking a certain action or parts of an action.
(b) Minimizing effects by limiting the degree of magnitude of the action and its implementation.
(c) Rectifying the effects by repairing, rehabilitating, or restoring the affected environment.
(d) Reducing or eliminating the effects over time by preservation and maintenance operations during the life of the action.
(e) Compensating for effects by replacing or providing substitute resources or environments.

Moiety: Term used to describe each descent group in a culture which is divided exactly into two descent groups.

Monitoring: Any on-going process or program for measuring the actual effects of constructing or operating a development.

Nodwell: a tracked vehicle for utility applications, often equipped with a man-lift bucket, backhoe, or post-hole auger.

Non-productive Land: Includes all forest land not capable of producing timber of merchantable size.

Non-settlement land:

(a) land other than settlement land;
(b) water lying on or flowing through land, including settlement land; or
(c) mines and minerals, other than specified substances, in category B or fee simple settlement land or Tetlit Gwich'in Yukon land.

Not sufficiently regenerated land: land that is still in the process of recovering from prior forest fire activity.

Organic material: Refers to any material that is capable of decay or of being decomposed or is the product of decomposition, and is usually the remains of a recently living organism, and may also include still-living organisms. Also called organic matter.

Orthographic photos: An aerial photographs that have been geometrically corrected ("orthorectified") such that the scale of the photograph is uniform, meaning that the photo can be considered equivalent to a map.

Overburden: The soil (including organic material) or loose material that overlies bedrock.

Panel of the Board: A panel established under subsection 65(1), paragraph 93(1)(a) or subsection 95(1), 103(1) or 105(1) of YESAA.

Permafrost: Permafrost is defined on the basis of temperature, as soil or rock that remains below 0°C throughout the year, and forms when the ground cools sufficiently in winter to produce a frozen layer that persists throughout the following summer.

Phase: Describes the distinct time periods in which project related effects accrue. There are three phases associated with the project: Construction, Operation and maintenance, and Decommissioning.

Physiography: A description of the natural features of the surface of the earth.

Plan: Any plan, program, policy or proposal that is not a project or existing project.

Pole framing: The construction of poles and corner towers, including cross arms, bracing, and preparation of foundation for poles.

Pole setting: Pole setting involves the installation of poles in the ground. This includes digging the holes with an auger or drill, placing the poles upright into the holes, and screwing in anchors to hold the pole in place.

Poorly Drained Soils: Poorly drained soils are typically deposited on locally shallowly sloping terrain and tend to accumulate water due to the site's inability to drain water away from the location, poor soil percolation potential or a combination of both.

Potential labour force: All persons in a given population, excluding institutional residents, age 15 years and over.

Power grid: A network of electric power lines and associated equipment used to transmit and distribute electricity over a geographic area; or, the network of transmission lines that link all generating plants in a region with local distribution networks to help maximize service reliability

Probability: The chance or possibility that a specific event will occur.

Project: An activity that is subject to assessment under section 47 or 48 and is not exempt from assessment under section 49 of YESAA. For the purposes of this submission document it is the Carmacks-Stewart/Minto Spur Transmission Project.

Project Site Area: The area that contains the transmission line right-of-way and footprint areas ultimately needed for the Project construction and operation. This is the ultimate footprint area for the project. Mapping of the preferred route describes in effect an area of about 100 m width within which the Project Site area will be located.

Project Study Region: The portion of the Northern Tutchone Planning Region between Carmacks and Mayo that is generally in close proximity to the Klondike Highway and the existing access road from the Klondike Highway to the Minto mine site.

Proponent: Proponent, in relation to a project or other activity, means a person or body that proposes to undertake it, or a government agency, independent regulatory agency, municipal government or first nation that proposes to require — under a federal or territorial law, a municipal by-law or a first nation law — that it be undertaken.

Public Consultation and Involvement Program (PIP): A plan developed by Yukon Energy describing public consultation and involvement activities being carried out in 2006. It was provided to YESAB in January 2006 (See Appendix 4A for a copy of the PIP Plan).

Purchase Power Agreement (PPA): An agreement to be negotiated between Yukon Energy and Minto mine setting tout the respective rights and obligations between the parties with regard toe the supply and purchase of electrical power.

Push brace: A wood brace attached to a wood pole supporting an overhead service. The push brace is attached to the same side of the pole as the service drop cable, to prevent tension on the cable from pulling the pole over.

Range: The geographical area where a species can be found.

Raptor: A bird of prey (for this study, includes eagles, hawks, falcons, owls and osprey).

Rate stabilization fund: Governments have over the years supported a series of rate relief programs. These programs have been funded by Yukon government contributions or at times directly by the Yukon Development Corporation. In 1998 after the Faro mine closed, the territorial government provided $10 million for the Rate Stabilization Program. The annual cost of this program is approximately $3.5 million and it reduces Yukoners' electricity bills by as much as a third. This fund is now being operated from internal funds provided by the Yukon Development Corporation. The program has been extended until March 31, 2007.

Ratepayer: A person who pays a regular charge for the use of a public utility, as gas or electricity, usually based on the quantity consumed.

Rare: Infrequently occurring in Yukon or uncommon.

Reactor: A device whose primary purpose is to introduce reactance into a circuit.

Reconnaissance: An examination or survey of a region in reference to its general geological character (e.g., wildlife occurrence in Project area).

Recreational: Where the primary intent is enjoyment.

Regeneration: The renewal of the natural vegetation, either by natural or artificial means.

Registered Trapping Concession: A parcel of land on which the holder is given exclusive rights to harvest furbearing animals.

Regulatory: Relating to a regulation or pertaining to legal requirements.

Remediation: The act or process of correcting a fault or deficiency

Renewable Resources Council (RRC): The Yukon First Nation Final Agreement provided for the establishment of Renewable Resources Councils (RRC's) in each of First Nation's Traditional territories. Acting as independent public interest advisory bodies, the RRC's may make recommendations on any matter related to fish and wildlife conservation, the establishment of Special Management Areas and to forest resources management.

Residual Effects: Effects of a project that are expected to remain after mitigation measures have been implemented.

Re-vegetation: The reestablishment and development of self-sustaining plant cover on disturbed sites. This may require human assistance such as ground preparation and reseeding or the natural vegetation of the area will be encouraged to re-grow in the area.

Right-of-Way (ROW): Area of land cleared and maintained to accommodate a structure such as a road or a transmission line.

Riparian: Along the banks of rivers and streams.

Riparian Zone: The interface between land and a water body. They are typically characterized by hydrophilic vegetation and are often subject to flooding. Riparian zones are associated with water bodies and wetland areas.

Route Study Area: This is the area defined in MOU between NTFN and Yukon Energy to guide the selection of a preferred route and Project Site Area for the Project, consisting of conceptual 500m wide study areas for the Carmacks Stewart/Minto Spur Transmission Project route running generally along the Klondike Highway from Carmacks to Stewart Crossing and routing options for the Minto Spur Project generally alongside the existing access road to the Minto Mine.

Rut: A furrow or track in the ground, especially one made by the passage of a vehicle or vehicles.

Scoping: The iterative process of identifying issues of concern related to the project, including the selection of Valued Components (VCs), identification potential pathways of effects along with the spatial and temporal boundaries for assessing effects of the project.

Sedimentation: Deposition of suspended solids in surface water.

Sediment load: Sediment load is divided into three categories: 1) Suspended Load: Contains organic and inorganic particulate matter that is suspended in and carried by moving water. 2) Dissolved Load: All organic and inorganic material carried in solution by moving water. 3) Bed load: Coarse materials such as gravel, stones, and boulders that move along the bottom of the channel. These materials move by skipping, rolling, and sliding

Self-government agreement: Self-government agreement has the same meaning as in the Yukon First Nations Self-Government Act.

Settlement land: Land that is category A settlement land, category B settlement land or fee simple settlement land under a final agreement or under section 63 of the Yukon Surface Rights Board Act, or land that is to be treated as such by virtue of a self-government agreement, and includes Tetlit Gwich'in Yukon land, but does not include water or mines and minerals defined to be non-settlement land.

Shoreline: The narrow strip of land in immediate contact with the sea, lake or river.

Significance: A measure of the residual effects after the application of mitigation measures. Effects may be considered significant (high residual effect), potentially significant (moderate residual effect), not significant/ insignificant (low residual effect) or not significant/ negligible (no definable effects).

Slash: Debris resulting from the felling of trees and shrubs.

Socio-economic effects: Includes effects on economies, health, culture, traditions, lifestyles and heritage resources.

Soil Fixing Vegetation: Plants with root structures that grab the soil and hold it in place.

Soil liquefaction: The process by which saturated, unconsolidated soil or sand is converted into a suspension. It is commonly observed in quicksand, quick clay, turbidity currents, and as a result of earthquake shock in unconsolidated sediments. It can be caused when flowing water reduces the friction between sand particles (as from an underground spring), or when a sudden change in pressure or repeated shock acting on water saturated or supersaturated sediments (as in an earthquake).

Species: A group of inter-breeding organisms that can produce fertile offspring.

Species at risk: Plants or animals that are in danger of extinction or extirpation throughout all or a portion of their range.

Spur Line: Referring here to a transmission line of lower voltage that branches from a higher voltage transmission line, and is attached to the transmission system at only one end.

Stage: Refers to a period of development activity. There are two stages of development of the CS/MS Project.

Staging: Resting and gathering of waterfowl such as geese and ducks on a water body prior to, or during fall migration.

Stand: A community of trees sufficiently uniform in species, age, arrangement, or condition to be recognized as a separate group from the forest or other growth in the area.

Step-down transformer: Equipment that steps down high voltages and currents of the electrical power system to convenient levels for use.

Subsistence economy: An economy in which a group obtains the necessities of life through self-provisioning. In such a system wealth is not measured in any form of currency, but rather exists in the form of natural resources.

Substation: An assemblage of equipment for switching and/or transforming or regulating the voltage of electricity.

Surficial Geology: The geology of surficial deposits, including soils; the term is sometimes applied to the study of bedrock at or near the earth's surface.

Synchronous Condenser: Equipment used to automatically regulate and correct power quality. In the case of the CS development, this equipment would be located at either terminus of the transmission line within the Carmacks and Stewart Crossing substations.

Temporal: Pertaining to time.

Tangent: A line meeting another line at a common point and sharing a common tangent line or tangent plane at that point.

Tendering: Providing different groups and companies with an opportunity to bid on a job. The general principle is that the qualified bidder with the lowest price gets the job. “Open tendering” means that anyone can bid. “Restricted tendering” means that only some types of companies can bid.

Terrestrial: Living on or in the ground, or related to the ground.

Territory:

(a) in relation to a first nation for which a final agreement is in effect, that first nation’s traditional territory and any of its settlement lands within Yukon that are not part of that traditional territory;

(b) in relation to the first nation known as the Tetlit Gwich'in, the areas described in Annex A of Appendix C to the Gwich'in Agreement; and

(c) in relation to any other first nation, the geographic area within Yukon identified on the map provided by that first nation under the Umbrella Final Agreement for the purpose of delineating the first nation's traditional territory.

Thermokarst: Refers to a land surface that forms as ice-rich permafrost melts. The name is given to very irregular surfaces of marshy hollows and small hummocks. Small domes that form on the surface due to frost heaving with the onset of winter are only temporary features. They then collapse with the arrival of next summer's thaw and leave a small surface depression.

Threatened species: As defined by COSEWIC, a species likely to become endangered if limiting factors are not reversed.

Three-phase circuit: Three-phase power is a type of polyphase system to power motors and other devices. Three-phase systems may or may not have a neutral wire, which allows the three phase system to use a higher voltage while still supporting lower single phase appliances. In high voltage distribution systems it is common not to have a neutral wire as the loads can simple be connected between phases.

Threshold: A limit of acceptable change. Threshold measurements enable both project proponents and regulators to evaluate the acceptability of a project-related effects on a specific component of the environment by comparing the effects of the project against a pre-determine limit of acceptable change. Thresholds may be refined over time, as understandings of populations and ecological interactions evolve.

Topography: the relief features or surface configuration of an area.

Total suspended solids: The material residue that is left in a sample of water after it is evaporated that does not pass through a filter.

Traditional economy: A traditional economy is an economic system in which decisions such as the who, how, what, and for whom questions are all made on the basis of customs, beliefs, religion, habit, etc.

Traditional knowledge: The accumulated body of knowledge, observations and understandings about the environment, and about the relationship of living beings with one another and the environment, that is rooted in the traditional way of life of first nations.

Note: Often referred to as Aboriginal Traditional Knowledge (ATK), which is knowledge held by, and unique to Aboriginal peoples. It is a living body of knowledge that is cumulative and dynamic and adapted over time to reflect changes in the social, economic, environmental, spiritual and political spheres of the Aboriginal knowledge holders. Sometimes used interchangeably with Traditional Ecological Knowledge (TEK), however TEK is generally considered to be a subset of ATK and is primarily concerned about knowledge about the environment.

Traditional lifestyle: Activities which have been followed by communities and people for long periods, often for generations.

Traditional resource use: Hunting, trapping, fishing and food gathering by Aboriginal peoples whether for subsistence purposes or not.

Traditional territory: Lands designated under the Umbrella Final Agreement that provide rights for subsistence hunting and fishing activities; allocation of 70 percent of traplines; representation on land use planning bodies; membership on the Yukon Water Board, Development Assessment Board, Surface Rights Board, Fish and Wildlife Management Board and the Renewable Resources Councils.

Transect: A long, continuous sample area.

Transformer / Switching Station: A transformer/switching station is a facility that transforms electricity from a generating station to the higher voltages needed to carry it on the existing transmission system, or a facility that transforms electricity from the transmission system to the lower voltages needed to distribute it to customers.

Transmission line(s): A structure consisting of a series of towers and wires used to carry electrical power, generally at high voltage.

Tributary: A stream or river that flows into another river or other body of water.

Umbrella Final Agreement: Umbrella Final Agreement has the same meaning as in the Yukon First Nations Land Claims Settlement Act.

Uncertainty: The possible error or range of error which may exist within assumptions

Understory vegetation: An underlying layer of vegetation, especially the plants that grow beneath a forest's canopy.

Unemployment Rate: The proportion of individuals in the active labour force that do not have a job. The classification of unemployed does not account for the underemployed, or those individuals working part time but desiring a full time position. As well, the classification does not include discouraged workers: those individuals who wish to work but have ceased looking because they do not believe they will find a job.

Ungulate: Hoofed mammals, including elk, moose, deer and caribou.

UTM Grid: A grid system based upon the Transverse Mercator projection. The UTM grid extends North-South from 80oN to 80oS latitude and, starting at the 180o Meridian, is divided eastwards into 60, 6o zones with a half degree overlap with zone one beginning at 180o longitude. The UTM grid is used for topographic maps and geo-referencing satellite images.

Valued Component: Described in YESAB guides as an element of a project area that is valued for environmental, scientific, social, aesthetic, or cultural reasons. For the Project, VCs were identified in the process of scoping the Project and through the Public Involvement Program (PIP).

VAR (volt-amperes-reactive): In alternating-current power transmission and distribution, volt-amperes reactive (vars) are the product of the rms voltage and current, or the apparent power, multiplied by the sine of the phase angle between the voltage and the current.

Vegetative / treed buffer: An area that protects or reduces impacts to a natural resource from human activity; a strip of land along roads, trails or waterways that is generally maintained to enhance aesthetic values or ecosystem integrity.

Vegetative Mat: The living vegetative layer found at ground level. This includes root, rhizome and mycelium structures and the material contained in the H (humus) and A_1 (soil horizon with organics) soil horizons.

Viewscape: A viewscape is all of the land and water seen from a point or along a series of points (a road or trail).

Waterfowl: Ducks, geese and swans (game birds that frequent water).

Water regime: A description of water body (i.e., lake or river) with respect to elevation, flow rate, velocity, daily fluctuations, seasonal variations, etc.

Watershed: The area within which all water drains to collect in common channel or lake.

Watt-hour: A watt-hour is a unit of energy. One watt-hour is the amount of electrical energy equivalent to a one-watt load drawing power for one hour.

Wetlands: Those lands where the water table is at, near or above surface or where land has been saturated for a long enough period to produce such features as wet-altered soils and water-tolerant vegetation.

Wildlife habitat: Any area providing food, shelter, cover, air and space, or any one of the aforementioned, to wildlife such as mammals, birds, reptiles, amphibians and/or invertebrates.

Wildlife Key Areas - WKA: Any area that is critical to wildlife during at least a portion of the year. This importance may be due to vegetative characteristics such as residual nesting cover, or behavioral aspects of the animals such as lambing areas. Key areas include: winter ranges, lambing/fawning/calving areas, dancing/strutting grounds, nesting areas, breeding grounds, riparian and woody drainages, and roosting areas.

Work Force: Persons within the labour market or are working or who are available for work.

Yukon Environmental and Socio-Economic Assessment Act – YESAA: An Act to establish a process for assessing the environmental and socio-economic effects of certain activities in Yukon.

Yukon Indian person: A person enrolled under a final agreement — other than the Gwich'in Agreement — or a person who is a Tetlit Gwich'in.

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