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December 21, 2006

Mr. Stephen Mills
Executive Committee Member
Yukon Environmental and Socio-Economic Assessment Board
3059-3rd Avenue
P.O. Box 31642
Whitehorse YT Y1A 2C6

Dear Mr. Mills:

RE - Carmacks–Stewart/Minto Spur Transmission Line Project Adequacy Review

Please find attached Yukon Energy's responses to the requests for Supplementary Information in the "Adequacy Review Report: Project No. 2006-0286 – Yukon Energy Corporation, Carmacks–Stewart/Minto Spur Transmission Line". For convenience, responses have been organized using formats adapted for YUB proceedings.

With regards to specific technical mapping information, YESAB has requested source data for maps used in the submission document. GIS shapefiles have been provided where requested and available, and in other instances where such information has been requested YEC is providing available CAD-based information for YESAB to convert to GIS shapefiles. We expect resolution of this may require further interaction and YEC will make arrangements as needed with Ryan Parry to facilitate this process.

A CD containing the attached material as well as map source data files will be forwarded to you as soon as this information can be compiled.

Should you require additional information, please do not hesitate to contact Mr. Hector Campbell, P. Eng., at 393-5331.

Yours truly,

John Osler
Principal, Consultant & Manager
InterGroup Consultants Ltd.

cc: Hector Campbell, YEC

PROJECT NO. 2006-0286

YUKON ENERGY CORP.'S CARMACKS STEWART/ MINTO SPUR TRANSMISSION LINE

ADEQUACY REVIEW REPORT

SUPPLEMENTARY INFORMATION

December 2006

REFERENCE: Chapters 4 (p. 4-21), 7 and 8 – 30m Buffer

QUESTION:

Within the project proposal it has been stated "due to concerns expressed by various parties regarding potential effects on wildlife corridors and aesthetics, a 30m buffer between the highway right-of-way and transmission line right-of-way will be provided wherever feasible" (p4-21). During the assessment of the proposed project it will be important to evaluate the affects associated with the proposed project and identify any potential mitigations, therefore, it is necessary to fully understand how the route selection was determined and how potential alternatives were eliminated.

- Describe where this rationale was specifically incorporated into the project design (i.e. specific sections of the proposed transmission line where the proposed line location is based primarily on the stated criteria as opposed to specific environmental constraints such as terrain hazards).
- The project proposal states that the route selection criterion was incorporated primarily with input from consultation. As such, please provide the original GIS shapefiles of the line that was originally proposed and consulted-upon. This information may provide the assessment with a greater understanding of potential alternatives, as well as areas of key concerns as determined through the consultative exercises.

ANSWER:

Bullet 1: In response to the first bullet, Chapter 7 of the Project Proposal details the options and rationale regarding route selection (i.e., project design where a minimum 30 m buffer was incorporated as opposed to other design factors such as specific environmental constraints, e.g., terrain hazards), and Chapter 8 provides further review of how such mitigation affects specific VCs.

It is very difficult to specify "where this rationale was specifically incorporated into the project design (i.e. specific sections of the proposed transmission line where the proposed line location is based primarily on the stated criteria as opposed to specific environmental constraints such as terrain hazards)".

To explain this point, certain overall observations are provided at the outset.
Overall, the proposed CS route in almost all areas does in fact involve at least a minimum 30 m buffer while this is not (for reasons re-stated below) a typical feature for the proposed MS route. In certain areas of the

CS route, however, it is apparent that design factors other than a 30 m buffer were the determining factors affecting route selection - either in forcing the route closer to the highway or, as was more often the case, in leading to route locations well beyond 30 m from the highway. Absent any consideration of the proposed "30 m buffer" as a design factor, which was brought forward during consultations, it is not self evident, however, where the proposed route selection would necessarily have changed in a material way, i.e., where the CS route would in fact have been consciously selected to be closer to the highway than 30 m. The preliminary route as originally proposed and consulted upon, for example, did not by its nature address issues at this level of detail.

To provide documentation on these matters, pages 8-14 to 8-16 of the Project Proposal specifically review the related ROW barrier issues (as well as habitat fragmentation issues), summarizing the following for each segment of the proposed lines:

- The percent of each CS line segment ROW that is less than 30 m distance from the highway (range from 5% to 8%), indicating the extent to which this minimum criteria was not met for the CS line location;
- The percent of each CS line segment ROW that is located within 30 to 150 m distance from the highway (range from 34% to 57%), within 150 to 500 m of the highway (19% to 23%), and more than 500 m distance from the highway (17% to 42%); and
- About two-thirds of the MS ROW is within less than 30 m distance from the existing mine access road, and only about 10% of the MS ROW is within 30 to 150 m of this access road.

The following description identifies (in summary) specific sections of the proposed transmission line where the line location is based primarily on the minimum 30 m buffer criteria; to assist in meaningful review, the summary also notes areas where the 30 m buffer criteria was not met and/or was not the primary criteria in route selection. Areas such as Tantalus Butte and Tatchun Creek, where route selection was based on a variety of criteria detailed in Chapter 7 of the Project Proposal, are not addressed in this summary.

Line Segment 1: Carmacks to McGregor Creek: (see Maps in Appendix 4D 3.1)

Upon crossing the Klondike Highway immediately north of Tantalus Butte, the proposed CS line maintains a minimum 30 m buffer between the Klondike Highway right-of-way and the transmission line right-of-way up to an area south of Tatchun Creek. There are two locations (both located on the west side of the highway) where the buffer is greater than 30 m due to terrain constraints: a small section of the proposed

route west of the Ambrose Property (Ambrose property is on the east side of the highway), and 1.5 km north of this section of the route.

From the area north of Tatchun Creek until Yukon Crossing the minimum 30 m buffer is maintained. In the Yukon Crossing area the proposed transmission line is located further away from the highway and aligned close to the base of bluffs due to aesthetic concerns identified during the consultation process. The proposed transmission line then angles back towards the Klondike Highway ensuring a minimum 30 m buffer until it reaches the McGregor Creek vicinity where the alignment of the transmission line is determined by a variety of criteria, including the location of an agricultural land application and First Nation settlement lands.

Line Segment 2: McGregor Creek to Pelly Crossing (See Maps in Appendix 4D 3.2)

For the majority of the area between McGregor Creek and McCabe Creek a minimum 30 m buffer is maintained between the transmission line right-of-way and the Klondike Highway. Terrain constraints squeeze the line close to the Klondike Highway at approximately 6929750 N and 412500 W up to the vicinity of McCabe Creek. North of McCabe Creek the proposed transmission line enters SFN settlement lands. Consultation with SFN members resulted in the line angling northeast into the proposed location of the Minto substation; at the request of the SFN the route was aligned along the base of the bluffs with a vegetative buffer considerably greater than 30 m.

North of the proposed Minto Substation location, the proposed CS line is routed through SFN settlement lands. Routing was based on a variety of criteria, including vegetative cover, aesthetics, heritage resources, technical and economic factors and consultation with SFN. Upon leaving SFN R10 block, the proposed CS line angles back towards the Klondike Highway with routing in this location based on a variety of criteria including vegetative cover, technical and economic factors and terrain constraints such as lakes.

Line Segment 3: Pelly Crossing to Stewart Crossing (See Maps in Appendix 4D 3.3)

North of Pelly Crossing the proposed CS line travels through SFN settlement lands. Routing was based primarily on maintaining a 30 m buffer; however, terrain constraints and consultation with SFN also assisted in route alignment, particularly in the vicinity of Pelly Crossing. As the proposed CS line exits SFN settlement land, the line is routed to the east of the Klondike Highway and maintains a minimum 30 m

buffer until it passes Jackfish Lake Park Reserve and re-enters SFN settlement land. Consultation with SFN resulted in a route close to the Klondike Highway that also maintains a 30 m vegetative buffer.

Upon exiting SFN settlement land at approximately 6993500 N and 427600 W, routing for the proposed CS line is based primarily on terrain constraints and technical considerations, as well as other criteria. A vegetative buffer of various distances was maintained throughout this segment up to the Top of 11% Hill. Terrain and technical feasibility were the predominant routing considerations (as detailed on pg. 7-34).

North of the first crossing of Crooked Creek, the proposed CS line maintains a 30 m buffer between the Klondike Highway and transmission right-of-way until it angles northwest. From this point onwards into the Stewart Crossing substation, routing is based on terrain, heritage resources and consultation with NNDFN.

Minto Spur Line Segment (See Map in Appendix 4D 3.4)

With the exception of the proposed substation location on EMR reserved land, the Minto Spur Line is almost entirely within SFN settlement lands. Routing for the majority of the length between the Yukon River crossing and the Minto Mine site has been alongside the existing Minto Mine access road in accordance with the MOU with the Northern Tutchone First Nations. As reviewed at page 8-15, about two-thirds of the MS ROW is within less than 30 m distance from the mine access road, reflecting the fact that any barrier effects are greatly reduced for the MS development compared to CS development (adjacent to the Klondike Highway (due to the reduced ROW needed for both the road and the transmission line).

Bullet 2: In reviewing the maps on the line that was originally proposed and consulted upon in order to evaluate potential routing without the 30 m buffer design factor, please review the overall initial comments in response to bullet 1. As noted above, the preliminary route as originally proposed and consulted upon did not by its nature address issues at this level of detail.

In response to the mapping requests in the second bullet, there are no "original GIS shapefiles of the line that was originally proposed and consulted-upon." Mapping used for consultation purposes was produced by Yukon Energy, which uses a CAD-based system. Maps were produced and delivered to each of the three Northern Tutchone First Nations at the May 18th, 2006 Steering Committee meeting in hard copy. At the end of June, 2006, these maps were also delivered to Little Salmon Carmacks Renewable Resources Council and Selkirk Renewable Resources Council in hard copy format, at their request. These maps were provided to YESAB on November 14, 2006 as PDF files, and are included in EMF format as YESAB-YEC-1-1:

Attachment 1. Specific attribute data for these EMF files will be provided directly from YEC as soon as technical requirements are confirmed with YESAB.

REFERENCE: Page 5-11 – Substation Site Conditions

QUESTION:

An understanding of the environmental conditions in an area where development is proposed to occur is important for the identification of potentially significant adverse effects as well as the assignment of feasible mitigations. Identification of existing site conditions provides the baseline information necessary for an effects assessment and determination. Within the proposal it is stated "site condition studies at substation locations are anticipated for completion late in 2006, and will be provided, if required, when available" (p 5-11).

- Please provide a description of site conditions, at the substations for inclusion in this assessment.

ANSWER:

It is noted that the date given on Page 5-11 is not correct; site condition studies, which are required solely for the engineering design work, will be available after the completion of the engineering design process which will start in Q1 of 2007 and which is expected to be completed for Stage One in Q2 2007. This is discussed on page 5-8 and noted on the project schedule on page 5-6.

The type of site evaluation that will be conducted at the new Carmacks substation, the Minto substation and the Pelly Crossing substation will be similar to the engineering study conducted at the Stewart Crossing substation which is found in the Chapter 5 Reference Material, 5R-3 and referenced on page 5-14.

General descriptions of the sites are as follows:

Carmacks substation:

This substation overlaps the WAF transmission line ROW as illustrated in Figure 5.7-2. While access will ultimately be determined during the engineering design process, a short all-weather access road will be constructed from the Robert Campbell Highway into the substation site (see YESAB-YEC-1-3). The substation site will require clearing some forest land that is considered to be of low volume potential according to Map 6-2 in the Map folio (Estimated Volume Potential Carmacks-Stewart Transmission Line).

Further details of the site specific conditions and requirements will be determined during the engineering design process.

Minto Landing Substation

The Minto Landing substation will utilize the existing access road that leads to the NW Tel microwave tower and there will be a short access road that will lead directly into the substation (see YESAB-YEC-1-3). This site itself is in a recently burned area (Minto Burn 1995) and consists of fallen trees and immature forest. Further details of the site specific conditions and requirements will be determined during the engineering design process.

Minto Mine Substation

The substation at the Minto Mine site will utilize existing access into the mine camp site and the substation facilities being developed at the Mine site (see page 5-16).

Pelly Crossing Substation

Figure 5.7-3 illustrates the location of the Pelly Crossing substation. This is a preliminary location that will be finalized during the engineering design process. The forest in this area is immature and has been previously impacted by forest fire activities. The access will utilize existing roads in and around the SFN Lands Department equipment yard and, as currently identified, a new single lane access road of approximately 30-40m will be required to extend the road to the substation site (see YESAB-YEC-1-3). Further details of the site specific conditions and requirements will be determined during the engineering design process.

Stewart Crossing Substation

This will be an extension of the existing substation as indicated on pages 5-24 to 5-25. The station will be contained within the existing ROW and will utilize the results of the engineering study conducted at the Stewart Crossing substation which are found in the Chapter 5 Reference Material, 5R-3 and referenced on page 5-14. The current access will be utilized for this site.

REFERENCE: **Chapter 5 – Access Trails to Transmission Line ROW and Access Roads to Substations**

QUESTION:

The project proposal states that "if no right-of-way access exists, new access trails will be required to access the right-of-way between stream crossings and slopes" (p. 5-15; summary). Since the construction and operation of the proposed transmission line right-of-way can not be undertaken without appropriate access points, the construction of any access trails is considered interdependent to the project, and must therefore form part of the project proposal. It is necessary for the assessment of this project to understand where, when and how the development of access trails will be developed. This information will be used to identify the site-specific effects associated with access, and to determine if any access trails will result in potentially significant adverse environmental or socio-economic effects.

- Please identify the location of all access trails to both the transmission right-of-way and substations as required for the proposed project given the current configuration.
- Provide GIS shapefiles detailing their location, as well as relevant information relating to land tenure and any required authorizations.
- Describe other activities required to be undertaken in relation to the development of access trails, including clearing, culvert installations, maintenance, etc.
- Describe the relevant design standards as well as the widths that will be applied to the access trails.
- Identify which access trails will be temporary vs. long-term in nature, and provide relevant information regarding reclamation/closure of the temporary trails as well as the required maintenance of the long-term trails.

ANSWER:

All Bullets - General Response: It is important to distinguish potential "access trails" related to transmission line development from "access road" requirements related to substation development.

While the "construction of any access trails is considered interdependent to the project, and must therefore form part of the project proposal", transmission line development does not typically address site-specific locations for "access trails" (if required) until well after the environmental assessment process. Such "access trails" are considered to be potential and (if needed) a temporary requirement during the brief

construction period to address access, if so required, in specific locations where the transmission right-of-way itself (which has still to be finalized on the ground within the preferred route area identified, after all reviews and approvals are completed) does not provide adequate access for construction purposes. Consistent with normal practice, the Project Proposal identifies potential generic requirements in this regard as well as best practices to be followed by Yukon Energy with regard to mitigation measures.

In contrast to such "access trails" for transmission line development, the Project Proposal specifies that each proposed new substation will require permanent all weather road access. The general location of such access is typically identified, as appropriate at this stage of development, as well as related requirements and best practices as may affect mitigation.

It is not feasible at this time to identify the location of all access trails to the transmission right-of-way, or the specific location of each substation access road. Accordingly, and as well, no GIS shapefiles information can be provided on these matters.

Further information on specific substation access road requirements is provided below (see also response to YESAB-YEC-1-2):

Carmacks Substation:

As noted in Section 5.7.3.1 of the Project Proposal Submission, a short all-weather access road will be constructed from the Robert Campbell Highway into the Carmacks Substation site. The all-weather access road will be single lane, gravel, approximately 6 m in width; and will either run off the Robert Campbell Highway along or adjacent to the existing WAF right-of-way, or exit off the Robert Campbell Highway at a 90 degree angle, in close proximity to the existing WAF right-of-way. Upon completion of the detailed engineering and design of the substation site, the all-weather access road specific location and design can be finalized, including specifications for drainage (i.e., a culvert if required).

Minto Landing Substation:

As noted in Section 5.7.3.3 of the Project Proposal Submission, a short all-weather access road will be constructed off the existing NW Tel access road into the Minto Landing Substation site. The all-weather access road will be single lane, gravel, approximately 6 m in width; and will extend from the NW Tel access road at a 90 degree angle. Upon completion of the detailed engineering and design of the substation site,

the all-weather access road specific location and design can be finalized, including specifications for drainage (i.e., a culvert if required).

Pelly Substation:

As noted in Section 5.7.3.2 of the Project Proposal Submission, a short all-weather access road will be constructed as an approximate 30-40 m extension to the existing SFN Lands Department equipment yard road. This extension will be single lane, gravel, and approximately 6 m in width. This may also require upgrading the existing equipment yard road to ensure it provides all-weather access. Upon completion of detailed engineering and design of the Pelly substation the all-weather access road specific location and design and upgrading of the SFN Land Department Equipment Yard road (if required) can be finalized, including specifications for drainage (i.e., culverts if required).

Stewart Crossing Substation:

As noted in Section 5.7.3.4 of the Project Proposal Submission and additional information provided in the response to YESAB-YEC-1-4, a short all-weather access road of approximately 300 m in length currently exists from the North Klondike Highway into the existing Stewart Crossing Substation. This access road will continue to be used and does not require upgrading beyond possible additional aggregate material to ensure that increased use of the road during construction does not result in erosion.

Further information on transmission right-of-way access is provided below.

In the Project Proposal two approaches have been considered for access to the transmission line ROW.

- First, any location where the transmission line ROW crosses the Klondike Highway or roads that lead off the Klondike Highway (or crosses the mine access road) will be considered for ROW access.
- Second, any existing points of egress that extend to the ROW from the Klondike Highway (or the mine access road) will be considered as a potential point of access.

It is anticipated that the above two approaches for access to the ROW will be sufficient to meet the needs of the ROW brushing and clearing, construction, and operation and maintenance requirements. All points of egress will be examined and identified in the detailed engineering design process.

As set out in the Project Proposal document at page 8-31, where required any line-stringing activities across creeks and rivers will occur by stringing the line by helicopter and/or by working in the riparian zone under frozen ground conditions (such as at rivers and Tatchun Creek). Further, all fisheries guidelines for creek and river protection will be followed to ensure there is no increase in sedimentation or loss of riparian quality.

Locations that are identified for access in the detailed engineering design process will conform to the requirements of the Government of Yukon Department of Highways "Permit for Work within the Right-of-Way" in accordance with the Highways Act. Once out of the Highway ROW, a Land Use Permit will be utilized in accordance with the "Territorial Land Use Regulations". During the detailed engineering design process there will be discussions with the Yukon Government Highways Department leading to applications for a "Permit for Work within the Right-of-Way" which will identify the access design requirements including clearing, culvert installation and removal, relevant design standards and widths, turning radius, grade requirements, reclamation procedures and any other design requirements (as per YEC's EMS Manual Appendix 5A).

Similarly, any trails that require upgrading to allow for the transport of transmission line construction materials and equipment will be identified in the detailed engineering design process. All modification to existing access points for the purpose of transmission line construction will be temporary and will not be maintained. Existing access points and access at highway crossings will be utilized for operation and maintenance work and the required permits will be obtained. Where there is existing land holding at a required access point (to be identified in the detailed engineering design process), the required authorization for access will be sought. For example, Yukon Energy has been in contact with Yukon Government Department of Highways for access to gravel pits for construction of the transmission line, and it is anticipated that these discussions will also lead to an agreement for access to the transmission line ROW using the gravel pit access road.

Where existing access trails lead to the transmission line ROW a variety of measures will be taken to manage access where it is necessary. Access management will be determined in consultation with the regional RMO, First Nation community leadership (as identified on page 7-52) and any other identified stakeholder (see pages 8-30 to 8-31). This is an ongoing process that will continue on into the operation and maintenance stage of the project (page 7-52 and 8-68). One of the options suggested for access management (to limit access by others) consists of the use of berms of roots, stumps, trees and rocks (page 8-19).

Tables 3-1 to 3-4 provide information about the current land dispositions and applications that have been identified as potential transmission line ROW access locations. Many of the access locations are on Crown land or FN settlement lands. Where access is required, measures will be undertaken to identify persons responsible for the access points on Crown lands in order to obtain permission for access. Where a required access location is on FN settlement lands, discussions will be held with the FN leadership in order to obtain agreement for access. The required locations will be identified in the detailed engineering design process. To provide further assistance with the assessment process, these potential access points have been identified on maps along the preferred transmission right-of-way and are included as YESAB-YEC-1-3; Attachments 1 through 9 in PDF format.

Table 3-1

Land Dispositions and Applications for Potential ROW Access Points

Line Segment 1 – Carmacks to McGregor Creek

Land Use	NTS Map Sheet	#	Owner/Applicant	How many
Klondike Highway (ROW crossing location)	115 I/01		TG Highways & Public Works	3 sites (2 at each location on either side the highway)
Existing Access trail	115 I/01		Unknown	4
Klondike Highway	115 I/01	41943	TG Highways & Public Works	1
Klondike Highway (ROW crossing location)	115 I/08		TG Highways & Public Works	1 site
Existing Access trail	115 I/08		Unknown	4
Gravel Pit	115 I/08	11508-012	TG Highways & Public Works	1
Existing Access trail	115 I/07		Unknown	3

Table 3-2

Land Dispositions and Applications for Potential ROW Access Points

Line Segment 2 – McGregor Creek to Pelly Crossing

Land Use	NTS Map Sheet	#	Owner/Applicant	How many
Existing Access trail	115 I/07		Unknown	5
Klondike Highway (ROW crossing location)	115 I/07		TG Highways & Public Works	1 site
Klondike Highway	115 I/07	41945	TG Highways & Public Works	1
Existing Access trail	115 I/10		Unknown	3
Klondike Highway (ROW crossing location)	115 I/10		TG Highways & Public Works	1 site
Unknown	115 I/10	42328	SFN	1
Road	115 I/10	82567 CLSR	Unknown	1
EMR Land	115 I/10	2006-0173	TG Highways & Public Works	1
Road	115 I/10	2004-0003	Unknown	1
Existing Access trail	115 I/15		SFN	1
Bridgehead	115 I/15	115I15-044	TG Highways & Public Works	1

Table 3-3

Land Dispositions and Applications for Potential ROW Access Points

Line Segment 3 – Pelly Crossing to Stewart Crossing

Land Use	NTS Map Sheet	#	Owner/Applicant	How many
Gravel Pit/Water Station	115 I/15	115I15-046	Environment Canada/ Water Survey	1
Whitehorse-Mayo Road Crossing	115 I/15	41949 CLSR 2004-0003	TG Highways & Public Works	1
Utility	115 I/15	115I/15-044	Yukon Electrical	1
FN Access Road	115 I/15 & 115 I/16		SFN	1
Existing Access trail	115 I/15 & 115 I/16		SFN	3
Existing Access trail	115 I/15 & 115 I/16		unknown	1
Existing Access trail	115 P/01 & 115 P/02		unknown	5
Klondike Highway (ROW crossing location)	115 P/01 & 115 P/02		TG Highways & Public Works	5 sites
Existing Access trail	115 P/01 & 115 P/02		SFN	1
Klondike Highway	115 P/01 & 115 P/02	41952 CLSR	TG Highways & Public	2

Land Use	NTS Map Sheet	#	Owner/Applicant	How many
(11% hill)			Works	
Gravel Pit	115 P/07	115 P07-033	TG Highways & Public Works	1
Existing Access trail	115 P/07		unknown	5
Klondike Highway (ROW crossing location)	115 P/07		TG Highways & Public Works	3
FN access trail	115 P/07		NND	2

Table 3-4

Land Dispositions and Applications for Potential ROW Access Points

Minto Spur Transmission Line

Land Use	NTS Map Sheet	#	Owner/Applicant	How many
EMR land	115 I/10	2006-0173	TG Highways & Public Works	1
Road	115 I/10	2004-0003	Unknown	1
Access Road	115 I/10	2000-0113 LTO 83639 CLSR	Unknown	1
Klondike Highway (ROW crossing location)	115 I/10		TG Highways & Public Works	1
Minto Mine Access Road Crossing	115 I/11		SFN	6
Existing Access Points	115 I/11		SFN	3

REFERENCE: Page 5-28 – Upgrades on Road to Stewart Crossing Substation

QUESTION:

All activities interdependent to the project must be assessed as part of the project. As stated within the project proposal "the road into the Stewart Crossing substation may require upgrading" (p. 5-28).

- Please explain the nature of these potential upgrades, and whether these upgrades will result in a change of footprint, compared to that which currently exists.

ANSWER:

If required, any potential upgrades to the access road would be limited to additional aggregate material to ensure that increased use of the road during construction does not result in erosion. This will not alter the footprint of the existing road.

REFERENCE:

Chapters 6 and 7 – GIS Shape files (terrain hazards, rare plant locations, and route options)

QUESTION:

In assessing a proposed project it is important for the assessor to have access to the mapping data which may be used in identifying areas where the project footprint and effects overlap. Mapping layers may be utilized during the assessment by YESAB to undertake spatial analyses, and to further understand a proponent's effects analysis. Please provide GIS shapefiles for the following layers presented in the proposal:

- terrain hazards;
- potential rare plant locations; and
- route options that were consulted-upon for the areas of Tantalus Butte, Tatchun, Lhutsaw, Pelly Crossing, Jackfish Lake Park Reserve, SFN S-3B1/D (cabin), top of the 11% Trail Road, South Crooked Creek Crossing, Stewart Crossing, and Minto Landing.

ANSWER:

As reviewed in Yukon Energy's cover letter transmitting this Supplementary Information, GIS shape files are being provided where requested and available, and in other instances where such information has been requested YEC is providing available CAD-based information for YESAB to convert to GIS shape files. As reviewed under bullet 3 below, neither GIS shape files nor CAD-based mapping information are available to be provided in many instances relating to route options that were consulted upon.

More explanation is provided below on specific items requested.

Bullet 1: The terrain analysis that forms the foundation for the Preliminary Terrain Analysis was carried out by Mougeot GeoAnalysis (Appendix 6A-1) in 2001 for the Carmacks-Stewart portion of the Project. This information was provided in hardcopy (Appendix 6A-1) and in electronic format (Map Folio 6A-1). The work was completed in an ArcGIS format and those files readily available are included in the Mougoet folder under YESAB-YEC-1-5: Attachment 1. For any additional specific information, please contact YEC directly. Access Consulting Group (Appendix 6A-2) produced supplementary terrain analysis of areas that were not covered by the original Mougeot work (Tantalus Butte East route alignment, Pelly Crossing East and Pelly

Crossing West route alignments, Minto Spur route alignments). This information was produced in a GIS shape file and is included as YESAB-YEC-1-5: Attachment 1 (Access folder).

Bullet 2: Vegetation Mapping (Appendix 6C and Map Folio 6C) includes areas along the preferred route that may have potential for rare plants. The GIS shapefiles for this information are found in YESAB-YEC-1-5: Attachment 2.

Bullet 3: The route options that were consulted upon as noted above were not produced in GIS shapefile format due to the effort required to develop and maintain information on various options that would ultimately be resolved into one preferred route. The iterative nature of route option analysis, including consultation, did not lend itself to the level of plotting suggested in this question (see response to YESAB-YEC-1-10).

REFERENCE: Chapter 6 – Timber Potential on Settlement Lands

QUESTION:

Within the proposal it has been identified that no data for timber potential on first nation settlement land is currently available. Given the route selection with utilize settlement land it is necessary to gain a basic understanding of what resources exist and are proposed to be removed. This baseline information will aid the assessment by identifying landscape values potentially affected by the project.

- Please identify to the extent possible (using adjacent timber information where necessary) areas (i.e. locations) of medium and high timber potential on settlement land that overlap with the proposed project.

ANSWER:

As noted at page 6-22 of the Project Proposal, the Estimated Volume Potential Maps produced by Yukon Forest Management Branch (Maps 6-1 and 6-2 on Map Folio CD) for the CS transmission line suggest that the majority of the area has either low timber potential (i.e., only about 6% of the Route Study Area has medium timber potential and only about 3% has high timber potential), or has not recovered from past forest fires (about 36% of the Route Study Area). The Yukon Forest Management Branch is unable to provide information with regard to forest cover where Category A and Category B Settlement Lands are located; thus, where the Route Study Area intersects Category A or Category B Settlement Lands there is no available information with regard to timber potential.

Appendix 6C provides maps of vegetation and forest cover and Appendix 7B provides ortho-photographs of the entire route. Although it is difficult to make an accurate assessment, these maps and photographs can be used to provide information on the likely presence of areas with medium to high timber potential on Settlement Lands.

It appears as though the one relevant part of the proposed CS route involving LSCFN Settlement Lands i.e. the area in proximity to Tatchun Creek (Map 6C-2, Photos 7B-3 and 7B-4) could have medium to high timber potential, although there are also pockets of non-productive land present.

Moving north along the proposed CS route, the next parcels of Settlement Land belong to the SFN (Map 6C-3, Photos 7B-9 – 7B14) and the area is predominantly comprised of lands that have not recovered

sufficiently from forest fires. The maps identify pockets of forest cover to the east of the Lhutsaw Wetlands, however, the likelihood of medium to high timber potential is low as much of the area is either recovering from past forest fire activity, or has wetland characteristics (see ortho-photos). With regard to the Minto Spur area SFN Settlement Lands, the consultation undertaken identified one area of medium to high timber potential at the Yukon River crossing (Map 6C-4, Photo 7B-10, 7B-25 – 7B-27). Additional areas of timber in the Minto Spur area that were identified during consultation fall outside of the transmission line right-of-way and would be largely for personal fuel-wood use.

North of Pelly Crossing (Map 6C-5, Photos 7B-14 – 7B-19) maps indicate that there is some degree of forest cover on SFN Settlement Lands. The ortho-photographs indicate forest cover that is not very dense; several areas appear to be recovering from forest fires and the numerous creeks and small lakes in the area support a wetland characteristic that does not denote high timber potential.

REFERENCE: Chapters 6 and 7 – Medium to High Timber Potential Overlap with Route

QUESTION:

The proposal states that "6% of the route is in Medium Timber Potential, 3% of the route is in High Timber Potential" (p. 6-22). In assessing the effects on forest resources it is important to understand specific landscape values that may be affected by the project.

- Please identify the overlap locations of the proposed project with areas of medium and high timber potential.

ANSWER:

Page 6-22 provides baseline information on the Route Study Area, not the preferred route. The above quote is not accurate in this regard – the actual quote is: "The Yukon Forest Management Branch maps suggest that approximately six percent of the Route Study Area has medium timber potential, while only three percent has high timber potential." Page 8-12 provides information related to the proposed CS route, but does not attempt to break out estimates for medium and high timber potential areas along the proposed CS ROW. [On review of page 8-12, it has been noted that the estimates for the composition of the cleared 30 m ROW for the CS preferred line should be revised as noted below.[1]]

Maps 6-1 and 6-2 in the Map Folio produced by the Yukon Forest Management Branch for the CS line area present the estimated volume potential for timber in the Route Study Area. These maps do not include information on Category A and Category B Settlement Lands as information for these areas is not provided by the Yukon Forest Management Branch. Estimates of timber potential on Settlement Lands may be roughly calculated from the information provided in the Vegetation Maps (Appendix 6C) and ortho-photographs (Appendix 7B) (see response to YESAB-YEC-1-6).

High volume potential timber areas are located in small patches (less than 1 kilometer in length) in the following areas:

- East of Tantalus Butte
- South of Tatchun Creek

[1] The cleared 30 m ROW for the selected CS route (which in some areas goes outside the Route Study Area) is composed of:

- 68% Forest Cover
- 24% not sufficiently recovered
- 5% non-productive land
- 3 % wetlands.

- North-west of LSCFN Settlement Lands R-38B
- Just north of Yukon Crossing
- North of the gravel pit 115/02-002
- South of the community of Stewart Crossing

Medium volume potential timber areas are located in small patches (the largest being approximately 3 kilometers, but otherwise less than 1.5 kilometers in length) in the following areas:

- Between Tantalus Butte and Tatchun Creek
- North-west of LSCFN Settlement Lands R-38B
- Near Yukon Crossing
- South of the community of Stewart Crossing

In response to YESAB-YEC-1-6, it is considered possible that settlement land areas with medium to high timber potential may also likely exist in the following areas:

- LSCFN Settlement Land R-38B just north of Tatchun Creek (total distance approximately 2.5 kilometers)
- Barge landing on the west side of the Yukon River at Minto

REFERENCE: Chapter 6 – Wildlife VCs

QUESTION:

Only wildlife key areas and COSEWIC designations were noted for consideration in the "Wildlife" section of the project proposal. While critical habitat areas are important to identify, general habitats must also be identified in relation to the proposed project. This information will allow the assessor to characterize the spatial overlap of wildlife areas with that of the project proposal, and further determine if there is a potential for significant adverse effects. This information will also help ensure that any mitigation identified during the assessment does not contribute negative effects to wildlife and/or wildlife habitat.

- Please provide information and maps (where relevant and appropriate) relating to the overlap between the proposed project and any specific wildlife habitats, ranges, movement corridors, etc.
- Provide information regarding the Ethel Lake and Tatchun Caribou herds and bison, specifically spatial habitat use, in relation to the project.
- Identify any implications concerning the distribution and abundance of habitat types that may influence the project.
- In the course of proposal development we have been made aware that a YTG regional biologist noted locations of Sharp-tailed Grouse leks near the project (east of the Minto airstrip and Klondike Highway). Please identify these on an appropriate map and provide the GIS point files. Describe how the project considered this information.

ANSWER:

Bullet 1 and General Background Information on available wildlife habitat mapping: The Project Proposal Submission provides the only mapping of wildlife habitat that is publicly available. It is available from the Yukon Government which is an expert department (See Wildlife Key Areas Map 6-4). This map illustrates important or 'key' habitats for a variety of species in a regional context. General habitat areas for wildlife can be extrapolated from the Wildlife Key Areas depicted on the maps; thus, general habitat consists of those areas that surround the Wildlife Key Areas on the map.

As illustrated on the above referenced map provided in the Project Proposal, the Route Study Area overlaps, or is in the vicinity of, many specific wildlife habitats for different species of wildlife. This includes mule deer, moose, caribou, bison, sheep, alpine raptors, bald eagle, peregrine falcon and ducks.

Important moose habitat has not been mapped in any publicly available database. While some specific information is housed with the individual Northern Tutchone First Nations, the LSCFN Lands Directorate is not in a position at this time to release any mapping data. For more specific details please consult directly with LSCFN. General information on moose habitat indicates that moose prefer lowland spruce forest for late winter range and use sloughs and islands for calving in the summer (Personal Communication, Environment Yukon, December 14, 2006). Upland willow drainage is also key for post rut periods. General moose habitat can be found throughout the entire Project Study Region. The area along the Yukon River between Carmacks and Minto Landing provides an abundance of appropriate habitat for moose calving. The proposed CS transmission line does not intersect the Yukon River and would not disrupt moose calving. The proposed MS line crosses the Yukon River at a location that lies between large islands where no other development structures are located. The relative footprint of the proposed right-of-way is small in comparison to the overall Yukon Interior region capable of supporting moose.

Additional detail on caribou is provided under bullet 2 below.

Bullet 2: Caribou are a migratory species and in the Project Study Region they occupy a large range of habitat over the course of the seasons. Detailed spatial habitat mapping is not publicly available, although available habitat information is provided in the Project Proposal on Wildlife Key Areas Map 6-4 noted above.

As noted in the Project Proposal and in the above map, the majority of habitat for both the Tatchun herd and the Ethel Lake herd is to the east of the Route Study Area.

The following information is provided to clarify the statement made on pg. 6-35 concerning the winter range of the Ethel Lake caribou herd on the west side of the Klondike Highway in the vicinity of WKA 987. The statement should read:

> The Ethel Lake Herd's winter range extends west of the Klondike Highway and the proposed CS Route Study area and into the wetland complex identified as WKA 987 (Personal Communication, Environment Yukon, December 14, 2006). This is not a recent extension, but has been on-going. The Ethel Lake caribou herd uses the general habitat between WKA 987 (Willow Creek Wetland), WKA 988 (Willow Creek/Jackfish Lake Park Reserve area) and WKA 1934 (east towards Summit Lake) as part of their larger winter range from October through April.

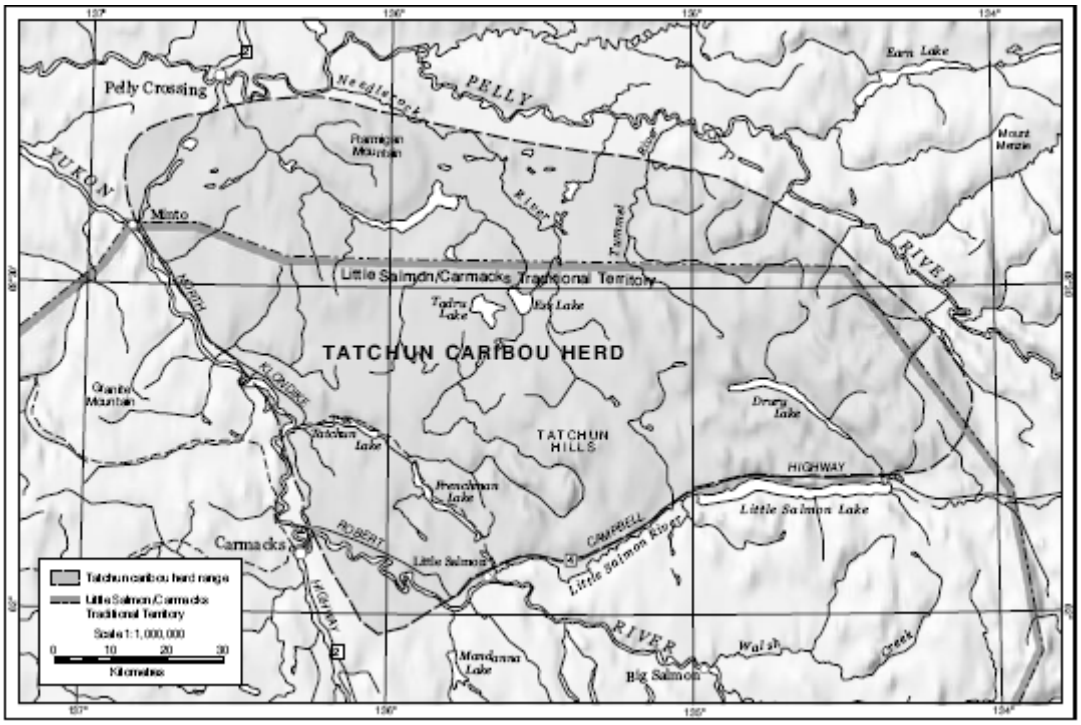
The proposed CS line intersects this general habitat of the Ethel Lake Caribou herd north of Pelly Crossing and continues northwards to the vicinity of Top of 11% Hill. Throughout this winter range habitat, the proposed CS line has maintained a protective vegetative buffer between the highway right-of-way and the transmission line right-of-way.

The Tatchun Caribou herd's general winter habitat stretches from Carmacks to south of Pelly Crossing. As noted in the Project Proposal Submission on pg. 6-35, summer and fall habitat is to the east of the Route Study Area and outside the scope of this project. There is potential for Tatchun Caribou to cross the proposed CS transmission right-of-way north of Minto Landing in the vicinity of the Lhutsaw Wetland Habitat Protection Area during the winter season of October through April. The proposed CS line will be located to the west of the Klondike Highway throughout the western extremes of this winter range and in some areas there will be significant buffer areas between the two rights-of-way. A portion of the proposed line will be located behind bluffs which should mitigate the effects of opportunistic hunting of the Tatchun herd from the highway throughout the section to the west of the Lhutsaw Protection area.

The following diagram illustrates the Tatchun herd range, as per the Little Salmon Carmacks First Nation Community-based Fish and Wildlife Management Plan 2004-2009.

Figure 1-8.1 –

Tatchun caribou herd range



From May through to October caribou are generally found in alpine habitat for calving in the spring and rutting in the fall. In late October/early November they migrate to a large, forested winter range habitat until April. The Tatchun herd's winter range has been affected by wildfires that occurred in 1969, 1995 and 1998. According to the LSCFN Community-based management plan "the animals are still in good physical condition and show no signs of stress from the effect of fires on their range".

As stated on page 6-37, Bison use habitat in the Carmacks/Tantalus Butte area (WKA 1925) and Tatchun Lake area (WKA 1926) on a year round seasonal basis. The information provided by Environment Yukon includes anecdotal sightings of between 3 and 14 animals by a Yukon Government biologist and has not been updated since 1994. Predominant bison habitat is well outside the Project Study Region to the southwest in the Braeburn/Mount Nansen areas (Little Salmon Carmacks Community-based Fish and Wildlife Management Plan).

Bullet 3: Implications concerning Project effects on distribution and abundance of wildlife and habitat is dealt with in Chapter 8, Effects Assessment under each relevant VC. For example, effects on moose and

moose habitat is included in Section 8.2.2.5 on pgs 8-17 to 8-18; and effects on caribou and caribou habitat in Section 8.2.2.6 and 8.2.2.7 (pgs. 8-18 through 8-20).

Bullet 4: Further communication on December 14, 2006 with Mark O'Donoghue, Yukon Government Regional Biologist, has clarified the general location of the Sharp-tailed Grouse leks. These leks are situated along the east side of the Klondike Highway south of the Minto gravel pit. This information is not currently mapped through YG's wildlife key areas database; however, the Wildlife Key Areas Map has been revised, and included as YESAB-YEC-1-8; Attachment 1, to illustrate the general location of these leks based on consultation with the Regional Biologist. The GIS shapefiles of Attachment 1 are provided in YESAB-YEC-1-8: Attachment 2. Please note that in order to protect the species the exact locations of the Sharp-tailed Grouse leks cannot be provided. The proposed CS transmission line is routed to the east of the leks following the base of the bluffs and the proposed MS line is routed to the north of this general location.

REFERENCE: Chapter 2 and 7 – Private Land Crossings

QUESTION:

In assessing areas for potential use it is necessary to confirm the viability of the proposed route and review any uncertainty related to presented options. The project proposal identifies areas where private land is to be crossed in order to complete the project as proposed, however, it is not clear is easement has been negotiated or agreed to.

- It is stated that "segment 1 crosses through a parcel of land recently approved by YG Lands for agricultural use" (p. 7-7). Please confirm that permission from the landowner, or a negotiation of easement exists for this segment, or provide alternate routing around this property.
- Appendix 2A identifies 14 private land crossings, 2 residential agreements, 2 agriculture agreements for sale, and 1 agriculture application. Please provide information regarding approvals/permissions granted by the registered land owners to the proponent for access and construction of the transmission line along the preferred route. Where an easement has not been negotiated provide an alternative routing option for consideration in the assessment.
- Identify on a map of appropriate scale, all areas along the study area that are not under tenure of the proponent or a First Nation that has signed an MOU with the proponent.

ANSWER:

Bullet 1 and general comment on negotiation of easements: Yukon Energy has not negotiated or agreed to any easements at this time with respect to non-Crown or non-settlement lands. Only one area is identified in the Project Proposal where such lands may need to be crossed (see below) and the matter of options to such use is addressed.

The land disposition in question on the west side of the Klondike Highway and immediately south of McGregor Creek is held by Mr. Larry Paulsen and is currently in the agricultural land applications process. At present the parcel of land in question is considered to be a "hung" disposition as the application is being legally challenged by the LSCFN. Until the legal challenge is settled an agreement for sale between Mr. Paulsen and Mines and Resources - Agriculture Branch cannot be completed; consequently, the land remains Crown land to which Mr. Paulsen currently has no concluded legal entitlement. The earliest anticipated settlement date for the case is in February or March of 2007. (Personal communication, David Murray, December 14, 2006.)

Mr. Paulsen was contacted by Yukon Energy during the public involvement process to inform him of the project and its potential for crossing this application. Should Mr. Paulsen be granted acquisition of the land disposition Yukon Energy will proceed to negotiate an easement. Given that Mr. Paulsen expressed no concerns about the transmission line routing there are no anticipated issues with regard to negotiating an easement. During the course of the route selection process, however, options not requiring any use of this land disposition were noted where the line would cross the highway north of this land disposition. As reviewed at page 7-7 the proposed route in this area reflects the following considerations:

- Need to avoid two LSFN members' individual land selections on the east side of the highway and to be in an optimum location for any future tap connection to the proposed Carmacks Copper mine (these needs can be met without use of the noted land disposition); and
- LSCFN request that this line cross the highway in this area to avoid proximity to an LSFN member trapline area on the east side of the highway.

Bullet 2: Appendix 2A addresses land tenure within the Route Study Area wherein only a portion of the area is required for the proposed route right-of-way.

Appendix 2A identifies 14 private land crossings, two residential agreements, two agriculture agreements for sale, and one agriculture application that fall within the Route Study Area. The Route Study Area is a 500 meter corridor that lies generally along the Klondike Highway and was used for preliminary studies in order to determine route alternatives.

Within the 500 meter Route Study Area (as modified during the course of the studies) the CS Project will require a 60 meter right-of-way (ROW) of which 30 to 40 meters will be cleared. The actual ROW for the proposed CS line will not cross any of the private land holdings, residential agreements, or agricultural agreements; however, as reviewed in response to bullet 1 above the CS Project ROW may cross the agricultural application of Mr. Paulsen (see above details).

Bullet 3: Aside from First Nation Settlement Land and the potential to cross Mr. Paulsen's agricultural application the transmission route falls entirely on Crown Land. Yukon Energy does not hold land tenure within the proposed transmission line route area. The map provided at Appendix 4D (Map 4D-2) which was used at the September 12th Steering Committee meeting indicates the location of Mr. Paulsen's agricultural parcel immediately south of McGregor Creek on the west side of the highway (as noted at page 7-53 the final preferred route as set out in Appendix 7B (Photo 7B-6) crosses the highway at a point slightly further

1 south than indicated on Map 4D-2 and thus now is proposed to cross portions of Mr. Paulsen's agricultural
2 application).

REFERENCE: Chapter 7 - Maps

QUESTION:

It is important for assessors to understand all considerations that went into choosing valid route options, given the scale and dimension of the proposed project, maps are invaluable in the spatial characterization of effects and the determination of potential mitigations. Within the proposal several maps, especially those in Section 7, are difficult to interpret given the size. layout, and legend properties.

- Please provide detailed maps of those areas where alternatives were discussed in consultations, detailing the spatial relationship between identified values (e.g. cabins, habitat), route constraints (e.g. terrain hazards), and preferred routing options.
- For Section 7 of the proposal, please provide larger maps at a scale appropriate to understanding alternatives, with suitable legends.
- The two items above may be combined where relevant to reduce the amount of maps to be produced.

ANSWER:

Bullets 1, 2 and 3: As reviewed in response to YESAB-YEC-1-1, the figures that are included in Section 7 consist of the preliminary route options developed for the purposes of initial consultation with stakeholders, and accordingly this information was produced in CAD format and is not available in shape file format. Electronic copies of the preliminary route options within the Route Study Area were provided in PDF format on November 14, 2006.

The figures in Chapter 7 were provided in order to illustrate specific areas within the Route Study Area where consultation on route alternatives occurred, as well as to document this consultation. This analysis was not consolidated into one map format as in some instances this was not feasible (e.g. terrain analysis, see response to YESAB-YEC-1-5), practical (route option identification and analysis is iterative and does not lend itself to detailed digital graphical plotting) or permitted (where routing constraints such as resource use or culturally significant sites are confidential).

In all instances consultation on alternatives occurred with reference to the individual NTS map sheets with the initial map sheets showing the Route Study Area and the initial route options as noted in the May newsletter. During the course of the consultation process additional options emerged beyond those initially

identified and mapped at the outset. The response to YESAB-YEC-1-11 provides an updated listing and tables to assist in review of all relevant options that were ultimately examined for each CS segment. In many instances specific "alternatives" discussed did not merit a lot of detail or complex mapping; in other instances the discussions were of a preliminary nature and did not indicate any need to consider further certain suggested options (such that further details and/or mapping development was not warranted).

In order to further assist review of these materials an Index of Chapter 7 figures is provided as YESAB-YEC-1-10 Attachment 1.

Consolidation and analysis of identified constraints and opportunities with these various route options was undertaken separately based on the information contained in this Project Proposal Submission documentation including, for example:

- NTS Maps Sheets of the proposed routes;
- Preliminary terrain analysis (Appendix 6C);
- Other baseline information in Chapter 6; and
- Information arising from the consultation process (Chapter 4) and the evaluation of alternative routes (Chapter 7).

REFERENCE: Chapter 7 – Routing Options (CS Line Segments 2 and 3)

QUESTION:

The identification of routing options will be useful in understanding the feasibility of mitigations identified both in the project proposal as well as during the assessment of the project. The text contained within the project proposal is not always clear, and may provide difficulty to the general public in their review of the project during the public comment period.

- In order to understand the routing options that were considered please provide a preliminary route options table (i.e. similar to table 7.2-1) and a comparison of the preliminary routing options table (i.e. similar to table 7.2-2) for the area between McGregor Creek and Pelly Crossing (p. 7-24), as well as Pelly Crossing to Stewart.

ANSWER:

Preliminary route options for McGregor Creek to Pelly Crossing: The Project Proposal Submission identified the original preliminary route options in the vicinity of Minto Landing and Pelly Crossing. Table 11-1 below provides an index of the additional route alternatives between McGregor Creek and Pelly Crossing beyond those originally identified and addressed in the Project Proposal Submission tables.

Table 11-1

Index to Additional Route Alternatives between McGregor Creek and Pelly Crossing

Route Alternative/Location	Explanation
Moving further back from highway on east side opposite LSC R17B settlement lands - Map 4D-3, Preferred Route Segment 2.1	• Consultation with LSCFN and SFN led to suggestions for moving the proposed CS line for aesthetic reasons outside the Route Study Area along the base of the bluffs through the section opposite LSC R17B settlement lands • Proponent, in consultation with YG regional biologist was unprepared to move inland by 1 km due to habitat fragmentation and economic concerns. A compromise was adjusting the line inland by up to 200 m where feasible. • No further explanation is warranted as effects to the project, environment and community are

Route Alternative/Location	Explanation
	the same with either the original routing or the minor route adjustment.
McCabe Creek area	• Consultation with SFN led to route adjustments across McCabe Creek on SFN settlement land (and not on Crown land). This is well documented on pgs. 7-17 through 7-19 and further documentation is not warranted.
Approach to proposed Minto Spur substation location, SFN R-3A lands and EMR reserved land (Map 4D-4, Preferred Route Segment 2.2)	• The route refinement through this section of the line crosses SFN settlement lands R-3A. • Consultation with SFN members resulted in a route refinement away from the Klondike Highway and along the base of McCabe bluffs into the EMR parcel of land. • Consultation with Dept. of Highways verified the route refinement, in conjunction with the proposed Minto substation location in the north-east corner of the EMR parcel. • No further documentation is warranted on SFN settlement land.
An approximately 1 km section North of proposed Minto Spur Substation	• The minor route refinement along this 1 km stretch on SFN R-3A settlement lands came about through consultations with SFN and concerns expressed over heritage resources, a gravesite on Policemen's Hill, and staying to the west of Von Wilczek/Lhutsaw Creek. • As this minor route refinement is solely on SFN settlement land, no further documentation is warranted.
Lhutsaw Route Options	• Details and comparative analysis is provided in Tables 11-2 and 11-3 below.
South of Pelly Crossing	• In September, the location of the proposed Pelly substation was changed from south of the community on Crown land, to a parcel of SFN land next to the SFN Lands Department equipment yard (see Figure 5-7.3 on pg. 5-23). The change in substation location occurred at the Sept. 12th Steering Committee meeting, and was subsequently identified in a Memo from YEC to Jim Harper and Albert Peters (see Appendix 4D-2.0). • To simplify technical and economic

Route Alternative/Location	Explanation
	considerations for routing the proposed CS line in straight tangent lengths from Six Mile Lake north to Pelly Crossing, and in consultation with SFN over trapping concerns through this area, the route was adjusted as shown in Figure 7.2-9 and Appendix 4D, Map 4D-5.
Route Options through Pelly Crossing	• See Project Proposal Submission Tables 7.2-3 and 7.2-4

As consultation with SFN progressed several additional route options were proposed in the section north of Minto Landing, including the section to the west of the Lhutsaw Wetland Habitat Protected Area. The following additional information is provided to address these route options and should be used in conjunction with Figures 7.2-6 and 7.2-7 on pages 7.21 and 7-23 respectively.

Table 11-2

Lhutsaw Route Options

Original Route	Lhutsaw Route Option 1	Lhutsaw Route Option 2	YEC Preferred Route Option
• Route avoids wetland habitat on east side of highway • Maintains a vegetative buffer between highway and t-line right-of-way • In close proximity to highway for easy access and maintenance	• Includes adjustment resulting from change in Minto substation location • Route avoids wetland habitat • Increases buffer between highway and t-line right-of-way for aesthetic reasons voiced by SFN (located behind bluff) • Maintains easy access	• SFN proposed option reflects their interest in improving access to fuelwood to the west, future development of land behind Policeman's Hill, potential development of Old Pelly Coach Trail and viewscape concerns • Longest and most costly route option including the need for temporary access trails, and higher operation and maintenance costs • Wildlife fragmentation concern	• YEC compromise option to avoid higher costs of additional line length and maintenance costs for Route Option 2 • Maintains visual and vegetative barrier • Avoids identified heritage resources immediately north of Minto substation near Von Wilczek/Lhutsaw Creek

In consultation with SFN the original route option (in close proximity to the Klondike Highway) was dismissed outright. Additional route refinement and assessment was restricted to Lhutsaw Route Options 1 and 2 and the YEC Preferred Route. The following table reviews key comparisons in this regard.

Table 11-3

Comparison of Lhutsaw Route Options

	Lhutsaw Route Option 1	Lhutsaw Route Option 2	YEC Preferred Route Option
Effects on the Project			
Line Length (estimated from proposed Minto substation to existing access trail on either side of highway, opposite Rock Island Lake)	16.36	19.21	16.74
Number of Corner Towers (approximate)	3	4	3
Preliminary Estimated Costs[1]	$ 2.127 million	$ 2.497 million	$ 2.176 million
Effects on the Environment			
Terrain types[2]: - sensitive terrain - stable terrain			
Wildlife[3]	Winter range for Tatchun caribou herd; moose habitat; avoids waterfowl habitat in wetland areas to east of Route	Winter range for Tatchun caribou herd; moose habitat; avoids waterfowl habitat in wetland areas to east of Route. Concern over habitat fragmentation due to greater distance between highway and t-line rights-of-way.	Winter range for Tatchun caribou herd; moose habitat; avoids waterfowl habitat in wetland areas to east of Route. Concern over potential habitat fragmentation along one section of this route option.

[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 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.

	Lhutsaw Route Option 1	Lhutsaw Route Option 2	YEC Preferred Route Option
Vegetation[4]	• Entire area part of 1995 fire	• Entire area part of 1995 fire • Conifer stand behind Policeman's Hill	• Entire area part of 1995 fire
Effects on the Community[5]			
Resource Use: - traplines	Line passes through trapping concession #s 139, 136 and 137	Line passes through trapping concession #s 139, 136 and 137	Line passes through trapping concession #s 139, 136 and 137
Access to Resources	Concern expressed that ROW may increase access to SFN lands and timber and increase hunter access	Positive community access to fuelwood harvesting, potential future development of land behind Policeman's Hill, and potential development of Old Pelly Coach Trail between Minto and Pelly Crossing	Option would discourage future development as route is behind a bluff
Aesthetic Concerns	Viewscape concerns expressed by SFN – expressed desire to minimize visual impact of t-line throughout this section of the route	No aesthetic concerns – route is behind bluffs and Policeman's Hill.	Reduces visibility from highway as compared to Option 1.
Cultural/heritage sites	Avoids known heritage sites.	Avoids known heritage sites.	Avoids known heritage sites.

Preliminary route options for Pelly Crossing to Stewart Crossing: The Project Proposal Submission includes comparative tables for the route alternatives around Stewart Crossing. Table 11-4 provides an index to additional locations where route options were identified during the route assessment process.

[4] Analysis is based on Fire History Map, ground-truthing and consultation with SFN.
[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.

Table 11-4

Index to Route Alternatives between Pelly Crossing and Stewart Crossing

Route Alternative/Location	Explanation
Jackfish Lake Park Reserve	There is little practical value in including detailed comparative tables for this option as the original preliminary Route Option 4B was quickly eliminated in early consultation with both Yukon Government Parks and SFN. Both groups determined that Route Option 4B through the Park Reserve was not acceptable. The slight modification to the original route (as depicted in Figure 7.2-11 on pg. 7-33) was due to SFN's desire to limit the amount of SFN settlement lands the proposed CS line would cross. While this refinement results in a small amount of additional Crown land being crossed in the area south of Jackfish Lake Park Reserve: • The effects on the environment are the same for either route, • The effects on the trapping concession are identical (# 137), and • The effects on other community variables are the same for either route.
Mud Lake/SFN Cabin Route Refinement	There is little practical value in including detailed comparative tables for this minor route refinement. During the route assessment and consultation process, traditional knowledge identified both a local cabin and resource use camp in this area. This resulted in relocating the proposed CS line to the opposite side of the highway to avoid this individual SFN parcel (S-3B1/D – a personal cabin). The proposed route refinement maintains a vegetative buffer between the highway and t-line rights-of-way, and is routed to avoid terrain constraints such as steep slopes and wetland areas. The route also avoids a traditional resource use camp on the north-east side of Mud Lake (as identified in Figure 7.2-12 on pg. 7-34).
Top of 11% Trail Road Route Alternative	See discussion and Tables 11-5 and 11-6 below.
South of Crooked Creek Route Refinement	There is little practical value in including detailed comparative tables for this minor route refinement (see pg. 7-35 and 7-36 and Figure 7.2-14). During the route assessment terrain analysis suggested placement of the proposed CS line on the west side of the highway. However, traditional knowledge obtained through consultation identified both high potential for heritage resources along Crooked Creek west of the highway and concerns over west-facing viewscapes. The route refinement also allows for tighter alignment on more solid or previously disturbed terrain, while recognizing the need to span an area of permafrost and poorly drained soils (see Map 6A1-9).

Top of 11% Trail Road: The original proposed routing in this area followed the Klondike Highway and terrain contours. As the highway bends sharply in this section, the original option included several corner

towers. During the consultation process, members of SFN and NND noted the poorly drained/permafrost terrain along the southern section of the highway (see Mougeot Terrain Analysis Map 6A1-8), as well as wetlands to the east. The additional information below in Tables 11-5 and 11-6 provides for a comparison of the original route and the option to follow Top of 11% Trail Road.

Table 11-5

Original Route	Top of 11% Trail Road Option
• Adjacent to Klondike Highway • Avoids both gravel reserves, wetland areas and SFN S-45B1/D individual parcel on lake to the west • Requires more angle towers • Low-lying permafrost and poorly drained sections	• Located between existing Klondike Highway and Top of 11% Trail Road • Firmer terrain; can take advantage of slope contours • Straighter (fewer angle towers); shorter distance

Table 11-6

Comparison of Route Options along Top of 11% Trail Road

	Original Route Option	Top of 11% Trail Road Option
Effects on the Project		
Line Length (approximate)	9.34	8.82
Number of corner towers (approximate)	4	2
Preliminary estimated costs[6]	$ 1.214 million	$ 1.147 million
Effects on the Environment		
Terrain Types[7] - Sensitive terrain - Stable terrain	 • Sensitive (5%) • Stable (95%)	 • Sensitive (0%) • Stable (100%)
Wildlife[8]	Key habitat for peregrine falcon and waterfowl to south-east. General habitat for moose and Ethel Lake caribou herd.	Key habitat for peregrine falcon and waterfowl to south-east. General habitat for moose and Ethel Lake caribou herd.
Vegetation[9] - % of burned or non-burned productive	 • Burned/non-productive (70%) • Forest cover (20% - high	 • Burned/non-productive (85%)

[6] Using a base cost of $130,000 per km for 138 kV line – no consideration of large angle cost differences.
[7] Sensitive terrain defined as terrain features to avoid from Mougeot's classification of 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
[8] 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

	Original Route Option	**Top of 11% Trail Road Option**
area - % of forest cover	volume potential; 10% medium)	• Forest cover (15% - high volume potential)
Effects on the Community[10]		
Resource Use: traplines	Trapping concession # 76	Trapping concession # 76 and 77
Access to resources	Adjacent to Klondike Highway and access trails	Adjacent to Top of 11% Trail Road
Aesthetic concerns	Aesthetic concerns relating to viewscape of McArthur Mountain Range	No aesthetic concerns
Cultural/heritage sites	No identified heritage concerns	No identified heritage concerns

[9] Analysis is based on Forest Cover Mapping, Forestry Branch April 2006 – estimated volume potential is not calculated by Yukon Government Forest on First Nation Settlement Land.
[10] 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.

1

REFERENCE: Page 7-30 – Pelly Crossing Substation Location

QUESTION:

As the development of the Pelly Crossing substation is part of the proposed project it is necessary to consider its location for the purpose of identifying any potential effects on the community of Pelly Crossing as well as effects of the location on the environment. The proposal states that the "revised location of the Pelly Crossing substation is by the SFN Lands Department equipment yard" (p. 7-30), however, the area referred to is not identified on the provided maps.

- Please provide a larger map containing the location of the Pelly Crossing substation in detail, and ensure a legend is included. This may be combined with the items in number 10 (above).

ANSWER:

Section 5.7.2.2 (Page 5-23) describes the Pelly Crossing and Minto Landing Substations. Figure 5.7-3 shows a sketch of the proposed substation including description of the preliminary footprint of the cleared and fenced area.

Appendix 7B contains the proposed route for the Carmacks-Stewart and Minto Spur Transmission Lines, including the location of proposed substations at Carmacks, Minto Landing, Pelly Crossing and Stewart Crossing. Specific reference for the proposed Pelly Crossing substation can be found in Photo 7B-14.

The Pelly Crossing substation is also identified on YESAB-YEC-1-12; Attachment 1: Land Use Map 2B-5 revised. GIS shape files for the locations of the proposed substations at Carmacks, Minto Landing, Pelly Crossing and Stewart Crossing, as well as all Land Use information are provided in YESAB-YEC-1-12: Attachment 2.

REFERENCE: Chapter 7 – Stewart Crossing Approach Options

QUESTION:

In following the process of route selection and the rationales presented it is necessary to understand what effects are being avoided and/or mitigated. Option 5D was selected for the Stewart Crossing approach. While part of the rationale for not using other options was the avoidance of poorly-drained areas, in reviewing the information presented it appears that option 5D overlaps with a boggy and poorly drained area.

- Please provide a rationale for why 5A Stewart East option was not chosen, given the preferred option 5D overlaps with boggy and poorly drained areas.

ANSWER:

The original route option 5A Stewart East was initially discussed with members of NNDFN on July 4, 2006, including a member who resides close to the community of Stewart Crossing. This route alternative was modified to avoid community housing and infrastructure and resulted in the route alternative 5A (modified) as shown in Figure 7.2-15 on page 7-37. NNDFN then undertook some ground-truthing in late summer in order to determine an optimal crossing of Crooked Creek to avoid any potential heritage resources and important wildlife habitat. The area in the vicinity of 5A near the proposed crossing of Crooked Creek was in fact flooded. There were also heritage concerns identified in the Heritage Impact Assessment Report for Route Option 5A. In addition, it was determined through ground-truthing that Option 5D was partially located on a ridge line of higher, firmer ground resulting in a more optimal crossing of Crooked Creek. It also facilitated easier access via the existing dump road and Old Dawson Trail. These route options were discussed internally by NNDFN Chief and Council. Their preference for route Option 5D was then subsequently communicated to YEC.

REFERENCE: Page 7-52 – Potential Access Management

QUESTION:

Access is considered when assessing the effects on various values, for example hunting, increased use of an area, habitat fragmentation, as well as the positive effect of increased access to an area for recreational use. The project proposal speaks to the future identification of potential access management approaches (p. 7-52). Access management may mitigate certain potential effects, however the assessment must be aware of the tools/techniques proposed in order to assess the mitigations effectiveness.

- Provide the details of the proposed access management plan that will be used to restrict movement along access trails. Please note that if none is provided, the assessment must assume no access management will be in place.

ANSWER:

Generally, Yukon Energy has committed in the Project Proposal to work with each of the NTFN (and others) to restrict access onto and along the proposed transmission right-of-way to the extent practicable in specific areas of concern identified to date in consultations with the NTFN. This does not imply a commitment to develop one overall 'access management plan' for the Project or a commitment to restrict movement along all access trails. As reviewed separately (see response to YESAB-YEC-1-3), the area of the proposed route already has a general abundance of ROW access points - and it would clearly not be feasible for Yukon Energy to contemplate any overall attempt to 'manage access' to the ROW. The commitment in this regard is therefore limited to specific areas of concern, and to examine with others options that may be feasible in such circumstances.

Although there are at this time no agreed upon specific plans with individual First Nations, Yukon Energy's commitments to the NTFN that are described and reflected in the Project Proposal Submission constitute the framework for YESAB to consider. Yukon Energy has not adopted the position that no access management plans will be in place for this Project and has in fact committed to developing certain such plans with stakeholders as required and as feasible.

As demonstrated by the referenced page (p. 7-52) (which addresses a specific commitment to LSCFN regarding the Tatchun Creek area) Yukon Energy has committed, for example, to work collaboratively with LSCFN and other parties over the next few months to identify and assess specific access management

approaches for the route through specific areas, which in the specific instance noted at page 7-52 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 specific 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. Yukon Energy clearly does not want to prejudge in advance what specific plan may be agreed upon by the parties as a result of these consultations; however, as reviewed below, the Project Proposal does address certain potential tools and techniques that can be examined in this regard.

By way of a further example in this regard, the summary residual effects tables in Section 8.5 identify the specific VCs where, with regard to "long-term presence of permanent ROW," mitigation is committed to follow Yukon Energy's EMS best management practices for [ROW] access or for consultation with the RMO's, First Nations and others (e.g., trappers) "regarding access restriction and control measures." As regards specific potential measures or tools/techniques, it is noted in the Project Proposal that where feasible Yukon Energy will restrict off-road access with physical barriers (roots, stumps, trees, rocks) [e.g., see Table 8.5-2 re Mammals; also page 8-16 re: mule deer, page 8-19 re: Ethel Lake woodland caribou herd, and page 8-20 re: Tatchun woodland caribou herd]. Other techniques might involve spanning certain areas.

The Project Proposal also describes in Section 8.6 processes that have been set out for Yukon Energy to work with other parties to establish appropriate arrangements. Consistent with best practices to direct in-field construction and maintenance activities, an EPP for the Project will be developed after receipt of final regulatory approvals and prior to the start of clearing and construction activities. Yukon Energy is committed to an environmental protection and monitoring program which will extend through all phases of the project's construction, operation and maintenance, and decommissioning. These arrangements will be in addition to activities and procedures Yukon Energy already employs in its Environment Management System (see Appendix 5A).

Section 5.10.3 describes steps that will be taken when temporary access trails are no longer required and notes that Yukon Energy will leave trails in a serviceable condition for future maintenance requirements, and that this may require obstruction of access to ROWs.

REFERENCE: Page 8-8 – Strategic Pole Placement

QUESTION:

The technical feasibility and implementation of mitigations forms part of the assessment. Specific decision processes must be explained for consideration.

- Please provide further detail regarding the meaning and approach to "strategic pole placement" (p. 8-8).

ANSWER:

The term "strategic pole placement" as used in the Project Proposal means final selection of specific pole placements, where feasible, to avoid sensitive terrain, heritage or other adverse conditions as noted. As stated in Table 8.2-1 this may involve use of rock-filled barrels for pole support where necessary. Further information is provided below to outline how in practice this would occur.

Pole structure locations will be set in the final design process on the basis of digitized mapping and will reflect assessment of engineering and economic factors with respect to line-length, clearing requirements, site-specific topographic and geo-technical considerations, in conjunction with environmental and socio-economic factors. Subject to detailed engineering analysis future pole locations can be selected during this design stage as a potential mitigative measure to avoid or minimize known adverse environmental effects (e.g., known sensitive terrain or other specific conditions). Small adjustments to pole placement can typically also be made thereafter during the construction phase of the development to address localized physical, geotechnical, and environmental concerns that become known at that time.

REFERENCE: Chapter 8 – Monitoring and Reporting - Rutting and/or Other Damage

QUESTION:

Soil erosion and compaction are potential effects of developments utilizing large machinery and equipment off established roadways. The proposed project identifies a monitoring and reporting system as a potential approach to mitigating adverse soil effects.

- What type of monitoring and reporting system will be in place during construction and operation to identify rutting and/or other damage that may require remediation by the proponent?

ANSWER:

Potential environmental effects and mitigation measures associated with soil compaction and erosion are described in Section 8.2.1.1 and summarized in Section 8.5.1.1. These sections identify the following proposed mitigation with regard to sensitive terrain that may be affected by rutting and/or the removal of soil fixing vegetation (which may contribute to erosion) due to project-related use of large machinery and equipment off established roadways:

- Route selection to avoid sensitive terrain;
- Timing construction to occur in winter months;
- Use specialized equipment;
- Where rutting occurs on steep slopes, wetlands or permafrost areas, ruts will be levelized or filled in to avoid erosion or damage to permafrost sub-soil;
- Yukon Energy's EMS best practices (includes YEC's EMS manual, Section C.4.11 - Overall Guidelines includes monitoring of vegetation (see Appendix 5A)); and
- Following practices outlined in Chapter 5, sections 5.10.3, 5.10.4, and 5.10.5 to negate impacts.

Without focusing specifically on these mitigation matters relating to rutting and/or other damage related to soils the Project Proposal also sets out commitments for a Project specific Environmental Protection Plan (EPP), including monitoring and reporting protocols, to be provided after receipt of final regulatory approvals and prior to the start of clearing and construction activities (see Section 8.6 on Environmental Protection and Monitoring, pg. 8-68). The following elements of this EPP can be noted here from the information provided in Section 8.6:

- Commitments for compliance monitoring through all phases of the development to ensure implementation of the required mitigation measures;
- "Overall, the nature of the proposed Project activity and the related assessment predictions are such as to require only minimal consideration of additional monitoring or follow up measures to determine the accuracy of any assumptions made with regard to the Project during the assessment, to test the accuracy of any predictions made regarding the Project's effects, or to detect any unanticipated Project effects and determine whether any additional mitigation is required...";
- Following construction and clean-up activities, a post-construction environmental effects monitoring inspection of the proposed facilities will be undertaken "to identify any potential problems and a post-construction inspection report will be prepared"; and
- Monitoring during the operations and maintenance phases will continue through routine aerial and ground patrols.

The above overall monitoring and reporting systems that are proposed to be in place during construction and operation will enable Yukon Energy to monitor compliance with respect to mitigation proposed regarding rutting and/or other damage and, where relevant, to identify instances when further remediation may be required.

REFERENCE: Section 7 of Guide – Cumulative Effects Assessment

QUESTION:

Please provide a cumulative effects assessment as required by Section 7 of the Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submissions. The identification of cumulative effects is integral to the analysis of information during an assessment, as it works to identify and mitigate any effects that are residual of the proposed project which may affect existing or foreseeable environmental and/or socio-economic conditions.

ANSWER:

The Project Proposal Submission provides a cumulative effects assessment ("CEA") as required by the Yukon Environmental and Socio-economic Assessment Act ("YESAA" or the "Act") and standard assessment practice under Canadian Environmental Assessment Act ("CEAA") considering cumulative effects and related mitigation as relevant and required for each Valued Component ("VC"). Following discussion with YESAB and considering both the advisory nature of the guides and the specific needs for this Project Proposal Submission, the cumulative effects assessment has been provided within the overall Chapter 8 effects assessment (supported by information in Chapters 3 and 6) and not as a separate chapter as suggested by Section 7 of the Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submissions (the "Guide"). As reviewed in the attached table of concordance all parts of Section 7 of the Guide are contained in the Project Proposal Submission.

In support and explanation of the approach adopted in the Project Proposal Submission additional information is also provided below on the following matters:

- Requirements of the Act and Guide
- Considerations affecting Adoption of Integrated Assessment Approach

Requirements of the Act and Guide

YESAA (section 42(1) (d)) requires that an Executive Committee Screening of a project consider the significance of any adverse cumulative environmental or socio-economic effects of that project in combination with the ongoing effects of existing projects or activities or the predicated effects of other

specific projects (that meet criteria in the Act) that will occur in the future. The specific other projects and activities defined in the Act to be considered in the CEA are:

(i) other projects for which proposals have been submitted under subsection 50(1), or

(ii) other existing or proposed activities in or outside Yukon that are known to the designated office, executive committee or panel of the Board from the information provided to it or obtained by it under this Act.

Although the Act does not require that a project proposal submission to the Executive Committee consider CEA, such analysis of adverse effects is standard to good environmental assessment practice under CEAA. The Guide also sets out on page 43 that "the proponent is required to provide the results of a preliminary cumulative effects assessment in the project proposal" and sets out certain proposed requirements (see the attached concordance table).

In summary, the relevant legislation and the Guide require that a CEA consider certain matters with regard to the significance of likely adverse effects expected from a project. There is no requirement in this regard that the CEA be conducted separately from the basic environmental or socio-economic effects assessment. Under CEAA practice it is in fact recognized that the environmental effects assessment and the cumulative effects assessment may usefully be integrated with cumulative effects issues being examined as regional issues arise in the assessment. For example, the CEAA Cumulative Effects Assessment Practitioner's Guide sets out (at page 62) that a CEA may be fully integrated within the EIA.

Considerations affecting Adoption of Integrated Assessment Approach

When looking at CEA approach options for specific projects one important consideration is the extent to which "baseline" conditions without the project for many key valued components ("VCs") inherently involve combined ongoing effects from existing and past projects and activities. The ultimate requirement is to consider the incremental combined effect with the new proposed project rather than to conduct an assessment of the residual effects of each past project or activity. In such cases where it would be most difficult (if even feasible) to try and set out separately (in a separate CEA chapter or assessment) the specific separate residual effects of such existing and past activities and projects, the CEA with regard to past and existing activities and projects may typically be fully integrated into the description of baseline VC conditions.

The current Project is to be generally located in areas already disturbed by past and existing projects and activities including the Klondike Highway, various community developments and mining developments as

well as (at each end of the Project Study Region) past transmission projects. These factors were important considerations supporting full integration of CEA within the environmental and socio-economic assessment of VCs.

When looking at the CEA for new projects and activities there are inherent difficulties in trying to do a separate CEA for such projects when the CEA with regard to past and existing activities and projects is already fully integrated into the description of baseline VC conditions. Additional considerations supporting an integrated approach for this Project regarding CEA for other new projects and activities included the fact that most expected Project environmental effects are site specific and restricted to an area well within the Project Study Region, that many expected effects of construction and maintenance activities are also short term in duration, and that Project route selection and other mitigation measures play a major role in avoiding or preventing adverse environmental and socio-economic effects. Under these conditions the potential for adverse cumulative effects due to interaction of Project effects with the effects of other new projects and activities in the region was minimal (and could best be addressed as needed in an integrated approach for any specific VC).

Based on the above guidance documents and on the character of the Project and the environment being assessed as outlined above it was determined (in consultation with YESAB) that an integrated approach would be taken with regard to the cumulative effects analysis for the Project. Thus, the cumulative effects assessment has been fully integrated into the environmental effects assessment and socio-economic effects assessment for the Project and where cumulative effects arise in relation to affected VCs they are duly noted and discussed.

The approach to cumulative effects assessment is fully set out in Chapter 3, sections 3.4 (including lists of past, present and future projects and activities specifically considered in the CEA) and further in section 3.5.2 of the Project Proposal Submission. Page 3-9 sets out that the CEA for the proposal was conducted concurrently with the environmental and socio-economic impact assessment and that there was no explicit distinction between the cumulative effects assessed and other effects assessed in the submission. Detailed assessments of baseline conditions (Chapter 6) and effects of the Project (Chapter 8) are provided for each VC and address, as required, the consideration of CEA requirements. The approach taken is consistent with common environmental assessment practice and is not inconsistent with YESAA or the Guide.

Most potential adverse cumulative environmental and socio-economic effects of the Project are due to the proximity of the Project ROW to the Klondike Highway and are related to potential effects of enhanced barrier effects and new habitat fragmentation as well as positive and adverse effects due to increased

access to areas used for trapping, hunting, plant gathering and timber and other resource use or community activities. Accordingly, the related CEA analysis in these instances focused on the relevant terrestrial environmental VCs as well as the noted socio-economic resource use VCs.

Although not required under the Act, the Project Proposal Submission also notes that positive environmental and socio-economic cumulative effects may result as diesel communities and other current and planned developments along the Project ROW will have an opportunity to access grid power, resulting in a reduction in diesel emissions in the Project Study Region. The opportunity to access grid power may also spur future development in the region. A cumulative effects analysis was integrated into the baseline and into the residual effects assessment for VCs regarding air quality, mining and utility ratepayers.

Summary CEA Concordance Table

The attached CEA concordance table confirms where each requirement in Section 7 of the Guide is addressed in the Project Proposal Submission, setting out the following:

- **Guide Requirement (Section 7)** - The cumulative effects assessment ("CEA") requirements are listed and summarized as set out in Section 7 of the *Proponent's Guide to Information Requirements for Executive Committee Project Proposal Submissions*.
- **Location in Proposal Submission** – The location is identified in the Project Proposal Submission where the required CEA information (as set out in the Guide) is provided.
- **Content in Project Proposal Submission** – The content of the CEA information and analysis in this part of the Project Proposal Submission is summarized. No attempt is made to provide all of the details for the assessment for specific VCs (as this is provided in the referenced material).

1 **Table 17-1**

2 **Summary CEA Concordance Table – Section 7 of Guide and Project Proposal Submission**

3

Guide Requirement (Section 7)	Location in Project Proposal Submission	Content in Project Proposal Submission
Section 7.1 – Valued Components • Identify VCs chosen for purposes of the CEA, • provide rationale for inclusion of each VC, • identify extent to which local values were used in the identification of VCs The Guide states "Generally, the VCs used in the environmental and socio-economic assessment will be the same as those used for the purposes of the cumulative effects assessment."	Page 3-6 - overview on approach re: VCs Table 6.2-1 and pages 6-1 and 6-2 for environmental VCs Table 6.3-1 and pages 6-51 and 6-52 for socio-economic VCs Specifically regarding local values, for environmental and socio-economic values chapter 4 sets out: • Page 4-17 and 4-18 set out key issues and perspectives identified after three rounds of public consultation. • 4-18 set out issues related to experiences with past projects • to 4-19 sets out issues related to project route selection and environmental assessment including land and resource use, biophysical effects and socio-economic effects • 4-19 sets out site specific concerns for Little Salmon/Carmacks First Nation, Selkirk First Nation and First Nation of Nacho Nyak Dun as well as other publics • 4-21 to 4-22 describes areas where the PIP process was influential	Chapter 3 reviews process for how VCs were identified and grouped for assessment, while Chapter 6 provides details on VCs selected. The VCs used to assess environmental and socio-economic effects were the same as the VCs used for the CEA. Tables 6.2.1 and 6.3.1 set out environmental and socio-economic VCs, including: • valued component, • who/ which groups identified the valued component and • characterize the project effect on the component Issues of public concern raised in PIP process that formed part of the cumulative effects baseline include: • Past experiences with transmission projects (i.e. Mayo Dawson and Faro) • Access issues • Use of vegetative buffers • Effects of corridor on wildlife habitat and travel, ie, creation of barrier effect • Access to grid power stimulating future projects

Guide Requirement (Section 7)	Location in Project Proposal Submission	Content in Project Proposal Submission
		and opportunities for local communities
Section 7.1.1 – VC-specific Baseline Information • Identify all sources of baseline information used to characterize VC conditions	Generally for sources, see page 6-1 VC-specific information is provided in Chapter 6, (CEA baseline information typically relates to VC range and proximity to Klondike Highway or proximity of Klondike Highway to certain areas) - see especially: **Page 6-18 to 6-20** for air quality **Page 6-20 to 6-27** for vegetation and wildfires **Page 6-33 to 36** for large mammals (including Mule deer, Moose, Tatachun and Ethel Lake Caribou herds) **Page 6-37 and 6-38** for small furbearing mammals. **Page 6-41 to 6-51** for aquatic environment baseline **Page 6-58 to 6-69** for traditional and domestic land and resource use (including trapping, hunting, fishing, plant collection, timber harvesting, protected areas, outdoor recreation) **Page 6-69 to 6-76** for commercial land use (including tourism, outfitting, commercial	Page 6-1 - general sources used were: 1. Public, government and other technical documents; 2. Published statistical information; 3. Project-specific field studies, including key-person interviews conducted for the socioeconomic assessment; 4. Comments obtained during the public involvement consultation process (Chapter 4). For relevant VCs the sources of baseline information are generally referenced in the text of the document (Chapter 6) and the effects baseline information is not significantly differentiated from the cumulative effect baseline information. Two areas of the Project baseline that form the cumulative effects baseline are: • Proximity of the Klondike Highway, and • Proximity of diesel-served communities and current and planned developments that may connect to the grid in the future. Cumulative effects baseline

Guide Requirement (Section 7)	Location in Project Proposal Submission	Content in Project Proposal Submission
	fishing, agriculture, mineral and aggregate extraction **Page 6-77 to 6-87** for local and regional economy baseline, including local employment, training, and business as well as government fiscal flows and utility ratepayers (includes potential new industrial loads) **Page 6-88 to 6-90** for social context background, including population demographics and past experience with similar projects **Page 6-90 to 6-98** for other social context VCs, including community and family life, community infrastructure and services, recreation and leisure, public health, aesthetics, and heritage resources.	information for environmental VCs is mostly related to issues regarding habitat fragmentation, the creation of a barrier effect and increased access to hunting, trapping and other resource use areas due to the proximity of the Project ROW to the Klondike Highway. For air quality and potential benefits of future grid connection, relevant baseline information relates to developments and communities currently using diesel power that have the opportunity to switch to grid power and thereby reduce emissions and/or increase opportunities for future developments in the region by access to low cost grid power.
Section 7.1.2 - Determine Assessment Boundaries 7.1.2.1 - Spatial Bounding - Identify spatial bounds used for each VC for the purposes of the cumulative effects assessment [Guide – boundaries can in most cases be unique to each VC, and should encompass an area large enough to consider most, if not all regional pressures (past, present and future) on he VC] 7.1.2.2 – Temporal Bounding of assessment - Identify temporal	Page 3-5 and 3-8 Page 6-1 and 8-1 to 8-3 Chapter 6 and 8 (subsections for each VC – see Section 7.1.1 above for Chapter 6)	Discusses overall scoping of the assessment, including overall temporal and spatial boundaries for the purposes of the assessment The study area extends beyond the immediate footprint of the Project activities, where applicable for efficiency, and it is consistent with the area to be analyzed in the cumulative effects analysis. Summarizes the overall temporal and spatial

Guide Requirement (Section 7)	**Location in Project Proposal Submission**	**Content in Project Proposal Submission**
bounds used for each VC for the purposes of the cumulative effects assessment [Guide – define time period within which cumulative effects will be considered; should cover a period long enough to incorporate long-term, direct and indirect effects of the Project that overlap with the residual effects of other projects]		assessment scoping boundaries from Chapter 3 for potential Project effects (including cumulative effects), including geographic extent measure and temporal measures used to make determinations of significance for purposes of effects assessment (including cumulative effects assessment): Specific spatial and temporal assessment boundaries as determined for each VC
Section 7.2 – Other Projects and Activities Guide - Identify other projects and activities within the spatial and temporal scope of the cumulative effects assessment	Section 3.4 on CEA Approach Page 3-11 to 3-12 (existing activities) Page 3-12 to 3-17 (future projects/activities; table 3.4-1)	Lists past and existing projects and activities addressed in the CEA. Discusses criteria for determining which future projects/activities are relevant to this CEA; lists applicable YESAB Registry future activities considered; lists other future activities considered.
Section 7.2.1 – Residual Effects of Other Projects and Activities Guide - Describe the residual environmental and socio-economic effects of the other projects and activities identified within the spatial and temporal scope of the cumulative effects assessment	Section 3.3 on Assessment Approach (Page 3.-3 to 3-4) and Section 3.4 on CEA Approach (Page 3-9 to 3-11) Chapter 6	Baseline without the Project defined to include consideration of other projects or activities Chapter 6 reviews as part of the baseline for each VC (see section 7.1.1 above for listing), the conditions expected without the Project (including, where relevant for potential overlap, residual

Guide Requirement (Section 7)	Location in Project Proposal Submission	Content in Project Proposal Submission
		effects without the Project from existing, past and future projects included in the CEA)
Section 7.3 – Potential Cumulative Effects Guide - Identify potential cumulative environmental and socio-economic effects that may occur in connection with the project in combination with the effects of other projects or activities within or outside Yukon.	Chapter 8, page 8-7 and 8-27/28 Some specific examples below of CEA assessments for certain VCs as provided in Chapter 8.	The effects of the Project on environmental VCs in the Project Study Region are generally not expected to combine with other relevant future actions in the CEA that will occur in the Project Study Region. However, effects of the Project on socio-economic VCs in the Project Study Region are expected to combine with certain future actions in the CEA that will occur in the Project Study Region (namely those that activities that involve line connections to the Project).
	Page 8-4 Page 8-10 and 8-11 (Air Quality) Page 8-36 (mining) Page 8-45 (Community infrastructure and Services) Page 8-23	When Minto Mine, as well as Pelly Crossing, shift from diesel generation to surplus grid hydro electricity, it is expected that there will be positive residual effects due to the reduced production of diesel generation air emissions (including GHG's in the Project Study Region).
	Page 8-14 to 8-16 Page 8-16 and 8-17 (Mule deer) Page 8-17 and 8-18 (Moose) Page 8-18, 8-19 (Ethel Lake Caribou)	Overview of residual cumulative environmental effects of Klondike Highway and Minto access road and the Project ROW. Habitat Fragmentation due to cumulative impact of transmission line ROW and

Guide Requirement (Section 7)	Location in Project Proposal Submission	Content in Project Proposal Submission
	Page 8-19 and 8-20 (Tatchun Caribou) Page 8-21 (Small Furbearing Mammals) Page 8-29 to 8-31 (Trapping and Hunting)	Klondike Highway; barrier effect where ROW may lie in close proximity to Klondike Highway (Tatchun Caribou herd and Small furbearing mammals)
	Page 8-16 and 8-17 (Mule deer) Page 8-17 and 8-18 (Moose) Page 8-18, 8-19 (Ethel Lake Caribou) Page 8-19 and 8-20 (Tatchun Caribou) Page 8-21 (Small Furbearing Mammals) Page 8-29 to 8-31 (Trapping and Hunting) 8-32 and 8-33 (Collection of plants) Page 8-33 (Timber harvesting) Page 8-34 (Outdoor recreation) Page 8-44 (Community and family life) Page 8-21 and 8-22 (migratory waterfowl) Page 8-22 and 8-23 (Peregrine falcon)	Increased access for hunters and other resource users due to transmission ROW proximity to Klondike Highway (may be positive and negative effects). Potential cumulative effects relating to new plus existing structures (placement of ROW close to other existing infrastructure to mitigate adverse effects on VC).
Section 7.4 -Mitigation Measures Guide: If applicable: • Present mitigation plans or measures to address cumulative effects, and identify the anticipated success associated with each plan or measure.	Chapter 8 (Sections 8.2 and 8.3 and summarized by VC in tables in Section 8.5) Page 3-2 (Assessment Approach) Page 8-6 Specific sections of Chapter 8 (Sections 8.2, 8.3 and 8.5)	Mitigation measures are addressed by VC as relevant through sections 8.2 and 8.3, and summarized by VC in section 8.5 Route selection process sought to identify areas to be avoided and/or used in order to minimize adverse effects and enhance beneficial effects

Guide Requirement (Section 7)	Location in Project Proposal Submission	Content in Project Proposal Submission
• Provide a rationale for the expected success of the mitigation measure, including results of any field studies and research.		Summarizes that primary means of mitigation for both short-term and long-term effects has been through the process of careful route selection to avoid sensitive ecosystems and critical habitat areas and to minimize habitat fragmentation effects or barrier effects. Discussion of effects and mitigation for each VC; includes mitigation related to potential adverse cumulative effects on environmental and socio-economic VCs as noted above re: barrier and fragmentation effects, enhanced access to resources, and the combination of existing and new structures
Section 7.5 – Residual Cumulative Effects Guide - Describe any anticipated residual cumulative effects in a manner similar to the project effects. Any assumptions of uncertainty surrounding the implementation of mitigation measures and the prediction of residual effects should be clearly outlined	Chapter 8 (Sections 8.2 and 8.3 and summarized by VC in tables in Section 8.5)	Residual effects (including residual cumulative effects) are addressed by VC as relevant through sections 8.2 and 8.3, and summarized by VC in section 8.5. Residual effects of cumulative effects is fully integrated into the residual effects assessment for each VC. All relevant CEA matters are fully considered.
Section 7.6 – Significance Guide:	Section 3.5, pages 3-17 to 3-22; Section 3.6, page 3-22; Section 8.1, pages 8-1 to 8-4; Section	Describe methods, rationale, information and criteria used to determine significance of all

Guide Requirement (Section 7)	Location in Project Proposal Submission	Content in Project Proposal Submission
• Provide an analysis of the significance of any adverse residual environmental or socio-economic effects of the proposed project in combination with the residual effects of other projects, including the nature of the effects and the specific methods used to assess the significance of each. • Describe the methods and rationale used to determine significance • Indicate the level of confidence associated with each assessment of significance • Provide an assessment of the significance of identified adverse environmental and socio-economic residual effects • Provide information on the process, rationale and criteria for each determination of significance.	8.5, page 8-50 to 8-52 Sections 8.2 and 8.3 and summary in Section 8.5, pages 8-52 to 8-68 (Table 8.5-1, Table 8.5-2, Table 8.5-3, Table 8.5-4,Table 8.5-5 and Table 8.5-6)	residual effects (including cumulative effects). (Section3.5.2 for methodology for determining significance for cumulative adverse effect.) Significance analysis is fully integrated into the significance determination for adverse residual effects (including cumulative residual effects) for each VC in Chapter 8, section 8.2 and 8.3 and summarized by each VC in section 8.5. Where relevant, level of confidence is addressed.

1

REFERENCE: Chapter 6 – Pages 6-45 to 6-51 - Fish Bearing Streams

QUESTION:

The definition used to identify fish-bearing streams does not provide a comprehensive understanding of which streams within the route study area may be affected by the development of a transmission line. Effects to fish and fish habitat are not limited to streams containing fish with consumptive and/or recreation value to people. It is also necessary to consider potential project effects on streams which contain or have the potential to contain fish at any period in their lifecycle, as the success of juvenile populations are integral to future adult populations.

- Please provide a comprehensive list of streams (similar to table 6.2-12) defined as fish-bearing using the following definition: watercourses containing any fish, at any time of the year (including periodic use), during any period of their lifecycle.

ANSWER:

As stated at page 6-48, the referenced table (Table 6.2-12) was developed using the FISS provided by DFO, based on criteria used by DFO to define a "fish-bearing stream." This specific definition used for this baseline information table, however, is not intended to suggest a definition of all riparian habitat affected by DFO Operational Statements for vegetation clearing and line construction.

As stated in the Project Proposal (page 1-7 and page 8-24), Yukon Energy is committed to the protection of riparian habitat and also to a construction process that conforms to DFO Guidelines for Overhead Line Construction (Reference 5R-4). The project:

- will not involve the clearing of riparian vegetation, with the following exception: the removal of select plants within the right-of-way can occur to meet operational and/or safety needs;
- does not require the construction or placement of any temporary or permanent structures (e.g. islands, poles, crib works, etc.) below the high water mark; and
- incorporates measures to protect fish and fish habitat when constructing overhead lines listed within this Operational Statement.

In addition to this, Yukon Energy intends, and has stated to this end, that continued commitment to the YEC EMS adopted best practices for water bodies, wetlands and stream crossings as well as for ROW maintenance will be adhered to. Additional information regarding the above is found in Reference 5R-1, C.4.3.

Section 35(1) under the Fisheries Act prevents harmful alteration, disruption or destruction of fish habitat. Operational Guidelines issued by DFO explicitly describe overhead line construction of stream crossings and the protection of riparian habitat which could include the broader definition YESAB has provided.

The streams identified in Table 6.2-12 are from the Yukon Fisheries Information Summary (FISS) provided by DFO. It is not known at this time whether a similar DFO list of streams is available based on the broader definition YESAB has provided (watercourses containing any fish, at any time of the year, during any period of their lifecycle). If such information is readily available within FISS for the Route Study Area, it will be summarized and forwarded to YESAB.

REFERENCE: **Figure 7.2-1 and Appendix 4 Map – Crossing of Highway around McGregor Creek**

QUESTION:

Conflicting information (Figures 7.2-1 and Appendix 4 map) has been provided with respect to the crossing of the highway around McGregor Creek, please confirm the preferred route.

ANSWER:

Appendix 4 (Map 4D-2) was produced to facilitate discussion with the NTFN Steering Committee on September 12, 2006. Subsequent to that meeting further changes were made to routing including routing of the transmission line in the vicinity of McGregor Creek.

As noted on page 7-7, Figure 7.2-1 illustrates the line segment and route options that formed the basis for initial discussions with stakeholders including the NTFN. It does not reflect the preferred route alignment that was concluded in the Project Proposal Submission documentation.

The preferred route alignment showing the preferred highway crossing in the vicinity of McGregor Creek is described in Section 7.3. As noted on page 7-53, the final preferred route as set out in Appendix 7B crosses the highway at a point slightly further south than indicated on Map 4D-2 and thus now is proposed to cross portions of Mr. Paulsen's agricultural application. A photo mosaic of aerial photos with a preferred route overlaid on the photos can be found in Appendix 7B (Photo 7B-6 is the specific reference to the McGregor Creek area).

See also response to YESAB-YEC-1-9, bullets 1 and 3.

REFERENCE: Chapter 8 – Diesel Operation Emissions (Air Quality)

QUESTION:

Current hydro infrastructure requires diesel generator supplementation during periods of peak demand. This requirement may increase with the addition of anticipated demands (e.g. Minto and Carmacks Copper mines). The increased burning of diesel may result in potential environmental and socio-economic effects.

- Provide a quarterly summary (tabular form) and forecast of existing and anticipated hydro and diesel power demand of the WAF grid (i.e. forecast the scenarios of phase 1 with Minto online and phase 2 with Minto Mine online as well as phase 1 with Carmacks Copper online and phase 2 with Carmacks Copper online).
- How much diesel on average is currently consumed to address shortfalls during peak periods?
- How much diesel is anticipated to be required to address shortfalls during peak periods after phase 1 (with Minto online) and after phase 2 (with Minto Mine online)? What are the cost implications with Carmacks Copper online in the same scenarios (i.e. both mines are drawing anticipated power requirements).
- To address concerns related to health effects associated with diesel emissions please identify where diesel generators will be located to address energy shortfalls caused by mine energy consumption in the above scenarios, and any other relevant information.

ANSWER:

Answers to all bullets are combined below.

The question assumes that the Project will increase overall diesel generation due to increased WAF diesel generator needs during periods of peak demand and that the "increased burning of diesel may result in potential environmental and socio-economic effects". However, notwithstanding any potential increased WAF diesel generator needs during periods of peak demand it is incorrect to assume that the Project will lead to any overall "increased burning of diesel". In fact, as summarized in Table 8.5-1 (see also Section 8.2.1.7) the Project Proposal Submission concludes that due to use of WAF grid surplus hydro-electricity the overall residual effects on air quality that would result from Stage One development and operation of the Project will result in a substantial reduction in the use of diesel fuel generation at the Minto Mine and at Pelly Crossing, as well as at other potential mines such as Carmacks Copper (if developed). Stage Two

development of the Project will further enhance opportunities for increased diesel generation displacement on WAF, or in the Project Study Region, to the extent that it facilitates use of Mayo-Dawson grid surplus hydro-electricity. These overall assessments are not altered in the event that the new Minto Mine, Pelly Crossing or other potential mine loads, such as the Carmacks Copper mine, result in some increased WAF diesel generator needs during the brief periods of the year when winter peak demands occur.

Based on the above conclusion the Project will reduce rather than increase any concerns related to health or other effects associated with diesel emissions.

Further information on these points is provided below utilizing both the Project Proposal Submission and available information developed for Yukon Energy's 20-Year Resource Plan that was recently reviewed by the Yukon Utilities Board.

As indicated in section 6.2.1.4 Climate and Air Quality both the Minto Mine and the Carmacks Copper mine will operate with diesel fuel if they are not connected to Yukon Energy's WAF grid. Minto Mine's estimated diesel generation load in the Project Proposal Submission is 32.5 GW.h for at least 6 years and Carmacks Copper's is 48 GW.h for 8 years (page 6-19). The Project proposes to connect the Minto Mine (which is currently being developed) and Pelly Crossing to the WAF grid during Stage One. Currently, the Carmacks Copper mine is in the initial permitting stage and from the submissions available it is assumed that the mine will use on-site diesel generation; further, it is noted that Yukon Energy has no agreements with this mine (or any specific proposal in the Project proposal Submission) to supply grid power to this mine.

Given the current material surplus of hydro-electricity on the WAF grid (recently about 90 GWh/yr, Section 6.3.3.2), use of the Project to connect the Minto Mine and Pelly Crossing to the WAF grid will result overall in the near-term use of surplus hydro-electricity to displace diesel generation. Any incremental increase in peaking diesel on the WAF system as a result of connecting the Minto Mine and Pelly Crossing would be far less than the diesel that would be burned if these loads were to operate with on-site diesel as will occur without the Project. Accordingly, the net effect of supplying the Minto Mine and Pelly Crossing with surplus hydro energy reduces the overall use of diesel generation in Yukon and would not increase the burning of diesel. This residual effect would substantially diminish the potential overall environmental effects in Yukon from diesel generation such as greenhouse gas emissions.

Table 20-1 and Table 20-2 below provide additional details from Yukon Energy's 20-Year Resource Plan on the expected effects on WAF generation over the period extending to 2025 in the event that the Minto mine and Pelly Crossing are connected to the WAF grid though Stage One of the Carmacks-Stewart Project.

As indicated in Table 20-1, under the Base Case without mines (or the current system) minimal peaking diesel (i.e., diesel generation that is forecast to occur only during brief periods of the winter season peak) is currently starting to be used on WAF. The level, as shown on the peaking diesel line of the table, grows slowly from 0.2 GWh in 2009 and is expected to reach about 5.1 GW.h a year by 2020. After this time the current system without mines is forecast to run with small amounts of baseload diesel (i.e., diesel generation that will tend to occur through all seasons of the year), reaching 27.8 GWh/yr by 2025 under the Base Case forecast without mines.

Table 20-2 shows the projected WAF generation with the Project connecting Pelly Crossing (1.5 GWh/yr) and the Minto Mine (32.5 GW.h) to the WAF grid starting 2009 (full year required for this analysis). Comparing Table 20-2 to Table 20-1, illustrates that during the period of the mine operation, from 2009 to 2016 (8 years estimated for this updated analysis), "WAF diesel consumption" (which includes now any diesel generation at Minto Mine or Pelly Crossing) will increase to 0.6 GW.h in 2009 (increase of 0.4 GWh/yr) and to 7.2 GW.h in 2016 (increase of 5.3 GWh/yr) as a result of the Project connecting the Minto Mine and Pelly Crossing to WAF. These "increased WAF diesel generation" loads are significantly less then the 34 GW.h of annual diesel generation that would be required throughout this period if the Minto mine and Pelly Crossing are not connected to WAF grid power. As set out in Yukon Energy's 20-Year Resource Plan, Yukon Energy is also considering projects such as Aishihik 3^{rd,} turbine (as well as Stage Two of the Project) to further reduce WAF diesel consumption. Yukon Energy does not at this time know where increases to WAF diesel generation may occur. At low levels of such generation it is likely that the Whitehorse Diesel Plant would be used; however, as WAF diesel generation increases Yukon Energy will consider alternative available generation locations (including the Minto Mine site) with a view to minimizing generation costs associated with line losses.

Yukon Energy has committed to the Yukon Utilities Board that the Project will be developed only if it is expected to have no adverse effects on ratepayers. Overall, as reviewed in Section 8.3.2 of the Project Proposal Submission, connection of the Minto Mine and Pelly Crossing to WAF is forecast to result in material, net revenue benefits to Yukon ratepayers (due to savings in costs for diesel generation at Pelly Crossing and enhanced net revenues from new firm sales of surplus hydro-electricity on WAF). On these

matters, Yukon Energy is currently concluding a Power Purchase Agreement with the Minto Mine which will then be tabled for review by the Yukon Utilities Board.

Yukon Energy does not plan to pursue Stage Two of the Project unless Carmacks Copper connects to the system and other conditions are met to ensure no adverse effects on Yukon ratepayers. Carmacks Copper has not yet entered into an LOI with Yukon Energy and until they do Yukon Energy is assuming that if and when Carmacks Copper starts operations it will do so with isolated diesel.

Table 20-1:

Base Case without Mines

WAF SALES AND GENERATION
Base Case

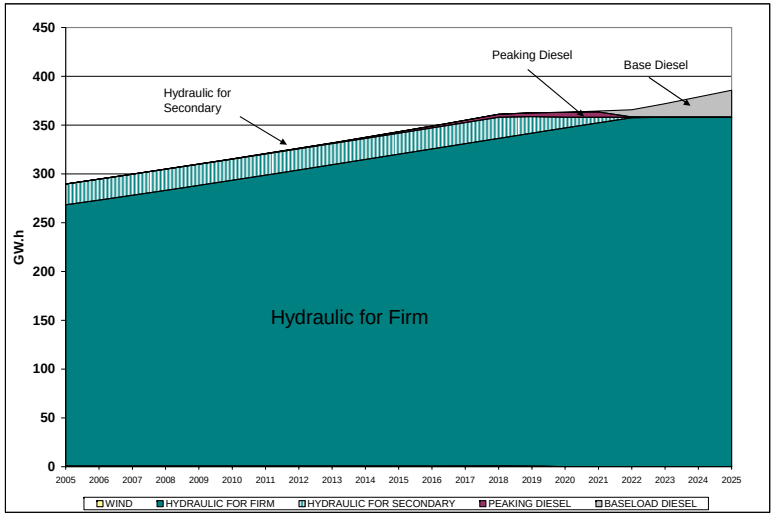
Key Assumptions

		year	*Energy*	*Peak*	loss
Industrial					
	Minto	no			12.70%
	PELLY	no			12.70%
	CC	no			12.70%
C - S connection		no			
Aishihik 3rd Turbine		no			
Load Forecast Sensitivity		1.85%			

Other Notes:
1. Secondary sales cap is 20.0 GW.h
2. Peaking dispatch assumes 56.0 MW

Economic Assumptions

Peaking Diesel Efficiency	3.480
Baseload Diesel Efficiency	3.900
WAF Diesel Price per litre 2005	0.650
MD Diesel Price per litre 2005	0.650
Secondary Energy Rate 2005	0.055
Variable O&M per kW.h 2005	0.016
WACC 2005	7.52%
Inflation	2.00%



SALES (GWh)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
WAF LOAD	249.2	253.7	258.4	263.1	267.9	272.8	277.8	282.9	288.1	293.3	298.7	304.2	309.7	315.4	321.2	327.1	333.1	339.2	345.4	351.7	358.2
firm losses (7.7%)	19.2	19.5	19.9	20.3	20.6	21.0	21.4	21.8	22.2	22.6	23.0	23.4	23.8	24.3	24.7	25.2	25.6	26.1	26.6	27.1	27.6
INDUSTRIAL	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
TOTAL FIRM LOAD	**268.4**	**273.3**	**278.3**	**283.3**	**288.5**	**293.8**	**299.2**	**304.7**	**310.2**	**315.9**	**321.7**	**327.6**	**333.6**	**339.7**	**345.9**	**352.3**	**358.7**	**365.3**	**372.0**	**378.8**	**385.8**
SECONDARY SALES	19.8	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	15.7	10.1	5.2	0.4	0.0	0.0	0.0
losses	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.2	0.8	0.4	0.0	0.0	0.0	0.0
TOTAL WAF LOAD	**289.7**	**294.8**	**299.8**	**304.9**	**310.1**	**315.3**	**320.7**	**326.2**	**331.8**	**337.5**	**343.2**	**349.1**	**355.1**	**361.2**	**362.8**	**363.1**	**364.3**	**365.8**	**372.0**	**378.8**	**385.8**

GENERATION (GWh)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
HYDRAULIC FOR FIRM	267.5	272.4	277.3	282.4	287.4	292.6	297.9	303.2	308.7	314.1	319.6	325.0	330.4	335.8	341.1	347.2	352.4	357.5	358.0	358.0	358.0
WIND	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0
PEAKING DIESEL	**0.0**	**0.0**	**0.0**	**0.1**	**0.2**	**0.3**	**0.4**	**0.6**	**0.8**	**1.0**	**1.4**	**1.9**	**2.4**	**3.2**	**4.1**	**5.1**	**5.6**	**0.5**	**0.0**	**0.0**	**0.0**
BASELOAD DIESEL	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.7**	**7.3**	**14.0**	**20.8**	**27.8**
TOTALGENERATION FOR FIRM	**268.4**	**273.3**	**278.3**	**283.3**	**288.5**	**293.8**	**299.2**	**304.7**	**310.2**	**315.9**	**321.7**	**327.6**	**333.6**	**339.7**	**345.9**	**352.3**	**358.7**	**365.3**	**372.0**	**378.8**	**385.8**
HYDRAULIC FOR SECONDARY	21.3	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	16.9	10.8	5.6	0.5	0.0	0.0	0.0
TOTAL GENERAION	**289.7**	**294.8**	**299.8**	**304.9**	**310.1**	**315.3**	**320.7**	**326.2**	**331.8**	**337.5**	**343.2**	**349.1**	**355.1**	**361.2**	**362.8**	**363.1**	**364.3**	**365.8**	**372.0**	**378.8**	**385.8**

SURPLUS HYDRO (GWh)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Long Term Average Hydro/Wind Generation	358.9	358.9	358.9	358.9	358.9	358.9	358.9	358.9	358.7	358.7	358.7	358.7	358.7	358.7	358.7	358.0	358.0	358.0	358.0	358.0	358.0
Firm Load	268.4	273.3	278.3	283.3	288.5	293.8	299.2	304.7	310.2	315.9	321.7	327.6	333.6	339.7	345.9	352.3	358.7	365.3	372.0	378.8	385.8
SURPLUS HYDRO/WIND FROM FIRM	**90.5**	**85.6**	**80.6**	**75.6**	**70.4**	**65.1**	**59.7**	**54.2**	**48.5**	**42.8**	**37.0**	**31.1**	**25.1**	**19.0**	**12.8**	**5.7**	**(0.7)**	**(7.3)**	**(14.0)**	**(20.8)**	**(27.8)**

Table 20-2:

Minto 32.5 GW.h per year

WAF SALES AND GENERATION
Minto 32.5 GWh starting 2009

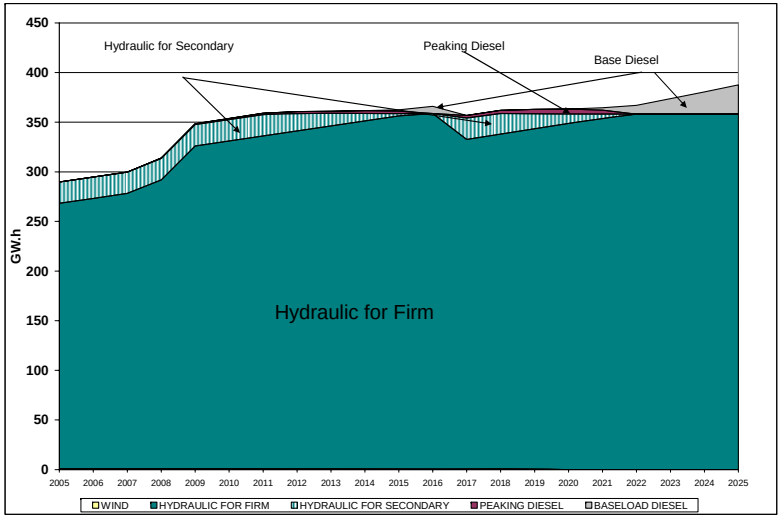
Key Assumptions

Industrial		year	*Energy*	*Peak*	loss
	Minto	2008 3Q	32.5	4.4	12.70%
	PELLY	2009	1.5	0.2	12.70%
	CC	no			12.70%
C - S connection		no			
Aishihik 3rd Turbine		no			
Load Forecast Sensitivity		1.85%			

Other Notes:
1. Secondary sales cap is 20.0 GW.h
2. Peaking dispatch assumes 56.0 MW

Economic Assumptions

Peaking Diesel Efficiency	3.480
Baseload Diesel Efficiency	3.900
WAF Diesel Price per litre 2005	0.650
MD Diesel Price per litre 2005	0.650
Secondary Energy Rate 2005	0.055
Variable O&M per kW.h 2005	0.016
WACC 2005	7.52%
Inflation	2.00%



SALES (GWh)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
WAF LOAD	249.2	253.7	258.4	263.1	267.9	272.8	277.8	282.9	288.1	293.3	298.7	304.2	309.7	315.4	321.2	327.1	333.1	339.2	345.4	351.7	358.2
firm losses (7.7%)	19.2	19.5	19.9	20.3	20.6	21.0	21.4	21.8	22.2	22.6	23.0	23.4	23.8	24.3	24.7	25.2	25.6	26.1	26.6	27.1	27.6
INDUSTRIAL	**0.0**	**0.0**	**0.0**	**9.2**	**38.3**	**38.3**	**38.3**	**38.3**	**38.3**	**38.3**	**38.3**	**38.3**	**1.7**	**1.7**	**1.7**	**1.7**	**1.7**	**1.7**	**1.7**	**1.7**	**1.7**
TOTAL FIRM LOAD	**268.4**	**273.3**	**278.3**	**292.5**	**326.8**	**332.1**	**337.5**	**343.0**	**348.6**	**354.2**	**360.0**	**365.9**	**335.3**	**341.4**	**347.6**	**354.0**	**360.4**	**367.0**	**373.7**	**380.5**	**387.5**
SECONDARY SALES	19.8	20.0	20.0	20.0	20.0	20.0	20.0	16.4	11.6	6.9	2.2	0.0	20.0	19.2	14.2	8.7	3.8	0.0	0.0	0.0	0.0
losses	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.3	0.9	0.5	0.2	0.0	1.5	1.5	1.1	0.7	0.3	0.0	0.0	0.0	0.0
TOTAL WAF LOAD	**289.7**	**294.8**	**299.8**	**314.0**	**348.4**	**353.7**	**359.0**	**360.7**	**361.0**	**361.7**	**362.4**	**365.9**	**356.8**	**362.0**	**362.9**	**363.3**	**364.5**	**367.0**	**373.7**	**380.5**	**387.5**

GENERATION (GWh)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
HYDRAULIC FOR FIRM	267.5	272.4	277.3	291.0	325.2	330.2	335.3	340.3	345.5	350.6	355.6	358.0	332.0	337.4	342.7	348.7	353.9	358.0	358.0	358.0	358.0
WIND	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0
PEAKING DIESEL	**0.0**	**0.0**	**0.0**	**0.6**	**0.8**	**1.0**	**1.3**	**1.8**	**2.3**	**2.9**	**2.4**	**0.0**	**2.5**	**3.3**	**4.2**	**5.3**	**4.1**	**0.0**	**0.0**	**0.0**	**0.0**
BASELOAD DIESEL	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.3**	**7.2**	**0.0**	**0.0**	**0.0**	**0.0**	**2.4**	**9.0**	**15.7**	**22.5**	**29.5**
TOTALGENERATION FOR FIRM	**268.4**	**273.3**	**278.3**	**292.5**	**326.8**	**332.1**	**337.5**	**343.0**	**348.6**	**354.2**	**360.0**	**365.9**	**335.3**	**341.4**	**347.6**	**354.0**	**360.4**	**367.0**	**373.7**	**380.5**	**387.5**
HYDRAULIC FOR SECONDARY	21.3	21.5	21.5	21.5	21.5	21.5	21.5	17.7	12.5	7.4	2.4	0.0	21.5	20.6	15.3	9.3	4.1	0.0	0.0	0.0	0.0
TOTAL GENERAION	**289.7**	**294.8**	**299.8**	**314.0**	**348.4**	**353.7**	**359.0**	**360.7**	**361.0**	**361.7**	**362.4**	**365.9**	**356.8**	**362.0**	**362.9**	**363.3**	**364.5**	**367.0**	**373.7**	**380.5**	**387.5**

SURPLUS HYDRO (GWh)	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Long Term Average Hydro/Wind Generation	358.9	358.9	358.9	358.9	358.9	358.9	358.9	358.9	358.7	358.7	358.7	358.7	358.7	358.7	358.7	358.0	358.0	358.0	358.0	358.0	358.0
Firm Load	268.4	273.3	278.3	292.5	326.8	332.1	337.5	343.0	348.6	354.2	360.0	365.9	335.3	341.4	347.6	354.0	360.4	367.0	373.7	380.5	387.5
SURPLUS HYDRO/WIND FROM FIRM	**90.5**	**85.6**	**80.6**	**66.4**	**32.1**	**26.8**	**21.4**	**15.9**	**10.2**	**4.5**	**(1.3)**	**(7.2)**	**23.5**	**17.3**	**11.1**	**4.0**	**(2.4)**	**(9.0)**	**(15.7)**	**(22.5)**	**(29.5)**

REFERENCE: Chapters 6 and 8 – Regional Economy – Utility Ratepayers

QUESTION:

Under YESAA the assessment of a proposed project includes the consideration of economic effects both positive and negative. Please provide the following information:

- Describe the anticipated cost implications to existing (currently on the grid) and future (i.e. Pelly and Stewart) ratepayers in the following scenarios: after phase 1 (with Minto online) and after phase 2 (with Minto Mine online). What are the cost implications with Carmacks Copper online in the same scenarios (i.e. both mines are drawing anticipated power requirements).
- What are the cost implications of the payment structure to ratepayers if the Minto Mine life is shorter than expected (i.e. how will ratepayers be affected by total cost of infrastructure due to the loss of revenue generated by the mine?).
- What are the implications of temporary shutdowns of the Minto Mine to ratepayers?

ANSWER:

Answers to all bullets are combined below.

The Project Proposal Submission includes consideration of both positive and negative projected potential economic effects of the Project.

There are no expected adverse economic effects or "cost implications" of the Project on Yukon ratepayers currently on the grid or to be located on the grid in future.

The Project Proposal sets out Yukon Energy's basic overall policy position on this matter: "The project is subject to the provision of Yukon Government funding and mine customer contributions in order to ensure that there is no net cost to Yukon Energy or Yukon ratepayers beyond what would be required for any other option to provide required electric energy and capacity" (page 1-2). Therefore, as recently confirmed to the Yukon Utilities Board during its hearing on Yukon Energy's 20-Year Resource Plan, Yukon Energy will not proceed with Stage One or Stage Two of the Project if there is any expectation that Yukon utility ratepayers will be negatively affected.

A more detailed discussion on the possible implications for ratepayers takes place in Section 6.3.3.2 and Section 8.3.2.2 on Regional Economy. Pelly and Stewart ratepayers, like all ratepayers in the Yukon, share the benefits and costs of the system due to rate equalization. Thus, "all Yukon residential and other non-governmental ratepayers can potentially benefit from new sales of surplus hydro, even those in diesel-served communities" (pare 6-85). The expected effects on utility ratepayers from the Project serving Pelly Crossing and new mine loads, if there are any, are projected to be positive.

The Project proposes to connect the Minto Mine (which is currently being developed) and Pelly Crossing to the WAF grid during Stage One. The Carmacks Copper mine is currently in the initial permitting stage and based on the submissions provided it is assumed that there will be on-site diesel generation at the mine site; further, Yukon Energy currently has no agreements with this mine (or any specific proposal in the Project Proposal Submission) to supply grid power to this mine. Yukon Energy does not currently plan to pursue Stage Two of the Project unless Carmacks Copper connects to the system and other conditions are met to ensure no adverse effects on Yukon ratepayers. Carmacks Copper has not yet entered into an LOI with Yukon Energy and until they do Yukon Energy is assuming that if, and when, Carmacks Copper starts operations it will do so with isolated diesel.

Yukon Energy is in the process of concluding a Power Purchase Agreement (PPA) with the Minto Mine which will subsequently be tabled for review and approval by the Yukon Utilities Board (YUB). All issues relating to specific customer contributions, rates and security that are to be provided by the Minto Mine (as well as other measures to ensure no adverse effects on ratepayers in the event of risks such as shorter mine life and/or temporary mine shutdowns) will be addressed in the PPA and will be subject to the review and approval of the YUB. Yukon Energy will only proceed with Stage One of the Project after the PPA with the Minto Mine has been executed and after the PPA has been subject to review and approval by the YUB. As noted above, Yukon Energy will not proceed with Stage One or Stage Two of the Project if there is any expectation that Yukon utility ratepayers will be negatively affected.

To update the Project Proposal Submission with regard to information provided to the YUB regarding Yukon Energy's 20-Year Resource Plan (Appendix 1A), the following updates are provided:

- **Resource Plan Update (Exhibit B-16 in Resource Plan Hearing)** - In the Resource Plan Update filed in November, Section 4.0 pages 4 to 12 provide the most recent information available on the Carmacks-Stewart project. This document is attached as YESAB-YEC-1-21 Attachment 1.
- **Schedule 1 - Summary of Carmacks-Stewart Updated Project Economics (page 1 of Exhibit B-22 in Resource Plan Hearing**) - This information, which generally summarizes Exhibit

B-16 except as noted, is included below. It describes three cost estimates (low, mid point and high) to build to Stage 1 and Stage 2 of the Carmacks-Stewart Transmission Line. The table does not including any capital contributions from Minto or Carmacks Copper. It indicates that there are positive net benefits to ratepayers for Stage 1 in all but the high cost scenario (-$2.88 million ($2005)) before mine contributions.

On December 21, 2006 Yukon Energy and Minto Explorations Ltd. agreed by way of a Term Sheet on the key terms to be included in a Power Purchase Agreement (PPA) for the supply of electricity to the Minto mine. A copy of the Term Sheet is attached as YESAB-YEC-1-21 Attachment 2. Key provisions are noted below:

- The Term Sheet includes a $7.2 million customer contribution to the CS Project, a $24 million minimum take or pay power purchase provision within the first 8 years of YEC service, security to be provided by Minto for these commitments, and other ongoing measures to ensure no adverse rate impacts on other ratepayers in Yukon.
- The Term Sheet notes that PPA will not be effective until it is approved by the YUB, and that to complete the Transmission Project prior to the end of 2008 such approval will be needed on or before April 30, 2007. Accordingly, YEC and Minto have agreed to finalize the PPA as soon as feasible prior to the end of January 2007.
- YEC will file its application to seek YUB's approval as soon as the PPA is finalized. The Board's approval will be sought for various new rates, including a new firm mine power rate providing for projected 2008 costs of service for the Major Industrial Customer class that yields an estimated average charge to the Minto Mine of approximately 10 cents per kWh.

Schedule 1 - Summary of Carmacks-Stewart Update Project Economics

Analysis per Exhibit B-16 except as noted) - PV (2005$million)

	Low Costs	Mid Point Costs	High Costs
Stage 1- Carmacks to Pelly Crossing			
Net YEC Capital Costs			
Project capital costs	17.2	20.2	23.1
YDC no cost funds (reflects FTN)	5.0	5.0	5.0
YTG funds to date	0.45	0.45	0.45
Net YEC Costs	11.75	14.75	17.65
Note - No net capital contribution assumed from Minto or Carmacks Copper Mines (no presumption re: PPA)			
NET Ratepayer Benefits (PV)			
Minto Mine net revenues	12.5	12.5	12.5
Pelly Crossing cost savings	2.3	2.3	2.3
Total net ratepayer savings	14.8	14.8	14.8
Overall Stage 1 Net Benefits (Costs)			
Minto Mine Only	**3.02**	**0.02**	**(2.88)**
With Carmacks Copper Mine	**14.6**	**11.6**	**8.7**
Stage 2- Pelly Crossing to Stewart Crossing			
Net YEC Capital Costs			
Project capital costs	13.0	15.2	17.5
YTG funds	-	-	-
Net YEC Costs	13.00	15.20	17.50
NET Ratepayer Benefits (PV)			
Interconnection Cost Savings (assumed)	10.0	10.0	10.0
	See Schedules 2 & 3 for detail on a $11.5 million estimate		
Overall Stage 2 Net Benefits (Costs)	**(3.00)**	**(5.20)**	**(7.50)**
Total Stage 1 and Stage 2- Carmacks to Stewart Crossing			
Net YEC Capital Costs			
Project capital costs	30.2	35.4	40.6
YDC no cost funds (reflects FTN)	5.00	5.00	5.00
YTG funds to date	0.45	0.45	0.45
Net YEC Costs	24.75	29.95	35.15
Note - No net capital contribution assumed from Minto or Carmacks Copper Mines (no presumption re: PPA)			
NET Ratepayer Benefits (PV)			
Minto Mine net revenues	12.5	12.5	12.5
Pelly Crossing cost savings	2.3	2.3	2.3
Carmacks Copper Mine net revenues	11.5	11.5	11.5
Interconnection Cost Savings	10.0	10.0	10.0
Total net ratepayer savings	36.3	36.3	36.3
Overall Project Net Benefits (Costs)	**11.57**	**6.37**	**1.17**

ATTACHMENTS

ATTACHMENTS

YESAB-YEC 1-1: Attachment 1: EMF files of CAD Preliminary Route

YESAB-YEC-1-3:
Attachment 1: Map Line Segment 1.1
Attachment 2: Map Line Segment 1.2
Attachment 3: Map Line Segment 2.1
Attachment 4: Map Line Segment 2.2
Attachment 5: Map Line Segment 2.3
Attachment 6: Map Line Segment 3.1
Attachment 7: Map Line Segment 3.2
Attachment 8: Map Line Segment 3.3
Attachment 9: Map Line Segment Minto Spur

YESAB-YEC-1-5:
Attachment 1: Terrain GIS Shape Files
Attachment 2: Potential Rare Plant GIS Shape Files

YESAB-YEC-1-8:
Attachment 1: Wildlife Key Areas Map Revised
Attachment 2: Wildlife Key Areas GIS Shape Files

YESAB-YEC-1-10: Index of Chapter 7 Figures (includes 4 pages of maps with figures from Ch. 7 indexed as to location on map)

YESAB-YEC-1-12:
Attachment 1: Land Use Map 2B-5 Revised (includes location of Pelly Substation)
Attachment 2: All Land Use Maps in GIS Shape Files

YESAB-YEC-1-21:
Attachment 1: Resource Plan Update, November 2006
Attachment 2: Minto PPA Term Sheet

REFERENCE: YESAB-YEC-1-2

QUESTION:

Question 2 of the Adequacy Review Report requested a description of site conditions at proposed substation sites. This question was intended to allow the proponent to demonstrate that construction of substations at these sites is feasible, and to identify potential values/issues overlapping the chosen sites.

In response to the question, the proponent provided basic vegetation information. Other than for Stewart Crossing substation, the proponent stated that "further details of the site-specific conditions and requirements will be determined during the engineering design process". As well, the following information was provided:

Carmacks substation: "Access will ultimately be determined during the engineering design process, a short all-weather access road will be constructed from the RC highway into the substation site."

Pelly Crossing substation: "This is a preliminary location that will be finalized during the engineering design process."

The supplementary submission did not meet the needs of the information request.

A prevalent theme within the proposal and supplementary information submission is that of seeking an assessment on the proposed project, but reserving the option to redesign aspects of the project subsequent to the assessment. This approach is not consistent with the spirit and intent of YESAA. At minimum, in this particular case, final preferred locations of substations and an understanding/explanation that building at chosen sites is feasible is required. Engineered designs are not a requirement; however, sufficient information must be provided to allow for the assessment to consider particular project components in a relevant manner. Road corridors (maximum 200 m design area widths) can be provided in lieu of exact road locations, on condition that site conditions for the entire design corridor are provided.

Required follow-up:

a) Please provide relevant locations of substations and substation access roads (as detailed above);
b) Please provide site conditions relevant to the construction and situation of substations on the selected sites; and
c) Please provide information related to values that overlap substation and substation road locations.

ANSWER:

In response to (a) and (b):

The locations identified in Chapter 5 of the Submission Document reflect the specific preferred location of the proposed substations including figures which are also noted below, as required for assessment. All-weather road access to each of these sites is required, and specific preferred access road routes and/or options have been identified in each instance for assessment.

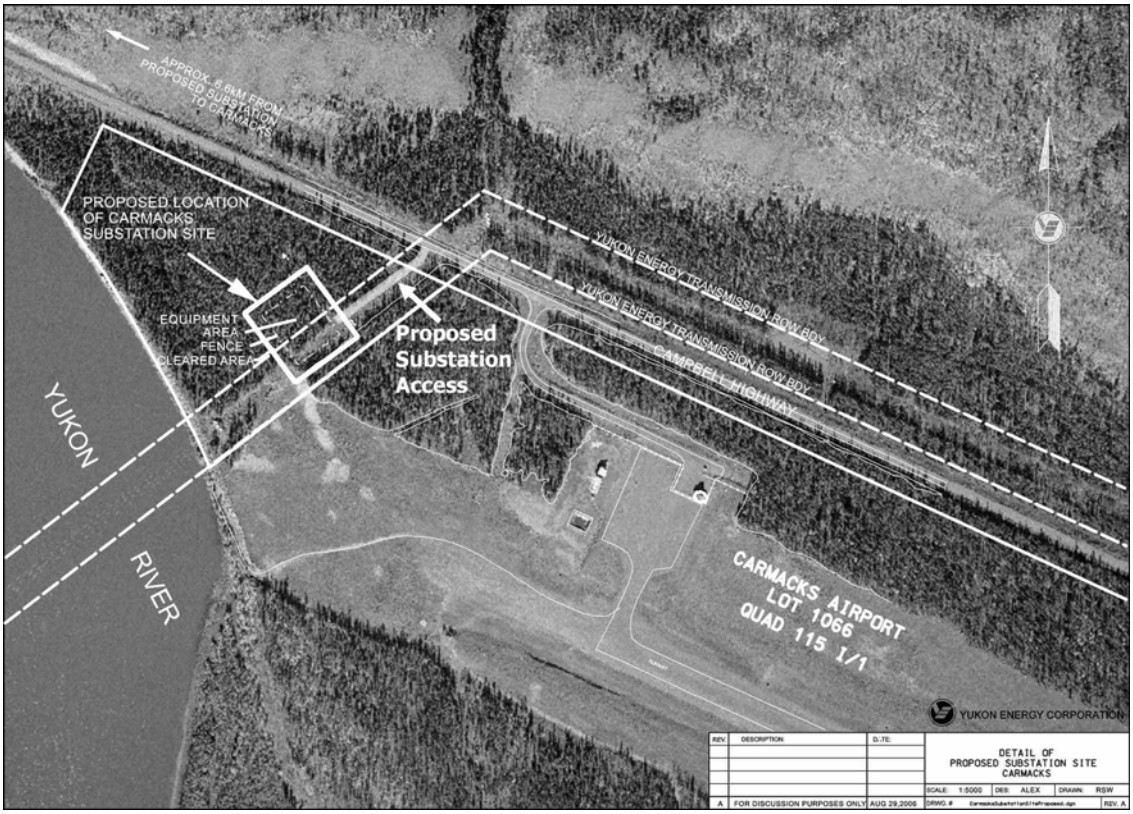
The following figures identifying the location of the substations have been revised to denote the location of all-weather access road corridors from existing road networks to the individual substation site (on the understanding that final road siting will occur within these corridors). The revised figures and additional discussion on site conditions are provided below. In all instances, site conditions were considered in the identification of proposed site locations and have been found to be suitable and feasible for construction and operation. The area identified for each substation is the preferred and proposed location.

Carmacks Substation (Figure 5.7-2): This substation is proposed to be located on a site previously identified as the preferred relocation site for the existing Carmacks substation. It is situated adjacent to the existing WAF transmission line and close to existing all-weather road access (Robert Campbell Highway). As stated in YESAB-YEC-1-3, a short all-weather gravel access road will be built from the Robert Campbell Highway either along or adjacent to the existing WAF transmission right-of-way. Figure YESAB-YEC-2-1a below shows the location of the proposed approximately 150 m all-weather road access corridor to the site from the Robert Campbell Highway. Terrain features include stable, gently sloping terrain in proximity to the Robert Campbell Highway, the Carmacks Airport, and the Yukon River. Soils in proximity

to the highway are generally well-drained, gravelly sand to gravelly loam. Terrain analysis of the site area (Appendix 6A-1, Map 6A-1-1) indicates that there are no terrain units that require avoidance. Vegetation cover is forested (Appendix 6C, Map 6C-1) with low timber potential. The location of the substation is not considered constrained by the runway approach and clearance requirements of the Carmacks Airport given that the land parcel lies to the northwest of the existing WAF transmission line, and the maximum estimated height of substation equipment and structures will not conflict with these requirements.

Figure YESAB-YEC-2-1a

Revised Carmacks Substation Location & Road Access



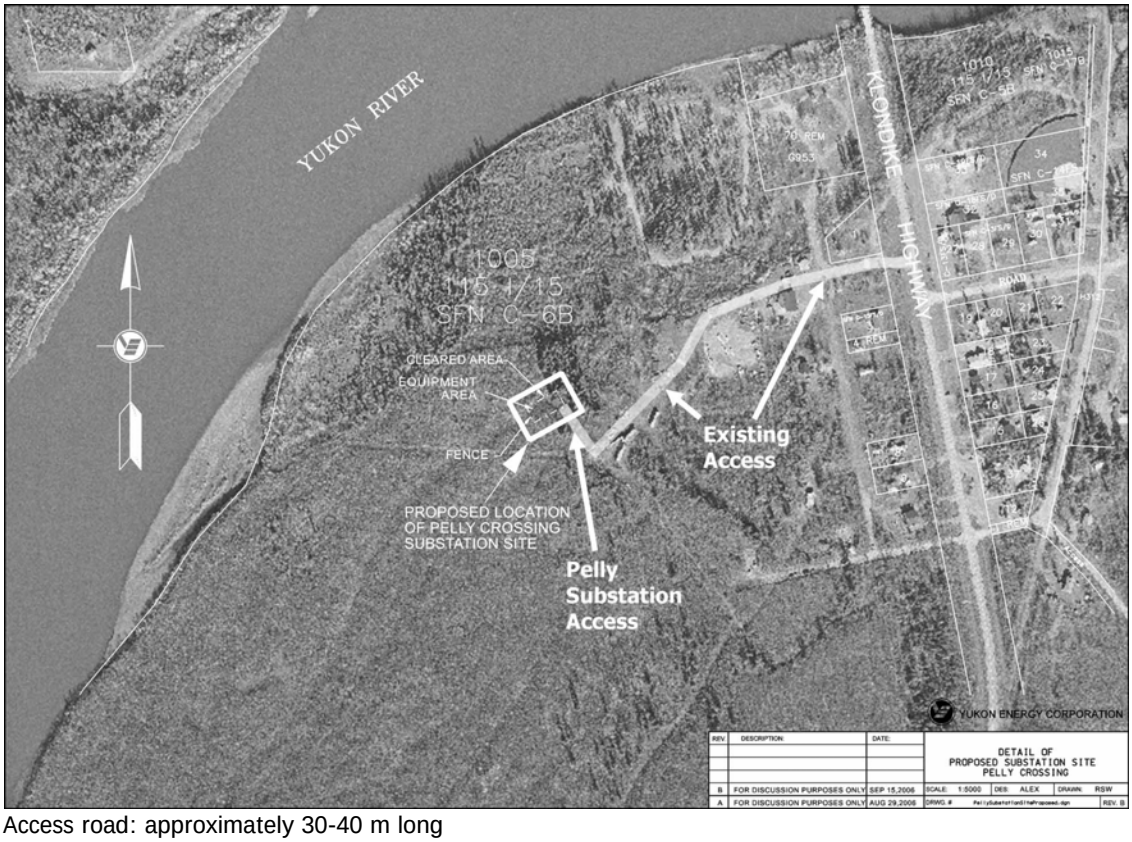
Access road: approximately 150 m long
Substation Cleared area: 90 m by 100 m; Fenced area: 60 m by 70 m (See Section 5.7.2.1, pg. 5-22 of Project Proposal Submission)

Pelly Crossing Substation (Figure 5.7-3): The site is situated in the vicinity of other similar structures (SFN Lands Equipment Yard) and is close to existing roads that are suitable for all-weather use. As stated in YESAB-YEC-1-2 and 1-3, access will make use of the existing road in and around the SFN Lands Department equipment yard, with the addition of a new single lane access road of approximately 30-40 m

in length to extend the road to the substation site. Figure YESAB-YEC-2-1b below shows the location of the proposed all-weather road access corridor to the site from the Klondike Highway.

Terrain analysis of the site area (Appendix 6A-1, Map 6A-1-5) indicates that the proposed substation location is north of an OW unit, or organic rich, poorly drained materials. The area is also known to have fluvial silt and sand/gravel (Appendix 6A-2, Map 6A-2-2). Otherwise the area is generally stable and well-drained, consisting of gravelly sand to gravelly loam. Vegetation cover is forested (Appendix 6C, Map 6C-5) with low timber potential. The proposed site is located above the Pelly River flood plain. It is situated adjacent to the proposed CS transmission line corridor, and its relative proximity to YECL's Pelly Crossing distribution system (existing YECL diesel generation facility) minimizes the requirement for additional powerline connection between the substation and the Pelly Crossing distribution system.

Figure YESAB-YEC-2-1b
Revised Pelly Crossing Substation with Road Access



Access road: approximately 30-40 m long

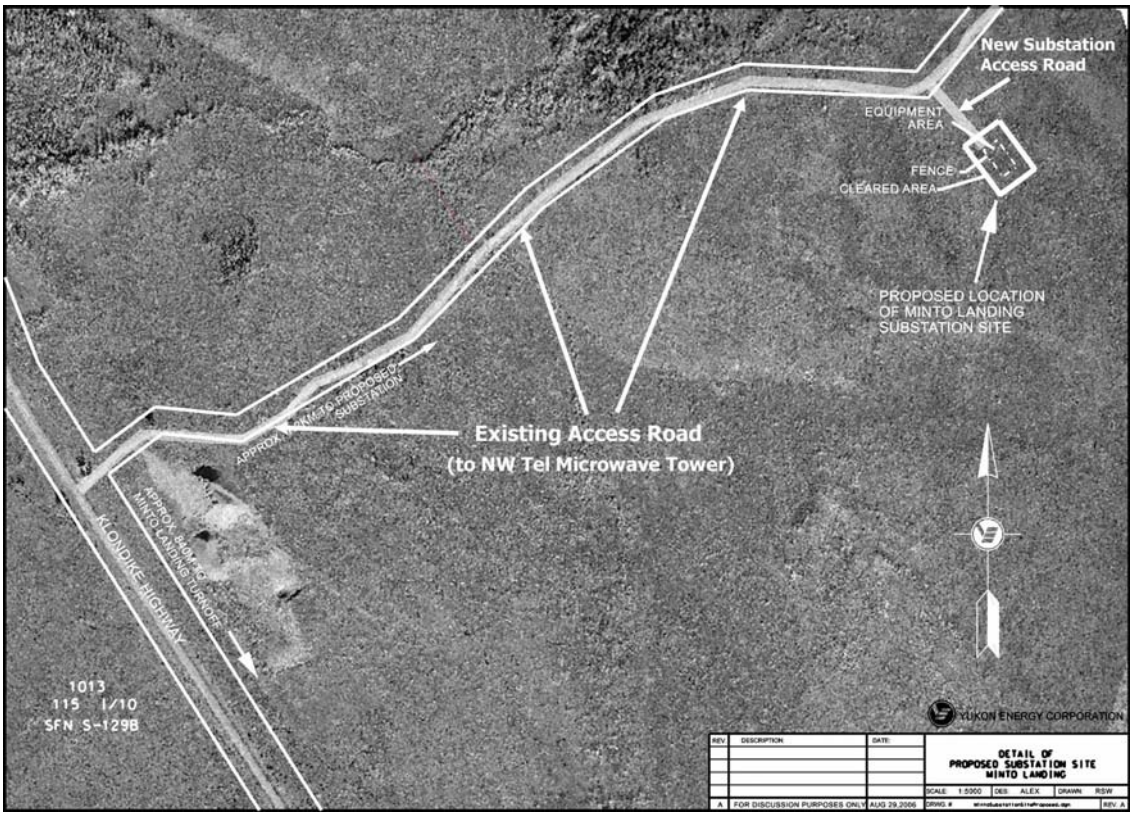
Substation cleared area: 50 m by 70 m; fenced area: 20 m by 40 m (See Section 5.7.2.2, pg. 5-23 of Project Proposal Submission.

Minto Spur Substation (Figure 5.7-4): As described on Page 7-47, the consideration of the Minto Spur substation location was influenced by the following variables:

- Location of the CS route – route refinements resulted in locating the CS line along the base of the bluff to the east, within 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 the Klondike Highway (substation maintenance); and
- Yukon Government Highways interest in connecting to the grid and preference to preserve the land reserve for future development by minimizing disturbance.

Terrain analysis of the site area (Appendix 6A-1 Map 6A-1-4) indicates that the substation's location will be on a flat, stable section of land adjacent to VS:R units (very steep terrain) located to the east. Soil in proximity to the Klondike Highway is well-drained and gravelly sand to gravelly loam. Vegetation in the area is not sufficiently recovered from forest fires (Appendix 6C, Map 6C-3). As stated in YESAB-YEC-1-3, a short extension of the NW Tel access road of approximately 80 m will be built as an all-weather gravel access road to the substation site. Figure YESAB-YEC-2-1c below shows the location of the proposed all-weather road access to the site from the Klondike Highway.

Figure YESAB-YEC-2-1c
Revised Minto Spur Substation with Road Access



Access road: approximately 80 m long
Substation cleared area: 50 m by 70 m; fenced area: 20 m by 40 m (See Section 5.7.2.2, pg. 5-23 of Project Proposal Submission).

In response to (c):

Consideration of a substation location is based on the following key variables:

- Proximity to existing transmission lines and/or the proposed CS/MS transmission line;
- Availability of all-weather all-season road access for construction and maintenance; and
- Relatively flat, stable terrain.

In addition to these key factors, the proponent also considered substation locations to avoid potential overlap with major value components. These major value components are presented in Table YESAB-YEC-2-1c for the proposed Carmacks, Minto Spur and Pelly substation locations and their associated road

access. Although Chapter 8 of the Project Proposal Submission lists other components beyond those provided in Table YESAB-YEC-2-1C, they were not identified as areas of potential overlap.

Table YESAB-YEC-2-1c
Substations and Road Access Overlap with Major Environmental Components

Component	Carmacks	Minto Spur	Pelly
Physical			
• Sensitive terrain	• Avoids known sensitive terrain	• Avoids known sensitive terrain	• Avoids known sensitive terrain
Terrestrial			
• Vegetation • Rare Plants • Key wildlife areas	• Forest cover with low timber potential • Avoids potential rare plant locations • Within northern section of key bison habitat; within key bald eagle habitat	• Located in area of Minto burn, insufficiently regenerated • Avoids potential rare plant locations • Avoids key Tatchun caribou habitat and sharp-tailed grouse lek	• Forest cover with low timber potential • Avoids potential rare plant locations • Avoids key wildlife areas
Aquatic			
• Riparian zones and wetlands	• Avoids riparian zones & wetlands	• Avoids riparian zones & wetlands	• Avoids riparian zones & wetlands
Socio-economic			
• Resource Use • Heritage Sites/Resources • Infrastructure & Services	• Avoids key resource use areas due to proximity to airport, highway and existing WAF transmission line • Avoids known heritage sites • Located within and adjacent to existing WAF transmission line, adjacent to Klondike Highway for all-weather road access	• Avoids key resource use areas due to proximity to existing gravel pit, Microwave tower access road • Avoids known heritage sites • Located adjacent to Dept. of Highways gravel pit for ease in providing power for gravel pit operations; and in proximity to the existing NWTel all-weather access road	• Avoids key resource use areas due to proximity to existing SFN equipment yard and community infrastructure • Avoids known heritage sites • Located adjacent to SFN's equipment yard and existing road access which minimizes the requirement for additional power line connection between the substation and the Pelly Crossing distribution system

REFERENCE: YESAB-YEC-1-3

QUESTION:

Question 3 of the Adequacy Review Report requested that the proponent identify all access trails required for all parts and phases of the project. The proponent responded initially by stating: "It is not feasible at this time to identify the location of all access trails to the transmission right-of-way, or the specific location of each substation access road. Accordingly, and as well, no GIS shapefile information can be provided on these matters". This is followed-up by the following statement: "It is anticipated that highway crossings and existing egress will be sufficient to meet the needs of RoW brushing and clearing, construction, operation, and maintenance requirements (summary)."

The information provided in the second statement (i.e., that no access roads will be built) is new information not previously provided by the proponent to YESAB. As such, the assessment will be undertaken with the understanding that YEC will not be seeking to build any access road (except to substations) and will scope the project accordingly.

The proponent provided cursory information related to the existence of potential access points.

Required follow-up:

a) Please provide the source of access point information, and the coordinates of potential access points, or shapefiles of the trails; and
b) Referencing the tables 3-1 to 3-4 provided, please clarify the meaning of 'Unknown' under the column heading 'Land Use', specifically as it relates to other descriptors such as 'Existing Access Trail', 'Gravel Pit', etc.

ANSWER:

In response to follow-up to both (a) and (b) on access point information, we have compiled two tables. As stated in YESAB-YEC-1-3, any location where the transmission line crosses the Klondike Highway or existing roads will be considered for access. Table YESAB-YEC-2-1 lists the UTM coordinates for all points where the proposed transmission line crosses the Klondike Highway or existing roads that would be used for

access to the power line right-of-way. These access points, along with the access provided by proposed all-weather road access to substations (see YESAB-YEC-2-1), will be sufficient access for the Project.

Table YESAB-YEC-2-1
Transmission Line Access Points with
Klondike Highway and Existing Roads

NTS Map Sheet	Easting	Northing	Road	Transmission Line
The following coordinates refer to orange dots on revised route segment maps in YESAB-YEC-1-3 attachments				
115 I01	437200	6888000	Klondike Highway	CS
115 I01	434000	6892800	Klondike Highway	CS
115 I01	433900	6896350	Klondike Highway	CS
115 I08	433600	6906850	Frenchman/Tatchun Road	CS
115 I07	421850	6917850	Klondike Highway	CS
115 I07	416850	6922000	Klondike Highway	CS
115 I10	405300	6941250	Klondike Highway	MS
115 I10	405600	6945050	Klondike Highway	CS
115 I15	419450	6967150	Pelly Crossing local road	CS
115 I15	419400	6968000	Pelly Farm Road	CS
115 I15	423800	6983650	Klondike Highway	CS
115 P01	426500	6988500	Klondike Highway	CS
115 P01	427800	6992650	Klondike Highway	CS
115 P01	425050	7000700	Klondike Highway	CS
115 P01	424700	7003700	Klondike Highway	CS
115 P02	422750	7013500	Klondike Highway	CS
115 P07	420750	7016900	Klondike Highway	CS
115 P07	420200	7017450	Klondike Highway	CS
115 P07	414400	7029800	Klondike Highway	CS
115 I11	396750	6942500	Minto Mine Access Road	MS
115 I11	395900	6942750	Minto Mine Access Road	MS
115 I11	391250	6948000	Minto Mine Access Road	MS
115 I11	389500	6947850	Minto Mine Access Road	MS
115 I11	386600	6946750	Minto Mine Access Road	MS
115 I11	385250	6945250	Minto Mine Site	MS

NTS Map Sheet	Easting	Northing	Road	Transmission Line
These following coordinates refer to purple dots showing existing points of egress on revised route segment maps in YESAB-YEC-1-3 attachments				
115 I01	431700	6902050	Staging Area[1]/ Existing Access Trail	CS
115 I08	430050	6911050	Gravel Pit/ Existing Access Trail	CS
115 I07	413400	6928400	Gravel Pit/ Existing Access Trail	CS
115 I10	409100	6935200	Existing Access Trail	CS
115 I10	404750	6942100	Gravel Pit/ Service Road/ Existing Access Trail	CS/MS
115 I10	413000	6956100	Existing Access Trail	CS
115 I15	423500	6970250	Existing Access Trail	CS
115 P01	426150	6996600	Old Klondike Highway Section	CS
115 P02	424150	7005500	Old Klondike Highway Section	CS
115 P07	418000	7024500	Gravel Pit/ Garbage Dump Road/Existing Access Trail	CS

All UTM coordinates have been taken from NTS map sheets (UTM Zone 8, Datum NAD 83) and cross-referenced with aerial photography. All coordinates are within 50 to 100 metres. The engineering design process will finalize exact locations.

Table YESAB-YEC-2-2 provides the UTM coordinates for the existing points of egress provided in response to YESAB-YEC-1-3 in Attachments 1 through 9. This table also provides additional known information on the types of access to "clarify the meaning of 'unknown' under the column heading 'Land Use', specifically as it relates to other descriptors such as 'Existing Access Trail', 'Gravel Pit', etc."

[1] Staging area is being used in this context to represent a widened, cleared area extending beyond the cleared highway RoW which may be, or have been, used for staging of equipment.

Table YESAB-YEC-2-2
Existing Points of Egress

NTS Map Sheet	Easting	Northing	Type of Access	Transmission Line
115 I01	436950	6888200	Existing Access Trail	CS
115 I01	433150	6897200	Clear Area Adjacent to Klondike Highway[2]	CS
115 I01	432600	6897800	Existing Access Trail	CS
115 I01	431800	6899900	Existing Access Trail	CS
115 I08	433400	6908350	Staging Area	CS
115 I08	432200	6910000	Existing Access Trail	CS
115 I08	427150	6913800	Existing Access Trail	CS
115 I08	425900	6195200	Gravel Pit	CS
115 I08	423400	6196750	Existing Access Trail	CS
115 I07	421550	6918000	Existing Access Trail	CS
115 I07	420500	6918750	Borrow Pit/Existing Access Trail	CS
115 I07	419700	6919500	Clear Area adjacent to Klondike Highway	CS
115 I07	419500	6919700	Existing Access Trail	CS
115 I07	417000	6921800	Borrow Pit/Existing Access Trail	CS
115 I07	415850	6924400	Existing Access Trail	CS
115 I07	415650	6924900	Existing Access Trail	CS
115 I07	415050	6925900	Existing Access Trail	CS
115 I10	409300	6935150	Existing Access Trail	CS
115 I10	405700	6940500	Local Road	MS
115 I10	405200	6941300	Minto Landing Access Road	MS
115 I10	414950	6958300	Existing Access Trail	CS
115 I15	418750	6965200	Gravel Pit	CS
115 I15	421850	6968900	Existing Access Trail	CS
115 I15	423300	6974650	Existing Access Trail	CS
115 I15	423400	6981800	Existing Access Trail	CS
115 P01	426200	6988100	Existing Access Trail	CS
115 P01	427550	6990950	Overlaps the Klondike Highway	CS

[2] Clear area is being used in this context to represent an area visible on aerial photos as having no trees which may have been previously used.

NTS Map Sheet	Easting	Northing	Type of Access	Transmission Line
115 P01	427500	6993700	Overlaps the Klondike Highway	CS
115 P01	425050	7000750	Existing Access Trail	CS
115 P01	424950	7001500	Gravel Pit/ Existing Access Trail	CS
115 P01	424800	7002900	Existing Access Trail	CS
115 P02	424300	7005100	Existing Access Trail	CS
115 P02	423250	7012050	Old Klondike Highway Section	CS
115 P07	421850	7015000	Existing Access Trail	CS
115 P07	420650	7107000	Old Klondike Highway Section /Existing Access Trail	CS
115 P07	420000	7017800	Existing Access Trail	CS
115 P07	419200	7019800	Existing Access Trail	CS
115 P07	418950	7020750	Existing Access Trail	CS
115 P07	418700	7021650	Existing Access Trail	CS
115 P07	416050	7027800	Stewart Crossing Local Access Road	CS
115 I11	396450	6942500	Existing Access Trail	MS
115 I11	395250	6944600	Existing Access Trail	MS
115 I11	394000	6948050	Gravel Pit/ Existing Access Trail	MS
115 I11	387900	6947550	Road and Transmission Line Overlap	MS

All UTM coordinates have been taken from NTS map sheets (UTM Zone 8, Datum NAD 83 and cross-referenced with aerial photography). All coordinates are within 50 to 100 metres. The engineering design process will finalize exact locations.

REFERENCE: YESAB-YEC-1-10

QUESTION:

Question 10 of the Adequacy Review Report requested clearer maps (with suitable legends and at an appropriate scale) which detailed the alternatives mapped in the proposal and the spatial relationship between values and constraints that were considered in the design process. In response, the proponent provided maps of the preferred route, which did not include legends, alternatives, or constraints. The maps provided in the supplementary information submission did not meet the needs of the initial information request.

Required follow-up:

a) Please provide maps of appropriate scale that detail the spatial relationship between values and constraints that were considered in the design process. If constraints were of a confidential/sensitive nature, refer to specific segments of the proposed line that were routed to avoid "confidential values" rather than identifying the values themselves on the maps.

ANSWER:

Yukon Energy has to date sought to provide YESAB with all the available mapping information that was used in the development of the Submission documentation (including in the design process for selection of the preferred route) and in addition has provided, where available, this information in formats that YESAB has subsequently requested. Yukon Energy would welcome the opportunity to work with YESAB during the screening process to clarify further the information provided in the Submission documentation on these matters, focusing on any specific route design issues that YESAB would like to review in more detail in order to assess potential significant adverse environmental effects associated with the Project.

To assist the adequacy review of this matter, Yukon Energy's approach to date in the route design process is summarized below in the context of the requested mapping information.

Yukon Energy set out a Route Study Area and an initial suggested route, with specific options in certain areas, for discussion and consultation. As noted in response to YESAB-YEC-1-1, the preliminary route as

initially proposed and consulted upon did not by its nature address many issues at any specific level of detail i.e., it was designed to reflect one potentially acceptable least cost approach and to facilitate discussion with relevant parties.

During the consultation process on route selection, specific issues and options were addressed as required. In many instances, issues and concepts (e.g., the proposal for a 30 metre buffer) were addressed without developing specific new maps prior to the consolidation of the discussions into new maps for the preferred route discussion with the NTFN Steering Committee.

As described in response to YESAB-YEC-1-10, throughout this design process Yukon Energy used various sources of information to assist in the identification of a preferred route and to assess potential effects on valued components that might result from the preferred route. These sources included various printed and mapping formats, interviews, and consultation with interested stakeholders. As noted in response to YESAB-YEC-1-1, for example, the Submission documented certain matters regarding separation distances between the highway and the preferred route to assist in the assessment of related RoW barrier issues (as well as habitat fragmentation issues).

In specific areas where clear route alternatives emerged for discussion, the comparison of applicable or localized valued component criteria and constraints was done to identify first the alternatives and, ultimately, the preferred route option. For each such specific routing alternative, relevant comparative features were identified and compared to develop a preferred route. The subsequent sections of Chapter 7 describe, by line segment, where route alternatives emerged, what comparative features were used to compare alternatives, and the conclusions from this process that resulted in identification of a preferred route.

Broader route design issues, including consideration of a minimum 30 metre buffer, often did not involve such specific map development or "option assessment" in areas where this criteria could easily be met. If constraints were of a confidential/sensitive nature, specific maps were not typically used or developed in this process - and the Submission and responses have sought to refer to specific segments of the proposed line where such valued component information might be relevant to route design (e.g., locations of Sharp-tailed Grouse leks as discussed in response to YESAB-YEC-1-8) without trying to identify specific locations on the maps.

To help with the review process of the submission document, Yukon Energy has produced the following description of variables that contributed to the selection of the preferred and proposed transmission line route.

Overall Route Selection

Routing objectives, constraints, and opportunities are described in Section 7.1.1 (page 7-2) and outline major influencing variables associated with the development of the CS/MS routes as follows:

- **Biophysical and Socio-Economic features:** various biophysical features (such as terrain, wildlife habitat, water bodies, and special areas) and socio-economic features (FN Settlement lands, communities, cultural sites, and resource use) all contribute and influence the location of the route.

- **Technical constraints:** the route must join the WAF and MD transmission line routes and connect the Minto Mine and community of Pelly Crossing site to grid power. In addition, certain terrain must be and/or should be avoided.

- **Cost Constraints:** minimizing total costs is an important variable and for route selection, the two key factors effecting total cost are the total line length and the number of angle towers (i.e., locations where the route deviates materially from a straight line routing).

- **Routing Opportunities:** The use of existing corridors (particularly the Klondike Highway and the Minto mine access road) as well as previously disturbed areas, and burned areas through the study region are seen as opportunities for routing to help minimize impacts.

For each of the CS/MS transmission line preferred route segments, the following tables (YESAB-YEC-2-3 1a through 1d) provide a summary of key considerations that influenced the identification of a preferred transmission line route. These tables are intended to accompany the revised maps included as YESAB-YEC-1-3, Attachments 1 through 9.

Table YESAB-YEC-2-3-1a
Summary of Key Routing Considerations: CS Line Segment 1 (Carmacks to McGregor Creek)

YESAB-YEC-1-3 Attachments 1 and 2 (maps) illustrate these line segment sections.

Location Descriptor	Biophysical Features	Socio-Economic Features	Technical & Cost Constraints	Routing Opportunities	Cross-Reference
CS Line Segment 1.1 – Carmacks to Tatchun Creek					
Carmacks Substation	• Relatively flat stable terrain		• Adjacent to WAF transmission line • Proximity to all weather road access		Project Proposal pg. 7-3; YESAB-YEC-2-1
Tantalus Butte East Option (Section 1.1-a)	• Avoids moose habitat to east • Avoids poor drainage area	• Avoids high value hunting area to east • Avoids private & FN land	• Shorter length than Tantalus West option along Highway		Project Proposal pgs. 7-9 to 7-15
East of Five Finger Mountain (Section 1.1-b)	• Avoids small lake	• Avoids private property • Refinement requested from FN near lake	• Straight span		Project Proposal pg. 7-7
East side of Hwy., up to south of Tatchun Creek (Section 1.1-c)	• Avoids poor drainage on west side of Hwy.	• Avoids trapper's cabin			Project Proposal pg. 7-7
Five Finger Rapids and Tatchun Creek – Tatchun East option (Section 1.1-d)	• Span maintains riparian vegetation	• Avoids view-scape impact & YG Park's interest at Five Finger Rapids site • Avoids gravel pit • Avoids LSCFN fishing camps & YG campground • Less impact on view-scape throughout	• Straighter & less costly than Tatchun West option (fewer corner towers) • Longer span over creeks (less brushing)		Project Proposal pgs. 7-9 to 7-15, and pg. 7-52
CS Line Segment 1.2 – Tatchun Creek to McGregor Creek					
North of Tatchun Creek to Yukon Crossing (Section 1.2-a)	• Steep slopes squeeze ROW to close proximity to Hwy. south of Yukon Crossing	• Adjacent to Hwy. to avoid active portion of pit • FN requested refinement up on bench out of sight from Hwy. through Yukon Crossing area. This expanded the buffer between Hwy. & line to preserve view-scape in an important traditional FN area	• Additional costs incurred with extra corner towers near Yukon Crossing		Project Proposal pg. 7-7
South of McGregor Creek (Section 1.2-b)		• Route refinement crossing to west side was requested by FN to avoid trapping concerns			Project Proposal pg. 7-7
McGregor Creek (Section 1.2-c)		• Avoids 2 individual FN parcels, trapper's cabin & existing active trap line			Project Proposal pg. 7-7

Table YESAB-YEC-2-3-1b
Summary of Key Routing Considerations: CS Line Segment 2 (McGregor Creek to Pelly Crossing)

YESAB-YEC-1-3 Attachments 3, 4 and 5 (maps) illustrate these line segment sections.

Location Descriptor	Biophysical Features	Socio-Economic Features	Technical & Cost Constraints	Routing Opportunities	Cross-Reference
CS Line Segment 2.1 – McGregor Creek to McCabe Creek					
North of McGregor Creek (Section 2.1-a)	• Steep slopes north of McGregor Creek and area approaching McCabe Creek	• Route crosses to east side of Hwy. to avoid FN settlement land and minimize impacts on views • FN request to increase vegetative buffer to 200m between Hwy and transmission line to reduce visual site lines behind unburned trees			Project Proposal pgs. 7-17 to 7-19
South of McCabe Creek to McCabe Creek (Section 2.1-b)	• Steep slopes result in line encroaching on Hwy. RoW	• Avoids agricultural parcel (Kruse farm) • Cultural significance to SFN & proximity of cabins upstream with traditional use areas • FN request to minimize visual impact resulted in route behind unburned stand of trees • SFN settlement land & future development of lands • Yukon Quest route & proximity of Klondike Hwy. bridge • Avoids Old Road House foundation		• Use of Old Coach Trail reduces amount of brushing	Project Proposal pgs. 7-17 to 7-19 & YESAB-YEC-2-4 for details
CS Line Segment 2.2 – McCabe Creek to Lhutsaw Wetlands					
North of McCabe Creek to Minto Spur Substation (Section 2.2-a)	• Steep slopes after McCabe Creek	• FN request to align route along base of McCabe Hills to reduce visual impact through SFN settlement land (results in increased distance and wider vegetative buffer between route and Klondike Hwy.)	• Opportunity for straight span into substation location		Project Proposal pgs. 7-17 to 7-19 & YESAB-YEC-2-4
Minto Spur Substation	• Previously burned area • Avoids sharp-tailed grouse lek	• Proximity to Dept. of Highway's gravel pit for connection; does not dissect gravel reserve area • Access from existing all-weather road • On Crown land	• Proximity to Minto Landing airstrip – location avoids constraints of airstrip clearance requirements		Project Proposal pgs. 7-48 to 7-49
North of Minto Substation to Lhutsaw Wetlands area (Section 2.2-b)	• Von Wilczek Creek • Policeman's Hill • Lhutsaw Wetlands	• Avoids known/potential archaeological sites • SFN requested alignment move west, at least 1 km away from Hwy	• Straight span into existing gravel area, opportunity to reduce costly corner towers		YESAB-YEC-1-11 YESAB-YEC-2-4 Project Proposal pgs. 7-19 to 7-23
CS Line Segment 2.3 – Lhutsaw Wetlands to Pelly Crossing					
Lhutsaw Wetlands (Section 2.3-a)	• Lhutsaw Wetlands Habitat Protected Area to east • Habitat fragmentation – caribou habitat	• SFN expressed concerns over visual impact of line near Hwy. and access to resources from Hwy. • SFN interest is discouraging future development in this section of their settlement lands	• Resulted in longer line length (increases cost) through settlement lands over original option • Preferred route is shorter & less costly than SFN preferred route • Increased maintenance costs		Project Proposal pgs. 7-19 to 7-23 and pg. 7-53 YESAB-YEC-1-11
South of Pelly Crossing & Substation (Section 2.3-b)	• Avoids Six Mile Lake • Habitat fragmentation	• Trapping concerns • Change in location of Pelly Substation resulted in route deviating materially from Klondike Hwy., thus increasing the buffer between line and Hwy.	• Desire for straight tangent line lengths into revised Pelly substation location (fewer corner towers) • All-weather road access to substation		YESAB-YEC-1-11 Pelly Route options detailed in Project Proposal pgs. 7-24 to 7-30

Table YESAB-YEC-2-3-1c
Summary of Key Routing Considerations: CS Line Segment 3 (Pelly Crossing to Stewart Crossing)

YESAB-YEC-1-3 Attachments 6, 7 and 8 (maps) illustrate these line segment sections.

Location Descriptor	Biophysical Features	Socio-Economic Features	Technical & Cost Constraints	Routing Opportunities	Cross-Reference
CS Line Segment 3.1 – Pelly Crossing to Jackfish Lake Park Reserve					
North of Pelly Crossing to Gravel Reserve (Section 3.1-a)	• Steep slopes north of Pelly Crossing • Avoids Willow Creek and associated wildlife habitat	• SFN settlement land • Avoids active gravel area • Maintains vegetative buffer	• Opportunity for straight tangent spans over much of this section • Pelly airstrip clearance requirements		Project Proposal pg. 7-31 and YESAB-YEC-1-11
Gravel reserve to Jackfish Lake Park Reserve (Section 3.1-b)	• Lakes & wetlands south of Park on west side	• SFN interest in minimizing use of settlement lands resulted in crossing to east side • Maintains vegetative buffer			Project Proposal pgs. 7-31 to 7-33 YESAB-YEC-1-11
CS Line Segment 3.2 – Jackfish Lake Park Reserve to Top of 11% Hill					
Jackfish Lake Park Reserve to north of Mud Lake (Section 3.2-a)	• Poor drainage & Mud Lake to west • Steep slopes to east • Avoids key wildlife concern areas	• Avoids Jackfish Park Reserve by routing on east side • Route refinement to avoid SFN trapper cabin and resource use camp • Maintains vegetative buffer	• Straight tangent lines, few corner towers • Adjacent to Klondike Hwy.		Project Proposal pgs. 7-33 to 7-34 YESAB-YEC-1-11
North of Mud Lake to bottom of Top of 11% Hill (Section 3.2-b)	• Steep slopes & area of poor drainage	• Avoids gravel pit			Project Proposal pgs. 7-34 to 7-35 YESAB-YEC-1-11
CS Line Segment 3.3 – Top of 11% Hill to Stewart Crossing					
Top of 11% Hill to South Crooked Creek Crossing (Section 3.3-a)	• Steep slopes of Ddhaw Ghro Protected area to east • Poor drainage to west	• Avoids active section of Gravel Pit	• Straight tangent lines, minimum corner towers • Firmer terrain; takes advantage of slope contours	• Opportunity to use old Klondike Hwy corridor	Project Proposal pgs. 7-35 to 7-36 YESAB-YEC-1-11
South Crooked Creek Crossing to Landfill Site road (Section 3.3-b)	• Crooked Creek • Poor drainage/permafrost to east of Creek at south crossing • Steep terrain at crossing	• Avoids of potential heritage resources noted by FN along Crooked Creek west of Hwy. • Concerns expressed over west-facing views at Hwy. pull-out	• Straight tangent lines with minimum corner towers		Project Proposal pgs. 7-36 to 7-40 YESAB-YEC-1-11
Landfill Site road to Stewart Crossing Substation (Section 3.3-c)	• Boggy, poorly drained terrain along Crooked Creek • Area prone to flooding along Stewart River • Moose habitat	• Avoids FN settlement lands, community infrastructure and gravel pits • Potential heritage resources noted by FN along Crooked Creek led to FN identifying optimal creek crossing • Preferred route of NNDFN	• Direct line into Existing substation location • Proximity to existing transmission lines • Access via existing dump road	• Opportunity to route along firmer, higher ground	Project Proposal pgs. 7-36 to 7-40 YESAB-YEC-1-11

Table YESAB-YEC-2-3-1d
Summary of Key Routing Considerations: MS Line Segment (Minto Landing to Mine Site)

YESAB-YEC-1-3 Attachment 9 (map) illustrates these line segment sections.

Location Descriptor	Biophysical Features	Socio-Economic Features	Technical & Cost Constraints	Routing Opportunities	Cross-Reference
MS Line Segment – Minto Landing to across Yukon River					
Minto Substation to Yukon River crossing (Section MS 1)	• Yukon River • Von Wilczek Creek riparian habitat • Moose calving on islands • Migratory bird nesting sites • Maintain old growth trees	• Avoids known archaeological resources in Minto Landing area • Avoids SFN Annual Gathering place and fish camp sites • Future community plans of SFN for Minto Landing area • Interest for future connection to gravel pit expressed from YTG Highways • FN settlement land at Minto Landing	• Length of line, corner towers • Proximity to airstrip & clearance requirements • Proximity to CS line • Opportunity to provide power to gravel pit • Yukon R. line length (extra costs for crossing over original option)	Opportunity to align near existing access road into gravel pit	Project Proposal pgs. 7-41 to 7-51
MS Line Segment – Yukon River to Minto Creek					
Yukon River crossing to Minto Creek (Section MS 2)	• Big Creek channel migration • Floodplain & wetland habitat	• FN settlement land: May 2006 MOU requires spur line to be generally routed along existing mine access road RoW	• Uses existing mine access road where feasible	Opportunity to align adjacent to Mine Access Road	Project Proposal pgs. 7-41 to 7-51
MS Line Segment – Minto Creek to Mine Site					
Minto Creek to Mine Site (Section MS 3)	• Steep slopes • Minto Creek • Avoid permafrost in valley bottom	• FN settlement land throughout	• Straight spans with fewer corner towers • Takes advantage of contour to angle directly into mine site • Existing mine substation site	Opportunity to align adjacent to Mine Access Road	Project Proposal pgs. 7-41 to 7-51

REFERENCE: YESAB-YEC-1-11

QUESTION:

Question 11 of the Adequacy Review Report requested a preliminary route options table (in the format of table 7.2-1 of the proposal) for the McGregor to Pelly Crossing and Pelly Crossing to Stewart Crossing portions. Although not specifically as requested, the format of the tables provided is sufficient. The content, however, has raised some questions as to the origin and intent. In several instances the proponent provided the rationale of "no further documentation is warranted on settlement land." It is unclear whether there is a misunderstanding respecting the jurisdiction of the YESAA assessment but, to provide necessary clarification, this assessment extends to, and encompasses, First Nation settlement land.

Required follow-up:

a) Please provide the relevant documentation for those parts of the line on settlement land, which were previously referred-to (by the proponent) as not being required due to their location.

ANSWER:

The original YESAB Question 11 noted potential "difficulty to the general public in their review of the project during the public comment period," and focused specifically on the need to identify and "understand the routing options that were considered." In response, Supplementary Information YESAB-YEC-1-11 provided Table 11-1 – an Index to Additional Route Alternatives between McGregor Creek and Pelly Crossing – to clarify in summary form the routing options actually considered, setting out summary information beyond that originally identified and addressed in the Project Proposal Submission tables. Where additional information did not appear to be needed to clarify the routing options reviewed, YEC so noted in Table 11-1, saying "further documentation is not warranted" or, where this situation applied to route options on settlement lands, "further documentation is not warranted on settlement land." Where further documentation and clarification did appear to be needed, this was provided, regardless as to whether the routing option was on or off settlement land, e.g., Table 11-2 and Table 11-3 provided added information on Lhutsaw Route Options, as well as Table 11-1 that provided information on route options "South of Pelly Crossing."

In short, YEC completely understands the jurisdiction of YESAB under *YESAA* to encompass First Nation settlement land in their overall assessment. We suggest there was a misunderstanding as to the meaning of the information portrayed in the response to YESAB-YEC-1-11 and, as demonstrated above, the referenced comment regarding certain settlement land areas was solely meant to state that sufficient documentation on the route options considered had already been provided with regard to the specific route segments being noted.

During the route selection consultation process with First Nation members, YTG representatives and other interested parties, route options were considered and assessed based on a variety of effects – to the project, to the environment and to the community. To help further clarify this matter, additional explanation is provided in Table YESAB-YEC-4-1 for the three route refinements where "no further documentation is warranted on settlement land" (or "further documentation is not warranted") as was stated in Table 11-1.

Table YESAB-YEC-4-1
Additional Route Alternatives between McGregor Creek and Pelly Crossing

Route Alternative/Location	Additional Explanation
McCabe Creek area	As stated in YESAB-YEC-1-11, consultation with SFN led to route adjustments across McCabe Creek. This consultation was **in addition** to taking into consideration a variety of factors and project effects. These were outlined in the Project Proposal Submission on pages 7-17 and 7-18 and included effects of: • Steep terrain • Proximity of private agricultural land • Viewscapes in the vicinity of the bridge • SFN settlement land parcels and future development of land • Opportunity to use an abandoned coach trail (as opposed to brushing a new corridor on the west side of the Klondike Highway) • Other users of this area such as Yukon Quest **Effects on the Project:** SFN agreement to the route crossing their settlement land alleviated project effects on Crown land and private land, and took advantage of using the abandoned coach trail road.

Route Alternative/Location	Additional Explanation
	Effects on the Environment: The route refinement avoids steep terrain (as did the route alternative on the west side of the Klondike Highway); no difference in effects on the environment. **Effects on the Community**: Viewscapes towards the Yukon River are maintained as the line is sited on the east side of the highway.
Approach to proposed Minto Spur substation location	As stated in YESAB-YEC-1-11, consultation included SFN and Dept. of Highways in this route refinement – the two primary users and/or land owners of this section of the route. **Effects on the project**: although further set back from the highway, the preferred route maintains a straight line into the proposed Minto substation, avoiding costly corner towers. **Effects on the environment**: crossing the same type of terrain, there is no difference in the effect on the physical environment. Avoids concern over Sharp-tailed grouse lek; some habitat fragmentation in a small section where the proposed line deviates from the highway. SFN as land owner was requesting this refinement, thus it was put forward as the preferred route. Dept of Highways also expressed interest in not having the transmission line RoW dissect the EMR Reserve land parcel, and were in agreement with the preferred route following the east side as opposed to the west side of the EMR reserve land. **Effects on the community:** No difference in crossing traplines; positive effect on access to fuelwood harvesting which was identified as a concern for SFN; avoids SFN land which was identified by the community for future residential use; and avoids known heritage sites.
1 km section north of proposed Minto substation	**Effects on the Project:** the minor route alternation resulted in the proposed route being sited further from the highway. This is due to the preferred location of the Minto substation, which was a result of consultation with the Dept. of Highways, the airport authority, and SFN. Angling the line from the proposed substation back towards the highway would require an additional costly corner tower. **Effects on the Environment:** concern was identified with proximity to Von Wilczek/Lhutsaw Creek. The route refinement took this into consideration and

Route Alternative/Location	Additional Explanation
	maintains avoidance of wetland habitat, in addition to other terrain constraints such as slopes. Heritage resource concerns on Policeman's Hill (east of Klondike Highway) and potentially west of Von Wilczek/Lhutsaw Creek resulted in further route refinement. **Effects on the Community:** community concerns identified by SFN were proximity of heritage resources, gravesite on Policeman's Hill (on west side), and aesthetic viewscape looking west and southwest approaching Minto Landing from the north. Consultation with SFN, including these identified concerns, resulted in the route refinement.

1

REFERENCE: YESAB-YEC-1-20

QUESTION:

Question 20 of the Adequacy Review Report requested a summary of existing and anticipated (with the existence of Minto and Carmacks Copper mines) hydro and diesel demand on the WAF grid, and information related to the anticipated locations of diesel generators that will be in place to address energy shortfalls. In response to the first part, the proponent responded by providing an analysis of existing and anticipated hydro and diesel demand, which only considered the Minto Mine.

This response does not meet the needs of the information request. Conflicting information/direction has been provided by the proponent, which is outlined below. In consideration of Question 20 of the Adequacy Review Report the proponent stated: "Yukon Energy does not plan to pursue Stage Two of the Project (Pelly Crossing to Stewart Crossing portion) unless Carmacks Copper connects to the system and other conditions are met to ensure no adverse effects on Yukon ratepayers". However, in answer to Question 21, Carmacks Copper forms an integral part of the economic analysis provided by the proponent. The conflicting approach to incorporating information related to Carmacks Copper in certain parts, and excluding it in other parts must be resolved.

Required follow-up:

If grid energy consumption by Carmacks Copper is assumed to be part of the project:

a) Please provide an analysis of anticipated hydro and diesel demand for Stage 1 and 3 of the project, with Minto and Carmacks Copper Mines online.

Otherwise:

b) Please provide an economic analysis for the project, minus the consideration of any revenues from Carmacks Copper mine; and
c) Provide direction to YESAB as to whether Stage 2 of the proposed project is to be removed from the scope of the project.

In response to the potential health effects of diesel emissions, and the location of diesel generators, the proponent responded by stating that the project will reduce overall diesel consumption in Yukon, and consequently reduce concerns related to health effect. Also, the proponent provided the following statement: "Yukon Energy does not at this time know where increases to WAF diesel generation may occur. At low levels of such generation it is likely that the Whitehorse Diesel Plant would be used; however, as WAF diesel generation increases Yukon Energy will consider alternative available generation locations with a view to minimizing generation costs associated with line losses."

While the overall emissions in the Yukon may be reduced because of the project, the location of emissions may be concentrated in Whitehorse and magnified from baseline if Whitehorse-based generators are exclusively or primarily relied-upon for addressing energy shortfalls, which will increase over time with the addition of mine customers to the grid.

Required follow-up:

d) Please provide information related to factors that will be specifically considered in relocating diesel generation from Whitehorse, including decision points and thresholds. Conversely, the assessment will consider that al diesel generation to address future energy shortfalls will occur at the Whitehorse Diesel Plant;
e) For tables 20-1 and 20-2, please explain the terms 'hydraulic for firm' and 'hydraulic for secondary'; and
f) For peaking and base diesel figures, please provide relevant volumes in litres.

ANSWER:

In response to (a), (b), and (c):

YEC acknowledges that the earlier response to Question 21 included, in its attached Schedule 1, a copy of information filed with the YUB which included (as a possible add-on under the Stage 1 assessments, as well as under potential total Stage 1 and 2 benefits) earlier estimates of Carmacks Copper ratepayer net ratepayer benefits, i.e., as noted in Attachment 1 to Question 21, this estimate related to Carmacks Copper is the same as was originally filed with the YUB in June, 2006 (a copy of which was provided in YEC's YESAB Project Proposal).

As noted in the earlier response to Question 20 (as well as Question 21), Yukon Energy understands that Carmacks Copper is currently in the initial permitting stage based on a proposal which assumes that the project will use only on-site diesel generation; it was further noted that Carmacks Copper has not yet entered into an LOI (or any other understanding) with Yukon Energy "and until they do Yukon Energy is assuming that if and when Carmacks Copper starts operations it will do so with isolated diesel." Yukon Energy would further note that any future opportunity to connect Carmacks Copper to the CS Project will require a new 138 kV spur line to be reviewed (as a separate project) by the YESAB Executive Committee.

Therefore, in accordance with YESAB screening requirements, Yukon Energy's current CS/MS Project Proposal no longer considers Carmacks Copper as a "future project" to be included in the cumulative effects assessment of the CS/MS Project.

Based on this change to the Project Proposal Submission, Yukon Energy is not providing any analysis of anticipated hydro and diesel demand for Stage 1 or Stage 2 of the CS/MS Project with Carmacks Copper Mine assumed to be online. In addition, a revised Schedule 1 for Question 21 of the Adequacy Review Report (YESAB-YEC-1-21) is also attached to provide the requested economic analysis for the CS/MS Project minus any consideration of any revenues from Carmacks Copper mine.[1] As contemplated in the Project Proposal (page 1-2), this updated and adjusted project economics indicates that, without Carmacks Copper, Yukon Government funding would be required for Stage 2 development in order to ensure no adverse impact on ratepayers.[2]

Yukon Energy's Project Proposal to YESAB for the CS/MS Project continues to include both Stage 1 and Stage 2.

[1] The revised Schedule 1 also updates the economics to reflect the December 21, 2006 Term Sheet (which was attached to Question 21 as Attachment 2).

[2] Yukon Energy's comment that it "does not currently plan to pursue Stage Two of the Project unless Carmacks Copper connects to the system" indicates a likely precondition, but not a sufficient condition, for Stage 2. The key decision criteria remains ensuring no adverse impact on ratepayers. As indicated, in the absence of the Carmacks Copper Mine, Stage 2 development can also proceed with sufficient YG funding to meet this criteria. Environmental and socio-economic effects related to the Carmacks Copper Mine receiving grid power will be addressed specifically when and if a project proposal is required for the spur line project to serve this mine.

In response to (d):

Assuming Minto Mine development and connection to the WAF grid as a precondition for Stage One of the MS/CS Project, a scenario that assumes all future energy shortfalls will be addressed by running diesels at the Whitehorse Diesel Plant will substantially overstate the use of these diesels for reasons set out below.

YEC's initial response to Question 20 indicated that non-Whitehorse diesel generation will be considered "as WAF diesel generation increases…with a view to minimizing generation costs associated with line losses." The Term Sheet with Minto specifically provides for retention of diesel units at the Minto mine site (such units to be owned by YEC), and these diesels would be considered for use when baseload WAF diesel generation is required (as projected in Table 20-2 in response to YESAB-YEC-1-20); non-Whitehorse diesel use might also be considered under other situations.

Further background on this matter is provided below.

- **Yukon Energy's Current WAF Diesel Configuration:** Yukon Energy's Whitehorse Diesel Plant provides an abundance of fully permitted and licensed existing and efficient diesel generation capability which was installed and previously used extensively when the Faro mine was operating. Yukon Energy also maintains a substantial component of diesel generation in Faro (on the order of 10 MW will be in service as of the time of the CS Project, including rehabilitation of diesel capability at Faro as a first step in YEC's current diesel rehabilitation and life extension planning per Attachment 1 to YESAB-YEC-1-21). When the Faro mine was last operating, YEC utilized the diesel energy capability at Faro as baseload generation to reduce line losses.

  In addition to YEC's diesel generation, YECL maintains backup diesel generation on the WAF system at Carmacks, Haines Junction, Teslin and Ross River.

- **Typical Diesel "Stacking Order" when WAF Diesel use is material:** On an integrated utility system, system operators maintain a stacking order to guide in the dispatch of each unit to serve loads at various levels. In the case of WAF, the stacking order requires all hydro and wind resources be loaded prior to dispatch of diesel units for capacity (peaking) reasons. When material diesel generation is being run (e.g., when the Faro mine was operating), the dispatch of the diesel units follows the stacking order which is based on economics.

Accordingly, when material diesel generation is being run, the order in which the diesel units on the WAF grid will be started to meet load requirement is intended to support least-cost operation of the system. The current diesel stacking order as it is likely to be amended to incorporate the Minto diesels is provided as Table YESAB-YEC-5-1. This Table shows the following:

- The first diesel unit that will typically be started pursuant to the stacking order dispatch will be the 3.3 MW Caterpillar unit located in Whitehorse. This unit has been the first unit to be dispatched based on economic tests since it was installed in the early 1990s as it is the most fuel efficient unit, is relatively low cost to maintain and overhaul, can be started and stopped fairly readily in comparison to other more baseload focused units that are best only dispatched when they will operate for relatively long periods of time, and can practically be monitored and maintained by the full time complement of staff in Whitehorse.
- Based on the incorporation of the Minto diesel units into YEC's stacking order, likely at least two of these units would be next on the stacking order list (noted as SD1 and SD2 in the attached table). This is consistent with bringing 3.2 MW of power on line near the focused load centers on the Carmacks-Stewart line, to aid in keeping line losses on the system at a minimum[3].
- The fourth unit to be brought on-line pursuant to the stacking order is the 3.0 MW Caterpillar unit in Faro. This unit is similar to the Whitehorse Caterpillar unit in that it is relatively fuel efficient, lower cost to overhaul, and relatively well suited to this type of dispatch. In addition, it aids in reducing line losses by providing service nearer the load center of Faro. However, compared to the Whitehorse Caterpillar, the Faro diesel plant is not routinely staffed or monitored and has somewhat higher costs for some activities such as overhauls given the more remote location.

[3] Note that the third and fourth Minto diesels are assumed in this table to be much lower in the stacking order as these units are basically being installed, at least to some extent, by Minto as redundant backup (i.e., the total installed capacity at the mine prior to the CS/MS Project is in excess of the Minto peak loads). In the event Minto loads are in excess of 3.2 MW (which is expected in that peak Minto mine loads are assumed at 4.4 MVA), it is expected that SD3 would move well up in the stacking order to become dispatched consistent with SD1 and SD2. After meeting Minto mine load requirements with the Minto diesel units pursuant to the assumed stacking order (SD1, SD2 and possibly SD3), the Carmacks-Stewart loads will be fully supplied, and further dispatch of the Minto diesel units SD3 and SD4 would be effectively needed only to service core WAF loads, such as in Whitehorse. Given line loss considerations, these units would be relatively uneconomic for supply to Whitehorse, and would only be used as a final option if the system is capacity constrained to this level.

The dispatch of the above units will bring nearly 10 MW of generation onto the system. Given that this generation is only used once all secondary sales are interrupted and hydro generation has been maximized (typically 56 MW in winter), the total WAF supply under these conditions would be nearly 66 MW. YEC's WAF firm load is not expected to reach these levels until the final years of the Minto mine's life. In other words, outside of emergency conditions (such as hydro outages), there is basically no expectation of having to dispatch beyond this number of units under any normal conditions.

- **Non-Stacking Order Operation when WAF Diesel use is not material:** Under conditions with the Carmacks-Stewart line in service, where diesel is not required for baseload generation, the detailed stacking order has somewhat less relevance than under loads such as when the Faro mine was operating and major diesel baseload generation was required (up to 100 GW.h per year). Under the conditions forecast with the Minto mine, where WAF diesel is only used for peaking at relatively infrequent times during the year, other factors outside of pure economic stacking order become relevant to determining which unit is dispatched. For example, pursuant to the manufacturer's recommendations and good utility practice, YEC attempts to ensure each diesel unit is run for some amount of time ("exercised") on a routine basis. During winter peak conditions, the first unit to be dispatched will therefore in many cases be the unit that is next required to be exercised, regardless of the stacking order. In these cases, the impact of the CS/MS Project on diesel use is basically zero (the diesel generation would have been run in any event for other unit maintenance requirements). Other considerations will also be brought into the dispatch decision; for example, there is a benefit to helping "turn over" YEC's fuel inventories to ensure stored fuel is not stale, which will at times emphasize using generation at Faro ahead of Whitehorse. Consequently, under forecast conditions, even though the Whitehorse Caterpillar unit is the first in the "stacking order", there are many conditions when other units (including units outside of Whitehorse) will be dispatched ahead of this unit.

Historically, diesel generation on the WAF system has varied from zero to over 100 GWh per year, as shown in the attached table (Table YESAB-YEC-5-2) showing the historical WAF generation from 1967 up to 1998, the year that the Faro mine shut down.

The YEC 20-Year Resource Plan as recently reviewed and recommended by the YUB also provides for near term development (in-service by at least 2013) of the Aishihik 3rd Turbine, which will act to reduce peaking

and baseload diesel generation from the levels estimated in the Question 20 tables. Aishihiik 3rd Turbine development, however, has not been considered in the Project Proposal cumulative effects assessment (given its current status as only a potential future project).

In response to (e):

'Hydraulic for firm' is the estimated amount of hydro power that will be used to meet firm energy sales, i.e., sales that can not be interrupted due to lack of surplus hydro electricity.

"Hydraulic for secondary' is the estimated amount of hydro power that will be used to meet secondary sales, i.e., sales that can be interrupted by the utility when surplus hydro electricity is not available, and as such will not be supplied by diesel generation at any time.

In response to (f):

The attached Table YESAB-YEC-5-3 provides the requested peaking and base diesel in litres. Table YESAB-YEC-5-4 is also included to provide further clarification and accuracy on diesel use (in litres) at Pelly Crossing and the Minto mine site, with and without the CS Project connection of these loads to the WAF grid.

1

Schedule 1 - Summary of Carmacks-Stewart Update Project Economics

Analysis per Exhibit B-16 except as noted: excludes consideration of Carmacks Copper Mine - PV (2005$million)
Excludes consideration of any additional Yukon Government funding required to prevent adverse ratepayer impacts

	Low Costs	Mid Point Costs	High Costs
Stage 1- Carmacks to Pelly Crossing			
Net YEC Capital Costs			
Project capital costs	17.2	20.2	23.1
Minto Capital Contribution (Term Sheet)	6.5	6.5	6.5
YDC no cost funds (reflects FTN)	5.0	5.0	5.0
YTG funds to date	0.45	0.45	0.45
Net YEC Costs	5.30	8.30	11.20
NET Ratepayer Benefits (PV)			
Minto Mine net revenues (Term Sheet)	13.6	13.6	13.6
Pelly Crossing cost savings	2.3	2.3	2.3
Total net ratepayer savings	15.9	15.9	15.9
Overall Stage 1 Net Benefits (Costs)			
With Minto Mine	**10.59**	**7.59**	**4.69**
Stage 2- Pelly Crossing to Stewart Crossing			
Net YEC Capital Costs			
Project capital costs	13.0	15.2	17.5
YTG funds	-	-	-
Net YEC Costs	13.00	15.20	17.50
NET Ratepayer Benefits (PV)			
Interconnection Cost Savings (assumed)	10.0	10.0	10.0
Overall Stage 2 Net Benefits (Costs)	**(3.00)**	**(5.20)**	**(7.50)**
Total Stage 1 and Stage 2- Carmacks to Stewart Crossing			
Net YEC Capital Costs			
Project capital costs	30.2	35.4	40.6
Minto Capital Contribution (Term Sheet)	6.5	6.5	6.5
YDC no cost funds (reflects FTN)	5.00	5.00	5.00
YTG funds to date	0.45	0.45	0.45
Net YEC Costs	18.30	23.50	28.70
NET Ratepayer Benefits (PV)			
Minto Mine net revenues (Term Sheet)	13.6	13.6	13.6
Pelly Crossing cost savings	2.3	2.3	2.3
Interconnection Cost Savings	10.0	10.0	10.0
Total net ratepayer savings	25.9	25.9	25.9
Overall Project Net Benefits (Costs)	**7.59**	**2.39**	**(2.81)**

2

Table YESAB-YEC-5-1
WAF Generation Stacking Order with CS/MS Project

WAF ECONOMIC GENERATION STACKING ORDER

STACKING ORDER	UNIT	LOCATION	CAPACITY MW	FUEL EFF kWh/L	LINE LOSS ADJUSTED $/KWH
1	WD7	WHSE	3.3	3.9	0.2087
2	SD1	MINTO MINE	1.6	3.7	0.2110
3	SD2	MINTO MINE	1.6	3.7	0.2110
4	FD7	FARO	3.0	3.9	0.2121
5	WD6	WHSE	2.7	3.6	0.2188
6	FD3	FARO	1.0	3.7	0.2264
7	WD4	WHSE	2.5	3.5	0.2270
8	WD5	WHSE	2.5	3.5	0.2270
9	HD1	HAINES JUNC	1.3	3.7	0.2280
10	WD1	WHSE	3.0	3.7	0.2305
11	RD1	ROSS RIVER	1.0	3.7	0.2309
12	FD5	FARO	1.3	3.7	0.2318
13	WD2	WHSE	4.2	3.7	0.2325
14	WD3	WHSE	4.2	3.7	0.2325
15	CD1	CARMACKS	1.3	3.7	0.2347
16	TD1	TESLIN	1.3	3.7	0.2347
17	SD3	MINTO MINE	1.6	3.7	0.2683
18	SD4	MINTO MINE	1.6	3.7	0.2683

Note 1: The Minto mine diesels are the same engine make and model as HD1 thus will have the same overall performance
Note 2: Minto Mine diesels get a 12.75% line loss credit for serving the mine load but a line loss debit for serving Whitehorse load
Note 3: SD1/SD2 stacking order determined by applying a 12.75% line loss credit to the HJ1 unit cost per kWh
Note 4: SD3/SD4 stacking order determined by applying a 12.75% line loss debit to the HJ1 unit cost per kWh
Note 5: The Aishihik 3rd turbine is currently not included in the above table.

Table YESAB-YEC-5-2
WAF System Generation
GW.h per Year (1967-1998)

YEAR	WHSE HYDRO	AISHIHIK HYDRO	DIESEL	WIND	TOTAL
1967	56.8	0.0	0.0		56.8
1968	67.0	0.0	0.0		67.0
1969	93.4	0.0	0.0		93.4
1970	145.4	0.0	6.2		151.6
1971	151.3	0.0	10.2		161.5
1972	154.4	0.0	9.8		164.2
1973	164.7	0.0	31.8		196.5
1974	153.8	0.0	49.3		203.1
1975	157.9	51.8	34.7		192.6
1976	139.3	81.7	3.1		142.4
1977	163.7	118.0	1.8		165.5
1978	170.2	124.0	10.8		181.0
1979	165.9	119.0	16.8		182.7
1980	173.8	109.1	38.8		212.6
1981	165.8	83.1	75.8		241.6
1982	168.7	75.3	57.0		225.7
1983	154.7	44.6	0.0		154.7
1984	148.4	54.8	0.0		148.4
1985	120.1	80.4	0.0		120.1
1986	182.0	108.5	1.2		183.2
1987	250.6	112.9	1.5		252.1
1988	220.2	145.0	4.8		225.0
1989	255.4	124.5	17.7		273.0
1990	248.8	150.7	36.8		285.6
1991	236.0	145.9	25.1		261.1
1992	233.2	170.1	32.6		265.7
1993	165.1	108.2	21.3		186.4
1994	153.2	87.3	0.4		153.6
1995	230.2	63.6	39.5	0.2	333.5
1996	229.0	110.4	104.6	0.2	444.2
1997	182.5	59.2	81.8	0.2	323.7
1998	206.8	49.1	6.1	0.3	262.3

Table YESAB-YEC-5-3
Peaking and Base Diesel (in litres)

Peaking and Baseload Diesel in Litres (re: Tables 20 - 1 and 20 - 2 in response to YESAB-YEC-1-20)																					
Peaking Diesel Efficiency (kW.h/litre)	3.480																				
Baseload Diesel Efficiency (kW.h/litre)	3.900																				
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Base Case without Mines (Table 20 - 1)																					
Peaking Diesel (GW.h)	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.4	1.9	2.4	3.2	4.1	5.1	5.6	0.5	0.0	0.0	0.0
Peaking Diesel (000 litres)	0.0	0.0	6.4	26.2	52.6	83.0	118.6	162.8	220.5	297.3	399.1	531.7	700.3	909.7	1,164.1	1,467.2	1,614.2	133.2	0.0	0.0	0.0
Baseload Diesel (GW.h)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	7.3	14.0	20.8	27.8
Baseload Diesel (000 litres)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	185.2	1,871.5	3,589.0	5,338.3	7,120.0
Minto at 32.5 GW.h per year + Pelly at 1.5 GW.h per year (Table 20 - 2)																					
Peaking Diesel (GW.h)	0.0	0.0	0.0	0.6	0.8	1.0	1.3	1.8	2.3	2.9	2.4	0.0	2.5	3.3	4.2	5.3	4.1	0.0	0.0	0.0	0.0
Peaking Diesel (000 litres)	0.0	0.0	6.4	159.4	222.8	294.2	387.1	506.2	656.1	840.8	695.7	0.0	730.8	946.4	1,207.4	1,517.3	1,185.5	0.0	0.0	0.0	0.0
Baseload Diesel (GW.h)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	7.2	0.0	0.0	0.0	0.0	2.4	9.0	15.7	22.5	29.5
Baseload Diesel (000 litres)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	328.7	1,839.4	0.0	0.0	0.0	0.0	618.7	2,305.0	4,022.5	5,771.8	7,553.4

Table YESAB-YEC-5-4
Peaking and Base Diesel (in litres)

Peaking and Baseload Diesel in Litres (re: Tables 20 - 1 and 20 - 2 in response to YESAB-YEC-1-20)

WAF Peaking Diesel Efficiency (kW.h/litre)	3.480
Pelly Isolated Diesel Efficiency (kW.h/litre)	3.500
WAF Baseload Diesel Efficiency (kW.h/litre)	3.900
Minto Isolated Diesel Efficiency (kW.h/litre)	3.700

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Base Case without Carmacks-Stewart Project (Table 20 - 1)																					
WAF Peaking Diesel (GW.h)	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.4	1.9	2.4	3.2	4.1	5.1	5.6	0.5	0.0	0.0	0.0
WAF Peaking Diesel (000 litres)	0.0	0.0	6.4	26.2	52.6	83.0	118.6	162.8	220.5	297.3	399.1	531.7	700.3	909.7	1,164.1	1,467.2	1,614.2	133.2	0.0	0.0	0.0
WAF Baseload Diesel (GW.h)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	7.3	14.0	20.8	27.8
WAF Baseload Diesel (000 litres)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	185.2	1,871.5	3,589.0	5,338.3	7,120.0
Total WAF Diesel (GW.h)	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.0	1.4	1.9	2.4	3.2	4.1	5.1	6.3	7.8	14.0	20.8	27.8
Total WAF Diesel (000 litres)	0.0	0.0	6.4	26.2	52.6	83.0	118.6	162.8	220.5	297.3	399.1	531.7	700.3	909.7	1,164.1	1,467.2	1,799.5	2,004.8	3,589.0	5,338.3	7,120.0
Pelly Isolated Diesel (GW.h)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Pelly Isolated Diesel (000 litres)	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6	428.6
Total Utility Diesel (GW.h)	1.5	1.5	1.5	1.6	1.7	1.8	1.9	2.1	2.3	2.5	2.9	3.4	3.9	4.7	5.6	6.6	7.8	9.3	15.5	22.3	29.3
Total Utility Diesel (000 litres)	428.6	428.6	435.0	454.8	481.1	511.5	547.1	591.3	649.1	725.9	827.7	960.3	1,128.8	1,338.2	1,592.7	1,895.7	2,228.0	2,433.3	4,017.6	5,766.9	7,548.5
Minto Isolated Diesel (GW.h)	0.0	0.0	12.3	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minto Isolated Diesel (000 litres)	0.0	0.0	3324.3	8783.8	8783.8	8783.8	8783.8	8783.8	8783.8	8783.8	8783.8	8783.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Diesel (GW.h)	1.5	1.5	13.8	34.1	34.2	34.3	34.4	34.6	34.8	35.0	35.4	35.9	3.9	4.7	5.6	6.6	7.8	9.3	15.5	22.3	29.3
Total Diesel (000 litres)	428.6	428.6	3,759.3	9,238.6	9,264.9	9,295.3	9,330.9	9,375.1	9,432.8	9,509.7	9,611.5	9,744.0	1,128.8	1,338.2	1,592.7	1,895.7	2,228.0	2,433.3	4,017.6	5,766.9	7,548.5
Carmacks-Stewart Case: Minto at 32.5 GW.h per year + Pelly at 1.5 GW.h per year (Table 20 - 2)																					
WAF Peaking Diesel (GW.h)	0.0	0.0	0.0	0.6	0.8	1.0	1.3	1.8	2.3	2.9	2.4	0.0	2.5	3.3	4.2	5.3	4.1	0.0	0.0	0.0	0.0
WAF Peaking Diesel (000 litres)	0.0	0.0	6.4	159.4	222.8	294.2	387.1	506.2	656.1	840.8	695.7	0.0	730.8	946.4	1,207.4	1,517.3	1,185.5	0.0	0.0	0.0	0.0
WAF Baseload Diesel (GW.h)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	7.2	0.0	0.0	0.0	0.0	2.4	9.0	15.7	22.5	29.5
WAF Baseload Diesel (000 litres)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	328.7	1,839.4	0.0	0.0	0.0	0.0	618.7	2,305.0	4,022.5	5,771.8	7,553.4
Total WAF Diesel (GW.h)	0.0	0.0	0.0	0.6	0.8	1.0	1.3	1.8	2.3	2.9	3.7	7.2	2.5	3.3	4.2	5.3	6.5	9.0	15.7	22.5	29.5
Total WAF Diesel (000 litres)	0.0	0.0	6.4	159.4	222.8	294.2	387.1	506.2	656.1	840.8	1,024.4	1,839.4	730.8	946.4	1,207.4	1,517.3	1,804.2	2,305.0	4,022.5	5,771.8	7,553.4
Pelly Isolated Diesel (GW.h)	1.5	1.5	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pelly Isolated Diesel (000 litres)	428.6	428.6	428.6	428.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Utility Diesel (GW.h)	1.5	1.5	1.5	2.1	0.8	1.0	1.3	1.8	2.3	2.9	3.7	7.2	2.5	3.3	4.2	5.3	6.5	9.0	15.7	22.5	29.5
Total Utility Diesel (000 litres)	428.6	428.6	435.0	588.0	222.8	294.2	387.1	506.2	656.1	840.8	1,024.4	1,839.4	730.8	946.4	1,207.4	1,517.3	1,804.2	2,305.0	4,022.5	5,771.8	7,553.4
Minto Isolated Diesel (GW.h)	0.0	0.0	12.3	19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minto Isolated Diesel (000 litres)	0.0	0.0	3324.3	5378.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Diesel (GW.h)	1.5	1.5	13.8	22.0	0.8	1.0	1.3	1.8	2.3	2.9	3.7	7.2	2.5	3.3	4.2	5.3	6.5	9.0	15.7	22.5	29.5
Total Diesel (000 litres)	428.6	428.6	3,759.3	5,966.3	222.8	294.2	387.1	506.2	656.1	840.8	1,024.4	1,839.4	730.8	946.4	1,207.4	1,517.3	1,804.2	2,305.0	4,022.5	5,771.8	7,553.4

Notes:
1. 2007 Minto Diesel estimated at 50% of first year level of 24.6 GW.h
2. 2008 Minto Diesel estimated at 50% of first year level and 50% of full operational level (12.3 GW.h + 16.3 GW.h = 28.6 GW.h)
3. 2008 Minto Isolated diesel is only isolated 3/4 of a year before connecting to the grid in Q3 2008 (28.6 GW.h * 75% = 19.9 GW.h)
4. 2008 Minto assumes connected to the grid in 3rd quarter 2008 (32.5 GW.h * 25% = 8.1GW.h)
5. Assumes no Aishihik 3rd turbine or new baseload generation
6. Isolated means not connected to the grid
7. After interconnection and YEC purchase of Minto diesel units, all generation from these units is reported as WAF peaking or WAF baseload
8. "Isolated" in this table means not connected to the grid. "Pelly Isolated Diesel" are owned and operated by YECL and are part of Yukon's electricity generation system. Minto Isolated Diesel are owned an operated by Minto Mine and are not part of Yukon's electricity generation system.

REFERENCE: YESAB-YEC-1-21

QUESTION:

Question 21 of the Adequacy Review Report requested information related to the economic implications of the project to taxpayers. The proponent responded by stating that there will be no net cost to Yukon Energy or Yukon ratepayers beyond what would be required for any other option to provide required electric energy and capacity. In Schedule 1 – *Summary of Carmacks-Stewart Update Project Economics,* the table demonstrates that the break-even costs for Stage 1 of the project is approximately $20 million (project capital costs), with only Minto Mine online. Understanding the economic viability of a project is important in assessing potential economic effects on Yukoners.

a) Please explain whether the statement 'no net cost to Yukon ratepayers' considers Yukon ratepayers as an average (and therefore some individual ratepayers can expect costs to increase), or whether this statement is meant to read: "no individual ratepayers in Yukon are expected to experience an increase in cost"; and
b) Please provide the anticipated project capital costs of the preferred route provided in the project proposal, broken down by Stage.

In the proponent's supplementary information submission, no answer was provided to the second and third parts of question 21 in the adequacy review report which related to the cost implications of the payment structure to ratepayers if the Minto Mine life is shorter than expected, and the implications of temporary shutdowns of the Minto Mine to ratepayers.

The proponent did provide the following statement: "Yukon Energy will not proceed with Stage One or Stage Two of the Project if there is any expectation that Yukon utility ratepayers will be negatively affected." This answer, however, does not provide the assumptions that are being considered by YEC (e.g., that the Minto Mine has a mine life of X years) and therefore does not meet the needs of the information request.

Required follow-up:

Please provide an answer to the questions listed below, as originally included in the Adequacy Review Report (Question 21), and any relevant assumptions so related:

c) What are the cost implications of the payment structure to ratepayers if the Minto Mine life is shorter than expected (i.e., how will ratepayers be affected by total cost of infrastructure due to the loss of revenue generated by the mine?); and

d) What are the implications of temporary shutdowns of the Minto Mine to ratepayers?

ANSWER:

Question 21 of the Adequacy Review Report requested information related to economic implications of the project to ratepayers (not "taxpayers").

In response to (a):

The statement "no net cost to Yukon ratepayers" applies to all ratepayers, i.e., "no individual ratepayer would be expected to experience an increase in rates due to the Project." With respect to ratepayers throughout Yukon, this follows from the YUB process for review and approval of rates per OIC 1995/90, as reviewed in the Project Proposal. With respect to Pelly Crossing, bringing Pelly Crossing ratepayers onto the hydro grid would in effect reduce second block energy rates for ratepayers in this community. The "second block" refers to rates for power consumed in excess of 1,000 kW.h per month for residential customers and in excess of 2,000 kW.h per month for businesses. At the present time, these second block rates are 12.36 cents/kW.h for Small Diesel communities (Pelly Crossing's current zone) and 10.45 cents/kW.h for Hydro zone, excluding all riders and taxes. Power consumption for the first block (for consumption less that these amounts on a monthly basis for each of these customer classes; e.g., up to 1,000 kW.h per month for residential and 2,000 kW.h per month for commercial) is at a levelized rate across the territory and as such would not be affected by the connection of Pelly Crossing to the hydro system.

In response to (b):

Schedule 1 of the response to YESAB-YEC-1-21 (and the update provided as Schedule 1 to YESAB-YEC-2-5) clearly sets out anticipated capital costs (as a range from low to high) in the same manner for both Stage 1 and Stage 2, based on estimates provided to the YUB and reviewed in the November Update (Attachment 1 to YESAB-YEC-1-21). To clarify, as reviewed in the November Update, these estimates assume the preferred route as set out in the Project Proposal filed with YESAB (see "Capital Costs" at page 10 of the referenced attachment for a full explanation of the assumptions adopted for the Schedule 1 capital cost estimates).

In response to (c) and (d):

As noted in the answer to Question 21, the YUB will review these risk and security issues, and potential related ratepayer implications (if any), in its forthcoming review of the Minto Power Purchase Agreement (PPA) planned to be filed by YEC with the YUB by the end of January 2007. As parts of its legislated mandate, the YUB is being requested to review and approve the PPA, including assessment of the risks to ratepayers; accordingly, the YUB would not be expected to approve the PPA in the event these risks are expected to exceed the clear ratepayer benefits that arise under the PPA. As also noted in the response to Question 21, "Yukon Energy will only proceed with Stage One of the Project after the PPA with the Minto Mine has been executed and after the PPA has been subject to review and approval by the YUB…Yukon Energy will not proceed with Stage One or Stage Two of the Project if there is any expectation that Yukon utility ratepayers will be negatively affected."

The Term Sheet attached to the Question 21 response sets out agreed terms expected to be included in the PPA to address, among other matters, the risk concerns raised in this question.

a) In addition to a firm rate to be charged to Minto which must cover the costs of service for this customer class determined on a Yukon wide basis, the Term Sheet specifically includes, as commitments to be covered by the Security to be provided to YEC by Minto (i.e., the charge on the Mine assets granted to YEC second only to the Current Bank Financing):
   - a minimum take or pay power purchase provision of $24 million within the first 8 years of YEC service; plus
   - a customer contribution commitment to the CS Project of $7.2 million (with provision for full payment of this customer contribution plus accrued interest within the first four years of service by YEC unless YEC is satisfied by December 31, 2008 that mine operation is likely to continue at minimum assumed power loads until at least the end of 2016).

b) These commitments by Minto to, in effect, pay YEC at least $31.2 million plus the full cost of the Mine Spur materially exceed the range of capital cost estimates for Stage 1 as provided for in Schedule 1 of YESAB-YEC-2-5.
   - The high Stage One CS Project cost estimate in Schedule 1, including allowance for inflation and interest during construction, is about $26 million.
   - Net of YDC and YTG contributions of $5.45 million noted in Schedule 1, the net Stage One CS Project capital cost (excluding the Minto capital contribution) to be recovered via rates set by the YUB could be as high as $20.55 million, i.e., an amount well below Minto's committed payments of $31.2 million.

c) Other provisions are specifically identified in the Term Sheet to provide no adverse impacts on other ratepayers, including the deferred Mine Net Revenue Account which will set aside the expected positive net incremental revenues from mine payments to provide for (among other specified costs) the undepreciated remaining capital costs of the CS Project.

Overall, the Term Sheet sets out provisions whereby, during the first many years of being supplied by YEC, there will generally be no material impact (positive or adverse) from the Minto Mine on the rates paid by other ratepayers. The provisions for the Mine Net Revenue Amount (item 1(d) in the Term Sheet) in effect ensure, so long at least as the Minto Security is in place, that any net impacts on YEC's earnings during any fiscal year due to the Mine or the CS Project will be assigned to the Mine Net Revenue Deferral Account and thereby will not be considered when assessing rate requirements applicable to other ratepayers. These provisions set aside positive net incremental earnings due to power sales to the mine, retaining these net earnings as reserves to offset rate base costs and as protection against any potential future negative earnings related to the mine activities.

In this context, in response to **Question (d)** above, no material ratepayer impacts would be expected from temporary shutdowns of the Minto Mine – and, until the Security is discharged, the mine would remain liable under the PPA for its customer contribution and minimum take-or-pay commitments as noted above (as well as any minimum bill payments under the firm mine rate).

In response to **Question (c)** above, cost implications related to the Minto Mine life being shorter than expected are risk issues that require addressing the expected mine life and the Security to be provided to support the minimum payment commitments noted in the Term Sheet. The Term Sheet assumes an expected mine life of at least 10 years, but also addresses risks that mine life will be only 7.2 years or

less. To assist in review of these matters, which the YUB will address in its review and approval of the PPA, the following are noted:

- **YEC potential cost risks:** The net cost of the CS Project Stage One development, as noted above, could be as high as $20.6 million prior to any Minto contribution (and $13.4 million net of the Minto contribution of $7.2 million per the Term Sheet); in terms of risk, YEC also initially incurs the costs for the Mine Spur (high cost estimate of $4.6 million), i.e., total YEC cost at risk is estimated at $25.2 million.

- **Expected mine life of 10 years with high grade reserves and 32 GW.h/year power use after first year**: The Term Sheet overall assumes an expected mine life of slightly over 10 years, using high grade ore reserves and power consumption at about 32 GW.h/year i.e., if the Mine starts commercial operations in June 2007, it would be expected to continue such operations until at least the fall of 2016.
  - Under the Term Sheet, YEC's start of construction on the CS/MS Project is conditional on Minto having commenced commercial operation – this condition addresses risk that Minto might not be able to achieve this milestone.
  - YEC's service to the mine is targeted to start by September 30, 2008
  - Based on the assumed 10 year mine life and the target in-service date for YEC service, YEC power sales to the mine at about 32 GW.h/year would be expected to continue for approximately 8 years.
  - Minto's take or pay commitment of $24 million in effect reflects a minimum cumulative purchase of $3 million per year (30 GW.h/year at the initial firm rate of 10 cents/kW.h) for 8 years.
  - Minto's commitment is also to pay fully by the end of the seventh year of YEC power sales (i.e., one year prior to the end of the expected mine life) the capital contribution (interest and principal) for the Mine Spur and the $7.2 contribution to the CS Project. After these 7 years of service, the Minto take or pay commitments will equal at least $21 million, i.e., an amount well in excess of the net CS Project Stage One high remaining net capital cost estimate of $13.4 million.
  - Under the above assumptions, the mine will have stockpiled but not processed the low grade ore reserves mined in association with the high grade reserves; it is likely that these low grade reserves will be processed after the assumed 10 year mine life (thereby adding

to the effective length of time for YEC power sales at the assumed annual energy use levels).

- **Risk that mine life may be only 7.2 years with today's high grade reserves:** Based on current announced mine plans, the mine today has sufficient high grade ore reserves to operate for 7.2 years at the power levels assumed in YEC's current forecasts, i.e., if the Mine starts commercial operations in June 2007, it would be expected to continue such operations until at least September 2013.
  - Based on current mine plans and the target in-service date for YEC service, YEC power sales to the mine at about 32 GW.h/year would be expected to continue for approximately 5 years based on today's established high grade ore reserves.
  - If Minto is unable to confirm by December 31, 2008 sufficient additional reserves to extend the mine life until at least 2016 at power consumption levels of at least 30 GW.h/year, Minto will be required to pay at the end of the fourth year of YEC power sales the full capital contribution amount (with interest) for the Mine Spur and the $7.2 contribution to the CS Project; this provision in effect provides YEC with full payment of the capital contribution about one year prior to the end of this shorter mine life with today's confirmed high grade ore reserves[1] (in addition, under the take-or-pay commitments, Minto will pay at least $12 million by the end of the fourth year of YEC service, and about $15 million by the end of this shorter mine life with today's high grade reserves, i.e., these payments would exceed the net CS Project Stage One remaining net high capital cost estimate of $13.4 million).
  - Based on the mine feasibility study, the mine will stockpile low grade ore reserves mined in association with the high grade reserves which, if processed as assumed in the Minto feasibility study (after processing the high grade reserves) would be sufficient to extend the mine life a further 3 years until 2016 and provide added security to YEC.
  - If the mine shuts down operation in 2013 after mining only today's high grade reserves, Minto would also still have an outstanding take-or-pay commitment to YEC that would be subject to the Security (based on the 10 cent firm rate, this outstanding commitment could be from $7.8 to $9 million).

[1] Minto has announced promising results from drilling of Area 2 adjacent to the mine. Minto's plans anticipate confirmation during 2007 of material additional high grade reserves.

- **Minto Security provided to YEC:** The above scenarios involve situations which confirm the ability of Minto payments to enable YEC to recover its capital costs at risk prior to the expected 10 year mine life. In the event that Minto does not meet its capital contribution and/or take-or-pay commitments, for whatever reason, the Term Sheet also provides YEC with the Minto Security (the charge on the Mine assets granted to YEC second only to the Current Bank Financing).
  - The Current Bank Financing for $85 million is expected to be fully repaid by November 30, 2010, i.e., within a period just over the planned initial two years of YEC service to the mine. Thereafter, YEC will have a first charge on the mine assets as security for the specified obligations undertaken by Minto, i.e., such a first charge interest is designed to protect YEC interests in the property independent of Minto's corporate financial position.
  - Prior to repayment of the Current Bank Financing, YEC has noted the extensive due diligence carried out by the Macquarie Bank Limited, and the protection provided to the Current Bank Financing through forward sales contracts for a portion of the copper, gold and silver production (into 2011) as well as an off-take agreement for the sale of concentrates.
  - The Term Sheet also provides for YEC to purchase the Used Mine Diesels (6.4 MW) at a cost of $2.24 million; these trailer mounted diesel generation assets will provide YEC with added security as to recovery of Minto customer contributions related to the Mine Spur.
  - As part of completing the PPA, YEC is also carrying out its own extensive due diligence review of the Minto Current Bank Financing, forward sales contracts, feasibility study and other relevant information.

- **Other factors affecting any ratepayer impacts from infrastructure costs due to loss of revenues generated from the mine - YUB decisions required**: As for other hypothetical scenarios where the Minto minimum payment commitments are not substantially realized by YEC (e.g., due to mine life being shorter than assumed in any of the above scenarios), any ratepayer impacts related to outstanding YEC infrastructure costs would depend on prior review and decisions by the YUB to allow YEC to recover such remaining outstanding project costs from ratepayers. The simple fact that YEC incurs a net cost does not mean that such cost automatically gets passed on to ratepayers. For example, the YUB recently

did not allow YEC to recover from ratepayers the capital cost escalations related to the Mayo Dawson Transmission Project[2].

[2] Impacts on ratepayers related to net CS/MS Project capital costs not covered by the Minto mine revenues and payments may also be prevented or mitigated if other mine loads are connected to the CS/MS Project.