

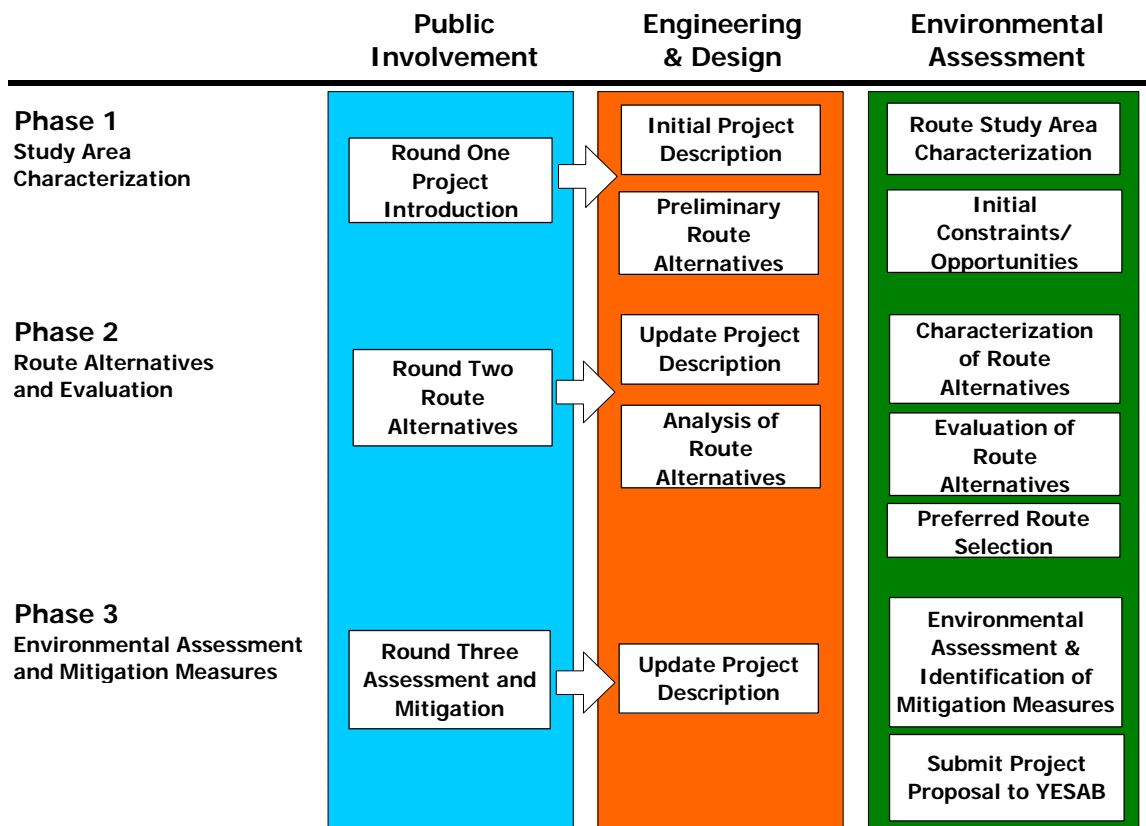
7.0 EVALUATION OF ALTERNATIVE ROUTES

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 Area¹ 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

Biophysical and Socio-Economic Features

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

Cost Constraints

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.

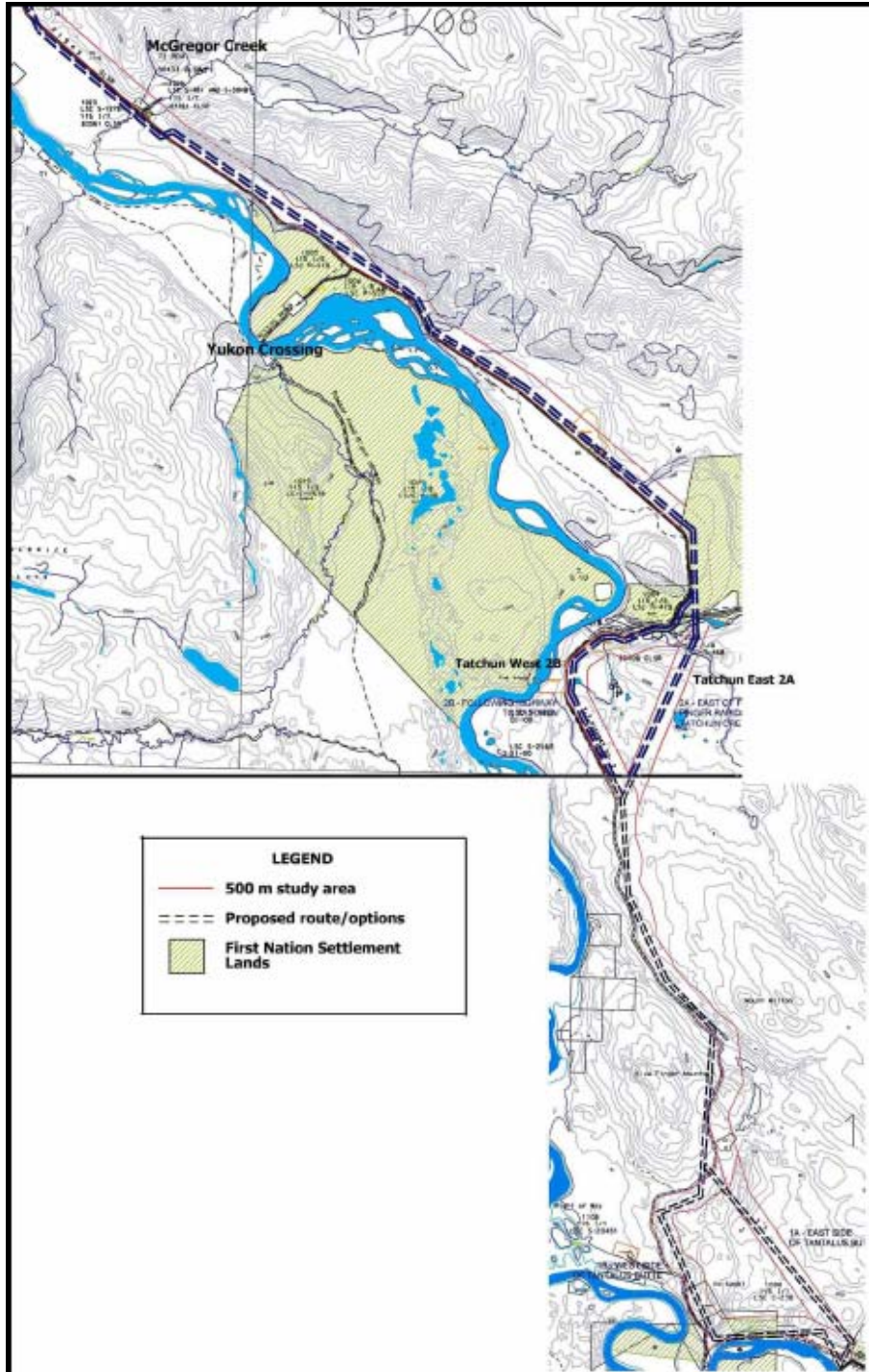
After crossing Tatchun Creek, the line segment continues on the east side of the Highway through LSCFN R 38B settlement lands, avoiding very steep terrain between the highway and the Yukon River. The line continues on the east non-view side to avoid aesthetic impacts such as west looking views and a 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
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> • Sensitive (10%) • Stable (90%) 	<ul style="list-style-type: none"> • Sensitive (30%) • Stable (70%) 	<ul style="list-style-type: none"> • Sensitive (30%) • Stable (70%) 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Burned/non-productive (16%) • Forest cover (84%) 	<ul style="list-style-type: none"> • Burned/non-productive (33%) • Forest cover (67%) 	<ul style="list-style-type: none"> • Burned/non-productive (10%) • Forest cover (90%) 	<ul style="list-style-type: none"> • Burned/non-productive (38%) • Forest cover (62%)
Effects on the Community⁵				
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 Community⁵ (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

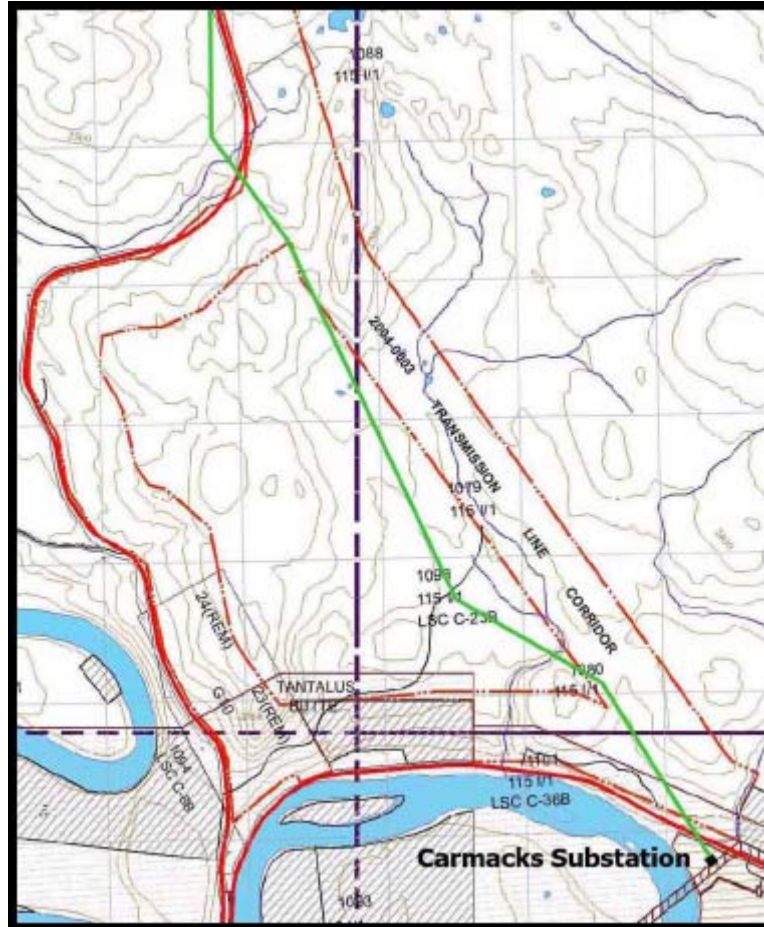
¹ Using a base cost of \$130,000 per km for 138 kV line – no consideration of large angle cost differences. ² Sensitive terrain defined as terrain features to avoid from Mougeot's classification of very steep slopes, very poorly drained terrain such as wetlands, and organic and ice rich terrain; stable 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

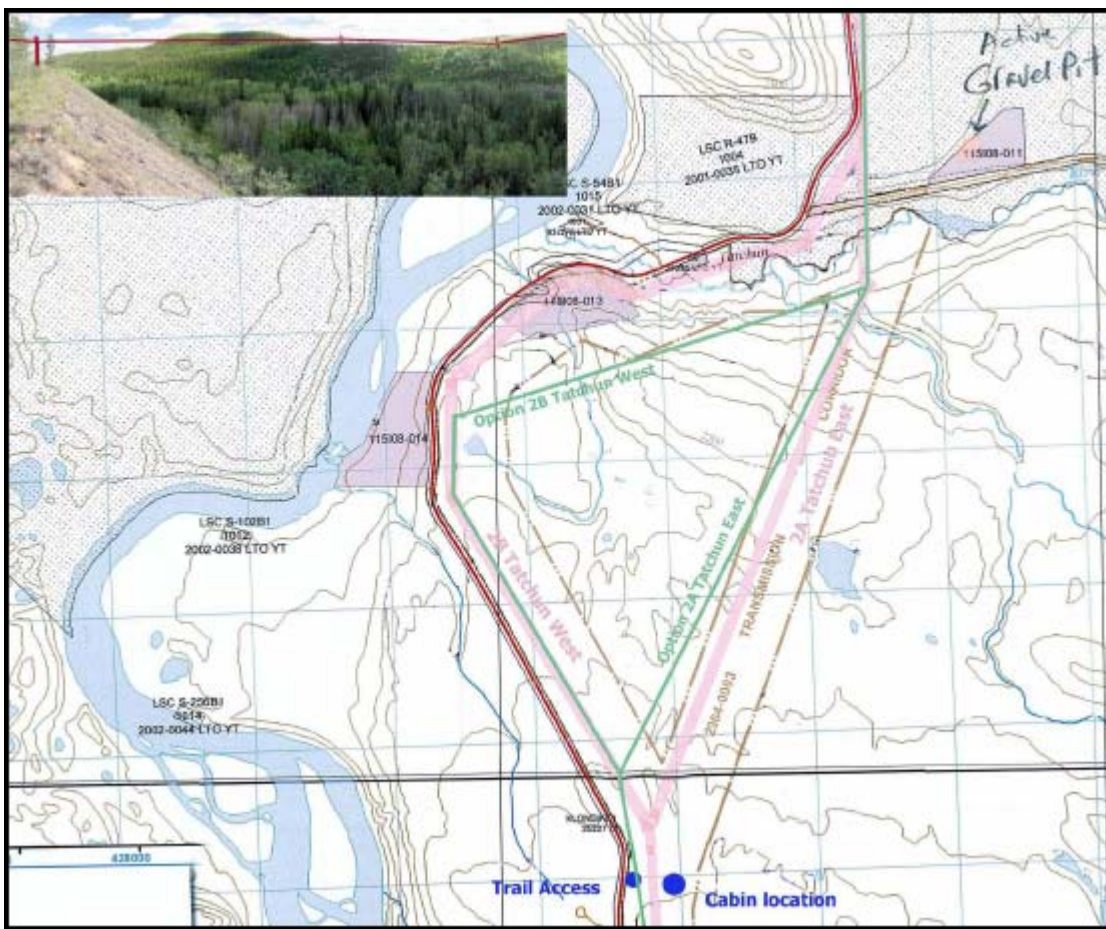


When Option 2A and Option 2B were initially compared in the Tatchun Creek area, the latter option adjacent to the Highway proved less desirable as it would be approximately 2.4 km longer than Option 2A and may require two additional corner towers, further increasing Project cost. However, both options 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.

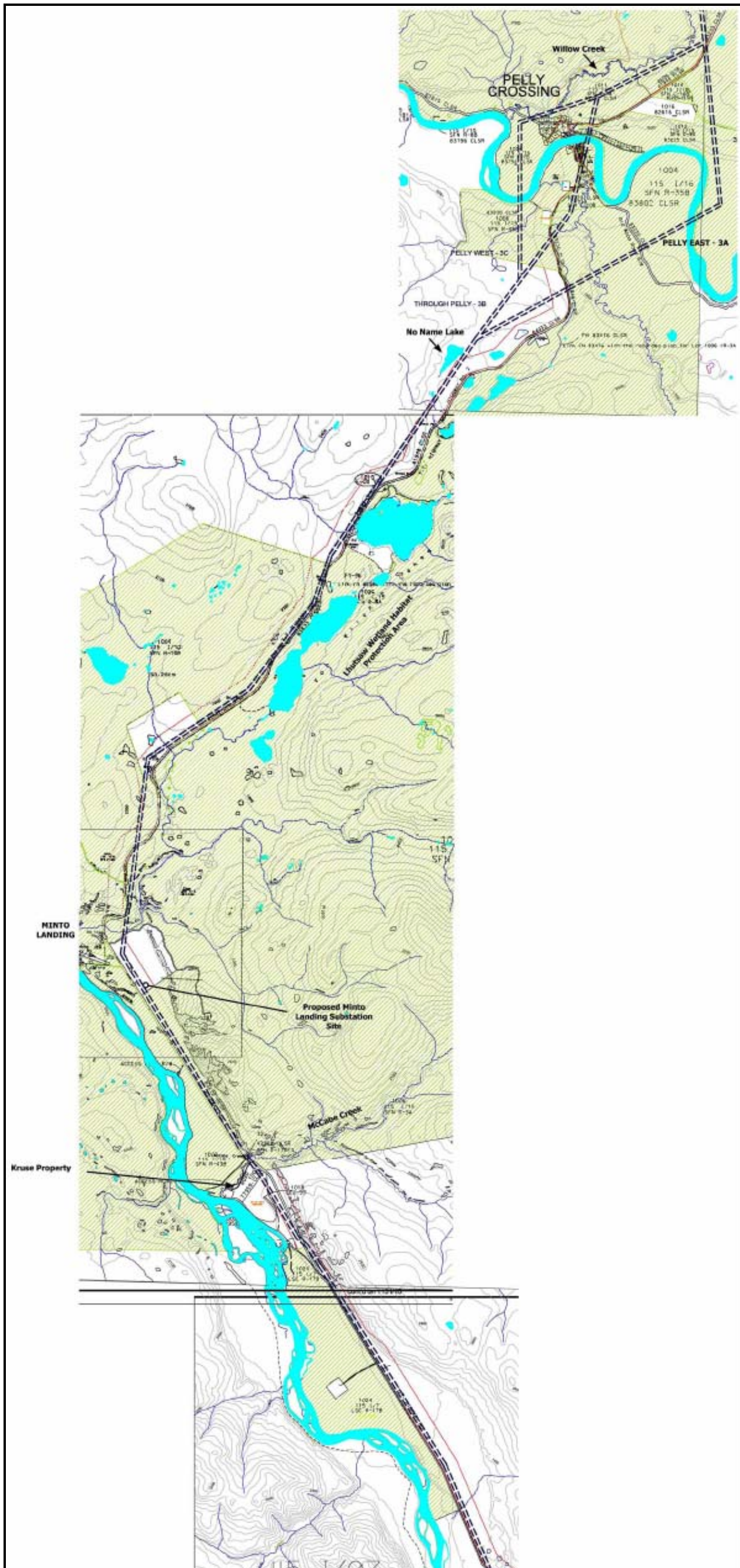
Concerns regarding culture and heritage resources relate to the Tatchun Creek area. This area is a known historical meeting place of Northern Tutchone people and the current location of summer fish camps for LSCFN members. Both Options 2A and 2B are located well to the east of the confluence of Tatchun 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 views 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.

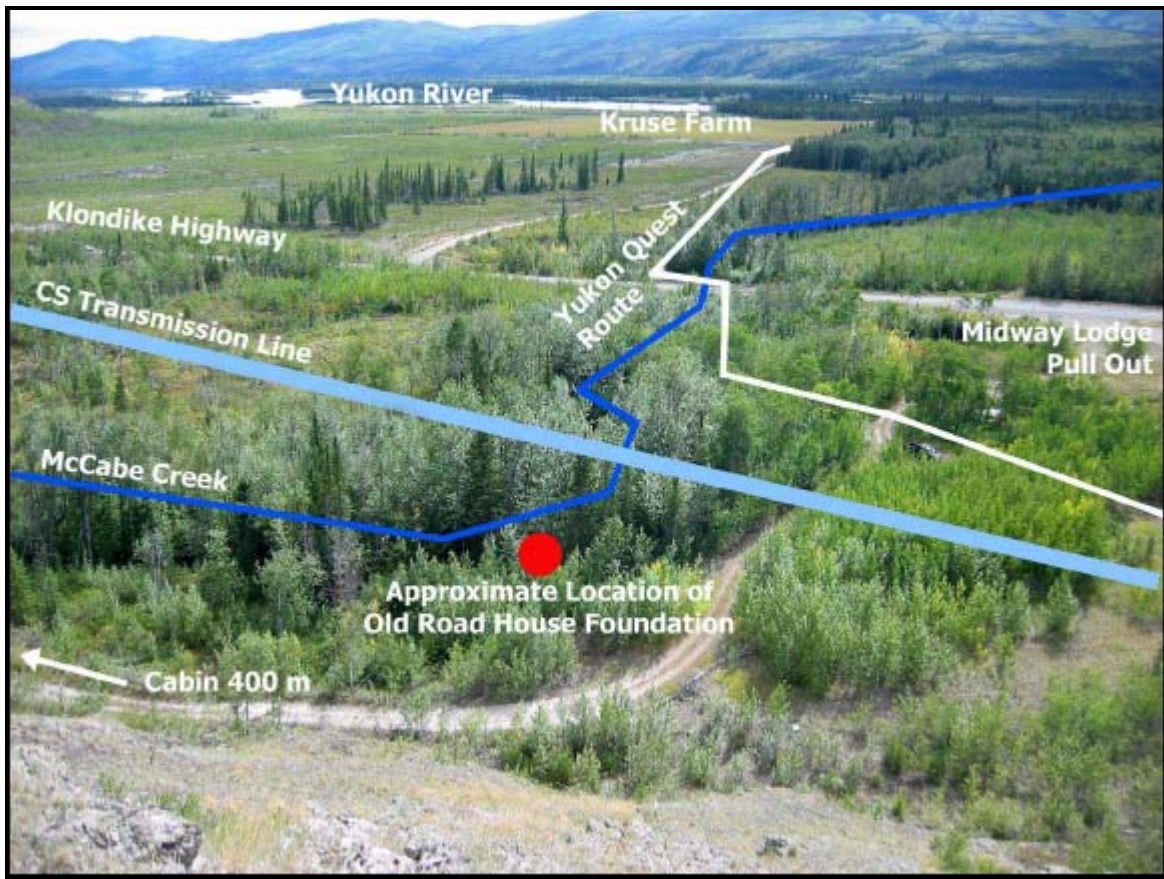
In the vicinity of McCabe Creek, various constraints contribute to limiting the possible routing, and provide a good example of the scope of consideration required in determining preferred routing. Contributing bio-physical and socio-economic constraints include the following:

- 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:

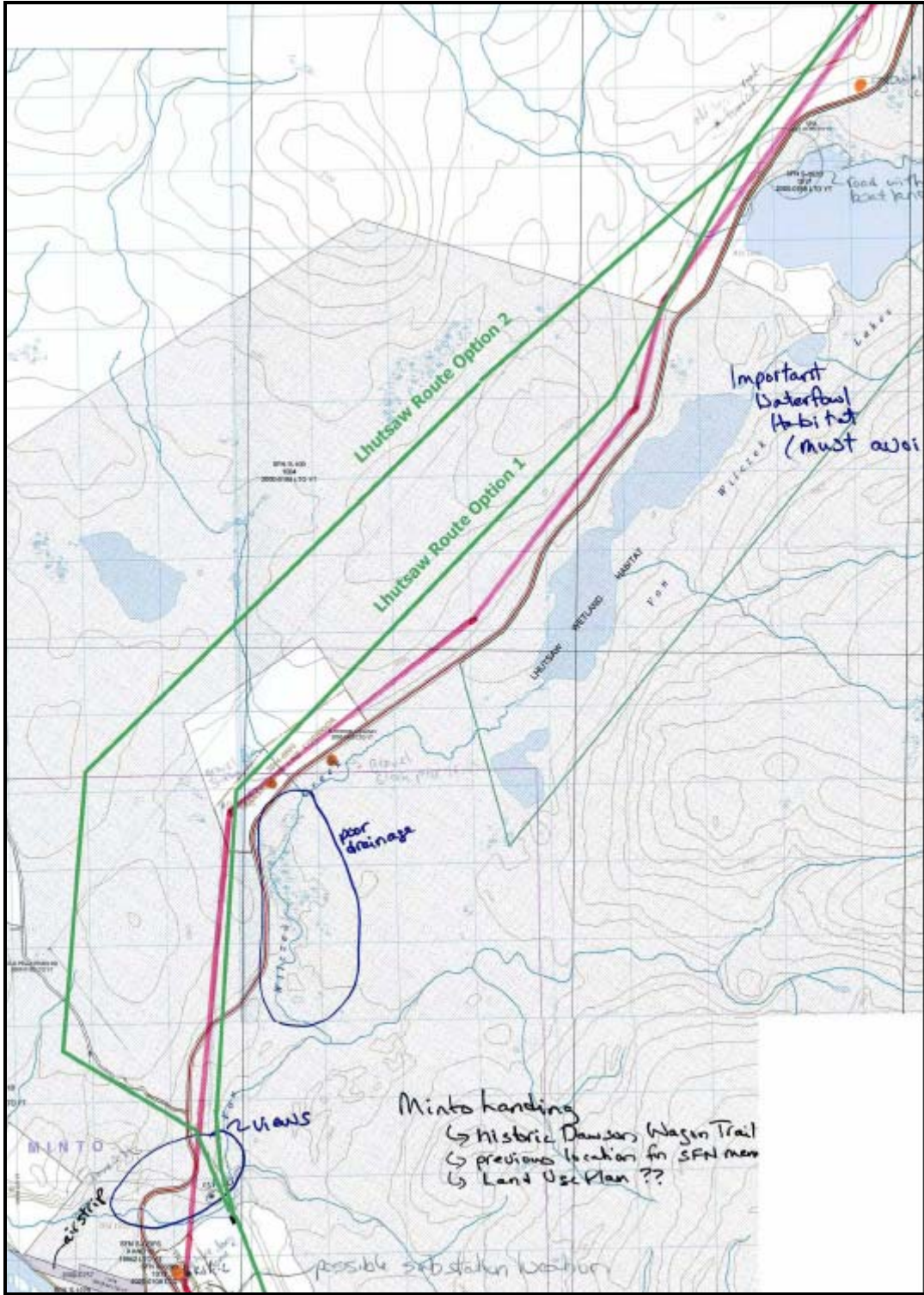
- **Construction Cost:** As described in Section 7.1.1, key technical constraints in route selection relate to overall line length and need for angle structures, both of which influence total construction costs.
- **Construction and Operation:** Transmission construction costs are also influenced to 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 Lhutsaw 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:

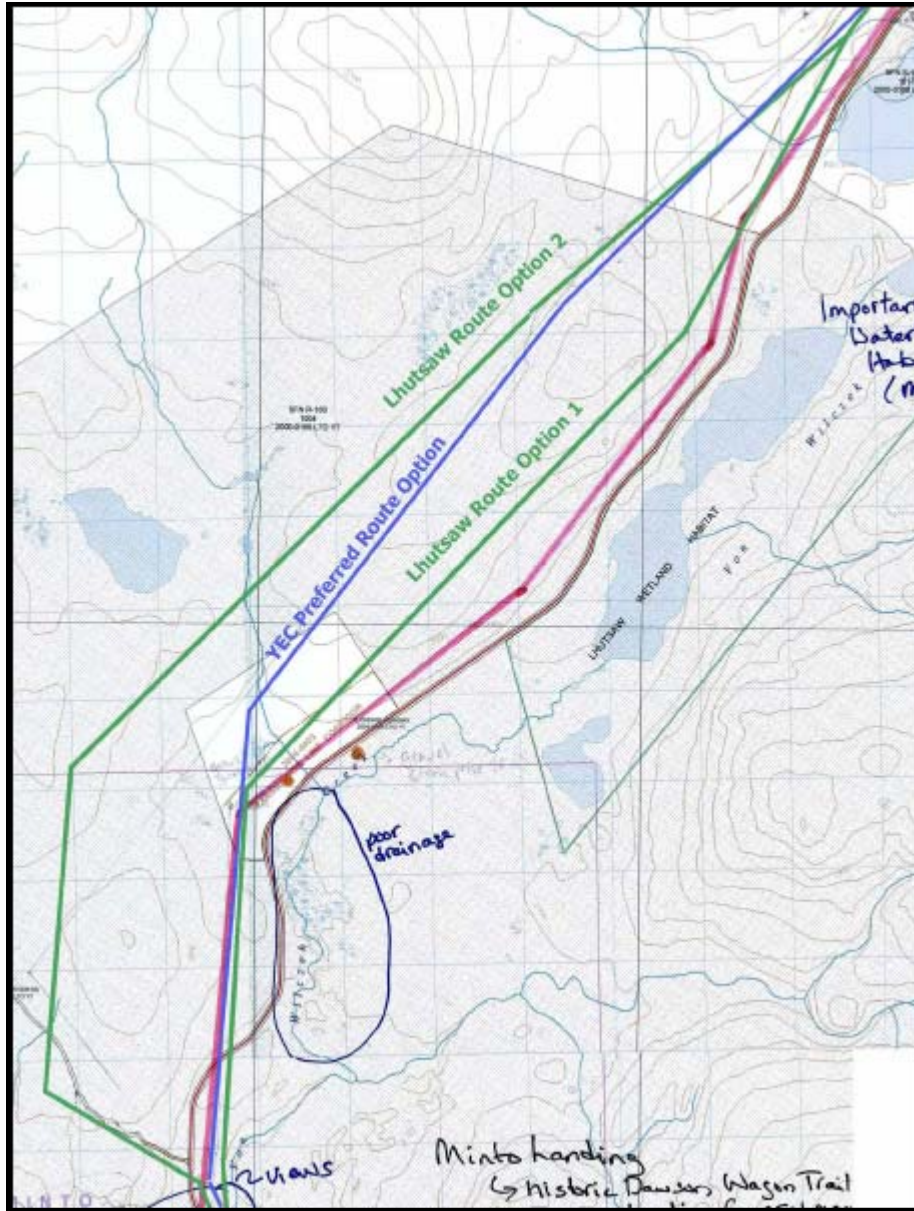
- Option 2 is approximately two to two and a half km longer than the preliminary proposed route or Option 1.
- Option 2 increases capital cost requirements as more poles and wire are needed – in the range of \$250,000 to \$400,000 for additional line length costs without considering other cost factors 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



Comparison and Evaluation of Route Options at Pelly Crossing

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
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Sensitive (20%) • Stable (80%) 	<ul style="list-style-type: none"> • Sensitive (25%) • Stable (75%) 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 Community⁵			
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 Mougout'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.

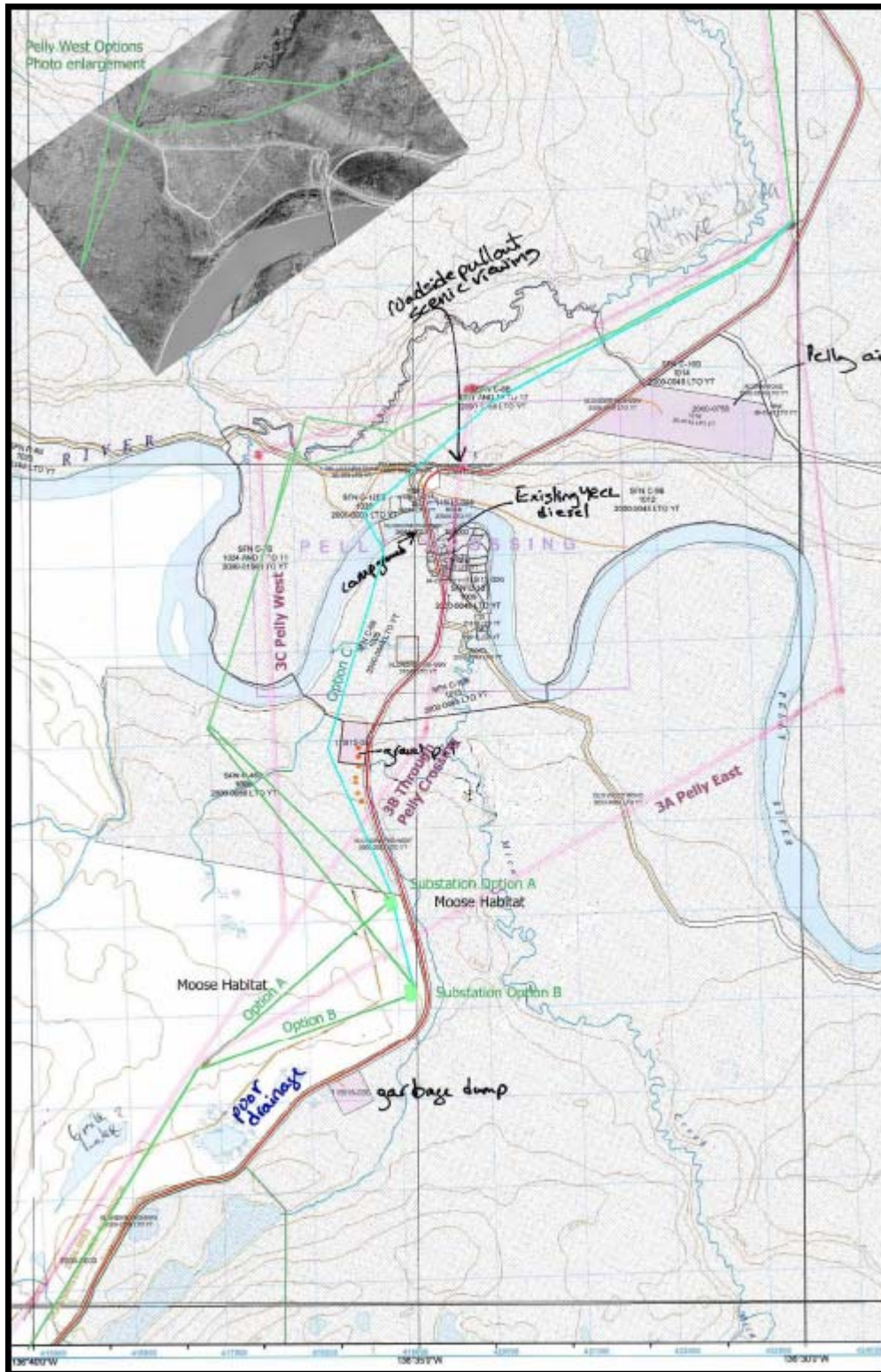
- The second option crosses Pelly Farm Road and then Willow Creek, turns east and crosses Willow Creek again to angle up the bluff north of Pelly Crossing. This option would require two crossings of Willow Creek and construction of a temporary access trail into the area north of Willow Creek for ROW 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

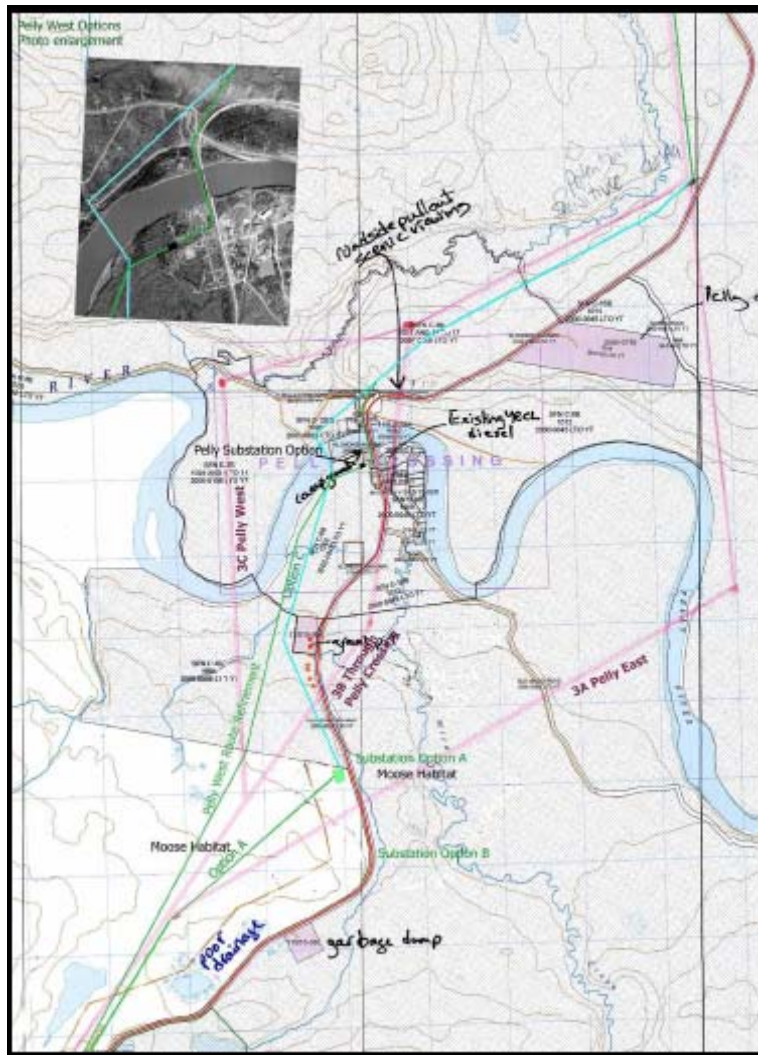


During follow-up meetings with SFN representatives throughout August and early September, a route refinement of Pelly West Option C was developed, incorporating future economic development interests of SFN and a river crossing adjacent to the existing YECL crossing.

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

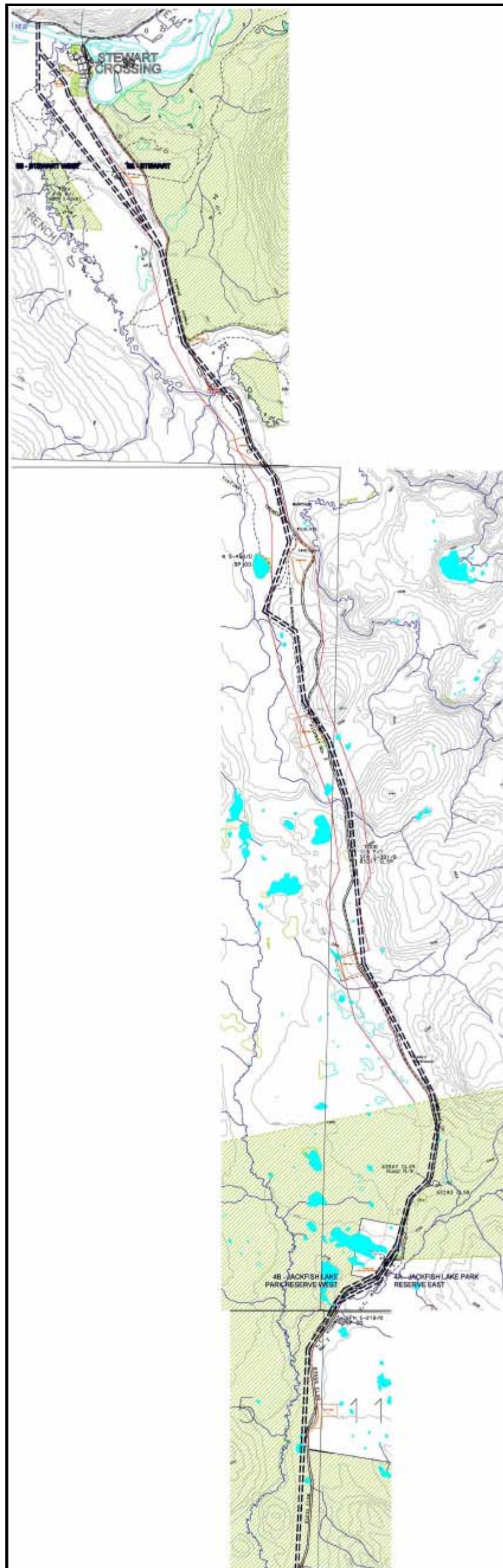
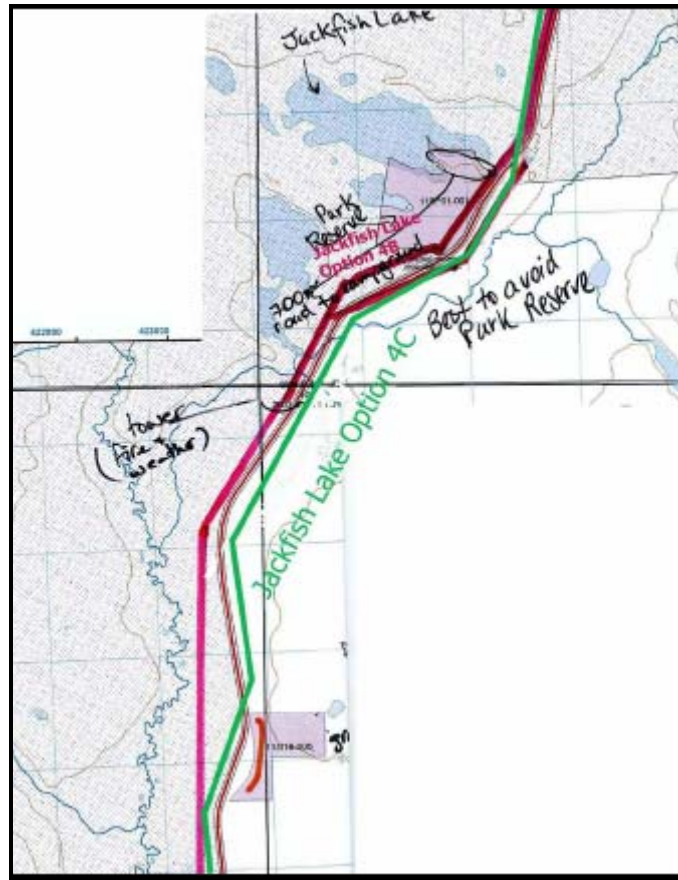


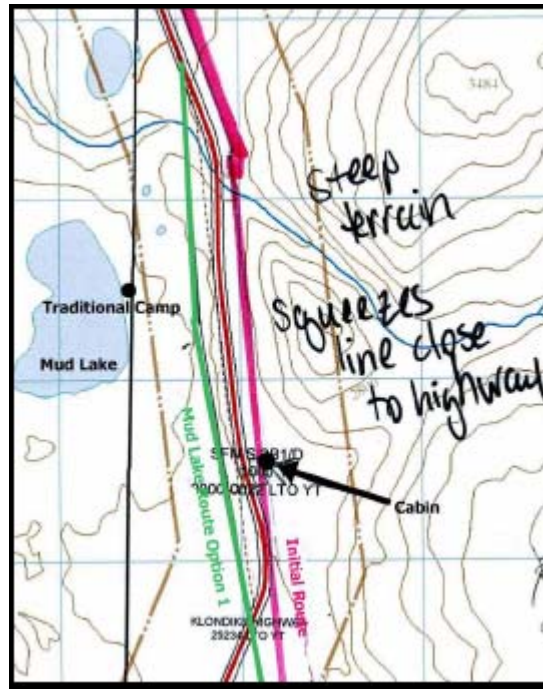
Figure 7.2-11
Jackfish Lake Park Reserve Route Refinement



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).

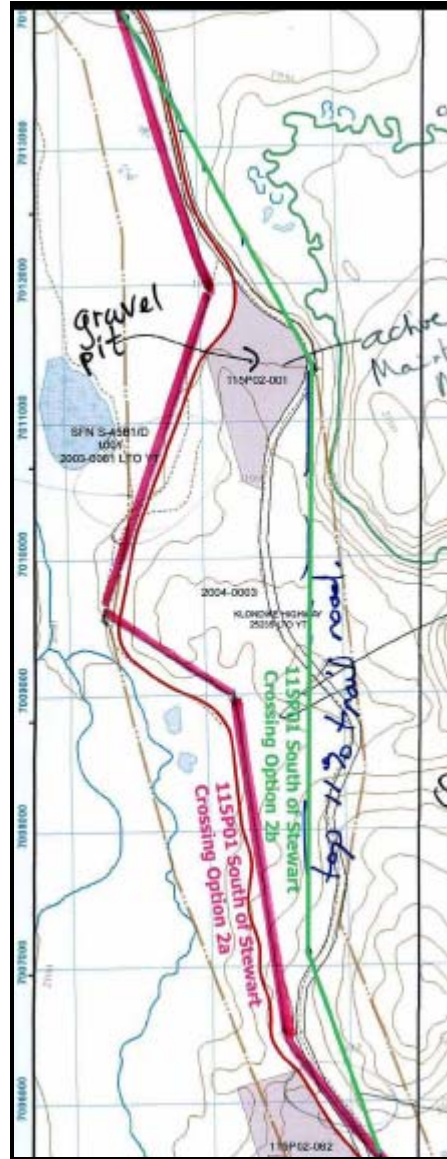
Figure 7.2-12
Route Refinement to Avoid SFN S-3B1/D (Cabin)



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.

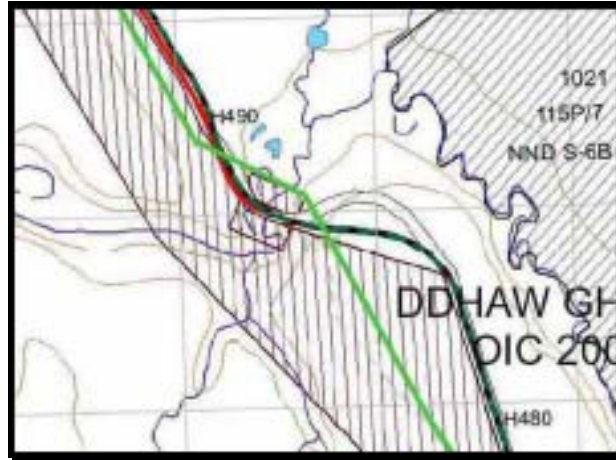
Figure 7.2-13
Route Refinement at Top of 11% Trail Road



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.

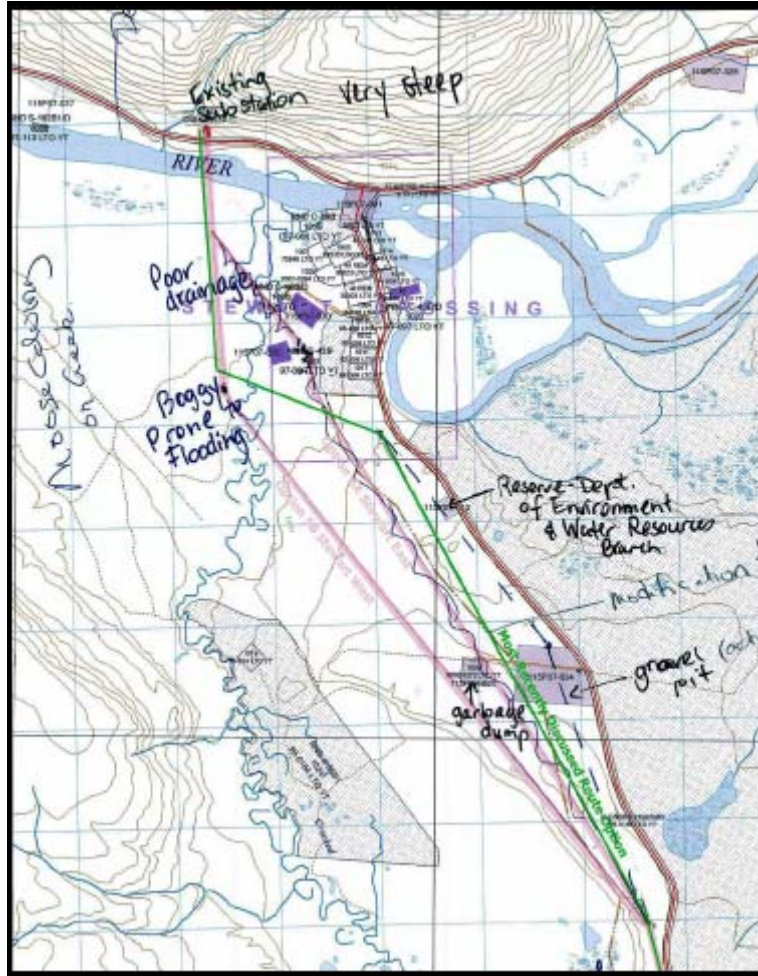
At Stewart Crossing the proposed route is sited directly into the existing substation on the north side of the Stewart River, avoiding housing and community infrastructure adjacent to the highway. Two preliminary route options were identified in the May 2006 Newsletter and are generally described in Table 7.2-5 below:

Table 7.2-5
Stewart Crossing Preliminary Route Options

5A Stewart East	5B Stewart West
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Sensitive (16%) • Stable (84%) 	<ul style="list-style-type: none"> • 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 Community⁵		
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.

Effects on the Environment

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.

Effects on the Community

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.

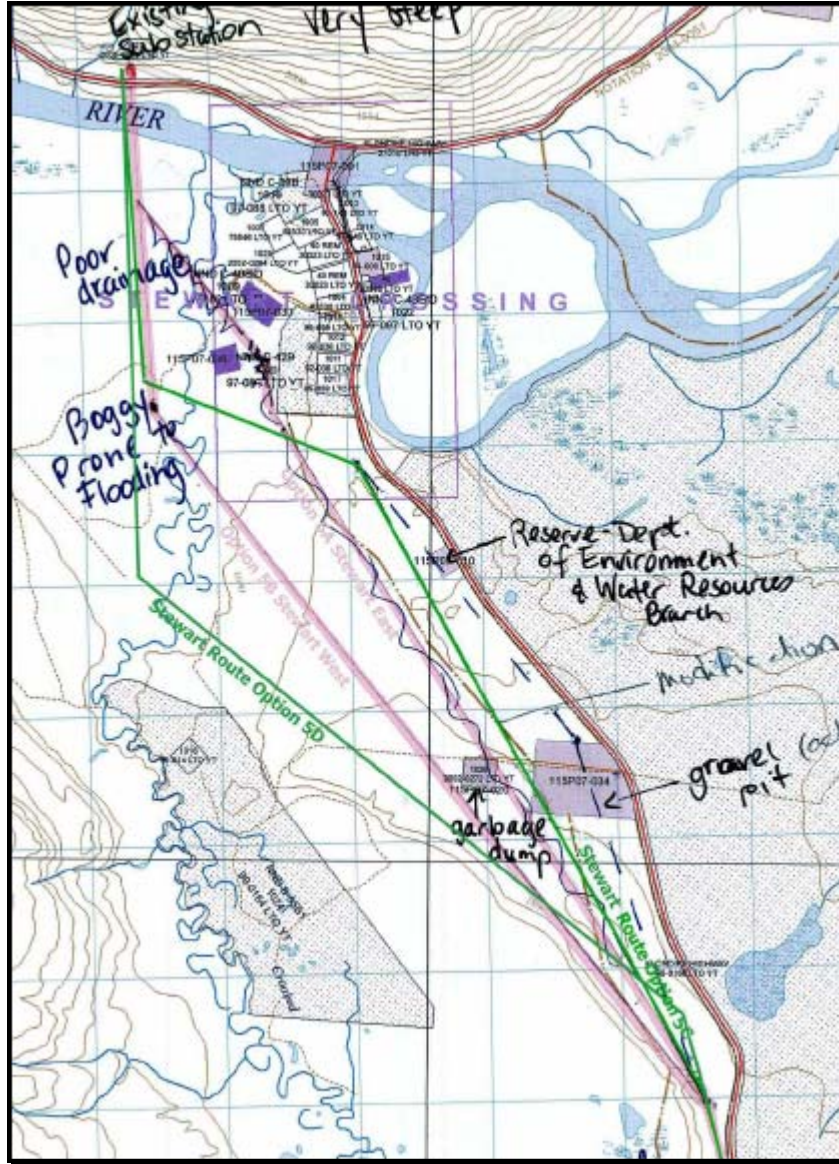
Historically, the Crooked Creek area was a favoured fishing, trapping and hunting area for NND members and both options have the potential for encountering unknown cultural/heritage sites. NND members agreed to ground truth the area to identify an optimal crossing location of the Creek taking both terrain 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

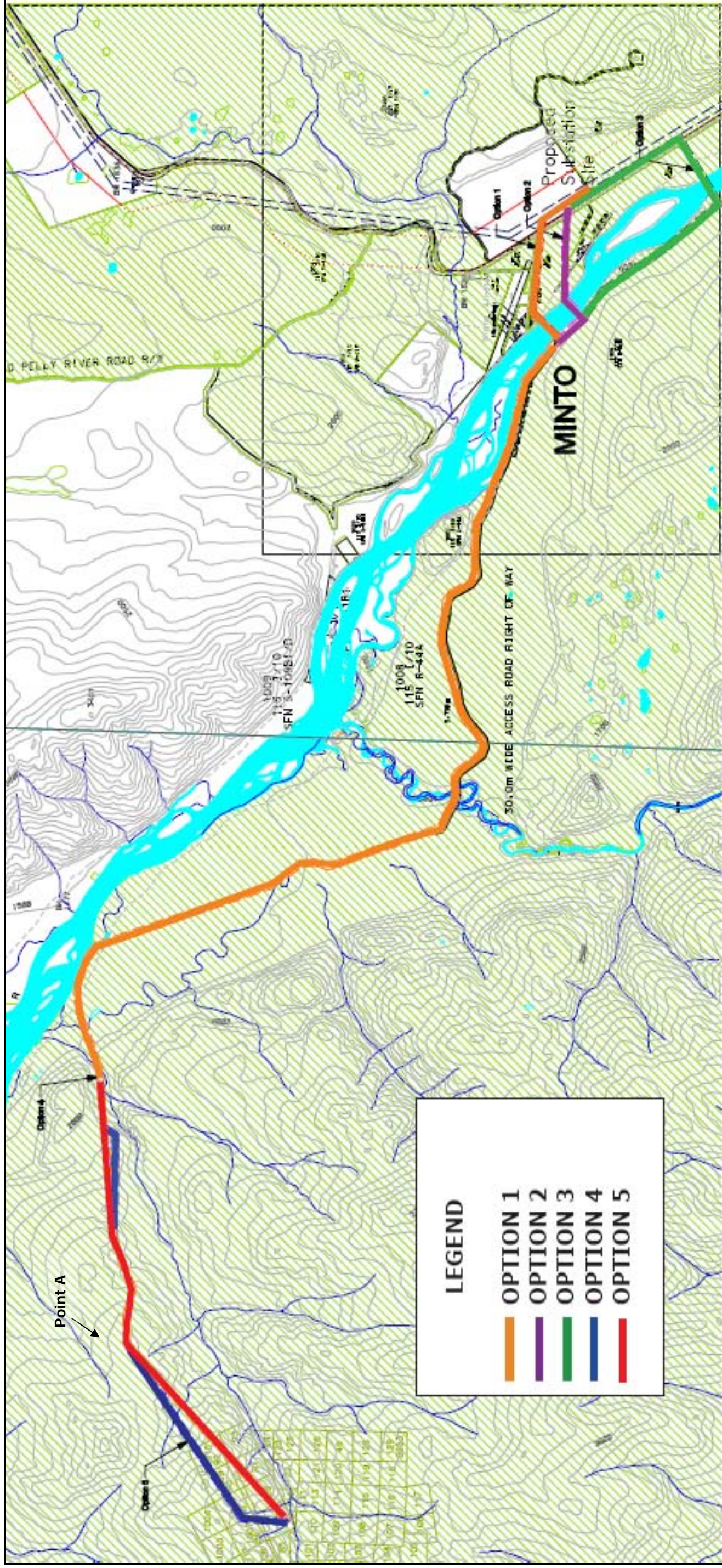
Identification of Preliminary Route Options

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
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Sensitive (0%) • Stable (100%) 	<ul style="list-style-type: none"> • Sensitive (0%) • Stable (100%) 	<ul style="list-style-type: none"> • Sensitive (0%) • Stable (100%) 	<ul style="list-style-type: none"> • Sensitive (10%) • Stable (90%) 	<ul style="list-style-type: none"> • Sensitive (10%) • Stable (90%)
Wildlife ³	<p>Migrating waterfowl & birds use the Yukon River as a major migration corridor – t-line crossing a concern</p> <p>Proximity to bald eagle aeries</p>	<p>Migrating waterfowl & birds use the Yukon River as a major migration corridor – t-line crossing a concern</p>	<p>Migrating waterfowl & birds use the Yukon River as a major migration corridor – t-line crossing a concern</p>	<p>General moose habitat (no key habitat)</p> <p>Small furbearing animal habitat</p>	<p>General moose habitat (no key habitat)</p> <p>Small furbearing animal habitat</p>
Vegetation ⁴ : - % of burned or non-productive area - % of forest cover	<ul style="list-style-type: none"> • Burned/non-productive (100%) • Forest cover (0%) 	<ul style="list-style-type: none"> • Burned/non-productive (98%) • Forest cover (2%) 	<ul style="list-style-type: none"> • Burned/non-productive (50%) • Forest cover (50%) 	<ul style="list-style-type: none"> • Burned/non-productive (98%) • Forest cover (2%) 	<ul style="list-style-type: none"> • Burned/non-productive (98%) • Forest cover (2%)
Effects on the Community⁵					
Resource Use: -traps	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 Community⁵ (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.

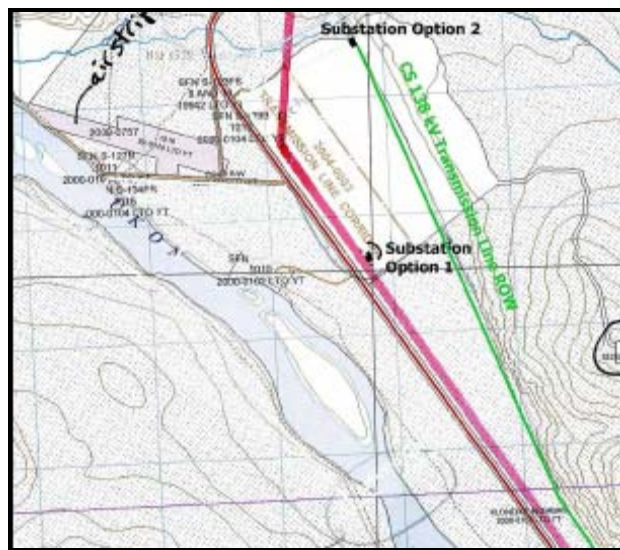
Comparison of Substation Location Options

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.

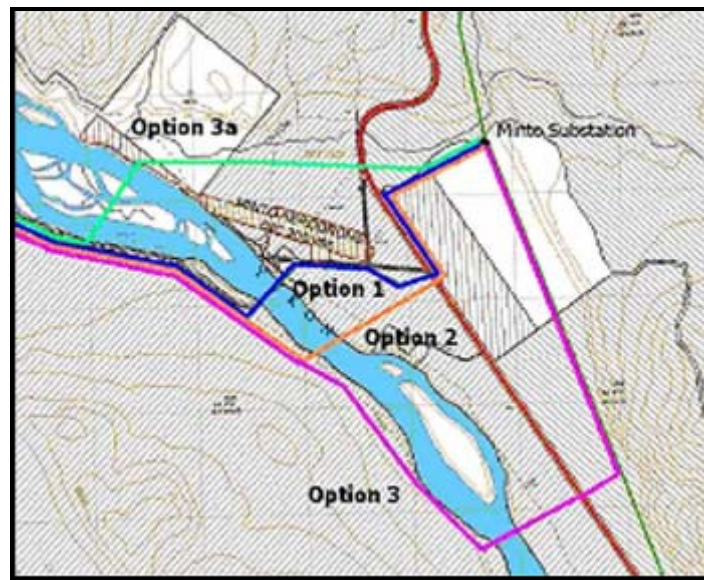
Figure 7.2-18
Minto Landing Substation Location



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 Morrison (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 NDNFN.

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

