

8.0 ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS ASSESSMENT

Chapter 8 provides an assessment of the effects of the Project, focusing on the following:

- Overview of Approach
- Environmental Effects and Mitigation
- Socio-economic Effects and Mitigation
- Other Effects (effects of environment on the Project, effects of accidents and malfunctions)
- Residual Effects and Determination of Significance (environmental and socio-economic effects of the Project)
- Environmental Protection and Monitoring

8.1 OVERVIEW OF APPROACH

Chapter 8 provides an assessment of the environmental and socio-economic effects of the Project to determine whether, after the implementation of mitigation measures, the Project is likely to result in significant adverse residual effects (including significant adverse cumulative effects) on identified VCs. The assessment proceeds on the basis of the preferred route (see Section 7.3) based on completion of the route selection and evaluation process as described in Chapter 7.

The effects assessment in Chapter 8 builds on the framework established in earlier chapters, including:

- The assessment approach as reviewed in Chapter 3, and in particular Section 3.2 (route selection and evaluation process), Section 3.3 (assessment framework), Section 3.4 (cumulative effects assessment approach) and Section 3.5 (determining the significance of residual effects).
- The public consultation and involvement program (PIP) as described in Chapter 4.
- The Project scope as determined in Chapter 5.
- Scoping of the assessment as provided in Section 3.3.1 (geographic and temporal study boundaries for Project effects), Section 3.4 (current and future projects included in cumulative effects assessment) and Chapter 6 (determination of environmental and socio-economic VCs based on effects pathways for the Project, public consultation and involvement and other factors as noted).
- Baseline conditions for the selected VCs without the Project, as reviewed in Chapter 6.
- Mitigation measures through alternative ways of designing, undertaking or operating the Project that would avoid or minimize adverse environmental or socio-economic effects (or enhance beneficial effects), including construction and operation and decommissioning measures based on best practices as set out in Chapter 5 and careful routing of the Project as described in Chapter 7.

As reviewed in Chapter 3 (Section 3.3.1), Project effects on baseline conditions are predicted separately for each environmental and socio-economic VC by comparing (a) "what would be expected without the Project" (the baseline), and (b) "what would be expected with the Project".

As reviewed in Chapter 6 (Section 6.3), there are three main pathways for effects from the Project on VCs:

- **Project-related direct and indirect changes to the biophysical environment:** Changes to the biophysical VCs (land, water and air environments and associated terrestrial and aquatic life) result from Project-related activities such as construction, operation and maintenance, and in the case of the Minto Spur line, decommissioning. Biophysical environmental changes can also be linked indirectly to subsequent socio-economic effects (e.g., resource use, economic and social changes).
- **Project-related direct socio-economic effects:** Changes to socio-economic VCs (resource use, economy and social context) result directly from the Project (e.g., direct local employment and expenditures on local business during Project construction, operation or decommissioning, supply of lower cost grid electricity supplies to displace diesel electricity generation during Project operation, and aesthetics changes resulting from the Project's presence that affect people).
- **Overall effects on people and communities:** All of the specific socio-economic effects from the Project through different pathways accumulate on the affected people and communities. The results can be described as overall resource use effects, economic effects and social effects on specific individuals, families, industrial sectors, governments, communities, or other groups of people.

Residual environmental and socio-economic effects are examined for all phases of the Project's life-cycle from construction to operation and maintenance activities and, for the MS development, to the decommissioning of certain MS facilities. Both positive and adverse environmental and socio-economic effects are considered, along with the potential effects of the environment on the Project, and the potential effects of accidents and malfunctions.

The assessment focuses on effects of the Project that are considered "likely" to occur. Based on the approach set out in Chapter 3, the expected effects of Project activities are assessed for each environmental or socio-economic VC, focusing initially on the expected geographic extent, duration and magnitude of each effect.

The Project effects for any environmental or socio-economic VC may fall within three distinct geographic areas and for the purpose of assessing their significance may be measured as either low, medium, or high, based on the described geographic ranges:

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

Most of the Project effects confined to the Project Site Area stem from the actual physical work performed in the ROW during construction and maintenance activities, as well as the physical presence of a long-term ROW.

- **Project Study Region: Moderate Geographic Extent**

This describes a broader Project Study Region for examining environmental and socio-economic effects and is defined as the portion of the Northern Tutchone Planning Region between Carmacks and Mayo that is generally in close proximity (e.g., 30 to 50 km) to the Klondike Highway and the existing access road from the Klondike Highway to the Minto Mine Site (see Figure 2.2-1).

The maximum geographic extent of most environmental and socio-economic effects is expected to be included in the Project Study Region. Within this Project Study Region, the Route Study Area represents the much smaller local region examined to assess route alternatives (i.e., 500 metre corridors identified along the Klondike Highway for the CS development and a somewhat smaller corridor generally along the Minto access road for the MS development).

Most environmental effects of the Project that extend beyond the Project Site Area, but are confined to the Project Study Region, result from noise, fumes, smoke and other by-products of construction work in the ROW that move beyond the ROW area or that might affect the activities of VCs such as small furbearing mammals and ungulates that move over larger distances in areas near the ROW and Route Study Area. It is anticipated that most Project effects which extend beyond the Route Study Area will not encompass the whole of the Project Study Region.

- **Beyond the Project Study Region: High Geographic Extent**

This is the area beyond the Project Study Region that covers the entire Yukon Territory. It is anticipated that no likely adverse environmental or socio-economic effects of the Project will impact on this broader region outside of the Project Study Region. However, some positive socio-economic effects are expected to extend to this broader region.

Two broad categories are considered for the duration of effects related to Project activities for the purpose of assessing the significance of effects within any of the above three geographic area:

- **Short-term effects (low duration)** tend to last not much longer than the specific construction, maintenance or decommissioning activities undertaken, and for the purpose of assessing significance of effects, are considered to be of low duration. These effects are related to the brief construction activities in each part of the Project Site Area (brushing, clearing, construction of new facilities), the subsequent infrequent brief maintenance activities in the new ROW (mainly clearing and brushing maintenance, usually recurring every seven to ten years while the facilities remain), and the subsequent brief decommissioning and removal activities for parts of the MS transmission line.

- **Long-term effects (high duration)** tend to be related to the ongoing existence of new transmission ROW and facilities in the Project Site Area (e.g., the CS facilities are expected to remain indefinitely and the MS facilities are expected to remain for at least ten years), and the future removal of certain parts of the MS ROW (which will allow over time for the affected areas to be restored). For the purpose of assessing significance of effects, long-term effects are considered to be of high duration.

Within the context of the above geographic area and duration categories, three categories for the magnitude of effects (level of detectability) are considered for the purpose of assessing the significance of effects related to Project activities:

- **Low magnitude effects** are unlikely to be detectable or measurable, or are below established thresholds of acceptable change.
- **Moderate magnitude effects** could be detectable within the normal range of variation with a well designed monitoring program, or are below established thresholds of acceptable change.
- **High magnitude effects** would be readily detectable without a monitoring program and outside the normal range of variation, or exceed established thresholds of acceptable change.

Mitigation measures to manage or to avoid adverse effects are described in Sections 8.2 and 8.3 where relevant for each VC.

Significance for the Project's effects on any VC is determined using the approach and criteria set out in Chapter 3 (Section 3.5) based on scientific analysis of ecosystem effects as well as TK, local knowledge, socio-economic research and professional judgement. Any deficiencies in the information base about potential effects have been noted and are addressed further in Section 8.5 Environmental Protection and Monitoring.

Certain investigations and monitoring programs will be developed as part of the final detailed engineering design and/or as part of clearing, construction, operation or decommissioning activities. For example, investigation and monitoring of site-specific archaeological resources or site-specific rare and endangered plants and vegetation will occur during clearing and construction phases of the Project.

After completion of the YESAA screening assessment process and decisions on environmental approvals, an EPP will be finalized prior to the start of clearing and construction activities to set out the specific impact management and mitigation measures (as well as regulatory terms and conditions) to be applied by field staff and contractors in order to minimize residual impacts of the Project.

8.2 ENVIRONMENTAL EFFECTS AND MITIGATION

Section 8.2 provides assessment of Project effects and mitigation measures with regard to three groups of environmental VCs:

- Physical Environment
- Terrestrial Environment
- Aquatic Environment

The Project is expected to have both positive and adverse environmental effects in the Project Study Region.

Potential short-term environmental effects relating to construction, maintenance and decommissioning activities include:

- Disruption of sensitive soils, wetland and riparian zones, and the vegetative mat from vehicles, equipment and the placement of poles and other structures in the Project Site Area
- Possible contamination of sensitive soils, wetlands and riparian zones due to fuel spills
- Possible disruption or removal of rare plants in the Project Site Area
- Reduction in air quality in the Route Study Area due to fumes from vehicles and smoke produced by slashing and burning
- Scattering of wildlife species and their temporary avoidance of the Route Study Area due to noise and disruptions caused by vehicles and equipment

Potential long-term environmental effects relating to the existence of permanent structures such as poles, conductors and substations, and maintenance of a permanent ROW with regard to the CS transmission line include:

- Permanent loss of vegetation and wildlife habitat areas where substations are located
- Intrusion of exotic species that thrive in edge environments or along roadways and which may crowd out native species in the Project Study Area
- Loss of habitat for some species due to creation of edge environment in the ROW and improved habitat for other species that prefer an edge environment along the ROW or that will benefit from a travel corridor
- Habitat fragmentation and the creation of a new or enhanced barrier for some species where the ROW is either immediately adjacent to the Klondike Highway and other previously disturbed areas, or well away from existing road corridors
- Increased pressure from opportunistic hunting on certain species due to the creation of new access points for maintenance along the ROW
- Increased pressure on certain species due to the creation of a travel corridor that may be used by predatory species such as wolves and coyotes for hunting
- Increased mortality for migratory waterfowl and other birds due to line strikes in Project Site Area

Decommissioning of the Minto Spur line will have short-term adverse environmental effects when certain portions of the line and structures are removed; however, decommissioning is expected to dissipate over time the above long-term effects due to the initial creation of the MS ROW as the MS Project Site Area returns to pre-Project conditions.

The primary means of mitigating both short-term and long-term Project environmental effects has been through the process of careful route selection to avoid sensitive ecosystems and critical habitat areas, and to minimize habitat fragmentation effects. For all VC's, route selection is expected to ensure that the magnitude of effects is low as the most sensitive ecosystem areas have been avoided. For most species, the Project Site Area will intersect only small parts of their total habitat area, avoiding critical habitat and consequently affecting a low proportion of the species' habitat and population. Treed or vegetative buffers between the new ROW and the Klondike Highway are provided where feasible to minimize new habitat fragmentation effects and to provide protective cover for affected mammals.

Where it is feasible, further mitigation will be provided by timing Project activities in the ROW to occur outside of sensitive times for both ecosystem-types and species thereby further reducing the magnitude of Project related environmental effects on selected VCs. In order to mitigate the severity of impacts on sensitive terrain and on wetland environments and riparian zones, construction, maintenance and decommissioning activities for such areas will be timed to occur where necessary in winter under frozen conditions. To minimize disruptions on certain species activities will be timed where feasible to occur outside of rutting, calving, denning or mating periods.

Yukon Energy's EMS Manual (see Reference Materials 5R-1) sets out standard construction and maintenance best practice for transmission line systems; it is ISO 14001 compliant and reviewed and updated on a regular basis. This manual is referenced in this Chapter as Yukon Energy's EMS. For all Project activities the relevant portions of the Yukon Energy's EMS will be followed to assist in mitigation of Project environmental effects. These include:

- Yukon Energy's EMS best practices for Emergency Response (includes fuel spills)
- Yukon Energy's EMS best practice for ROW Brushing (includes timber salvage and access)
- Yukon Energy's EMS best practice for ROW Maintenance (includes access)
- Yukon Energy's EMS best practice for Water Bodies, Wetlands and Stream Crossings.
- Yukon Energy's EMS best practice for Permafrost
- Yukon Energy's EMS best practice for Heritage Resources

Decommissioning activities will adhere to the decommissioning practice recommendations set out in Section 5.10 in Chapter 5 of this Project Proposal.

Most Project environmental effects will be site-specific occurring within the Project Site Area, and typically only in certain segments or parts of the Project Site Area. Environmental effects extending beyond the Project Site Area are for the most part short-term in duration and related to construction, maintenance and decommissioning activities in the ROW that produce noise, fumes and smoke that may be felt outside the Project Site Area. Such effects are categorized as impacting the Project Study Region. There

are no Project effects on the environment that are expected to have a discernable magnitude outside the Project Study Region.

Effects of the Project on environmental VCs in the Project Study Region are generally not expected to combine with other relevant future actions that will occur in the Project Study Region (see Assessment Approach, as described in Chapter 3). Such future projects and activities are assumed to include the proposed Carmacks Copper Mine in the Williams Creek area and YECL distribution lines connecting to the CS substations at Pelly Crossing and Carmacks (see Section 3.4.4), as well other forestry, mining, or other projects for which proposals have been submitted to YESAB (see Table 3.4-1).

8.2.1 Physical Environment

As reviewed in Chapter 6 (Table 6.2-1 and Section 6.2.1), Project environmental effects are examined for the following VCs relating to the physical environment:

- Sensitive Terrain
- Air Quality

8.2.1.1 Sensitive Terrain

During construction, maintenance and MS decommissioning activities, the transmission infrastructure and ROW may cross areas of sensitive terrain resulting in rutting on steep slopes, wetlands or permafrost areas. Slope damage may occur due to the heavy equipment used when undertaking activities within the ROW, and rutting or the removal of soil fixing vegetation may facilitate the erosion of colluvial material on slopes. Brushing and clearing of the ROW at the time of construction and every seven to ten years thereafter may result in the disturbance of sensitive terrains such as permafrost soils or wetlands. During construction, maintenance and decommissioning activities accidental fuel spills may occur which may cause site-specific damage to soils in the Project Site Area.

Route selection has avoided many identified sensitive terrain units. The terrain analysis set out in Appendix 6A-1-1 to 6A-1-9 identifies 21 units of sensitive terrain which will be intersected by the CS transmission line ROW, and three units of sensitive terrain that lie adjacent to the CS transmission line ROW. These sensitive terrain units are listed by the NTS map sheet in Table 8.2-1, which sets out the sensitive soil type, the location of the sensitive terrain unit and a description of the mitigation strategies to address adverse environmental effects.¹

¹ As identified in Mougeot Terrain analysis mapping, there are a number of lesser magnitude additional site-specific locations such as small wetlands, ice-rich permafrost soils and slopes which are not included in Table 8.2-1.

Table 8.2-1
Sensitive Terrain Location and Mitigation

NTS Map Sheet	Sensitive Soil Type	Sites	Mitigation
CS Line Segment 1: Carmacks to McGregor Creek			
115 I/01	OW (organic-rich, poorly drained material)	5 very small, localized sites	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> follow Yukon Energy's EMS best practices near Water Bodies, Wetlands & Stream Crossings, minimize disturbance of vegetation mat and removal of soil-fixing vegetation, minimize and repair rutting, strategic pole placement with rock filled barrels for pole support where necessary.
115 I/01	VS:R (very steep slope, mainly in colluvium covered bedrock or rock)	1 site opposite the Ambrose Farm	Mitigation will include spanning and strategic pole placement. Repair rutting, disturbance of vegetation mat and soil-fixing vegetation will be minimized.
115 I/08	VS:G (very steep slope, mainly in gravelly soil) Tatchun Creek crossing	5 very small, localized sites south & north of Tatchun Creek 3 sites north of Tatchun Creek are adjacent to ROW	Mitigation for these 5 sites will include spanning and strategic pole placement to take advantage of contour height. <ul style="list-style-type: none"> Repair rutting, disturbance of vegetation mat and soil fixing vegetation will be minimized. Construction timing during frozen ground conditions will be used in areas that cannot be spanned. These 3 sites have been avoided in route selection. No further mitigation is required.
CS Line Segment 2: McGregor Creek to Pelly Crossing			
115 I/10	VS:R-VS:G (see above)	Approximately 2 km long area south of McCabe Creek	Steep terrain restricts the ROW in close proximity to the Klondike Highway. Mitigation will include aligning the ROW as close to the Highway as possible to avoid the steep slopes.
115 I/10	VS:G and creek crossing	North of the Minto substation location along Von Wilczek Creek for 1.6 km.	CS line ROW will be routed in low-lying valley to avoid steep slopes and heritage resources in the vicinity. <ul style="list-style-type: none"> Repair rutting, disturbance of vegetation mat and soil fixing vegetation will be minimized. Construction timing during frozen ground conditions will be used in areas that cannot be spanned.
115 I/10	VS:R	In SFN R10 B, opposite Lhutsaw Wetland (1.5 km)	Routing through some steep terrain – mitigation will include: <ul style="list-style-type: none"> Strategic pole placement Repair rutting, disturbance of vegetation mat and soil-fixing vegetation will be minimized.
115 I/15	OW and small creek crossing	Pelly Crossing – small, site-specific area where ROW is adjacent to the Yukon River west of the gravel pit.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> follow Yukon Energy's EMS best practices near Water Bodies, Wetlands & Stream Crossings, minimize disturbance of vegetation mat and removal of soil-fixing vegetation, minimize and repair rutting, and strategic pole placement with rock-filled barrels for pole support where necessary.
CS Line Segment 3: Pelly Crossing to Stewart Crossing			
115 P/01	OZ-OWZ/G (organic-rich with ice-rich permafrost; poorly drained areas, some over gravel)	Small site-specific area about 24 km north of Pelly	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> follow Yukon Energy's EMS best practices near Water Bodies, Wetlands & Stream Crossings and in Permafrost areas, minimize disturbance of vegetation mat and removal of soil-fixing vegetation, minimize and repair rutting, and strategic pole placement with rock-filled barrels for pole support where necessary.

NTS Map Sheet	Sensitive Soil Type	Sites	Mitigation
115 P/01	OZ	Very small site-specific area immediately north of SFN R14 B, about 30 km north of Pelly	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> • follow Yukon Energy's EMS best practices in Permafrost areas, • minimize disturbance of vegetation mat and removal of soil fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock filled barrels for pole support where necessary.
115 P/01	OW	Very small, site-specific area approximately 43 km north of Pelly Crossing on the east side of the Klondike Highway.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
115 P/07	OWZ (organic-rich, ice-rich and poorly drained area)	Crooked Creek crossing at bridgehead	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, and in Permafrost areas, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
115 P/07	OW	Crooked Creek crossing, 3-4 km south of Stewart R.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
115 P/07	OW:FA (organic and/or silt, poorly drained and subject to regular flooding)	On the south bank of the Stewart River.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.
Minto Spur Line Segment			
115 I/11	OWZ and Permafrost OW:FA and stream bed movement	Minto Creek crossing Big Creek crossing on the north side of the Minto Mine Access road.	Construction timing during frozen ground conditions and/or spanning are the primary forms of mitigation. Other mitigation includes: <ul style="list-style-type: none"> • follow Yukon Energy's EMS best practices near Water Bodies, Wetlands and Stream Crossings, and in Permafrost areas, • minimize disturbance of vegetation mat and removal of soil-fixing vegetation, • minimize and repair rutting, and • strategic pole placement with rock-filled barrels for pole support where necessary.

Where sensitive terrain areas cannot be avoided access to such areas will be controlled during construction, maintenance and decommissioning activities in order to mitigate damage due to rutting of soil and disturbance of soil-fixing vegetation. Further, where route selection has been unable to avoid areas of sensitive terrain, construction and decommissioning will be timed to occur in winter in order to minimize disturbance of the vegetative mat and permafrost soils. On steep slopes, wetlands or

permafrost areas where there is the potential for rutting, the ruts will be levelled or filled-in to avoid erosion or damage to the permafrost subsoil. This practice will occur in all phases of the Project. Any site-specific damage due to accidental fuel spills will be mitigated through adherence to Yukon Energy's best practise for fuel spills.

With regard to brushing and clearing during construction and maintenance, the vegetation will be cut with 30 cm of plant material left standing in order to adhere to Yukon Energy's EMS best practices for permafrost soils (as adopted from the *Yukon Highway Standard for Minimal Disturbance Clearing*). Generally, ROW maintenance is expected to occur in seven to ten year cycles. This infrequent brushing will allow vegetation to re-grow in the ROW and help to insulate any sensitive permafrost areas. ROW maintenance in wetland areas will follow a similar practice and adhere to Yukon Energy's best practices for Water Bodies, Wetlands & Stream Crossings and ROW maintenance. Steep slopes will require little maintenance for vegetation control as there is typically little to no vegetative growth on steep slopes. Where brushing in wetland areas is required, it will be carried out in winter months using hand-clearing methods or light equipment.

With regard to construction, maintenance and decommissioning activities, any residual adverse effects due to the disruption of sensitive terrain are expected to be low in magnitude, of short-term duration and be limited to the Project Site Area.

8.2.1.2 Air Quality

The baseline presented in Chapter 6 notes that the primary activities having an adverse effect on air quality in the Project Study Region are vehicular traffic on the Klondike Highway (which is more pronounced in the summer) and home heating (oil and wood burning in the winter). With regard to the Project, construction, operation and maintenance, and decommissioning activities will have an adverse affect on air quality due to emissions and dust produced by transportation vehicles and machinery, as well as smoke and other emissions produced by the burning of slash during any required brushing and clearing activities. However, once the Minto Spur line is complete, operations at the Minto mine will shift from diesel generation to the use of grid power which will have a positive effect on emissions and reduce the production of GHG's in the MS Project Study Region.

Any adverse effects of emissions created during construction, maintenance and decommissioning activities will be mitigated by observing and applying routine maintenance and standard emission controls for all equipment and vehicles involved in Project activities. Slash burning will follow Yukon Energy's EMS Manual on best practices for timber salvage.

Adverse effects due to emissions from the Project are expected to be of a lesser magnitude during maintenance activities than during construction but all Project-related emissions during the life of the Project are expected to be low magnitude and short-term in duration for the Project Study Region.

It is expected that the Project will have a positive effect on CO₂ emissions and greenhouse gases produced in the Project Study Region since operations at Minto mine and Pelly Crossing will have the opportunity to shift from diesel power to grid power. For instance, at Minto mine, a shift from diesel

power to grid power would result in approximately 23,000 tonnes per year of reduced CO₂ emissions during the mine's life.

In essence, the long term presence of this Project will contribute to the Government of the Yukon's long term climate change goals through reducing the volume of greenhouse gases discharged and providing current diesel users and future developments in the Project Study Region with an alternative to diesel and the ability to shift to a renewable energy resource.

This positive effect will relate primarily to the effect on Minto Mine site emissions and be low in magnitude and of moderate-term duration, lasting until the MS transmission line is decommissioned. In the event that the Carmacks Copper Mine is developed and also connected to the CS development, during the life of this mine additional direct positive effects will occur on air quality in the Project Region compared to what would occur if the Carmacks Copper Mine power needs were to be supplied through on-site diesel generation.

8.2.2 Terrestrial Environment

As reviewed in Chapter 6 (Table 6.2-1 and Section 6.2.2), Project environmental effects are examined for the following VCs relating to the terrestrial environment:

- Vegetation
 - Vegetation
 - Rare Plants
- Mammals
 - Mule Deer
 - Moose
 - Woodland Caribou (Ethel Lake and Tatchun herds)
 - Small Furbearing Mammals
- Birds
 - Migratory Waterfowl
 - Peregrine Falcon

8.2.2.1 Vegetation

Most Project related effects on vegetation will result from the brushing and clearing activities undertaken during the construction and maintenance phases of the Project; however, there will also be minor disturbances to vegetation during decommissioning of the MS transmission line as equipment traverses the ROW to remove conductor and pole structures. Adverse effects during construction will include the removal of under-story vegetation and disturbance of the vegetative mat, as well as damage to and removal of timber. Soil disturbance and the creation of a permanent ROW may promote the intrusion of exotic species such as sweet clover, perennial sow-thistle, Canada thistle, and common tansy, which are known to exist within the Project Study Region and thrive in roadway environments.

Route selection was the primary means of mitigating adverse effects on vegetation, where it was feasible the process focused on avoiding areas with merchantable timber stands as well as those few areas with

identified medium or high estimated volume potential. The route selected often passes through non-productive areas and areas recovering from previous forest fires. In particular, the area around Minto Landing is still recovering from a forest fire that occurred in 1995.

The selected route also passes through areas of wetland or riparian zones. Additional mitigation provides for the large wetland areas and major creek crossings to be spanned. In these areas, or in areas where it is possible to span lengths from ridge to ridge, little or no vegetation will be cleared or disturbed.

When the terrain over the entire route is taken into consideration the actual areas of disruption and the amount of vegetation that will be removed is considerably smaller than the area of the total transmission line ROW. With regard to the CS transmission line, a corridor of approximately 172 km in length, with a typical cleared 30 metre wide ROW², would initially indicate approximately 516 hectares of disturbed or removed vegetation. However, the ROW selected is composed of:

- 63 % forest cover (vegetative cover, including forest, grassland and shrubs);
- 37 % not sufficiently recovered areas (e.g., areas burnt in previous forest fires);
- 13% non-productive land; and
- 5% wetlands.

With regard to the MS transmission line, a corridor of approximately 27 km in length, with a cleared 15 metre wide ROW³ would result in approximately 40.5 hectares of disturbed or removed vegetation; however, much of the area surrounding the proposed transmission line has been burnt and is still recovering from previous forest fire activity and is considered to be insufficiently regenerated land. The effect of construction, operation and maintenance and decommissioning activities in previously disturbed areas around MS line are consequently expected to be very low in magnitude.

Project substations are to be built next to existing disturbed areas, including:

- an airport, highway and existing 138 kV transmission line (Carmacks);
- a gravel pit (Minto Landing);
- a yard area used by SFN adjacent to the Pelly Crossing community (Pelly Crossing); and
- adjacent to the expansion of an existing substation and 69 kV transmission line (Stewart Crossing).

Construction at each of these substation locations will require the permanent removal of any trees, shrubs and ground cover which will result in long-term permanent impacts on any vegetation; however, the amount of disturbance is expected to be site-specific and low in magnitude relative to the overall Site Study Area and Project Study Region.

² The CS ROW for the 138 kV line will typically be cleared to about 30 m; however, where needed, clearing may be up to 40 m (see Chapter 5, Section 5.5).

³ The MS ROW for the 35 kV line will typically be cleared to about 15 m; however, where needed, clearing may be up to 20 m (see Chapter 5, Section 5.5).

For Project-related activities equipment will be used that minimizes disturbance to vegetation and to the vegetative mat (at ground level), including rotary mowers, hydro axes and swampers. Hand clearing methods will be used where required in sensitive areas such as locations in proximity to wetlands and riparian zones. Efforts that minimize the removal of under story vegetation and disturbance to the vegetative mat will also mitigate the intrusion of exotic species due to soil disturbance. No defoliant or herbicides will be used at any phase in the life of the Project.

Yukon Energy's EMS best practices for ROW maintenance will be followed, and where it is necessary, construction, maintenance and decommissioning activities will be timed to occur in the winter months, under frozen and snow covered conditions, in order to reduce impacts on sensitive terrain. It is expected that brushing and clearing maintenance activities will only be required at seven to ten year intervals, and in the interim vegetation will be allowed to re-grow throughout the length of the ROW. The frequency and extent of brushing and clearing activities will depend on the extent of re-growth and will include the removal of danger trees that may pose a threat to the transmission line. During maintenance activities the ROW will be monitored for invasive species and any invasive species discovered will be removed.

Short-term effects due to the removal or disturbance of vegetation during construction, operation and maintenance and decommissioning will generally be low in magnitude and confined to the Project Site Area.

Construction and the maintenance of a permanent ROW will require the permanent changes to vegetation, resulting in the creation of an edge environment that will endure for the life of the Project and that may promote the intrusion of invasive species in the Project Site Area. The edge environment effects will be long-term in duration but with monitoring and mitigation (including the removal of invasive species) any residual adverse effects on vegetation are expected to be low in magnitude.

8.2.2.2 Rare Plants

Adverse effects on rare plant species are only likely to occur, if at all, during the construction phase of the Project where rare plants may be disturbed or removed and thereby affect future propagation. No rare plant species have been found within the CS Route Study Area or the MS Route Study Area at this time; however, mitigation measures will be undertaken to avoid any potential adverse effect on rare plant species.

For the CS Route Study Area, any sites with the potential for rare plant species have been identified in the Vegetation Maps set out in Appendix 6C. The maps indicate that there are no areas with potential for rare plants located in the MS Route Study Area as the majority of area has been previously disturbed by fire.

Prior to brushing and clearing activities during the construction phase, a rare plant survey will be completed which will focus on the site-specific potential rare plant areas identified in the Vegetation Maps in Appendix 6C, and species identified in Table 6.2-4. Any rare plant species or communities identified will be flagged in the field and brought to the attention of construction workers. These flagged areas will be avoided entirely and will not be brushed or cleared; hand-clearing and strategic pole placement will be used to ensure that any identified rare plants are not disrupted. The locations of rare plants will then be

mapped to ensure that subsequent maintenance activities take a similar level of caution and avoid the area. Substations have been located in areas with very low potential for rare plant occurrence; however, if rare plants are encountered during site preparations the measures outlined above will be followed.

Since rare plants have not been identified in the Route Study Area and any site-specific areas that are identified will be flagged and avoided, adverse impacts on rare plants due to construction activities in the Project ROW are expected to be low in magnitude. Any residual adverse effects on rare plants due to disturbance or removal during Project construction are also expected to be short-term in duration and to occur only within the Project Site Area.

8.2.2.3 Mammals

Mammals in the Project Study Region may be affected by short-term effects due to Project related activities that may cause mammals to avoid the Route Study Area and adjacent areas during the period of Project activities and by long-term effects that result from the existence of a permanent ROW in the Project Site Area.

The existence of a permanent ROW may contribute to habitat fragmentation for certain species, creating new or enhanced barriers across which some species may display restricted movement. There are two ways in which the ROW may adversely impact on wildlife in this regard:

- **Adjacent to Highway or other existing corridor:** Where ROWs combine, (i.e., Project ROW and Klondike Highway) the combined cleared area may adversely restrict the movement of certain species such as small furbearing mammals and woodland caribou, while the wider open corridor may attract other species such as moose and mule deer that may become vulnerable to opportunistic hunting. In this regard, a vegetative buffer, where feasible, of at least 30 metres between the new ROW and any existing highway corridor is expected to mitigate such effects, reducing the expanded barrier impact and providing a vegetative screen between the highway and animals moving along the ROW.
- **Well away from Highway or existing corridor:** In contrast, where a new ROW is placed too far from the existing highway (e.g., over 150 metres or more away) and is also located in previously undisturbed areas there may be adverse effects due to the creation of a new barrier and consequent new adverse habitat fragmentation effects. This may increase habitat fragmentation and also provide new access trails into the previously undisturbed area that may be used for hunting, increasing pressure on certain species.

With regard to the issue of increasing the adverse effects of a barrier along the Klondike Highway, there are only a few instances where the CS Project ROW will pass within less than 30 metres distance from the Klondike Highway or other major existing corridor. Most of these areas occur where the Project ROW crosses the highway or where steep terrain provides no other acceptable options.

- **For CS Segment 1 (Carmacks to McGregor Creek)** there are four areas where the ROW will cross the Klondike Highway, and only roughly 6% of this line segment ROW will be less than 30 metres distance from the highway. In contrast, roughly 50% of this CS route

segment ROW will be located within 30 to 150 metres of the highway, and 23% will be located within 150m to 500 metres of the highway.

- **For CS Segment 2 (McGregor Creek to Pelly Crossing)**, there are 2 areas where the ROW will cross the Klondike Highway and only roughly 5% of this line segment ROW will be less than 30 metres distance from the highway. Roughly 34% of this CS route segment ROW will be within 30 to 150 metres of the highway and 19% will be within 150 to 500 m of the highway.
- **For CS Segment 3 (Pelly Crossing to Stewart Crossing)**, there are 8 areas where the ROW will cross the Klondike Highway and roughly 8% of the ROW will be less than 30 metres distance from the Klondike Highway. Roughly 57% of this CS route segment ROW will be within 30 metres to 150 metres of the Klondike Highway and 19% will be within 150 to 500 metres of the Klondike Highway.

In contrast to the CS route, about two-thirds of the MS ROW is within less than 30 metres distance from the existing mine access road, and only about 10% of the MS ROW is within 30 to 150 m of this access road. The barrier effects in this instance, however, are greatly reduced compared to CS development, adjacent to the Klondike Highway (due to the reduced ROW needed for both the road and the transmission line with the MS development as compared to the CS development).

There are a few specific areas where the CS route diverges well away from following the Klondike Highway and where there may therefore be adverse effects on wildlife due to habitat fragmentation:

- **In CS Segment 1 - Carmacks to McGregor Creek:** roughly 21% of this CS ROW segment is more than 500 m distance from existing highway corridors. Key areas affected are:
 - Where the ROW goes east around Tantalus Butte (other established access currently exists into many parts of this area)
 - Where the ROW approaching Tatchun Creek goes well east of the Highway (this area currently is generally undisturbed except for trapping activity)
- **In CS Segment 2 – McGregor Creek to Pelly Crossing:** roughly 42% of this CS ROW segment is more than 500 m distance from the existing Klondike Highway. Key areas affected are:
 - Where the ROW approaches the Minto Spur substation (other established access currently exists into this area)
 - Where the ROW enters areas west of the Highway in the vicinity across the Highway from the Lhutsaw Wetland Habitat Protection Area (this area currently is generally undisturbed)
 - Where the ROW approaches Pelly Crossing (this area to the west of the Highway currently is generally undisturbed except for trapping activity)

- **In CS Segment 3 - Pelly Crossing to Stewart Crossing:** roughly 17% of this CS ROW segment is more than 500 m distance from the existing Klondike Highway. Key areas affected are:
 - Shortly after the ROW crosses the Pelly River, a small area is affected
 - Where the ROW goes east of the Highway along Top of 11% Trail Road
 - Where the ROW goes to the west of Stewart Crossing (major parts of this area have currently established access)

The MS route, which generally passes through the area of the 1995 fire burn, moves more than 150 metres from the Minto Mine access road in only a few locations. Aside from brief excursions near the Yukon River crossing and the Minto Creek crossing, these locations occur between Minto Creek and the Minto Mine site where the line avoids turns in the road and particularly during the last segment of the line coming directly into the Minto Mine site. It is not considered likely that the specific portions of the MS route beyond 150 metres from the road will have any material impact on habitat fragmentation in this area.

Effects due to the existence of a long-term ROW will be long-term in duration. In the case of the CS development, these effects are considered to be permanent. In the case of the MS ROW, most of the line is planned to be decommissioned (potentially as soon as within ten years after operations commence at the Minto Mine site).

8.2.2.4 Mule Deer

Chapter 6 has noted that mule deer habitat mapping is not available for the full extent of their range. Occasional observations suggest a range that includes infrequent use of areas to the east of the Yukon River between Carmacks and Minto Landing, possibly extending north up to Stewart Crossing. These observations suggest sporadic expansion of habitat but do not imply a continuous distribution over the entire area; therefore, the assessment has focused on key habitat areas for mule deer within the Route Study Area which are restricted to the south slope of Tantalus Butte in CS Line Segment 1.

Noise and fumes from equipment and crews, and smoke from slash burning may cause mule deer to temporarily avoid the Route Study Area during construction and maintenance activities. The existence of a permanent ROW may also provide hunters with increased access to mule deer. A permanent ROW will provide some benefits to mule deer as the periodic brushing and clearing activities required every seven to ten years throughout the life of the Project will create browse or new vegetative growth preferred by mule deer. The ROW will also provide a travel corridor for mule deer.

Route selection for the CS line has sought to identify critical mule deer habitat areas that run adjacent to, and slightly within, the eastern boundary of southern parts of the Route Study Area. Any effects from MS decommissioning activities will be negligible as route selection has placed the MS transmission line outside of key mule deer habitat. Where it is feasible to do so, activities will be timed to avoid calving and rutting seasons in the southern extremity of the CS line.

In order to mitigate any adverse effects due to increased access along the ROW a no-hunting policy will be imposed upon construction, maintenance and decommissioning crews. Yukon Energy's EMS best

practices for ROW maintenance will also be followed. Where it is feasible and necessary to do so berms of trees and rocks may be placed across any ROW access trails to discourage access into this area. A vegetative or treed buffer will also provide cover from opportunistic hunters and other predators in most areas where the ROW runs adjacent to the Klondike Highway.

Key areas for mule deer within the Project Site Area are restricted to the south slope of Tantalus Butte and only a small portion of the project ROW will intersect mule deer habitat in this vicinity. Adverse effects due to the noise, fumes and smoke created by construction and maintenance activities are expected to be low in magnitude and short-term in duration within this part of the Project Study Region. While maintenance activities will recur, they are only expected to occur at seven to ten year intervals.

The effects of a permanent ROW will have long-term positive and negative impacts on mule deer. The creation of browse and a travel corridor will have positive, long-term effects for mule deer in the southern parts of the Project Study Region, while also providing long-term access for opportunistic hunters in small areas along the ROW. Both the positive and adverse effects are expected to be low in magnitude and will only affect a small part of the total mule deer range.

8.2.2.5 Moose

During construction, maintenance or decommissioning activities there will be an adverse effect on moose where noise produced by people and equipment will cause moose to avoid the Route Study Area. The creation a permanent ROW for the CS transmission line will also provide increased access for opportunistic hunters which may increase hunting pressure on the moose populations in certain areas along the ROW. A permanent ROW will also benefit moose by providing browse in recently cleared areas, as well as the creation of a travel corridor for moose to roam.

The magnitude of Project effects on the moose population throughout the Project Study Region is expected to be low as route selection of the line and substations has avoided all known critical calving habitat. The amount of moose habitat affected by the Project is very small and site-specific in comparison to overall moose habitat in the Project Study Region and consequently any adverse effects on moose are expected to be low in magnitude and Project Site-specific. There are no known calving locations within the Route Study Area with the exception of possible locations at Crooked Creek (CS Line Segment 3: Pelly Crossing to Stewart Crossing). Where it is feasible, during Stage 2 disruptive activities will be timed to occur outside of sensitive calving periods that occur between mid-May and mid-June.

To mitigate the adverse effects of increased hunting pressure due to access provided along the ROW, Yukon Energy's EMS best practices for ROW access will be adhered to and there will be a no-hunting policy for construction, maintenance and decommissioning personnel. A vegetative or treed buffer will be provided between the ROW and the Klondike Highway in most areas to act as a protective cover for the moose and reduce opportunistic hunting.

The short-term adverse effects on moose due to noise and fumes from construction, maintenance and decommissioning activities are expected to be low in magnitude since the amount of moose habitat affected by such activities will be small and site-specific.

Long-term adverse effects created by increased access for opportunistic hunters are expected to affect a small part of the Project Study Region since only a small part of the ROW will intersect moose habitat; with mitigation measures, only limited access will be provided to the ROW. While adverse effects will persist for the lifetime of the ROW, and be long-term in duration, they are expected to be low in magnitude since only a small portion of the moose population and habitat in the Project Study Region is likely to be affected.

8.2.2.6 Ethel Lake Woodland Caribou Herd

Project effects on the Ethel Lake caribou herd are restricted to fringe areas of the herd's habitat in the vicinity of Crooked Creek (located in CS Line Segment 3: Pelly Crossing to Stewart Crossing). The majority of the Ethel Lake herd's habitat is east of the Project in this area, in the regions near Ethel Lake and the Ddhaw Ghro Habitat Protected area. Chapter 6 notes, however, that there has been some recent winter range extension of the herd west across the Klondike Highway to the west into the Willow Creek Wetland Complex (WKA 987) which may result in small numbers of the herd crossing the CS Line Segment 3 ROW in this area during the period from October through April. There will be no Project effects on this herd from other parts of the CS transmission line outside this specific area or from the MS transmission line or any CS or MS substations during any phases of the Project.

Members of this herd may temporarily avoid areas of their range that are intersected by the CS transmission line due to noise and other disturbances created by people and vehicles undertaking construction and maintenance activities. The creation of a permanent ROW may increase hunting pressure on the herd by providing increased access for opportunistic hunters and increasing mobility along the ROW for other predators such as wolves, foxes and coyotes. The existence of a permanent ROW well away from existing road corridors may also contribute to new habitat fragmentation in some areas and serve as a possible barrier to caribou movement.

Route selection has avoided the critical habitat for this herd which is located to the east of the CS Project Route Study Area. Although there has been some anecdotal evidence of recent winter range extension across the Klondike Highway and west into the Willow Creek wetland complex, the actual numbers of caribou spotted have been small and only one caribou has been spotted in the vicinity recently. It is expected that any winter extension of the herd into this area west of the Highway is only sporadic in nature. It is thus expected that any effects on this caribou herd due to disturbances from Project construction or operations in the area of Crooked Creek will be minimal as this area is not part of the herd's normal range and caribou do not frequent the area with any constancy.

The route selected in this part of CS Line Segment 3 has placed the transmission line near previously disturbed areas along the Klondike Highway, while generally maintaining a vegetative buffer of at least 30 metres in order to reduce any impacts from habitat fragmentation. The presence of a vegetative or treed buffer is expected to reduce adverse effects where the new ROW may otherwise act as a barrier to infrequent crossings of the Klondike Highway by members of the herd.

The route crosses the Klondike Highway three times in the area between Top of 11% Trail Road (where the route is on the east side of the Highway) and north of crossing Crooked Creek (where the route ends up on the west side of the Highway). Measures to mitigate adverse effects of increased access for opportunistic hunting along the ROW will include the adoption of a no-hunting policy for construction and maintenance personnel, as well as the continuance of voluntary no-hunting restrictions on the Ethel Lake Caribou Herd. Where it is feasible, off-road access to the ROW at these road crossings will also be restricted by using physical barriers such as berms of roots, stumps, and trees. Mitigation measures will also adhere to Yukon Energy's EMS best practices for access.

Since only a small portion of the herd's total range is affected, any Project effects on the Ethel Lake caribou herd due to disruptions caused by construction and maintenance activities will be low in magnitude and short-term in duration in the vicinity of Crooked Creek.

Long-term adverse effects on the Ethel Lake caribou herd due fragmentation and increased hunting pressure caused by the creation of a permanent ROW are restricted to the vicinity of Crooked Creek which is only a small portion of the herd's range; as a result, the effects will be low in magnitude since only a small portion of the herd population and habitat in the Project Study Region is likely to be affected.

8.2.2.7 Tatchun Woodland Caribou Herd

Project effects on the Tatchun caribou herd are restricted to CS ROW areas from around Tatchun Creek north to the vicinity of the Lhutsaw Wetland Habitat Protection Area and include very small portions of the MS transmission line ROW in the vicinity of Minto Landing. As outlined in Chapter 6, winter range use of Minto Landing and areas west of the Klondike Highway near the Lhutsaw Wetland Habitat Protection Area has declined in post-fire years, and the Tatchun Caribou herd is only expected to use this area infrequently.

Noise produced by equipment and crews may cause the Tatchun Caribou herd to avoid the affected area during Project construction or maintenance activities while large open corridors may also become a barrier to herd movement. There may also be an adverse effect on the herd as the transmission line ROW and access trails will provide increased access and mobility for hunters and wildlife predators (i.e., wolves and coyotes) and thus increase hunting pressure on this herd.

Route selection has avoided critical habitat such as calving and post-calving areas and rut areas which are located well to the east of the Route Study Area. While the preferred route in the vicinity of Tatchun Creek and in the vicinity of the Lhutsaw Wetland Habitat Protection Area will intersect some winter range for this herd, the amount of habitat affected by the line ROW is very small in relation to the herd's overall habitat; consequently, any impacts of the Project on the herd are expected to be low in magnitude. Since the Tatchun herd's range does not include the MS line ROW to the west of the Yukon River, MS decommissioning activities are not expected to have any effect on the Tatchun herd.

A vegetative or treed buffer of at least 30 metres between the Klondike Highway and the line ROW is planned for about 95% of the CS route areas potentially affecting the Tatchun caribou herd (Tatchun Creek area and north through the areas in the vicinity of the Lhutsaw Habitat Protection Area), and will

act in this area as protective cover to reduce the impact of the ROW as a barrier to possible infrequent crossings of the Klondike Highway by members of the herd.

The CS route area potentially affecting the Tatchun caribou herd includes three crossings of the Klondike Highway and two areas where the route may create new habitat fragmentation barriers by being more than 500 metres from the Highway.⁴ Adverse effects on the herd due to the existence of a permanent ROW and access trails which may provide increased access and mobility for hunters and wildlife predators (i.e., wolves and coyotes) will be mitigated through the adoption of a no-hunting policy for construction personnel, adherence to Yukon Energy's EMS best practices for access and, where it is feasible and necessary, off-road access may also be restricted with physical barriers such as berms of roots, stumps, trees and rocks.

While the preferred route intersects a portion of the winter range for this herd, the amount of habitat affected by the line ROW is very small in relation to the herd's overall habitat. Since only a small portion of the herd's total range is affected, Project effects on Tatchun caribou herd due to disruptions caused by construction and maintenance activities are expected to be low in magnitude and short-term in duration.

Effects caused by the creation of a permanent ROW will be long-term in duration and restricted generally to the Route Study Area portion of the Project Study Region; however, since Project effects on the Tatchun caribou herd are restricted to a small portion of the herd's total range, they are expected to be low in magnitude and to affect only a small portion of the herd population and habitat in the Project Study Region.

8.2.2.8 Small Furbearing Mammals

The Project will have both positive and adverse effects throughout all phases of the Project on the various small, furbearing mammals found throughout the Project Study Region. Noise, fumes and the presence of equipment and crews may cause furbearers to avoid the Route Study Area during construction and ROW brushing and clearing maintenance activities that are expected to recur every seven to ten years. The construction of substations will permanently alter any existing furbearer habitat in the Project Site Area where they are located. Decommissioning of the MS line will cause minor disturbance to furbearer habitat when equipment and crews travel the ROW to remove conductor and structures.

Clearing and maintaining a ROW will increase habitat for species that prefer an open, low-vegetation environment; however, the ROW may also create an edge effect whereby predatory species (such as coyote, fox and wolf) may use the cleared ROW for hunting furbearing prey. The existence of a cleared ROW well away from existing road corridors may also contribute to new habitat fragmentation in some areas.

⁴ There are three areas where the CS route is more than 500 metres from the Klondike Highway: (a) where the ROW approaching Tatchun Creek goes well east of the Highway, (b) east of the Highway in the vicinity of the MS substation, and (c) where the ROW enters areas west of the Highway in the vicinity across the Highway from the Lhutsasw Wetland Habitat Protection Area. Only the first and last of these areas, however, are likely to create any material new habitat fragmentation impacts that merit consideration in this assessment.

Route selection has been used to avoid known critical habitat areas for furbearers and mitigate most of significant impacts on furbearing species. The route selected avoids important wetland habitats which should mitigate adverse effects on species such as the beaver, muskrat, mink and river otter. Route selection through previously burned areas and avoidance of mature forest will mitigate impacts on species such as the Red fox and lynx. Wherever possible, the route selection process has generally placed the Project transmission lines along previously disturbed areas, such as the Klondike Highway and the Minto Mine access road, in order to mitigate effects due to habitat fragmentation. Substations have also been located in, or adjacent to, previously disturbed environments and wetlands generally have been avoided.

A vegetative or treed buffer will be provided in most areas where the ROW lies adjacent to the Klondike Highway in order to mitigate adverse effects due to habitat fragmentation and provide protective cover for furbearing species. As noted earlier, only a very small portion of the CS ROW (less than 9% through each of the three line segments) is less than 30 metres distance from the Klondike Highway or other major road corridor. Similarly, where possible, a vegetative buffer will be maintained around substations. When it is possible, disruptive Project-related activities will be timed to occur outside of spring mating and denning periods. Yukon Energy's EMS best practices for ROW clearing and maintenance will be followed.

Short-term adverse effects due to disruptions and noise caused by construction, maintenance and decommissioning activities will affect small furbearers in the Route Study Area within the Project Study Region; however, since route selection has avoided most critical habitat for small furbearing mammals the magnitude of these effects will be low in magnitude.

The creation of a permanent ROW and the permanent loss of habitat areas due to the construction of substations will have long-term adverse effects on some furbearers; however, site selection has avoided critical habitat and the amount of potential habitat lost is relatively very small compared to the surrounding Project Study Region. Thus, adverse effects are expected to be restricted generally to the Route Study Area portion of the Project Study Region and to be low in magnitude, affecting only a small portion of the small furbearer habitat and population within the Project Study Region.

8.2.2.9 Birds

Migratory Waterfowl

The Project's lines and substations do not cross any significant nesting sites for species of migratory waterfowl.

The Yukon, Pelly and Stewart rivers are known migration corridors for waterfowl. Project effects on migratory waterfowl during operation and maintenance of the lines are expected to be most pronounced at river crossings where there is the greatest potential for migratory waterfowl to strike Project infrastructure.

Since suitable wetlands along the MS Project Site Area are scarce, there are no expected significant effects on waterfowl habitat due to the MS Project. It is expected that effects requiring attention and

mitigation measures will occur in the immediate vicinity of Minto Creek. Once the MS Project has been decommissioned, it is expected that the MS Project Site Area will return to pre-Project conditions over time and with the removal of the transmission conductors and poles (including the Yukon River crossing), any potential hazard to migratory waterfowl from bird strikes will end.

Careful route selection has ensured that the CS transmission line ROW avoids critical habitat for waterfowl, which is primarily focused around the Lhutsaw Wetland Habitat Protection Area. Mitigation measures to reduce potential mortality hazards due to line strikes will include locating the transmission lines at river crossings close to existing infrastructure such as bridges in a parallel horizontal configuration (just below the bridge's superstructure elevation where feasible) and installing effective visibility markers (as per Transport Canada regulations) along the conductors at all river crossings. Where it is feasible, construction activities will also be timed to avoid spring nesting season.

Short-term effects due to construction, operation and decommissioning activity disruptions such as noise and fumes will be low in magnitude since the CS and MS Transmission Line ROW have avoided critical habitat for waterfowl and only a small portion of the total population should be affected. The adverse effects due to the maintenance of a permanent CS ROW, poles and conductor are expected to be long-term but within a small portion of the Project Study Region in the vicinity of the Route Study Area and low in magnitude. Since the MS Project Site Area has little suitable wetland habitat, MS Project effects on waterfowl habitat are expected to be very low in magnitude and site-specific in the immediate vicinity of Minto Creek.

Peregrine Falcon

As reviewed in Chapter 6, there are potential sites in the Route Study Area for Alpine raptors north-east of McCabe Creek and general bald eagle and Peregrine falcon habitat along the MS line near the Yukon River crossing and in the vicinity of Minto Creek.

During the construction, operation and maintenance and MS decommissioning phases of the Project, there may be adverse effects on Peregrine falcons in the relevant areas such as noise produced by equipment and crews during brushing and clearing, line construction and decommissioning activities. This effect may cause Peregrine falcons to temporarily avoid the area. During the operation and maintenance phase of the Project there may also be adverse effects on Peregrine falcons through collisions with conductors and/or poles.

Route selection has mitigated the effects of disruptions and noise due to construction and maintenance activities that may cause Peregrine falcons to avoid the Route Study Area; consequently, the proposed lines and substations will not be located in known Peregrine falcon critical habitats or near known eyries. In addition, construction will be timed to avoid spring nesting season for all birds and raptors, including the Peregrine falcon. Any adverse effects due to collisions with conductors and poles throughout the life of the Project will be mitigated through the use of conductor markings (as per Transport Canada regulations) at the three river crossings which will reduce the potential for bird strikes.

During the operation and maintenance phase of the Project there may be indirect positive effects resulting from the creation of the ROW that Peregrine falcons may preferentially use for hunting. As this is determined to be a positive effect, no mitigation is required.

Since route selection has avoided all critical habitat and known eyries for the Peregrine falcon, any short-term Project effects due to disruptions caused by construction and operation activities are expected to be low in magnitude due to the small numbers of this species that may be affected.

Long-term residual adverse effects due to the maintenance of permanent structures and conductors in the Project Site Area are expected to be confined to small portions of the Project Study Region in the vicinity of some parts of the Route Study Area and, since the route is located outside of critical habitat areas, few Peregrine falcons are expected to be adversely effected. MS decommissioning will eventually remove potential effects of the Project involving the Minto Landing area, Yukon River crossing, and the MS ROW west of the Yukon River. Overall, long-term adverse effects on Peregrine falcons due to collisions are also therefore expected to be low in magnitude.

8.2.3 Aquatic Environment

As reviewed in Chapter 6 (Table 6.2-1 and Section 6.2.3), Project environmental effects are examined for following VCs relating to the aquatic environment:

- Riparian Zones and Wetlands
- Salmon and other Fish Species

8.2.3.1 Riparian Zones and Wetlands

The CS line will cross numerous small creeks, in addition to Tatchun Creek, McGregor Creek, McCabe Creek, Von Wilczek Creek, Willow Creek and Crooked Creek. The CS transmission line ROW will also cross the Pelly and Stewart Rivers. The MS transmission line ROW will cross Big Creek, Minto Creek and the Yukon River at Minto Landing. Most adverse Project effects on wetlands will occur during brushing and clearing activities undertaken with regard to construction and maintenance activities. Brushing and clearing will occur every seven to ten years, enabling some vegetation to re-grow in wetland areas. Decommissioning of the MS transmission line will result in minor disturbance to vegetation adjacent to the Big Creek and Minto Creek wetland areas. During construction, maintenance and decommissioning activities accidental fuel spills may occur which may cause site-specific damage to riparian zones or wetland areas.

Route selection where feasible has avoided known wetland habitats along the Route Study Area and in small, site-specific locations where wetland areas cannot be avoided, mitigation will include spanning the identified wetlands and ensuring pole structures are placed on firm ground. During ROW clearing and line construction, all creeks and rivers will be spanned with sufficient height and width to avoid any direct effect on the riparian zones alongside these water bodies.

Specifically, between Carmacks and Pelly Crossing on the CS line, there are two small wetland locations which will be spanned to avoid any adverse effects. There are four small wetlands between Pelly Crossing

and Stewart Crossing which will be spanned, as well as one wetland area associated with Crooked Creek which includes a series of oxbow wetlands associated with old stream beds which will be spanned.

On the south bank of the Stewart River, the line will be constructed in an area of periodic flooding, which will require strategic pole placement, the use of rock-filled barrels where required for stability, construction timing during frozen conditions and hand clearing where required to protect riparian vegetation and to minimize vegetation and soil disturbance.

The MS transmission line will cross two wetland areas at Big Creek and Minto Creek. Big Creek will be spanned; the Big Creek area north of the bridge is associated with a broad floodplain and route selection has avoided the meandering creek bed to the south of the bridge, locating the structures on firmer ground. The Minto Creek crossing is in an area of organic-rich soils and the creek will be spanned using neighbouring ridges to avoid clearing in the creek's wetland.

Additional forms of mitigation to be employed where necessary include timing construction, maintenance and decommissioning activities in such areas to occur under frozen conditions in winter months, the identification and flagging of ROW clearing limits prior to construction, and using hand clearing of riparian vegetation in order to minimize the disturbance of the vegetative mat. All clearing of danger vegetation within 30 metres of the high water mark will be done by hand and will follow DFO's guidelines for Overhead Line Construction and Riparian Areas and Re-vegetation. Yukon Energy's EMS best practices for Water Bodies, Wetlands and Stream Crossings will also be followed. Any site-specific damage due to accidental fuel spills will be mitigated through adherence to Yukon Energy's best practise for fuel spills.

Since route selection has avoided most wetlands and riparian zones and any wetlands or riparian areas within the Project Site Area will be spanned, effects of construction, operation and decommissioning activities on riparian zones and wetlands are expected to be low in magnitude and short-term in duration.

8.2.3.2 Salmon and other Fish Species

The Project Study Region includes rivers and creeks which are considered fish-bearing for salmon populations of Chinook and Chum. As Chapter 6 outlined, these salmon species are an important domestic, sport, and commercial resource for First Nation members, local residents and visitors to the Region. Many community members expressed concerns over potential Project effects on salmon and salmon habitat.

The Project will be built with no in-stream construction. As noted above, all rivers and creeks will be spanned, and riparian habitat will follow strict DFO Operational Statements for vegetation clearing and line construction. DFO laws and regulations prevent the harmful alteration, disruption or destruction (HADD) of fish habitat under Section 35(1) of the Fisheries Act. Yukon Energy will follow DFO's Operational Statement on Overhead Line Construction, and DFO's Riparian Area and Re-vegetation guideline in order to comply with the Fisheries Act.

By adhering to the above laws, operational statements and guidelines, this Project is not expected to have any adverse effects on salmon for any phase of the Project. No further mitigation is required.

8.3 SOCIO-ECONOMIC EFFECTS AND MITIGATION

Section 8.3 provides assessment of Project effects and mitigation measures with regard to three groups of socio-economic VC:

- Resource Use
- Economy
- Social Context

The Project is expected to have both positive and adverse socio-economic effects in the Project Study Region.

Many effects relate to a short-term construction period when the ROW and substation areas will be brushed and cleared within the Project Site Area, as well as a similarly short-term construction period when the infrastructure components (i.e., poles, conductors and substation equipment) are assembled and built in the same area. Similar effects of less magnitude will occur during the infrequent, short-term ROW maintenance activities (usually every seven to ten years); during operation of the Project there will also be positive economic effects due to surplus grid hydro power displacing diesel-fuel generation in the Project Study Region.

Potential short-term socio-economic effects relating to Project construction, periodic maintenance (expected once every 7 to 10 years) and MS decommissioning activities include:

- Trappers' inability to access traplines and local hunters' inability to hunt while construction, maintenance and decommissioning activities are underway due to safety concerns for crews.
- Disruptions from Project activities during construction, maintenance and decommissioning will cause wildlife to avoid trapping areas.
- Removal of valued plant species during construction, maintenance and decommissioning activities.
- Greater berry producing potential for some plants in first few years following brushing and clearing activities required for construction and ROW maintenance.
- Opportunities for timber salvage in ROW during the construction phase.
- Construction, maintenance and decommissioning activities may impact on the perception of wilderness and consequently tourism and local aesthetics.
- Local employment and local businesses will benefit from employment income due to required site preparation and clearing activities required for construction and ROW maintenance, as well as opportunities for demolition labour and hauling with regard to decommissioning.
- The wider regional economy will experience small benefits to government fiscal flows; Yukon Government costs will be incurred to the extent that government funding is provided to assist in development of the Project.

Potential long-term socio-economic effects relating to operation of the Project's facilities and the existence of a permanent ROW with regard to the CS transmission line include:

- Access points along the ROW that will provide increased access for trapping, hunting, plant collection, timber salvage for fuel wood harvesting and outdoor recreation for both local community members and for people from outside the community.
- Trapping and hunting resource use may be affected by environmental effects of the Project, including any barrier created for small furbearing mammals where the ROW runs immediately adjacent to the Klondike Highway.
- A transmission line ROW will impact on the perception of a wilderness environment and consequently tourism and local aesthetics.
- The availability of low cost grid power in the Project Study Region will facilitate near term utility ratepayer cost savings throughout Yukon due to the sale of surplus hydroelectric grid generation.
- Access to lower cost rates will provide cost savings for the Minto Mine operations and other future mining developments in this region that can utilize the Project's facilities to gain access to grid power; local Project Study region residents and communities may also benefit from access to hydro grid power rates.
- Yukon Government fiscal flow cost savings will be expected to occur to the extent that the RSF subsidy of ratepayers continues during Project operations.
- Positive regional socio-economic effects are expected in the long-term due to the development of electric grid connection and extension infrastructure that may support ongoing industrial and other economic development in the Project Study Region and enhance overall WAF and MD system reliability, economic efficiency and flexibility in power supply resource use.

Decommissioning of the Minto Spur transmission line will have short-term positive and negative socio-economic effects due to activity in the MS Project Site Area when certain portions of the line and structures are removed. There will be short-term disruptions to resource use in this site area and the adjacent vicinity due to activity by work crews in the ROW (although the incremental effect of MS removal may be minimal relative to concurrent decommissioning of other Minto Mine facilities); however, there will also be short-term employment opportunities arising from demolition work, hauling and other tasks required to decommission and remove parts of the MS transmission line. Any adverse effects of decommissioning activities will be mitigated through adhering to the decommissioning practices set out in Section 5.10 of the Project Proposal Submission. Decommissioning is expected to dissipate, over time, the long-term effects due to the initial creation of the MS ROW as the affected part of the MS Project Site Area returns to pre-Project conditions.

The primary means of mitigating both short-term and long-term adverse Project socio-economic effects has been through the process of careful route selection to avoid key areas of traditional resource use and heritage sites as well as viewsapes that are important to local aesthetics and the tourism industry, and where feasible, to provide appropriate vegetative buffers between the new ROW and the Klondike Highway. Additional VC-specific mitigation measures will be applied where necessary, including timing of construction and maintenance activities, prior notice to local residents and resource users of such Project

activities, monitoring of site activities to prevent disruption of heritage resources, cooperative planning with local First Nations and resource users to limit undesired access to the ROW, and compensation to trappers whose trapline infrastructure and/or productivity is directly affected by Project construction.

For all Project activities the relevant portions of the Yukon Energy EMS best practices set out in Reference Materials 5R-1 will be followed to assist in mitigation of Project environmental and socio-economic effects. These include:

- Yukon Energy's EMS best practices for Emergency Response (includes fuel spills)
- Yukon Energy's EMS best practice for ROW Brushing (includes timber salvage and access)
- Yukon Energy's EMS best practice for ROW Maintenance (includes access)
- Yukon Energy's EMS best practice for Water Bodies, Wetlands and Stream Crossings
- Yukon Energy's EMS best practice for Permafrost
- Yukon Energy's EMS best practice for Heritage Resources

Decommissioning activities will adhere to the decommissioning practice recommendations set out in Section 5.10 in Chapter 5 of this Project Proposal.

Due to mitigation adopted, adverse socio-economic effects on the Project Study Region due to the construction and operation and decommissioning of the Project are expected to be low in magnitude and specific to parts of the Project Site Area. No adverse socio-economic effects are expected to be discernable beyond the Route Study Area and most such effects will be specific to the Project Site Area.

Construction, maintenance and decommissioning activities in the ROW will have positive socio-economic effects on local employment and the local economy, as well as short-term and low magnitude impacts on government fiscal flows in the Project Study Region.

Long-term socio-economic effects resulting from biophysical effects caused by the existence of the permanent ROW will be restricted to the Project Site Area; such as effects due to increased access for local resource users as well as for resource users from outside the Project Study Region, effects on harvesting of plants or timber salvage in the ROW, any electrical effects, and effects on aesthetics. Due to mitigation, any adverse socio-economic effects due to such impacts related to the permanent ROW are expected to be low in magnitude and confined generally to the Route Study Area.

Throughout the operations phase of the Project there will be positive regional socio-economic effects due to the development of electric grid connection and extension of infrastructure that may support ongoing industrial and other economic development in the Project Study Region and enhance overall WAF and MD system reliability, economic efficiency and flexibility in power supply resource use. Increased system reliability and the potential to attract and serve new industrial loads will also tend to benefit utility ratepayers as well as government fiscal flows.

Effects of the Project on socio-economic VCs in the Project Study Region are expected to combine with other relevant future actions that will occur in the Project Study Region (see Assessment Approach, as described in Chapter 3). Such future projects and activities are assumed to include the proposed

Carmacks Copper Mine in the Williams Creek area and YECL distribution lines connecting to the CS substations at Pelly Crossing and Carmacks (see Section 3.4.4); in contrast, the Project's effects are not considered likely to combine with effects of other forestry, mining or other projects for which proposals have been submitted to YESAB (see Table 3.4-1).

As noted in Chapter 6 (Section 6.3), effects on socio-economic VCs can be interpreted by people according to their past experience with transmission projects such as the Mayo Dawson Transmission Project, as well as on their current way of life and how they perceive their way of life will be in the future (i.e. how the change of building a new transmission project will fit with their current way of life and community today, and their goals and aspirations for improving their community tomorrow). The Mayo Dawson experience, for example, has helped guide the current Project Proposal route selection and PIP processes to be done differently, with meaningful and timely consultation with affected communities receiving a high priority.

8.3.1 Resource Use

As previously identified in Table 6.3-1 and Section 6.3.2, the socio-economic VCs identified for assessment of the Project for Resource Use include:

- Traditional and Domestic Land and Resource Use
 - Trapping
 - Hunting
 - Fishing
 - Collection and Use of Plants,
 - Timber Harvesting
 - Protected Areas
 - Outdoor Recreation
- Commercial Land Use
 - Tourism
 - Outfitting
 - Agriculture
 - Mining
 - Aggregate Sites

Commercial Fishing and Oil and Gas Extraction were not included as part of the socio-economic effects assessment as it has been determined that the Project has no effect on these activities. Since creeks and rivers will be spanned and no structure will be placed in creek beds or river beds there will be no adverse effects on fish or on fishing resulting from the construction, operation or decommissioning of the Project. There are no active oil or gas developments in the Project Study Region.

8.3.1.1 Traditional and Domestic Land and Resource Use

The MOU between Yukon Energy and the NTFN provides for consultation on the Project route selection to identify and address the potential environmental impacts and potential socio-economic impacts and benefits of the Project and related activities, including impacts on affected traplines owned by NTFN

citizens, and to identify the best ways to enhance benefits and to avoid, mitigate or compensate for negative effects. Yukon Energy committed in the MOU to strive to avoid direct impact on trapline improvements owned by NTFN citizens, including such improvements not located on settlement lands.

Further, to avoid issues with final route construction and related land use, such as those experienced with the recent Mayo-Dawson Transmission Project construction, Yukon Energy committed in the MOU:

- To proceed with its construction of the Project line, if approved, within a pre-identified specific final route and access corridor (this Project Proposal sets out Yukon Energy's proposed final route in this regard); and
- To employ or sponsor the NTFN employment of one or more project monitors whose duties, among other things, shall be to ensure on-site that the Project line, as it is constructed, is at all times located in compliance with the approved final route and access corridor and to bring forthwith to the attention of the NTFN and Yukon Energy for action any departure or proposed departure there from.

Trapping

The CS transmission line will intersect 11 trapping concessions and the MS transmission line will cross 3 trapping concessions. The disruptions caused by Project construction, recurring maintenance and decommissioning activities are each expected to have short-term effects on the ability of these trappers to access their traplines and to earn an income from trapping activities. Experience from other jurisdictions indicates that wildlife will also temporarily avoid the areas in proximity to the ROW during construction activities. Project related effects on trapping will be most pronounced during initial brushing and clearing activities of the proposed Project ROW and, to a lesser extent, the substations.

The PIP process identified a longer term concern; if the transmission line ROW was immediately adjacent to the Klondike Highway, it would be more difficult for small furbearing animals to cross the ROW areas for the combined road and transmission line. This concern was identified by members of the First Nations, the Renewable Resource Councils, and the YG regional biologist. Aside from this specific concern, clearing and maintaining a ROW will increase habitat for small furbearing species that prefer open, low-vegetation environment; however, the ROW may also create an edge effect whereby predatory species (such as coyote, fox and wolf) may use the cleared ROW for hunting furbearing prey. The existence of cleared ROW well away from the current road corridors may also contribute to new habitat fragmentation in some areas. (See Section 8.2.2.8)

Access created by the line ROW provides both positive and adverse ongoing effects on trapping. The ROW will enable trappers to access their trapline more easily by ATV, snowmobile or on foot; however, the ROW may also enable others to access these areas.

A key component of mitigation has been the utilization of route selection process to avoid specific trapping areas and/or trapline infrastructure (e.g., cabins). The new or expanded substations avoid key trapping areas and have been located adjacent to existing or future infrastructure such as the Klondike

Highway, airstrips, an aggregate site, an existing substation, and a cleared site within the Pelly Crossing community.

Further discussions with individual trappers will occur prior to start of construction. Where it is required and where it is feasible, the Proponent will provide assistance to trappers during the construction phase to relocate their traplines and/or cabins. Compensation will also be provided for a fixed period of time for potential loss of income due to disruptions caused by construction. Details regarding trapper compensation are to be addressed by the Proponent with the NTFN as part of the Project Agreement pursuant to the MOU. Trappers will be given advance notice of construction and will be provided with a schedule for construction activities.

In order to address the concern that locating the transmission line ROW adjacent to the Klondike Highway would impede the ability of small furbearing animals to cross, where it is feasible a vegetative buffer of at least 30 metres is being incorporated into the Project design in most areas where the ROW runs adjacent to the Klondike Highway⁵. For the MS transmission line, the ROW generally will be shared with the mining road allowance; however, the road receives a lower volume of traffic than the highway. Further, the road ROW and MS transmission line are each smaller than the ROW for the highway and the CS transmission line, and the MS transmission line will be decommissioned in most areas when the Minto mine closes.

To mitigate any adverse effects due to the Project ROW providing increased access for opportunistic hunters, the Proponent will adhere to Yukon Energy's EMS best practices for ROW access, and will also consult with the regional **Resources Management Officer (RMO)**, the local First Nations and affected trappers to examine additional measures such as appropriate methods to restrict undesired access to the ROW in trapping areas.

Short-term residual adverse effects on trapping whereby disruptions from Project construction, maintenance and decommissioning activities affect trappers and cause animals to avoid trapping areas will be mitigated primarily through route selection to avoid specific trapping areas and infrastructure, as well as through the other measures noted. These short-term effects are therefore expected to be low in magnitude and specific to the Route Study Area in close proximity to the Project Site Area.

The long-term residual adverse effects on trapping due a cleared footprint contributing to wildlife habitat loss, a cleared ROW increasing access for trappers and opportunistic hunters and from habitat fragmentation and the creation of a potential barrier along the Klondike Highway, will be mitigated primarily through route selection to avoid the most sensitive areas, to provide appropriate vegetative buffers in many areas, and to locate permanent structures such as substations adjacent to previously disturbed areas. Other mitigation measures will also be adopted, including consultations on appropriate ways to restrict undesired access to the ROW in trapping areas. Accordingly, based on these considerations, any long-term adverse effects on trapping activities are expected to be low in magnitude and specific to the Project Study Region in close proximity to the Project Site Area.

⁵ See Section 8.2.2.2. Only a very small portion of the CS ROW (less than 9% through each of the three line segments) is less than 30 metres distance from the Klondike Highway or other major road corridor.

Hunting

For activities undertaken with regard to construction, maintenance and decommissioning of the MS transmission line, there will be direct adverse effects on the people who hunt in the immediate Project Site Area, and an indirect effect on hunting in adjacent areas. Hunting will be restricted when construction, operation and decommissioning activities are undertaken due to safety concerns for crews undertaking Project activities and the availability of wildlife in certain areas may be affected during construction and maintenance of the line ROW, as noise, fumes and smoke from construction equipment and burning of the brush piles will cause wildlife to avoid the area temporarily.

The existence of a permanent ROW will result in additional site-specific areas being accessible for hunters where access in the past may have been limited. This may be a positive effect for some local hunters, but may also be seen as a negative effect by local hunters if it leads to increased access to these areas by non-local hunters.

Mitigating the effects of construction and operation activities has included route selection of the transmission line ROW to avoid critical wildlife habitat and locating substations adjacent to existing infrastructure or previously disturbed areas. In addition, a vegetative buffer is provided in most areas between the ROW and the existing highway.

Prior to construction and maintenance brushing activities, advance notification will be provided to local communities to ensure hunters are aware of construction and maintenance activities in their local area. For safety reasons, hunting by construction personnel will not be allowed. Measures designed to mitigate adverse impacts of increased access to non-local, opportunistic hunters include following the Proponent's EMS best practices for ROW access and consultation with community members, local First Nations and the regional RMO to implement access restrictions and control measures where deemed appropriate.

Short-term adverse effects on hunting activities in local communities caused by wildlife scattering from the Route Study Area due noise, fumes and smoke produced by construction, operation and decommissioning activities will be low in magnitude. Adverse effects on hunting during such short-term periods of activity are expected to diminish with distance from the ROW and be confined to the Route Study Area in the vicinity of the Project Site Area.

Long-term effects on local hunting due to increased access to areas adjacent to the transmission line ROW will have both positive and negative effects in the Project Study Region. Adverse effects are expected to be low in magnitude since mitigation will restrict undesired access to the Project ROW, and be confined to the Project Study Region in the vicinity of the Project Site Area.

Fishing

The waterways within the Project Study Region are productive for chum and Chinook salmon, Arctic grayling, whitefish, inconnue, burbot, Northern pike (in lakes), and Long-nosed suckers. The salmon species are a significant part of the local culture, economy and diet for the NTFN people.

While fishing has been an issue of concern for First Nations, government and other public organizations, the Project will not be conducting any in-stream work. Where it is necessary, any line-stringing activities across creeks or rivers will occur by stringing the line by helicopter and/or by working in the riparian zone under frozen ground conditions (such as rivers and at Tatchun Creek). All fisheries guidelines for creek and river protection will be followed to ensure there is no increase in sedimentation or loss of riparian quality. Spanning creeks and rivers will occur with minimal hand clearing (removal of danger trees) within 30 metres of creeks and rivers in order to maintain the integrity of the riparian zone (Yukon Energy's EMS, Section C.4.3, #4, Section C.4.8, #1; DFO Pacific Region Operational Statement: Overhead Line Construction, v.2, 2006). Avoidance, Project timing and adherence to DFO guidelines will result in the needed mitigation. (See also Section 8.2.3)

Accordingly, based on the mitigation measures to be adopted, it is expected that there will be no detectable residual adverse effects on fishing as a result of Project construction, operation or decommissioning activities.

Collection of Plants

Throughout the Project Study Region the local residents gather berries for sustenance and other plants for medicinal purposes. Route selection has endeavoured to avoid all known and important traditional resource use sites along the route. Some of these plant collection areas have been identified and will be avoided; however, although community members were involved in the route selection process, not all traditional plant gathering areas have been identified by local residents for this Project Proposal as they wish to keep this knowledge within the community.

Some of the identified plant gathering areas used by local residents may be impacted by Project-related activities such as the removal of valued plant species during construction and during the brushing and clearing required for both construction and for maintenance activities that are to recur every seven to ten years. The existence of a permanent ROW will increase access to certain berry picking areas for members of the community but may also provide access to traditional plant gathering areas for others outside the community. Some areas have the potential to produce more berries in the first few years following any brushing and clearing work required for construction and maintenance activities (Berkes and Davidson-Hunt, 2005); over the long-term brushing activities that will be required every seven to ten years are expected to encourage the growth and production of berry producing plants.

During construction, maintenance and decommissioning activities, Yukon Energy's EMS best practices for access will be followed. Additionally, over the operational life of the CS transmission line any adverse effects due to ROW brushing and clearing will be mitigated through timing when such activities will occur, providing notice of such activities to communities, and using equipment designed to minimize damage. Measures designed to mitigate adverse impacts of increased access to non-local, opportunistic plant gatherers include following the Proponent's EMS best practices for ROW access and consultation with community members and local First Nations on the implementation of access restrictions and control measures where deemed appropriate.

Short-term adverse effects due to disruption of berry producing plants and medicinal plants resulting from construction, maintenance and MS decommission activities will be restricted to the affected Project Site Area and be low in magnitude since route selection has avoided most important resource use sites. Ongoing ROW maintenance will also have short-term positive effects as brushing and clearing activities undertaken every seven to ten years will stimulate growth of berry producing plants.

Long-term effects due to the existence of a permanent ROW will be positive and negative in the Project Site Area as access along the ROW will provide access to resource use areas for both community members and for others outside the community. Since route selection has sought to avoid key traditional resource areas, and additional measures will be considered to restrict undesired access where appropriate, the magnitude of Project effects on plant collection is expected to be low and specific to certain Project Site Areas.

Timber Harvesting

As reviewed in Chapter 6, the vast majority of timber harvesting that occurs in the Project Study Region is for fuel wood that is consumed by local communities that rely on wood for home heating. There are currently four active permits within the Project Study Region and all of these permits expire before the end of 2006; however, additional permits may be issued in the fall of 2006 for seasonal fuel wood cutting.

The CS transmission line ROW and related access trails could improve access for local residents involved in fuel wood harvesting. There has been some discussion with the YG Forestry office regarding utilization and timber permitting for the pockets of medium to high density stands of timber in the proposed Route Study Area. This could increase the level of utilization and reduce the amount of material that will need to be burned along the Project Site Area during the initial construction phase brushing and clearing.

The MS transmission line is predominantly sited through the 1995 Minto Burn area. Accordingly, opportunities for timber salvage along the MS transmission line are considered rare due to the extensive nature of the Minto Burn and the prohibitive distance that fuel wood would have to be hauled from the Minto Creek area.

Route selection for the CS transmission line ROW has avoided significant fuel wood harvesting areas that have been identified by local communities. Additional mitigation will include following the Proponent's EMS best practices for timber salvage with regard to construction activities for both CS transmission line ROW, the MS transmission line ROW, and the required substations. It is also expected that the Project Agreement with the NTFN will address local community access to timber salvaged from Project construction.

The short-term effects of timber salvage in the Project Site Area during construction will be positive and low in magnitude.

Long-term positive effects due to the existence of a permanent ROW will include increased access to timber harvesting opportunities in the Route Study Area adjacent to the ROW. These effects will also be low in magnitude.

Protected Areas

There are three designated protection areas and one recreation site in the Project Study Region. The protection areas are the Lhutsaw Wetland Habitat Protection Area, the Ddhaw Ghro Habitat Protection Area and Jackfish Lake Park Reserve. The recreation site is the Five Finger Rapids viewing area.

Each of these four areas have been avoided during the route selection process by placing the proposed transmission line on the opposite side of the Klondike Highway from the protected area or site. This was the primary form of mitigation and in conjunction with maintaining a vegetative buffer between the line ROW and site results in no Project-related effects being expected on these protected areas.

Outdoor Recreation

Chapter 6 outlines the multiple outdoor recreation and wilderness activities available to residents in the Project Study Region in addition to hunting, fishing and other resource use activities already noted. Concerns have been expressed over possible conflict with regard to construction activities and the use of recreational sites, especially the Tatchun Creek campground.

Local camp sites and other special outdoor recreation areas, including such sites in the Tatchun Creek area, have been avoided by the route selection process for the Project. A 30 metre vegetative buffer will also be used in many areas where the ROW runs adjacent to the Klondike Highway. Maintenance activities will also be timed to occur outside of periods when the campground is in use. Improved access resulting from the new ROW during operation of the Project may provide positive outdoor recreation effects for some local residents.

The short-term effects of Project construction and maintenance activities on outdoor recreation will be low in magnitude and site-specific given route selection to avoid local campsites and timing to avoid peak campground use. Overall, it is expected that there will be long-term low magnitude positive effects on outdoor recreation due to improved access to areas for recreational activities.

8.3.1.2 Commercial Land Use

Tourism

The Yukon Interior region is perceived as a wilderness environment by many residents and visitors alike. The Klondike Highway and the three rivers in the Project Study Region are used as tourism corridors. The majority of tourist traffic follows the Klondike Highway from Whitehorse to Dawson City and beyond, while the Yukon, Stewart and Pelly Rivers are used for boating and wilderness tourism. This river tourist activity is generally of a very small scale in comparison to the Highway traffic.

Communities in the Project Study Region benefit from the tourism industry by providing fuel, food, attractions and accommodations; however, this infrastructure is minimal within the Project Study Region. Concerns have been raised that the perception of wilderness environment that the tourism industry in the area relies on will be altered by short-term construction, maintenance and MS Project decommissioning activities, and that the long-term presence of a transmission line ROW will visually impact tourism by adversely affecting the perception of wilderness. In this context, completion of decommissioning of the MS transmission line which restores the affected area to Pre-Project conditions over time would be perceived as removing a potential negative long-term effect that would otherwise occur.

Part of the CS Project Site Area and MS Project Site Area may intersect the Yukon Quest Trail, or create alternative travel areas for the Yukon Quest race in low snowfall years.

The adverse effects of the Project on visual impacts have been primarily mitigated through careful route selection; however, the visual impact (both real and perceived) that the new transmission line will have on tourism will be further mitigated by:

- timing many construction, maintenance and decommissioning activities to occur during the off season (i.e. winter months);
- using at least a 30 metre vegetative buffer between the Klondike Highway and the Project ROW wherever feasible;
- avoiding key scenic views (i.e. line ROW on the opposite side of the Highway to the views, and behind benches or hills); and
- creating indirect access through treed barriers, if necessary and where feasible.

Additional mitigation will include following YEC's EMS best practices on access trails.

Measures to mitigate adverse impacts where the ROW intersects with the Yukon Quest Trail will include timing construction to avoid activities immediately prior to, and during, the race (mid-February) in those specific areas of concern and providing advanced notification to the Yukon Quest organization to coordinate activities during this time period. Guards will also be installed on guy conductors, as outlined in the Proponent's EMS manual on best practices (Appendix 5a, Section C.4.9). Short-term effects on the Yukon Quest due to construction and maintenance activities in the Project ROW and long-term effects due to the presence of a permanent ROW will be low in magnitude and occur within a localized area of the Project Site Area.

Short-term adverse effects of Project construction, maintenance and decommissioning activities on the perception of wilderness and consequently tourism are expected to be low in magnitude since route selection (including the use of a vegetative buffer in many areas) is expected to reduce impacts on the perception of wilderness at key viewing areas in the Project Study Region. Long-term adverse effects on the perception of wilderness and tourism due the existence of the permanent transmission line ROW will similarly be low in magnitude for the Project Study Region since route selection has avoided placing the transmission line in key viewing areas and a vegetative buffer will screen the line from key viewscapes in many areas.

Outfitting

Chapter 6 provides details on the types of activities associated with the three outfitting concessions in the Project Study Region. Outfitting accounts for a portion of tourist traffic in the Region for guided hunting and fishing trips. As a result of the route selection process, these outfitting activities take place largely in remote areas, well outside the Route Study Area where Project construction, maintenance and decommissioning activities will be concentrated.

Based on the above considerations, the Project construction, maintenance and decommissioning activities will have no detectable effects on outfitting activities. Accordingly, no further mitigation is required.

Agriculture

There are several agricultural land holdings and applications in the Project Study Region. Through route selection, all of the active agricultural land holdings will be avoided.

Only one agricultural land application that is in process, and has been challenged, will be crossed along its eastern edge immediately south of McGregor Creek on the west side of the Klondike Highway. Due to the fact that the application is under challenge it is unclear at this time whether an easement will be required. If the challenge is successful, the land will revert to Crown land; conversely, if the application is successful there will be restrictions on hunting and trapping activities in the area of that land holding (and in surrounding areas) which will reduce the CS ROW impacts on these resource use activities. Yukon Energy may need to arrange an easement with the land holder upon completion of the agricultural land application; however, it is possible that the brushing and clearing activities may actually benefit the land holder since no clearing has been done on this property. Mitigation includes route selection and negotiation as required with the agricultural land lease holder leading to an easement which is in keeping with Yukon Energy's current practices

Mining

Sherwood Copper's Minto Mine will be provided with lower cost hydroelectric grid power as a result of construction of the first stage of the Project: the CS line from Carmacks to Pelly Crossing and the MS line from the Minto Substation to the mine site. The availability of grid power will reduce overall mine operating costs⁶.

Within the Project Study Region there are additional mineral exploration activities, mining claims, and the proposed development of the Carmacks Copper Mine. In the event that the Carmacks Copper Mine is developed, it will likely arrange for its own transmission spur line access at 138 kV to the CS line near McGregor Creek (and thereby secure material reductions at the mine for on-site diesel-fuel generation capacity as well as operations costs). The existence of the Project will facilitate future benefits for other mining developments in the Project Study Region.

⁶ This is addressed further under Economy (Utility Ratepayers).

In summary, there is expected to be a long-term positive low to moderate magnitude benefit from the Project on mining that develops in the Project Study Region.

Aggregate Sites

There are 23 aggregate sites along the Route Study Area. Of these, 18 are active and 7 may be crossed by, or are immediately adjacent to, the CS transmission line. An active aggregate site may only be using a portion of the designated land.

Yukon Energy has engaged in discussions with Government of Yukon Department of Highways with regard to gaining access to, establishing infrastructure on (MS Substation and pole placement), and spanning aggregate sites with Project transmission lines. As a consequence of the noted discussions, the CS transmission line has been routed to avoid areas of particular concern, such as locations where equipment may be active and identified significant quarry sites. In addition, the MS substation location has been selected in part to facilitate providing power access (as requested by Highways) to the adjacent aggregate site. Yukon Energy will acquire the necessary permits and easements as required to enable the transmission line to cross any aggregate site.

With mitigation any residual effects of Project construction on aggregate sites are expected to be low in magnitude and short-term in duration in a few specific parts of the Project Site Area. Any residual effects of Project operation and maintenance activities on aggregate sites are expected to be low in magnitude and of long-term duration in the Project Site Area.

In summary, during all Project phases residual effects of the Project on aggregate sites are expected to be negligible.

8.3.2 Economy

As previously identified in Table 6.3-1 (Section 6.3.3), the socio-economic VCs identified for assessment of the Project on Economy include:

- Local Economy
 - Local Employment and Training
 - Local Business
- Regional Economy
 - Government Fiscal Flows and
 - Utility Ratepayers

8.3.2.1 Local Economy

Local Employment and Training

Brushing and clearing crews will be sourced locally for the Project from NTFN⁷, and trucking/hauling is also expected to be sourced locally. The number of crews that will be working simultaneously on brushing and clearing has yet to be finalized, but Stage One may include up to four crews of five workers each, working for a period of about 1.5 months, in addition to trucking and hauling (see Section 5.8.2). Somewhat smaller employment opportunities may be associated with subsequent Stage Two ROW preparation activities.

Since no companies within Yukon are known to have the capacity and expertise in transmission line construction to bid on the Project, the CS transmission line and MS transmission line construction workforce is expected to be sourced from specialized businesses from outside of the territory (see Section 5.8.3); however, a small number of labourer positions and trucking/hauling services may be sourced locally for line construction.

Substation clearing and site preparation will be sourced locally, and substation building construction may be sourced locally as well, depending on the building specifications. Site preparation crew size is expected to be small (likely between five to ten people) and the work is expected to be concurrent with ROW clearing and to take up to three months for each Stage (see Section 5.8.4). Installation of substation equipment will be sourced from outside the territory.

Yukon College representatives have met with Yukon Energy during the PIP (Round Two) to discuss potential training opportunities related to Project construction. Training and skill development is expected to be minimal, but may include workplace safety and first-aid.

Wages for local labour are expected to conform to the Yukon Territorial Government Fair Wage Schedule, current to the latest published update at the time of construction. Effective April 1, 2006 wages for the occupations expected to be utilized in construction are as follows:

- Category A Class: paid at \$26.63 per hour
 - Linesperson (electric)
- Category B Class: paid at \$23.87 per hour
 - Heavy Equipment operator (bulldozer, grader, loader, scraper or equivalents)
 - Truck Driver (heavy – ten ton Gross Vehicular Weight and up)
- Category C Class: paid at \$21.18 per hour
 - Truck Driver (three to ten ton Gross Vehicular Weight)
- Category D Class: paid at \$19.21 per hour
 - Labourer

⁷ As per the MOU (between YEC and NTFN) provisions to provide NTFN business entities with the opportunity to provide on a sole source basis all route clearing and brushing activities required by the Project. The MOU also provides NTFN business entities with the opportunity to participate in the open competition for the contract to construct the Project powerline, and provides qualified NTFN citizens the opportunity and preference to be employed by Yukon Energy's contractors for the Project.

Detailed work plans and worker requirements are not yet available, but the above local construction positions will be short-term and non-repeatable. The small scale and short-term nature of local employment opportunities precludes any meaningful multiplier analysis. No indirect job creation is expected and crowding out is not expected to be a concern given the high unemployment rates observed in Project Study Region.

ROW preparation activities during construction of the Project will have short-term positive effects on local employment that are low in magnitude.

During the operational phase of the Project there will be low magnitude short-term positive effects on local employment and training. Normal operation and maintenance will be handled by existing Yukon Energy staff; however, occasional brushing and clearing activities required to maintain the CS transmission line ROW are expected to recur every seven to ten years and will be sourced locally from NTFN resulting in short-term employment for a small number of labourers. Opportunity for training and skills development is expected to be limited. The small scale, intermittent nature of these effects and the long time interval between local employment opportunities precludes any meaningful multiplier analysis, and no indirect job creation is expected.

Decommissioning of portions of the MS transmission line may have low magnitude and short-term positive effects on local employment as local employment opportunities for demolition, general labour and hauling/trucking may arise. Work plans and details for decommissioning work are not yet available, though it is anticipated that the labour force will be drawn locally. The employment effects will be short-term and non-repeatable in nature.

In summary, the Project's effects on local employment are expected to be positive, very small in magnitude, and short-term in duration during each of the various phases..

Local Business

Effects of the Project on the local NTFN traditional economy are reflected in the assessment of effects on resource use (see Section 8.3.1.1, Traditional and Domestic Land and Resource Use).

Local NTFN businesses are expected to be directly employed in the brushing and clearing, and local trucking/hauling businesses are also expected to be directly employed in the brushing and clearing and line construction phase of the Project. Businesses providing services ancillary to construction, such as lodging, meals and fuel, are also expected to see small positive effects. These businesses are not expected to encounter supply constraints as construction will occur primarily during the winter months and outside of peak tourist season. No new business creation is expected and crowding out is not expected to occur.

The bulk of construction materials, poles and transmission conductors are to be sourced from outside the territory as no suppliers within the territory are known to carry transmission line materials. Construction materials for buildings at the substation sites may be sourced locally but the substation equipment will be purchased outside the territory.

There are expected low magnitude short-term effects on local businesses associated with the infrequent brushing activities and consequent demand for services ancillary to operation and maintenance of the substations. Local NTFN businesses are expected to be contracted for the brushing work over the life of the transmission line and some nominal amount of spending on fuel, meals and supplies associated with brushing and substations maintenance will occur. There is not expected to be any new business creation and no crowding out is expected.

During the decommissioning of the MS line, local contractors may be sourced to conduct demolition and site clean-up for the transmission line. Details for decommissioning work are not yet available and it is unclear where the decommissioning labour force would be sourced from. Indirect effects may result from demand for services ancillary to decommissioning such as fuel and supplies, meals and lodging.

Work plans and details on construction will be finalized only after the detailed design and tendering have been completed. The small scale and short-term nature of these effects precludes any meaningful quantitative or multiplier analysis.

In summary, the Project's effects on local businesses are expected to be positive, very small in magnitude, and short-term in duration during each of the various phases.

8.3.2.2 Regional Economy

The Project is expected to provide regional economic benefits within the Project Study Region and the broader Yukon region. The MOU between Yukon Energy and NTFN provides a framework for understanding and assessing these benefits.

The MOU states that the establishment of the Project is expected to provide the following beneficial effects in this regard:

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

The MOU more specifically commits that the CS Project route, to the extent practicable, shall be situated in the immediate vicinities of Minto and Pelly Crossing (which is currently served only by diesel fuel generation) and Stewart Crossing so as to be most conducive to the community development and other land use plans and priorities of the affected NTFN.

The MOU in addition sets out an understanding that the Project will be implemented so as to enable power to be delivered, by way of the Project, to residential and commercial customers in the Minto

Landing area and to the community of Pelly Crossing, at the same time and as part of the same stage of the Project which enables power to be delivered to the Minto Mine.

More specific assessments of effects on two specific VCs (government fiscal flows and utility ratepayers) are provided below.

Government Fiscal Flows

As reviewed in Section 6.3.3.2, the Yukon Government (YG) has near-term fiscal revenue interests related to Project capital expenditure funding and also related to mine sector developments (e.g., Minto mine and potentially the Carmacks Copper mine) that would be able to secure lower electricity costs due to the Project (and thus provide higher tax revenues to the YG). In the case of SFN, cost savings for the Minto mine due to the Project are similarly expected to provide increased royalty income yields. Longer term YG interests relate to developing electric grid connection and extension infrastructure to support ongoing industrial and other economic development in the Project Study Region and to enhance overall WAF and MD system reliability, economic efficiency and flexibility in power supply resource use. This would include securing reductions in use of diesel fuel generation with related reductions in ongoing emissions and economic leakages from the Yukon. No estimates with regard to the magnitude of these YG and SFN benefits have been made at this time.

In the event that the YG extends the current Rate Stabilization Fund (RSF) subsidy (see Section 6.3.3.2), YG fiscal flows will also benefit from utility rate savings resulting from the Project. No estimate has been made of the potential magnitude or duration of such potential YG cost savings.

YG infrastructure funding is expected to be required if the CS development in its entirety is to be developed at this time. Yukon Energy has proposed YG funding of \$10 million be committed (2005\$), with \$5 million for Stage One costs and the balance for Stage Two costs. No YG commitments have been made to date with regard to such construction-related funding.

In addition to the above effects, construction of the Project is expected to have positive effects on government fiscal flows which are low in magnitude and short-term in duration. Such effects will be one-time and be non-repeatable. Local NTFN, territorial and federal governments will be affected. Nominal increases in tax revenues are expected through increased income tax revenues, sales tax revenue, and business taxes. The Project is not expected to impose any material added expenditure burdens on local governments or the NTFN. Any specific additional NTFN benefit opportunities will be addressed in the Project Agreement to be concluded later this year.

Operation of the CS and MS lines is expected to have residual positive effects on government fiscal flows that are very low magnitude and long-term in duration. Such effects will be of moderate frequency throughout the life of the Project. Nominal increases in income and sales taxes are expected as a result of brushing and clearing which will recur every five to ten years. Local governments may also have increased revenues from grants in lieu or property taxes paid through the life of the Project by YEC on any land owned by YEC for substations. .

Nominal increases in income and sales tax revenue expected to result from the decommissioning activity will be positive, low in magnitude and short-term in duration. Such effects will be one-time and non-repeatable in nature.

Utility Ratepayers

As reviewed in Section 6.3.3.2, benefits are expected to be realized by all utility ratepayers when a new major industrial load or other currently diesel-served utility loads join the WAF grid.

The Stage One CS and MS development enables new firm Yukon Energy utility sales of surplus WAF hydroelectric generation to the new Minto mine (and provides the basis for YECL to connect to the Pelly Crossing community currently served by diesel generation), involving little to no incremental utility generation costs. Excluding consideration of any Project costs borne by Yukon Energy (i.e., costs not funded by YG or the Minto Mine), the present value of ratepayer net benefits from connection of the Minto mine and Pelly Crossing to grid power has been estimated at \$11.3 million⁸. The addition of the Carmacks Copper mine load, if and when this occurs, has been similarly estimated to yield further utility ratepayer net benefits having a present value of \$9.4 million.⁹ These rate net benefits serve to lower the revenue requirement to be collected from existing ratepayers. These benefits are contingent on the new mine load being realized, as well as other assumptions in the Resource Plan as to WAF Base Case forecast loads and supply developments.

The new industrial customers will also benefit from access to lower cost hydro electricity, securing cost savings through displacing the need to retain and operate significant on-site diesel generation.¹⁰ By way of example, operating cost savings for the Minto Mine would likely exceed \$3 million/year of grid power use while the Carmacks Copper mine operating savings would likely approach \$5 million/year¹¹. Each industrial customer will be fully responsible for all capital, operating and decommissioning costs related to any spur transmission line connecting the mine to the CS development as well as its related substation facilities. The LOI for the Minto mine also provides for additional levels of funding contribution by the mine towards the CS development (with potential rebate of such funding based on actual power purchases by the mine over the mine life).

Connecting the existing Mayo-Dawson (MD) and Whitehorse-Aishihik-Faro (WAF) grids is expected to increase firm electricity capacity for WAF, and lead to near term capital cost deferrals of up to \$4.5 to

⁸ Estimates are net of assumed rebates to the Minto mine and are subject to assumptions laid out in Yukon Energy Corporation Submission, 20-Year Resource Plan Supplement, Tab 2, pp. S2-14 (e.g., assumed power requirement at Minto Mine of about 24.5 GW.h/year and mine life of about 8 years)

⁹ Ibid, page S2-13 (net of assumed rebates) which indicates net benefits of \$20.7 million for serving the power needs of the two mines and Pelly Crossing.

¹⁰ The mine customers are expected to retain sufficient on-site diesel generation to meet emergency needs.

¹¹ Each customer would also secure capital cost savings, either through avoiding capital costs for material on-site diesel generation facilities (in the case of Carmacks Copper mine), or through being able to remove or otherwise use surplus on-site diesel generation facilities (in the case of the Minto Mine). Yukon Energy is reviewing with Sherwood Copper cost-effective opportunities for Yukon Energy to utilize the surplus on-site diesel generation facilities to assist in meeting WAF near term capacity planning requirements. The cost savings assessments exclude any potential added benefits these industrial customers might secure from use of interruptible secondary sales energy from the WAF grid.

\$5.4 million. The connection is also expected to result in avoided diesel energy generation costs of up to \$4.7 million in present value to 2025¹². These benefits are contingent upon Stage Two of the Project being undertaken, to fully integrate the two existing grids.

The financial obligation of the utility (Yukon Energy) for the Project on behalf of ratepayers will not extend beyond the amount that would be otherwise required to increase system capacity and reliability through increased diesel generation or other investments and costs. The Proponent is examining ways whereby some of the expected utility ratepayer benefits will be used to fund a portion of the Project costs.

Increased use of surplus hydroelectric generation on either WAF or MD as a result of the Project may lead to curtailment of secondary energy sales (particularly during peak winter periods when diesel generation could be needed to meet peak system loads); this effect will become material when and if the Carmacks Copper mine begins operation as a utility customer connected to the WAF grid.

Finally, Stage One development of the Project will facilitate YECL connection to the Pelly Crossing substation, thereby enabling YECL on a long-term basis to displace its reliance on diesel generation to serve this community. This change would remove from the community the noise and fumes associated with this diesel generation, and would also enable utility customers in Pelly Crossing to be charged "hydro" zone rates (rather than "small diesel" zone rates), thereby securing lower run-off electricity rates (see Section 6.3.3.2).

Operation of the Project will have a moderate positive effect on existing utility ratepayers, and future industrial ratepayers, during the period when major industrial mine loads are connected to the CS development. This positive effect will extend to all Yukon ratepayers (i.e., it will extend beyond the Project Study Region) and is expected to be long-term for the CS transmission line and to continue for six to ten years for the MS transmission line.

8.3.3 Social Context

As previously identified in Table 6.3-1 and Section 6.3.4, the socio-economic VCs identified for assessment of the Project on Social Context include:

- Community and Family Life
- Community Infrastructure and Services
- Public Health
- Aesthetics
- Heritage Resources

¹² Estimates are subject to certain assumptions laid out in Yukon Energy Corporation Submission, 20-Year Resource Plan Supplement, Tab 2, pp. S2-9. In particular, the estimates assume no other new mine loads on either the MD or WAF systems during the planning period.

8.3.3.1 Community and Family Life

Project effects on community and family life in the Project Study Region relate primarily to the effects on peoples' ability to pursue a traditional lifestyle during all phases of the Project. These local effects will arise in the Project Site Area when the ROW is cleared and the line is constructed. This type of Project Site Area effect will be repeated, to a lesser magnitude, during the required brushing and clearing activities undertaken during the maintenance phase of the Project, and again during any decommissioning phase activities for the MS transmission line.

As reviewed earlier (see Section 8.3.1.1), access created by the existence of a permanent ROW will have long-term positive and adverse effects on the pursuit of traditional lifestyle activities. The ROW will enable community members to access areas where traditional activities can be undertaken more easily by ATV, snowmobile, or on foot; however, the ROW may also enable others from outside the community to access these areas.

The route selection process has involved the NTFN directly, as described in Chapters 4 and 7, and has made every effort to avoid adverse effects on specific traditional use areas as a key component to mitigation. Mitigation has also included aligning the transmission line adjacent to an already disturbed environment such as the Klondike Highway in the case of the CS transmission line and the Minto Mine Access road for the MS transmission line. As indicated under Resource Use (Section 8.3.1.1), the Proponent will also provide assistance to trappers during the construction phase to relocate their traplines and/or cabins if needed and feasible and will also provide compensation for potential loss of income due to construction disruption for a fixed period of time.

To mitigate adverse effects arising from increased access the Proponent will follow their EMS best practices for ROW access and will incorporate consultation with community members and First Nations, where relevant, on desired barriers to access during the operation and maintenance phase of the Project.

The new or expanded substations avoid key traditional use areas and have been located adjacent to existing or future infrastructure or previously disturbed areas. Effects will be long-term as the footprint is cleared and removed from current use but they will be low in magnitude and extent in relation to the available land for traditional use activities in the Project Study Region as well as areas in the vicinity of each substation.

There will be both adverse and positive effects of the Project on the ability to pursue a traditional lifestyle during construction, maintenance and MS decommissioning; however, it is expected that any adverse effects will be short-term in duration and occur primarily within the Project Site Area. Since route selection has sought to avoid key traditional use areas and has placed structures near already disturbed environments where possible, effects of the Project on traditional use areas and traditional lifestyles are expected to be low in magnitude.

8.3.3.2 Community Infrastructure and Services

There will be no adverse effect on local schools or other infrastructure and services as there is no anticipated influx of residents to the Project Study Region due to the nature of employment opportunities, nor any direct effects on specific community facilities.

There will likely be a low positive effect on Yukon College as training opportunities may be offered to local community members in anticipation of employment during brushing and clearing of the line ROWs and preparation of the substation sites.

There may be a minor adverse effect during Project construction and decommissioning phases on community health centres due to job site accidents. In addition adherence to Workplace Health and Safety regulations for all construction workers, may require job safety training be available through local Yukon College programs. No further mitigation is required.

The Project will facilitate the future distribution of hydroelectric grid power to the community of Pelly Crossing (i.e. through future YECL distribution of lower voltage power). This will, in turn, facilitate the community displacing the use of diesel power, and provide access locally to "hydro zone" power rates which may reduce power costs for some community facilities and services (i.e., those consuming more than about 2,000 kwh/month).

8.3.3.3 Public Health

Overall, the Project is not expected to have any detectable effects on the determinants of public health (as reviewed in Section 6.3.4.6).

Normal safe practices will be followed during all Project activities, as regards both Project workers and other potential users of the affected site areas. During the construction and operation phases of the Project, guy conductors associated with pole structures will be equipped and maintained with guy guards to assist people in visually identifying conductors along the ROW. Safe practices will be followed with regard to marking of all river crossings. Yukon Energy's EMS Manual on best practices for line maintenance will also be observed. No detectable electrical effects on human health are expected from the operation of the Project (see Section 5.9.4).

8.3.3.4 Aesthetics

The Project Site Area is within a Project Study Region perceived by both visitors and residents as having a wilderness setting, with many significant views off the Klondike Highway (i.e., views of the Yukon River at a variety of locations, views looking back down valleys near Pelly Crossing and Crooked Creek, etc.).

Route selection has been the primary means of mitigating adverse impacts on aesthetics.

Mitigation measures relating to route selection will ensure the least possible visual impact of each river crossing within the Route Study Area. The proposed MS line will cross the Yukon River in a location in close proximity to where there is existing infrastructure (i.e., the existing barge landing), which will

minimize the visual impact of this infrastructure. The Stewart River crossing will be situated to the west of the existing Klondike Highway bridge, with a direct route into the existing substation. The Pelly River crossing location will be located just west of the Klondike Highway bridge and the existing distribution lines.

The visual impact (both real and perceived) the new CS transmission line will have on aesthetics will also be mitigated by avoiding recognized viewing locations and viewscapes, including those identified through the PIP (i.e. where feasible the transmission line ROW will be located on the opposite side of the Highway to viewing locations and behind benches or hills). A 30 metre vegetative buffer between the Klondike Highway and the transmission line ROW will also be incorporated wherever it is feasible. Infrequent brushing and clearing activities will be timed to avoid peak times when people are using the Highway and river systems. Where it is feasible and if necessary, indirect access to the transmission line ROW will also be provided through treed barriers. Additional mitigation will include following maintenance best practices in the Proponent's EMS Manual on access trails. Decommissioning of the MS transmission line will follow practices outlined in Chapter 5, Section 5.10 of this document.

With the application of mitigation measures residual adverse effects on aesthetics due to short-term construction, maintenance and decommissioning activities are expected to be low magnitude and restricted to parts of the Route Study Area in close proximity to the Project Site Area. Long-term effects stemming from the existence of a permanent ROW will be mitigated through route selection and the use of vegetative buffers and treed barriers, and as a result, any long-term adverse effects on aesthetics are expected to be low in magnitude restricted to parts of the Route Study Area in close proximity to the Project Site Area.

Decommissioning of the MS transmission line is expected to return the MS Project Site Area to pre-Project conditions over time and restore the aesthetics of the viewscape related to views from the Yukon River within the Project Study Region.

8.3.3.5 Heritage Resources

Construction of the CS transmission line and all CS substations will avoid all known heritage sites, but the CS Route Study Area will be in the vicinity of heritage resource sites at Tatchun Creek and north of Minto Landing (i.e. the Policeman Hill area). The Route Study Area may intersect the following sites where artefacts may potentially be found:

- At Lhutsaw Creek Terrace in CS line segment 2, immediately north of the Minto Sub location, the CS transmission line will cross the Von Wilczek Creek and travel along a terrace as it heads north. Since artefacts have been found along Policeman's Hill, it is likely that artefacts may be found in this vicinity. To address this, route selection has placed the CS routing 100 metres or more from the terrace edge. Further, a heritage inventory of the final design route through this area will be conducted prior to construction to ensure that any heritage resource not adversely affected by the Project.
- At Pelly Crossing in CS line segment 2, the routing through town and adjacent to the Pelly River will bring the CS transmission line near valuable areas for artefacts. This routing has

been suggested by SFN, and in part, reflects their perspective that this is not an area of comparative heritage value. At this location, the CS transmission line route will be at least 100 m back from the bank edge. In areas where this is not possible and where the area has not been previously disturbed, a heritage inventory will be completed prior to construction to ensure that any heritage resource are not adversely affected by the Project.

- At 11 Per Cent Hill and Crooked Creek crossing in CS line segment 3, the transmission line routing will follow the old road in the vicinity of Crooked Creek which raises potential for presence of artefacts. Crooked Creek crossing has been identified by NND as the best route option to mitigate possible heritage resources on west side of the bridge. Mitigation will include spanning of Crooked Creek, if feasible, in order to avoid heritage resources and issues with regard to poor terrain. With regard to 11 Per Cent Hill, the route will be placed at a distance from any possible terraces adjacent to Crooked Creek that have increased probability of heritage resources. The Project Site Area will be monitored during construction phase to ensure that any heritage resources are not adversely affected by the Project.
- At Stewart Crossing, the route selected was preferred by NND because it was further away from the community and any potential interference with cultural concerns. Higher ground at this location is also more suitable for a creek crossing. Because the route is located further back from the community, there is a reduced likelihood of effects on heritage resources and no further investigations are currently warranted; however, the creek crossing will be monitored during construction to verify this conclusion.

With regard to the MS route area, the Minto Landing site is the only road accessible riverboat timber fuel replenishing site in the Yukon and has substantial regional FN value due to the fact that it was a meeting place in the past. The Heritage Branch also considers the site to have interpretive value. It is considered that there may be an adverse effect at the Minto Landing site if the MS line is located in this area as the placement of poles and cables may adversely affect the interpretive value of the location in the future since development may be encouraged around this area. The MS transmission line crossing the Yukon River (as well as the MS facilities on the west side of the river) will be a temporary structure that will exist for the life of Minto Mine; the river crossing and the line on the west side of the river will be decommissioned following the practices established in Chapter 5, Section 5.10 of this document.

Mitigation measures related to the potential inadvertent discovery of unknown heritage sites during the Project ROW brushing and clearing activities includes adherence to Yukon Energy's EMS best practices for Heritage Resources, as well as flagging any newly discovered sites. Upon discovery of any new heritage sites, construction activity in proximity to the site will cease until the Lands Inspector indicates work can proceed. In areas where there is known high potential for heritage resource discovery, the Project EPP will recommend an archaeologist be present during ROW brushing and clearing activities. This is of particular concern in the Minto Landing area where the MS transmission line will intersect the Minto Landing community and be adjacent to two known heritage sites. Any adverse effects will be mitigated through the above listed measures.

During the operation and maintenance phase of the Project, heritage sites adjacent to the transmission lines may be affected. Mitigation measures will include adherence to Yukon Energy's EMS Manual on best practices for access. There are no expected Project effects on heritage resources related to operation and maintenance of the substations, or decommissioning of the MS transmission line.

Construction and maintenance effects of the Project on heritage resources are expected to be short-term and relate to activities undertaken in the Project Site Area. Route selection has avoided known heritage site areas and adherence to Yukon Energy's EMS Manual on best practices for Heritage Resources is expected to ensure that any effects on artefacts discovered in or adjacent to the Project Site Area will be low in magnitude and not significant.

8.4 OTHER EFFECTS

8.4.1 Effects of the Environment on the Project

In environmental assessment practice, the effect that the environment will have on the project is often considered as part of the environmental assessment and appropriate measures are applied to ensure that there will be no significant adverse effects in this regard. During the operational phase of the Project, for example, potential effects of the environment on the Project can occur as a result of ice storms, high wind events, forest fires and flooding.

Yukon Energy designs its transmission lines to meet or exceed the current CSA standard for overhead transmission systems. Current design practice involves the analysis of atmospheric weather data (i.e., wind, ice, wind/ice combination, etc.) Analysis of these weather factors provides the line design criteria used in determining strength requirements for structures, conductors, hardware and insulators. Design components are chosen to provide for a 50-year return period (i.e., meaning the line might fail once in a 50 year period due to climatic events [wind and ice]).

At some point, a forest fire could have an impact on Project transmission line structures. The potential likelihood of structure failure is low with the poles located within a cleared transmission line ROW and past experience with forest fires along the WAF line; however, it is possible that transmission line outages might be caused by insulator flashover as a result of ionization of the surrounding air due to smoke and ash from an intense forest fire.

Where applicable, potential flooding impacts are considered in the final design of transmission line structures; however these types of impacts are not typically a concern. Flooding is considered a concern only in those circumstances where a transmission line is routed through an area prone to floods such as the Big Creek area. In this location flood-prone areas are avoided by placing the poles on higher ground and spanning low lying areas. In areas of high water table or areas that are subject to flooding, structures can be erected on pile foundations to provide structural stability in the event of a flood. These circumstances are typically avoided through the route selection process; thus, it is not expected that the Project will be impacted in any significant way by flooding.

It has been suggested that the impact of climate change and its potential effects on the boreal forest ecosystem may result in a long-term increase in the number of extreme weather events (i.e., forest fire hazards, flooding, ice storms), an increase in infrastructure maintenance requirements due to the gradual change in permafrost (e.g., potential instability at structure foundation locations), and potentially more erratic water regimes resulting from more frequent or extreme weather events. Changes in forest composition and density as a result of climate change may directly or indirectly affect rainfall and snowmelt run-off rates. However, based on current information and projections, it is not presently expected that climate change will have a significant effect on the proposed CS Transmission Line and MS Transmission Line during their life cycle.

Yukon Energy monitors changes in the regional climate of the Project Study Region using climate information which includes measurements of temperature, precipitation and wind speed provided by the Meteorological Service of Canada. In addition, Yukon Energy monitors research work from the scientific community, in the area of global climate change, to assess the degree at which climate change is occurring in the Project Study Region as well as the overall WAF and MD grid areas.

An ongoing challenge to the scientific community is to determine the degree to which global climate is changing due to anthropogenic (manmade) causes such as increased greenhouse gas concentrations in the atmosphere as opposed to natural causes such as volcanic and solar activity. Yukon Energy will continue to monitor the capability of Global Climate models and Regional Climate models from the perspective of being able to duplicate climate change within the current climate regime. Once these models are calibrated to predict current climate regimes, they can be used with confidence to predict future climate trends and they may potentially be able to predict the frequency and magnitude of extreme events in the Project area (e.g., severe storms, wind events, ice storms).

8.4.2 Accidents and Malfunctions

YESAA¹³ and the YESAB Guides (Reference Materials 1R-2) require that significance of accidents or malfunctions be considered as part of the environmental and socio-economic effects assessment. In this assessment, possible accidents and malfunctions with regard to the Project were considered and appropriate mitigation is planned to be applied to ensure there would be no significant adverse environmental effects in this regard.

During construction and operation of the transmission lines and the substations, spills of hazardous materials could occur during re-fuelling of equipment or due to failure of station components. Soil contamination (which affects soil productivity) could potentially occur when a hazardous substance is spilled or leaked. Where contaminants enter ground water, there is a risk to public health and safety, as well as potentially adverse impacts on wildlife populations and habitat. The magnitude and duration of any potential effects of accidental spills depends upon the nature of the material spilled, the quantity spilled, the location of the spill, and the time of year when the incident occurs.

¹³ Section 42(1)(c) of YESAA sets out that an examination is required of the significance of environmental or socio economic effects of the project or existing project that have occurred or might occur in or outside Yukon, including the effects of malfunctions or accidents.

Construction under frozen ground conditions during the winter, where required or otherwise adopted, will facilitate the containment and recovery of any spilled material and reduce the potential effects on soils, watercourses and groundwater. Standard environmental protection practices, as described in Yukon Energy's EMS (Resource Materials 5R-1) and Job Site Spill Contingency Plan, Reporting Procedures (Resource Materials 5R-2) commit Yukon Energy to store fuel, lubricants and other potentially hazardous materials within dedicated storage areas in work camps and marshalling yards. Dedicated areas would be located away from any sensitive features and would provide spill containment, any necessary bermed storage areas, and spill response. Any products transferred from storage sites to work areas would not exceed the daily requirement. Yukon Energy also requires its contractors to have an emergency response plan in place that is consistent with Yukon Energy's EMS and spill response procedure.

Adherence to Yukon Energy's environmental protection practices and any additional specific mitigation measures identified as a condition of license approval, or in development of the EPP, will further minimize the potential impact of accidents or malfunctions on soil, wildlife or aquatic resources. Any potential adverse effects in this regard would likely be short-term and reversible.

As noted above, Yukon Energy designs its transmission lines to meet or exceed the current CSA standard for overhead transmission systems. Structures, insulators and hardware are selected to minimize the risk of failure. Regular patrols of the transmission lines are undertaken to ensure potential problems are identified and rectified in advance of a failure or malfunction.

8.5 RESIDUAL EFFECTS AND DETERMINATION OF SIGNIFICANCE

The approach for determining the significance of residual adverse effects has been set out in Chapter 3, Section 3.5.1. The assessment summarizes more detailed analysis provided in sections 8.2 and 8.3, including consideration as to how effects of the Project are expected to combine with other relevant future actions that will occur in the Project Study Region (See Chapter 3, Section 3.4).

For this assessment, the key criteria used initially to determine the potential significance of adverse Project residual effects were:

- Magnitude of the effect (level of detectability of effect, i.e., low, moderate or high)
- Duration of effect (short-term/ low and long-term/ high have been focused on in the assessment)
- Geographic or socio-economic extent of the effect (Project Site area/ low, beyond Project Site Area but within Project Study Region/moderate, and beyond Project Study Region/ high)

Additional criteria, such as frequency of effect, reversibility of effect and ecological/ socio-economic context or resilience, were only considered where an initial ranking based on magnitude, duration and geographic or socio-economic extent determines that there may be "potentially significant" effects or "significant effects" on the VC's selected for study.

Potentially adverse residual effects that are likely were initially ranked based on the above criteria and then their likely significance was rated based on the following definitions set out in greater detail in Section 3.5.1 of Chapter 3:

- To be “significant” effects must be long-term (high) duration, large (high) magnitude, and extend beyond the Project Study Region (high geographic or socio-economic extent)
- To be “potentially significant”, and merit further review, effects are either:
 - Low in extent and high in both magnitude and duration
 - Moderate in extent and either high in magnitude (regardless of duration) or moderate in magnitude and high in duration
 - High in extent and moderate or high in magnitude (regardless of duration)
- Not Significant/ low effects are either:
 - Low in magnitude, regardless of duration or extent, or
 - low in extent and not high in both magnitude and duration, or
 - short-term or moderate in duration and not high in magnitude or extent

Both environmental and socio-economic residual effects related to the Project were initially assessed based on the above-noted criteria.

It was determined that most adverse Project residual effects were short-term (low duration) related to activities undertaken during construction, brief periods during operation and maintenance or during decommissioning (in the case of the MS Project). Long-term (high duration) adverse Project effects were typically related to the existence of a permanent CS Project ROW. For the MS Project, ongoing effects during operation may be considered to be potentially only medium term (moderate duration) as the transmission line and infrastructure will be removed when the mine closes (which may occur after about ten years of Project operation).

Route selection resulted in likely adverse residual effects that are expected to be of low magnitude for all VC's as the most sensitive habitat areas, resource use areas and viewsapes were avoided; for all sensitive environments and wildlife species, the Project Site Area intersected only small parts of the total ecosystem-type or habitat area avoiding critical habitat and consequently affecting a minimal proportion of the terrain-type or the affected species' total numbers.

For both environmental VC's and socio-economic VC's, most of the adverse residual effects are expected to be specific to the Project Site Area and are not expected to extend past the Route Study Area within the overall Project Study Region. No likely adverse effects of the Project are expected to extend beyond the Project Study Region.

Generally, the short-term residual effects, due to activities undertaken with regard to Project construction, operation and maintenance and decommissioning, will be low in magnitude and only extend, at most, as far as the Project Study Region (medium extent). Long-term effects related to the existence of a permanent Project ROW are generally expected to be low in magnitude and generally confined to the Project Site Area (low extent).

No adverse residual effects are expected to be high magnitude and no adverse residual effects are expected to extend beyond the Project Study Region. Any long-term adverse residual effects expected to extend beyond the Project Site Area within the Project Study Region are expected to be of low magnitude. Based on these conclusions, no residual adverse effects of the Project are initially ranked as “potentially significant” or “significant”.

Since an examination of Project residual effects on VC’s based on the criteria of magnitude, duration and geographic extent found no “potentially significant” or “significant” effects on VC’s, it was not necessary to consider additional criteria such as frequency, reversibility or ecological or socio-economic context (resiliency).

Based on these conclusions, the Project is not expected to have any likely significant adverse residual environmental or socio-economic effects.

The following section summarizes the residual effects that the Project will have on the environmental and socio-economic VC’s that have been studied and the measures designed to mitigate impacts, before determining the significance of residual effects for each VC. The nature and extent of adverse residual effects associated with the Project are described generally in the following subsections, together with a rationale as to why the effects are considered insignificant.

8.5.1 Environmental Residual Effects

8.5.1.1 Physical Environment

This section summarizes the estimated residual effects of the Project on the physical environment in the Project Study Region (see Section 8.2.1). The assessment looks at the short-term and long-term effects that the Project is expected to have on sensitive terrain and on air quality. The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of residual effects are assessed and summarized in Table 8.5-1.

**Table 8.5-1
Summary of Residual Effects and Significance on Physical Environment**

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Biophysical VCs: Physical Environment			
Sensitive Terrain (steep slopes (VS:R), poorly drained soils (OWZ) and permafrost)			
Short-term construction, maintenance and decommissioning activities	Project-related activities such as the use of heavy equipment may cause slope damage; rutting and/or the removal of soil fixing vegetation may contribute to erosion.	<ul style="list-style-type: none"> Route selection to avoid sensitive terrain. Timing construction to occur in winter and/or strategic pole placement Use specialized equipment to minimize disturbance of the vegetative mat, the removal of soil-fixing vegetation and rutting on steep slopes. Where rutting occurs on steep slopes, wetlands or permafrost area ruts will be levelled or filled in to avoid erosion or damage to permafrost sub-soil. Yukon Energy's EMS best practices for ROW maintenance Follow practices outlined in Chapter 5, sections 5.10.3, 5.10.4 and 5.10.5 to negate impacts. 	Short-term, Project Site Area and Low Magnitude Low (-) Not Significant
	Accidental fuel spills	<ul style="list-style-type: none"> Follow Yukon Energy's EMS best practices for fuel spills 	Short-term, Project Site Area and Low Magnitude. Low to Negligible (-) Not Significant
Air Quality			
Short-term construction, maintenance and decommissioning activities	Machinery emissions and creation of dust could affect air quality in the immediate area.	<ul style="list-style-type: none"> Proper emissions controls installed on equipment and routine maintenance performed. Timing of construction activities 	Short-term, Route Study Area, Low Magnitude. Low (-) Not Significant
	Emissions from burning of slash.	<ul style="list-style-type: none"> Yukon Energy's EMS best practice for timber salvage will be followed. 	Short-term, Project Study Region, Low Magnitude. Low (-) Not Significant
Presence of long-term transmission project	The Minto Mine operations, likely Pelly Crossing, and potentially other mines such as Carmacks Copper will shift from diesel electricity generation to WAF grid surplus hydro-electricity.	<ul style="list-style-type: none"> Substantial reduction in use of diesel generator and consequent emissions will result in fewer adverse air emissions (including fewer GHG emissions). 	Long-term, Project Study Region, Low to Moderate Magnitude. Low to Moderate (+) Not Significant

With regard to the impact of the Project on sensitive terrain during the construction, operation and maintenance and the decommissioning phases of its lifecycle, it is anticipated that any adverse residual effects will be short-term and site-specific. Careful route selection has resulted in a ROW that avoids most sensitive terrain in the Route Study Area and where it has not been possible to completely avoid sensitive

terrain (such as steep slopes and poorly drained soils) construction has been timed to occur in winter and mitigation measures have been adopted which minimize disturbance to the vegetative mat. Decommissioning practices outlined in Chapter 5 Section 5.10.3, 5.10.4 and 5.10.5 will be adhered to in order to reduce impacts during the MS decommissioning process. The residual adverse effects of construction, operation and maintenance and decommissioning activities on the sensitive terrain are therefore expected to be low, short-term, site-specific and not significant.

With regard to the impact of activities undertaken during construction, operation and maintenance and decommissioning on air quality, it is anticipated that there will be some positive and negative effects which will be short-term and occur primarily within Route Study Area portions of the Project Study Region. Emissions from vehicles and the burning of slash that will negatively impact on air quality will be mitigated through use of proper emissions controls and routine maintenance on equipment, the application of dust suppression measures near communities and adherence to Yukon Energy's EMS best practices. When the Minto Mine, as well as Pelly Crossing, shift from diesel generation to surplus grid hydro electricity, it is expected that there will be positive residual effects due to the reduced production of diesel generation air emissions (including GHG's) in the Project Study Region. It is expected that with the application of mitigation, residual effects on air quality will be both positive and negative, low to moderate (in the case of positive reductions in diesel generation emissions) and not significant.

8.5.1.2 Terrestrial Environment

This section summarizes the short-term and long-term residual effects that the Project is expected to have on the terrestrial environment in the Project Study Region (see Section 8.2.2). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of residual effects are assessed and summarized in Table 8.5-2.

Table 8.5-2
Summary of Residual Effects and Significance on Terrestrial Environment

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Biophysical VCs: Terrestrial Environment			
Vegetation			
Short-term construction, maintenance and decommissioning activities	Merchantable timber and vegetation will be removed or may be damaged during clearing, construction maintenance, and decommissioning activities.	<ul style="list-style-type: none"> Route selection avoids merchantable timber stands. Minimize removal of under story vegetation and disturbance of vegetative mat. Use of rotary mowers for brush where practical, and minimize the use of heavy equipment in sensitive areas through hand clearing Yukon Energy's EMS best practices for ROW maintenance will be followed No use of herbicides or defoliant. Time decommissioning to occur in winter. 	Short-term, Project Site Area, Low Magnitude. Low (-) Not Significant
Long-term presence of permanent ROW	Soil disturbance in ROW and the existence of a ROW or cleared perimeters around substations could create an unnatural forest edge and promote the intrusion of exotic species.	<ul style="list-style-type: none"> Control through brushing and clearing activities. Yukon Energy's EMS best practices for access will be followed Monitoring ROW for invasive plant species and taking appropriate action 	Long-term, Project Site Area, Low Magnitude. Low (-) Not Significant
Long-term decommissioning of MS Project	Natural re-growth of MS Project Site Area after decommissioning is complete	<ul style="list-style-type: none"> no mitigation is required 	Long-term, Project Site Area, Low Magnitude. Low (+/-) Not Significant
Rare Plants:			
Short-term construction, maintenance and decommissioning activities	Rare plants may be disturbed or removed during construction activities affecting future propagation.	<ul style="list-style-type: none"> Site specific locations identified as having potential for rare plants will be surveyed prior to construction. Hand-clearing will be used if rare plants are identified. Strategic pole placement to avoid areas harbouring rare plants if identified. 	Short-term, Project Site Area and Low Magnitude. Low (-) Not Significant
Mammals (Mule Deer, Moose, Ethel Lake Woodland Caribou, Tatchun Woodland Caribou, Small Furbearers)			
Short-term construction, maintenance and decommissioning activities	Mammals may temporarily avoid the affected Route Study Area due to noise and fumes produced by equipment and people and smoke from slash burning.	<ul style="list-style-type: none"> Route selection avoids critical habitat. Where feasible and/or necessary timing construction and maintenance in specific areas to avoid rutting and calving periods or spring denning. Adherence to Yukon Energy's EMS best practices for ROW maintenance. 	Short-term, Project Study Region and Low Magnitude Low (-) Not Significant

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Mammals (Mule Deer, Moose, Ethel Lake Woodland Caribou, Tatchun Woodland Caribou, Small Furbearers) (cont.)			
Long-term presence of a permanent ROW	Creation of browse and travel corridor for large mammals, and habitat change (affect different mammals differently – some small species prefer an open area)	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Study Region (mainly in parts of Route Study Area), and Low Magnitude. Low (+/-) Not Significant
	Habitat fragmentation and possible barrier to mammal movement Edge effect and increased predator mobility (predatory species could preferentially use the corridor for hunting)	<ul style="list-style-type: none"> Route selection has placed transmission line near previously disturbed areas such as along the Klondike Highway. Vegetative buffer along the Klondike Highway and Project ROW to act as protective cover and to reduce impact of new ROW as a barrier Adherence to Yukon Energy's EMS best practices for ROW access 	Long-term, Project Study Region (mainly in parts of Route Study Area), and Low Magnitude Low (-) Not Significant
	Potential for increased hunting pressure from new access	<ul style="list-style-type: none"> Policy for no-hunting by construction and maintenance crews. Adherence to Yukon Energy's EMS best practices for ROW access Continuance of voluntary no-hunting restrictions on Ethel Lake Caribou Herd. Where feasible, restrict off-road access with physical barriers (roots, stumps, trees, rocks) A vegetative buffer from Highway for protective cover 	Long-term, Project Study Region (mainly in parts of Route Study Area) and Low Magnitude Low (-) Not Significant
Long-term decommissioning of MS Project	Natural growth of indigenous vegetation in the MS ROW to pre-Project conditions (affect moose and small furbearers).	<ul style="list-style-type: none"> No mitigation is required. 	Long-term, parts of MS portion of Project Study Region, and Low Magnitude Low (+) Not Significant
Migratory Waterfowl			
Short-term construction, maintenance and decommissioning activities	Migratory waterfowl may temporarily avoid the area due to noise produced by equipment and people.	<ul style="list-style-type: none"> Route selection avoids key habitat and nesting sites Timing construction to avoid nesting season. Transmission lines at river crossings will be located close to existing infrastructure in a parallel horizontal configuration. 	Short-term, Project Study Region and Low Magnitude. Low (-) Not Significant
Long-term presence of permanent ROW	Migratory waterfowl may collide with conductors, poles, and related structures at river crossings. Potential loss of habitat in wetland areas.	<ul style="list-style-type: none"> Use wire structure markings in proximity to known migratory route where feasible. Transmission lines at river crossings will be located close to existing infrastructure in a parallel horizontal configuration. 	Long-term, Project Study Region and Low Magnitude Low (-) Not Significant

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Migratory Waterfowl (continued)			
Decommissioning of MS project.	Removal of lines and poles will eliminate the obstacles for flight paths and return project site area to pre-project conditions.	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Study Region and Low Magnitude. Low (+) Not Significant
Peregrine Falcon			
Short-term construction, maintenance and decommissioning activities	Peregrine falcons may temporarily avoid the area due to noise produced by equipment and people.	<ul style="list-style-type: none"> The proposed transmission line corridor will not travel through known Peregrine falcon eyries or within Peregrine falcon WKA's. 	Short-term, Project Study Region and Low Magnitude. Low (-) Not Significant
Long-term presence of permanent transmission ROW	Bird mortality through collision with conductors and/or poles.	<ul style="list-style-type: none"> Conductor and structure markings will be used in areas frequented by peregrine falcon, including river crossings, in order to reduce potential for bird strikes. 	Long-term, Project Study Region (MS Route Study Area) and Low Magnitude. Low (-) Not Significant
	ROW will produce edge effect and Peregrine falcons may preferentially use corridor for hunting	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Study Region and Low Magnitude. Low (+) Not Significant

Most adverse effects on the terrestrial environment due to construction, maintenance and decommissioning activities in the ROW will be short-term in duration and site-specific in extent, or in the case of the effects of noise and fumes, will extend beyond the Project Site Area, but remain within the Route Study Area. Effects on the terrestrial environment due to the existence of a permanent ROW will be long-term in duration but confined to parts of the Route Study Area within the Project Study Region. Due to route selection and other mitigation, all of the long-term or short-term effects of the Project on the terrestrial environment are expected to be low in magnitude and not significant.

Effects on vegetation and rare plants will generally be short-term and site-specific. Such effects will be mitigated through efforts to minimize the impacts of construction activities on the vegetative mat, on understory and other sensitive areas, and mitigation will include timing construction where required to occur in winter in order to minimize impacts, as well as the use of hand clearing in sensitive areas or where rare plants are located. It is anticipated that residual adverse effects on vegetation and rare plants will be low in magnitude and not significant.

With regard to wildlife such as furbearers, ungulates and birds, there will be short-term disturbances due to construction, maintenance and decommissioning activities in the ROW caused by noise produced by people and equipment, as well as disturbances due to emissions from vehicles and the burning of slash. These short-term effects may be felt over the Route Study Area within the Project Study Region; however, route selection has avoided critical habitat and nesting areas, and where feasible activities will be timed to avoid critical lifecycles stages for the selected VC's such as nesting, rutting, mating, calving and denning periods which will minimize the magnitude of effects. It is expected that adverse residual effects of construction, maintenance and decommissioning activities in the ROW on these terrestrial VC's will be low in magnitude and not significant.

There will be long-term effects on terrestrial VC's in the Project Study Region due to the existence of a permanent ROW, which will require the permanent removal or restriction of certain vegetation and which may increase stress on wildlife due to the increased access provided to hunters and also due to the creation of a travel corridor which may be used by predators such as wolves and coyotes. There will be both positive and negative effects as a permanent ROW will create an edge environment which may facilitate growth of certain species (including potential invasive vegetation species), as well as a travel corridor that may be preferred by some species while removing areas of habitat preferred by other species. A permanent ROW may also contribute in some areas to habitat fragmentation in the Project Study Region.

Route selection has avoided areas of critical habitat and in most cases only minimal numbers of the total wildlife species population will be affected by long-term effects of a permanent ROW in the Project Site Area. Further mitigation will include:

- Imposing a no-hunting policy on construction, maintenance and decommissioning personnel undertaking project-related activities throughout the life of the Project
- Application of Yukon Energy's EMS best practices with regard to ROW access
- Where feasible, creating barriers at access points using rocks, trees and other available materials
- Where feasible, a vegetative buffer of at least 30 metres will provide cover for wildlife in areas where the route runs parallel to the Klondike Highway and mitigate the effects of habitat fragmentation
- Where feasible, transmission lines and substations have been placed near previously disturbed areas

With regard to migratory waterfowl and Peregrine falcons, there will be long-term and site-specific effects stemming from the existence of permanent transmission line structures which may contribute to bird mortality due to collision with conductors. Route selection has avoided critical nesting sites and any additional adverse effects due to accidental line strikes will be mitigated through conductor and structure marking (e.g., as per Transport Canada regulations at river crossings). Where it is possible, lines will be constructed near existing infrastructure and parallel to existing barriers. Decommissioning of the Minto Spur transmission line will eliminate potential hazards to migratory water fowl and Peregrine falcons and reduce bird mortality in the MS Project Site Area where the area is expected to return to pre-Project conditions over time. Given critical habitat has been avoided and that only a small portion of the total migratory waterfowl and Peregrine falcon populations in the Project Study Region are expected to be affected, adverse effects on these VCs are expected to be low in magnitude and not significant.

In summary, it is expected that adverse residual effects on the terrestrial environment VCs due to the existence of a permanent ROW and transmission line structures will be low in magnitude and not significant.

8.5.1.3 Aquatic Environment

This section summarizes the short-term residual effects that the Project is expected to have on the aquatic environment in the Project Study Region (see Section 8.2.3). The analysis of residual effects

incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of residual effects are assessed and summarized in Table 8.5-3.

Although it has been determined that the Project will have no adverse effects on Salmon, it has been included in the Residual Effects Tables for the Aquatic Environment due to a clearly expressed public concern with regard to any adverse effects that the Project may have on this valued resource in the Project Study Region.

**Table 8.5-3
Summary of Residual Effects and Significance on Aquatic Environment**

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Biophysical VCs: Aquatic Environments			
Riparian Zones and Wetlands			
Short-term construction, maintenance and decommissioning activities	Possible disturbance of wetlands, or riparian zones during construction activities.	<ul style="list-style-type: none"> Route selection to avoid wetlands and riparian zones Strategic pole placement to avoid sensitive wetlands Hand clearing within 30 m of wetlands and riparian zones Clearing limits will be flagged Timing Project-related activities to occur in winter Minimize disturbance of vegetative mat in and around wetland and riparian zones Application of Yukon Energy's EMS best practices for ROW maintenance Yukon Energy's EMS best practices for water bodies, wetlands and stream crossings will be followed Follow DFO's Operational Statement on Overhead Line Construction Follow decommissioning practices outlined in Chapter 5, Section 5.10 of this document 	Short-term, Project Site Area and Low Magnitude. Low(-) Not Significant
Salmon			
All Phases	There will be no adverse Project effects on salmon due to no in-stream construction	<ul style="list-style-type: none"> No mitigation is required. All work in vicinity of salmon-bearing water bodies will adhere to DFO's Operational Statement on Overhead Line Construction 	NA

Activities undertaken during construction, operation and maintenance, and MS decommissioning may possibly disturb riparian zones, wetlands and wetland plant species. The route selection process has sought to avoid riparian zones and wetland environments where feasible, and pole placement has tried to avoid disturbing wetland sites. Construction, operation and decommissioning activities will be timed to occur in winter where required to minimize adverse impacts on riparian zones and wetlands and the activities undertaken will strive to minimize disturbance to the vegetative mat around wetlands. Given

that the careful route selection avoids most sensitive sites and timing will further minimize adverse effects on any riparian zones and wetland environments, it is expected that the magnitude of Project effects on riparian zones and wetlands will be low and not significant

Further mitigation of Project effects will include hand-clearing to be used within 30 metres of wetland areas to minimize disturbance to wetland plant species. Yukon Energy's EMS best practices for water bodies, wetlands and stream crossings will be adhered to in order to mitigate any other possible adverse effects on wetlands. Mitigation for maintenance activities will also include the application of Yukon Energy's EMS best practices for ROW maintenance.

It is anticipated that any adverse effects on riparian zones and wetlands will be short-term in duration and occur within the Project Site Area. Since most sensitive sites have been avoided, and where possible activities will occur under frozen conditions, the residual adverse effects due to the Project are expected to be low in magnitude and not significant.

8.5.2 Socio-Economic Residual Effects

8.5.2.1 Resource Use

This section summarizes the long-term and short-term residual effects that the Project is expected to have on resource use in the Project Study Region (see Section 8.3.1). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of residual effects are assessed and summarized in Table 8.5-4.

Table 8.5-4 excludes the following two resource use VCs where route selection has resulted in no residual effect being expected (see Section 8.3.1):

- Protected Areas
- Outfitting

Table 8.5-4 focuses on specific effects pertaining to specific resource use VCs. In addition, the MOU between Yukon Energy and NTFN commits Yukon Energy (in order to avoid issues that arose in construction of the Mayo-Dawson Transmission Project) to proceed with construction within a pre-identified specific route and access corridor and to ensure that one or more project monitors are engaged during construction to ensure on-site, amongst other things, that the Project as it is constructed is at all times located in compliance with the approved final route and access corridor.

Table 8.5-4
Summary of Residual Effects and Significance on Resource Use

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Socio-Economic VCs: Resource Use			
Trapping and Hunting			
Short-term construction, maintenance and decommissioning activities	Ability to trap or hunt in the vicinity if the ROW and Route Study Area will be affected during construction, maintenance and decommissioning activities (includes restrictions due to safety concerns for construction and maintenance crews) Wildlife may temporarily avoid the area.	<ul style="list-style-type: none"> Avoidance of traplines and critical habitat where feasible during route selection Trapper compensation for construction period disruptions Trapper and local community notification of work schedule Maintenance procedures will follow Yukon Energy's EMS best practices 	Short-term, Project Study Region and Low Magnitude. Low (-) Not Significant
Long-term presence of permanent ROW	Improved access to transmission ROW and adjacent areas	<ul style="list-style-type: none"> Yukon Energy's EMS best practices for ROW access will be followed Consultation with the RMO's, First Nations and trappers regarding access restriction and control measures 	Long-term, Project Study Region and Low Magnitude. Low (+/-) Not Significant
Long-term decommissioning MS Project	Dissipation of MS Project effects in ROW and natural re-growth of vegetation and wildlife habitat over time	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Site Area and Low Magnitude Low (+) Positive Significance
Fishing			
All phases.	Concerns expressed by community members over protection of fish habitat	<ul style="list-style-type: none"> No in-stream work and adherence to DFO's Operational Statement on Overhead Line Construction and Riparian Areas and Re-vegetation Line stringing by helicopter for rivers and at Tatchun Creek where it is necessary Minimal hand clearing of danger vegetation within 30 m of riparian areas 	Short-term, Project Site Area, and Negligible Magnitude Negligible (n) Not Significant
Collection of Plants			
Short-term construction, maintenance and decommissioning activities	Potential removal of some valued plant species including medicinal plants.	<ul style="list-style-type: none"> Route selection to avoid plant collection areas where feasible Timing when activities in ROW occur Notice to communities prior to activity in ROW Equipment to minimize damage to vegetation 	Short-term, Project Site Area and Low Magnitude Low (-) Not Significant
	Brushing and clearing in ROW may encourage growth of berry producing plants.	<ul style="list-style-type: none"> Equipment designed to minimize damage to vegetation 	Short-term, Project Site Area and Low Magnitude Low (+) Not Significant

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Collection of Plants			
Long-term presence of permanent ROW	Increased Access for community members and others to berry picking areas within and adjacent to the ROW	<ul style="list-style-type: none"> Yukon Energy's EMS best practices for access will be followed 	Long-term, Project Site Area and Low Magnitude Minor (+/-) Not Significant
Decommissioning MS Project	Project effects in MS ROW will dissipate and vegetation will re-grow to a natural state over time	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Site Area and Low Magnitude. Low (+) Not Significant
Timber Harvesting			
Short-term construction, maintenance and decommissioning activities	Opportunities for collection of merchantable timber and fuel wood will be realized	<ul style="list-style-type: none"> Route selection will follow Yukon Energy's EMS best practices for timber salvage 	Short-term, Project Site Area and Low Magnitude Low (+) Not Significant
Long-term presence of permanent ROW	Permanent ROW will increase access to timber harvesting areas adjacent to the transmission lines.	<ul style="list-style-type: none"> Yukon Energy's EMS best practices for access will be followed 	Long-term, Project Study Region and Low Magnitude. Low (+) Not Significant
Outdoor Recreation			
Short-term construction, maintenance and decommissioning activities	Concerns expressed over conflict with use of recreational sites, particularly Tatchun Creek campground	<ul style="list-style-type: none"> Route selection has avoided known campground sites Timing construction and maintenance activities to avoid season when campground is in use A vegetative buffer will be left between the Highway and the ROW 	Short-term, Project Site Area and Low Magnitude Low (-) Not Significant
Long-term presence of permanent ROW	Improved access for outdoor recreation activities adjacent to the ROW	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Site Area and Low in Magnitude Low (+) Not Significant
Tourism			
Short-term construction, maintenance and decommissioning activities	The perception of a wilderness environment may be altered by construction, maintenance and decommissioning activities	<ul style="list-style-type: none"> Route selection and timing of construction and maintenance activities to avoid tourist season Where feasible a vegetative buffer will be left between the Highway and the ROW 	Short-term, Project Study Region and Low Magnitude. Low (-) Not Significant
	Possible disruption of Yukon Quest activities	<ul style="list-style-type: none"> Where feasible avoid activities in specific sections of ROW immediately prior to and during race period Advance notification to Yukon Quest of activities in ROW 	Short-term, Route Study Area and Low Magnitude. Low (-) Not Significant

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Tourism			
Long-term effects due to presence of permanent ROW	Diminished perception of wilderness due to periodic visibility of Project structures, including crossing of Yukon River	<ul style="list-style-type: none"> Maintenance of vegetative buffer 	Long-term, Project Study Region and Low Magnitude. Low (-) Not Significant
	ROW may intersect Yukon Quest trail	<ul style="list-style-type: none"> Guards will be installed on guy conductors 	Long-term, Project Site Area and Low Magnitude Low (-) Not Significant
Decommissioning of MS Project	Removal of MS Project structures adjacent to and across the Yukon River will restore viewscape	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Site Area and Low Magnitude Low (+) Not Significant
Outfitting			
All Phases	No residual effect	<ul style="list-style-type: none"> Not required 	No socio-economic effect
Agriculture			
All phases	CS ROW south of McGregor Creek is along Highway edge of current agricultural land use application	<ul style="list-style-type: none"> Route selection avoids or minimizes use of agricultural parcels 	Long-term, Project Site Area and Low Magnitude Low (-) Not Significant
Mining			
Presence of long-term transmission project.	Existence of Project infrastructure will facilitate future mining development in Project Study Region	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Study Region, and Low Magnitude Low to Moderate (+) Positive Significance
Aggregate Sites			
Short-term construction, maintenance and decommissioning activities	<p>Construction of ROW and pole structures within or adjacent to aggregate sites may affect aggregate operations.</p> <p>Periodic brushing activities within or adjacent to aggregate sites may affect aggregate operations</p>	<ul style="list-style-type: none"> Avoidance of aggregate sites where feasible Consultation with Highways on timing and procedures obtaining necessary permits Will follow Yukon Energy's EMS, best practices 	Short-term, Project Site Area and Negligible Magnitude Low (n) Not Significant

There will be short-term adverse effects on resource use due to Project-related activities in the ROW during construction, operation and maintenance as well as decommissioning related to the MS transmission line.

Most of the adverse effects on resource use due to Project-related activities in the ROW will be mitigated through route selection to avoid traplines and trapline infrastructure, hunting areas, potential rare plant sites and to minimize interference with the aesthetics of the landscape and the perception of a wilderness environment that is an essential aspect of the tourism industry. Route selection has also been used to enhance positive effects of the ROW for increasing access to timber stands for harvest and wood fuel consumption. Route selection to avoid key sites, reduce impacts on wildlife critical to trapping and hunting, and protect aesthetics is expected to ensure that the magnitude of adverse effects on resource use will be low for all VCs studied.

Where complete mitigation of adverse effects through route selection has not been possible, other measures will also be used to further mitigate any adverse effects including the application of any relevant Yukon Energy EMS best practices, notice to and consultation with communities, First Nations, regional RMOs and relevant government departments with regard to the particular activities to be undertaken.

The residual adverse effects due to Project construction, maintenance and decommissioning activities are expected to be short-term and not to extend past the Project Study Region for all resource use VC's. Adverse short-term effects on resource use VCs are expected to be low in magnitude and not significant.

Long-term Project effects on resource use due to the creation of a permanent ROW will be both positive and adverse. The maintenance of a ROW will provide increased access to certain areas along the ROW; however, such increased access will be available to community members as well as those outside the community. There will also be long-term effects due to the diminished perception of wilderness in areas where Project structures are visible.

Route selection has minimized these long-term adverse effects through avoiding key community resource use areas and traplines and by avoiding key viewscapes and viewing locations. Where route selection has not completely avoided resource use areas, access will be controlled to the extent feasible by applying Yukon Energy's EMS best practices for ROW access and through consultation with local affected interests. Effects on the perception of wilderness and consequently tourism will also be further mitigated through the use of a vegetation buffer where feasible to screen the transmission lines from view.

It is expected that residual adverse long-term effects on resource use VCs of the presence of a permanent ROW will extend beyond the Project Site Area within the Project Study Region and will be low in magnitude and not significant.

8.5.2.2 Economy

This section summarizes the short-term and long-term residual effects that the Project is expected to have on the economy in the Project Study Region (see Section 8.3.2). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of these effects are assessed and summarized in Table 8.5-5.

Table 8.5-5 summarizes effects on specific economy VCs. It is also relevant to note that the MOU between Yukon Energy and NTFN sets out broad regional economic and development benefits that are expected to result from the Project (see Section 8.3.2.2).

**Table 8.5-5
Summary of Residual Effects and Significance on the Economy**

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Socio-Economic VC's: Economy			
Local Employment and Training			
Short-term construction, maintenance and decommissioning activities	Job skills acquired through employment and training may be applied to other employment opportunities	<ul style="list-style-type: none"> MOU provisions for clearing contracting; potential Yukon College training 	Short-term, Project Study Region and Low Magnitude Low(+) Positive Significance.
	Employment of local people for construction, maintenance and decommissioning work	<ul style="list-style-type: none"> No mitigation is required 	Short-term, Project Study Region and Low Magnitude Low(+) Positive Significance.
Local Business			
Short-term construction, maintenance and decommissioning activities	Local businesses will benefit from infrequent maintenance activities, including secondary spending within the communities	<ul style="list-style-type: none"> No mitigation is required 	Short-term, Project Study Region and Low Magnitude Low (+) Positive Significance
Government Fiscal Flows			
Short-term effects due to construction, maintenance and decommissioning activities	Fluctuations in government revenues due to short-term activities	<ul style="list-style-type: none"> No mitigation is required 	Short-term, Yukon Territory and Canada, and Low Magnitude Low (+/-) Not Significant
	YG costs to extent provide infrastructure funds to Yukon Energy for CS Project		
Long-term effects due to presence of a permanent transmission project	Continued direct and indirect tax and royalty revenues Savings in YG ongoing RSF costs so long as RSF continues	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Study Region and Yukon Territory and Canada, and Low Magnitude Low (+) Positive Significance
Utility Ratepayers			
Long-term presence of a permanent transmission Project	Continued opportunity for firm industrial sales, contributing to utility revenues and cost savings for mine operations. Continued increased WAF and MD system reliability, economic efficiency and flexibility in power supply resource use	<ul style="list-style-type: none"> No mitigation is required 	Long-term within Yukon Territory and Low to Moderate Magnitude. Low to Moderate (+) Positive Significance

During periods of the Project's life where the construction, maintenance and decommissioning activities are required, there will be short-term and positive residual effects on the economy due to increased local employment, increased local business spending, and increased government fiscal flows. These positive, effects are expected to be low in magnitude. Adverse effects on Yukon Government fiscal flows will occur to the extent that YG provides infrastructure funding to the Project.

The long-term effects of the Project infrastructure on the Project Study Region include low positive impacts on government fiscal flows due to continued direct and indirect tax revenues stemming from the operation and maintenance of transmission lines and substations, as well as positive impacts on utility ratepayers due to increased system reliability, efficiency and flexibility, and the increased opportunities for firm industrial sales that will enhance the utility's revenues.

Increased system reliability and the potential to attract and serve new industrial loads will also tend to benefit utility ratepayers (both the specific mine customers and all other Yukon ratepayers) as well as government fiscal flows. These positive effects will be long-term with regard to the Carmacks-Stewart line and are expected to continue for about six to ten years for the MS line (reflecting the expected potential operating life of the Minto Mine). These positive long-term effects of the Project transmission infrastructure and substations will be low to moderate in magnitude.

8.5.2.3 Social Context

This section summarizes the short-term and long-term residual effects that the Project will have on social context in the Project Study Region (see Section 8.3.3). The analysis of residual effects incorporates, to the extent possible, a consideration of mitigation and enhancement measures outlined in previous sections and potential cumulative effects of other projects. Based on the criteria outlined in Chapter 3, the significance of these effects are assessed and summarized in Table 8.5-6.

**Table 8.5-6
Summary of Residual Effects and Significance on Social Context**

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Socio-Economic VCs: Social Context			
Community and Family Life			
Short-term construction, maintenance and decommissioning activities	Ability to enjoy traditional lifestyle may be affected during construction, operation and decommissioning activities	<ul style="list-style-type: none"> Route selection to avoid known traditional use areas where feasible, and be adjacent to existing disturbed environment Yukon Energy's EMS best practices Trapper compensation 	Short-term, Project Study Region and Low Magnitude. Low (-) Not Significant
Long-term presence of permanent ROW	Improved access to the ROW area	<ul style="list-style-type: none"> Yukon Energy's EMS best practices and consultation with local communities on access restrictions 	Long-term, Project Site Area, and Low Magnitude. Low (+) Not Significant
Community Infrastructure and Services			
Short-term construction, maintenance and decommissioning activities	Yukon College may have increased enrolment from community workers seeking training opportunities in anticipation of employment	<ul style="list-style-type: none"> No mitigation is required 	Short-term, Project Study Region and Low in Magnitude. Low (+) Not Significant
	Increased stress on community health centres due to job site accidents	<ul style="list-style-type: none"> Adherence to Workplace Health and Safety regulations. Job safety training through Yukon College programs may be available 	Short-term, Project Study Region and Low Magnitude Low (-) Not Significant

VC, Duration of effect, and Project Phase	Residual Effects After Mitigation	Mitigation Included in Assessment	Significance
Long-term presence of permanent ROW	Grid power at Pelly Crossing, displacing diesel power and reducing power costs for some community facilities and services	<ul style="list-style-type: none"> No mitigation is required 	Long-term, Project Study Region and Low Magnitude. Low (+) Not Significant
Public Health			
Long-term presence of a permanent ROW	Safety concerns with guyed conductors as hazard to snowmobile use within ROW	<ul style="list-style-type: none"> Will follow Yukon Energy's EMS best practices on line maintenance (installation of guards on guy conductors) 	Long-term, Project Site Area and Low Magnitude Low (-) Not Significant
Aesthetics			
Short-term construction, maintenance and decommissioning activities	Disruption of local wilderness environment and views	<ul style="list-style-type: none"> Avoidance of key viewscape locations Creation of a vegetative buffer where feasible Locating river crossings near existing infrastructure 	Short-term, Project Study Region and Low Magnitude. Low (-) Not Significant
Long-term presence of permanent ROW	Changed landscape	<ul style="list-style-type: none"> Route selection and maintenance of vegetative buffer 	Long-term, Project Study Region and Low Magnitude Low (-) Not Significant
Heritage Resources			
Short-term construction activities	Potential inadvertent discovery of unknown heritage sites along the ROW.	<ul style="list-style-type: none"> Route selection has avoided known heritage sites Yukon Energy's EMS best practices for Heritage Site Identification and Avoidance will be followed Archaeologist present during construction in areas with high potential for heritage resources 	Short-term, Project Site Area and Low Magnitude. Negligible Not Significant

Short-term effects on social context VCs caused by the Project will result from disruptions due to construction, maintenance and decommissioning activities in the ROW that cause wildlife to scatter or that impact on vegetation in the area and may interfere with traditional community and family life activities in the Route Study Area. Activities and the presence of people and equipment may also have short-term impacts on aesthetics. There may also be short-term impacts on heritage resources through the discovery of artefacts in the ROW.

Route selection has avoided, where feasible, key resource use areas (including heritage resource sites) and viewsapes. Project substations have also been located near previously disturbed areas. Where the route traverses near areas where artefacts may be found Yukon Energy's EMS best practices for Heritage Site Identification and Avoidance will be applied. It is expected that with route selection, short-term Project adverse effects on community and family life, heritage resources and other social context VCs will be low in magnitude and not significant.

There may be long-term positive and negative social context VC effects with regard to increased access to traditional use areas along the ROW for community members and for others from outside the community, as well as long-term impacts on the perception of wilderness and aesthetics in the Route Study Area due to the presence of a permanent transmission line ROW. It is expected that careful route selection and the use of a vegetative buffer where feasible to screen the transmission line ROW will

mitigate adverse effects due to changes in the landscape and alterations to the perception of wilderness environment. In addition, Yukon Energy's EMS best practices will also be applied with regard to access and maintenance.

Long-term residual adverse effects on social context VCs are expected to occur within the Project Study Region. It is expected that any residual effects on social context VCs in the Project Study Region stemming from the long-term presence of a transmission ROW in the Route Study Area will be low in magnitude and not significant; in the case of the MS ROW, long-term effects will be gradually reversed in most areas after the line is decommissioned.

8.6 ENVIRONMENTAL PROTECTION AND MONITORING

The Executive Committee is required to consider the need for any monitoring of environmental or socio-economic effects of any project or activity conducted in Yukon under Section 42(2)(a). Such monitoring may ensure the implementation and success of any required mitigation measures undertaken. Monitoring and follow-up also helps to determine the accuracy of any assumptions made with regard to the project during the assessment, as well as test the accuracy of any predictions made regarding the project's effects subsequent to the completion of the project and the commencement of operations. Such follow-up monitoring may also help to detect any unanticipated project effects and determine whether any additional mitigation is required to ensure that no significant adverse effects result from the operation of the project.

Most of the mitigation adopted in the assessment relates to route selection, and thus offers a high degree of certainty. In addition, specific external monitoring of this element will also be provided as noted in the MOU with NTFN. Similar clarity and certainty is provided for the extensive additional mitigation measures set out as part of Yukon Energy's EMS best practices, standard DFO requirements in sensitive riparian areas, seasonal controls committed on certain construction activities, and specific design measures adopted for the facilities as required in certain areas. On certain measures, such as future access management control measures, processes have been set out to work as needed with other parties to establish appropriate arrangements. Overall, the nature of the proposed Project activity and the related assessment predictions are such as to require only minimal consideration of additional monitoring or follow up measures to determine the accuracy of any assumptions made with regard to the Project during the assessment, to test the accuracy of any predictions made regarding the Project's effects, or to detect any unanticipated Project effects and determine whether any additional mitigation is required to ensure that no significant adverse effects result from the operation of the Project.

Consistent with best practices to direct in-field construction and maintenance activities, an EPP for the Project will be developed after receipt of final regulatory approvals and prior to the start of clearing and construction activities. Yukon Energy is committed to an environmental protection and monitoring program which will extend through all phases of the project's construction, operation and maintenance, and decommissioning.

8.6.1 EPP and Monitoring Approach

The EPP will encompass the following goals with respect to construction, operations and maintenance and decommissioning activities:

- Facilitate mitigation of environmental effects throughout the full-life cycle of the Project by providing construction and maintenance personnel with clear instructions on mitigation measures to be implemented (based on the commitments in this Project Proposal as well as any additional requirements resulting from regulatory approvals and permitting) and on the appropriate lines of communication and means of reporting to be followed;
- Incorporate issues and concerns identified in the PIP process;
- Identify modifications to construction methods or schedules, summarize environmental sensitivities and mitigative actions, and list emergency response plans and reporting protocols, including mitigation of potential hazards to public safety;
- Provide specific information on waste management practices to be utilized during the construction phase of the Project, including all liquid and solid wastes generated; and
- Monitor clearing and construction practices to ensure that the work proceeds in accordance with the EPP.

8.6.2 EPP and Monitoring Plans

The EPP will play a critical role in ensuring no significant adverse effects result from the Project and will be used for the following purposes: to ensure protection of the environment; to ensure that all personnel exercise due diligence in carrying out activities; and to evaluate the effectiveness of measures used to prevent or minimize environmental effects. The following monitoring programs will be established for the project:

- Compliance monitoring;
- Baseline monitoring; and
- Environmental effects monitoring.

8.6.2.1 Compliance Monitoring

An environmental compliance monitoring program will ensure that commitments made to regulatory authorities and others are implemented through all phases of Project development. Activities in each phase are subject to relevant legislation, regulation and guidelines, as well as to commitments made in the Project Proposal and the subsequent EPP.

Pre-construction monitoring will be undertaken in order to help mitigate any potential avoidable environmental site-specific impacts during the construction phase of the project. This will include a botanical/rare plant survey along the ROW, focusing on site-specific areas with the greatest potential for rare species. Locations of rare plants found and measures for mitigation will be specified in the EPP. For heritage resources, ongoing management of potential heritage resource sites (consistent with the commitments in the Project Proposal) will include construction on-site monitoring by an archaeologist at specific sites considered to be of high potential archaeological value.

8.6.2.2 Environmental Effects Monitoring

Under YESAA effects monitoring is defined as the monitoring of environmental and socio-economic effects, or of the effectiveness of mitigative measures. Section 42(2)(a) of YESAA sets out that the Executive Committee must take the need for effects monitoring into consideration.

The objectives of the environmental effects monitoring are to assess the accuracy of any predictions made in the Project Proposal concerning potential effects. Overall, as noted above, the nature of the proposed Project activity and the related assessment predictions are such as to require only minimal consideration of additional monitoring or follow up measures to determine the accuracy of any assumptions made with regard to the Project during the assessment, to test the accuracy of any predictions made regarding the Project's effects, or to detect any unanticipated Project effects and determine whether any additional mitigation is required to ensure that no significant adverse effects result from the operation of the Project.

Following construction and clean-up activities, a post-construction inspection of the proposed transmission facilities will be undertaken to identify any potential problems and a post-construction inspection report will be prepared. Both aerial and ground surveys will be used to conduct the inspection. If problem areas are noted, site-specific rehabilitation programs will be identified in the inspection report, implemented, and the problem areas will be monitored.

Monitoring during the operations and maintenance phases of the Project will continue and will be conducted through routine aerial and ground patrols. General environmental conditions will continue to be monitored.