Yukon

Quill Creek Timber Harvest Plan

Champagne and Aishihik First Nations
Traditional Territory

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EXECUTIVE SUMMARY

The Quill Creek Timber Harvest Plan has been prepared to meet the requirements of the *Forest Resources Act* and *Forest Resources Regulation*. Under Section 20(3) of the *Forest Resources Act*, a timber harvest plan is required before issuing any cutting permit or forest resources permit that authorizes harvesting in an amount greater than 25 cubic metres. The Quill Creek Timber Harvest Plan is guided by the Champagne and Aishihik Traditional Territory Strategic Forest Management Plan (2004) and the Integrated Landscape Plan for the Champagne and Aishihik Traditional Territory (2007).

The Quill Creek timber harvest planning area is located within the Haines Road North Landscape Unit of the Strategic Forest Management Plan, which is designated a high planning priority. Supported by the Strategic Forest Management Plan, the Integrated Landscape Plan is the guiding document for developing timber harvesting projects. It identifies this area in the forest resource management zone, where harvest planning and development may occur (Integrated Landscape Plan for the Champagne and Aishihik Traditional Territory, page 9).

The forest resource management zone is the zone that provides opportunities to develop commercial timber harvest plans and direction to focus harvesting stands with at least 30% spruce beetle mortality, which is the focus of this timber harvest plan. The north half of the timber harvest planning area is also within the fuel abatement *zone* of the Integrated Landscape Plan, where timber harvest planning must consider fuel management objectives during timber harvesting.

The purpose of the Quill Creek Timber Harvest Plan is to set the framework for commercial timber harvesting activities within the Quill Creek area, with the objectives of creating economic opportunities, reducing the wildfire hazard, and supporting the supply of firewood to communities throughout Yukon, all within the context of sustainable forest resources management. The goals and objectives of sustainable forest management are described in the Strategic Forest Management Plan for the Champagne and Aishihik Traditional Territory. This timber harvest plan includes mapping of all previous timber harvesting in the planning area, and all new harvest areas proposed in this timber harvest plan.

Early comments received from First Nations and stakeholders during the development of this draft timber harvest plan provided direction in developing a draft plan that aimed to address the public values and existing concerns. The Quill Creek timber harvest planning area is 11,596 hectares in size, of which 372 hectares (3.2%) has been previously harvested, and 1,767 hectares (15.2%) is proposed for additional harvesting. The proposed timber harvest plan will utilize up to 10 km of existing forest resources roads and 20 kilometres of existing public roads in

the area. The timber harvest plan also identifies up to 51 kilometres of new forest resources roads may be required to facilitate timber harvest.

A heritage resources overview assessment was completed in conjunction with the development of this timber harvest plan. Field work for a subsequent heritage resource impact assessment was conducted between September 14 and 19, 2020 on all proposed roads and cut blocks within the Interface, Kathleen and Quill Operating Units, the heritage resource impact assessment was completed on December 22, 2020. A heritage resources impact assessment will be completed in all other operating units once the road locations and a fuel break have been planned.

Identified high wildlife value areas in the Integrated Landscape Plan are taken into account through partial cutting of most areas, and through the sequencing of harvest areas to leave large undisturbed areas while other areas are being harvested. Connectivity corridors have also been retained as per the Habitat Connectivity Planning Recommendations (Connectivity Planning Sub-Group 2008).

Harvest blocks are not located near any streams or waterbodies, although stream crossings may be required for access. All streams are assumed to be fish bearing, unless a stream assessment shows otherwise. General biodiversity and wildlife values are partly addressed by retention of 20-40% of trees (live aspen and spruce) within the harvest blocks, and retaining 73% of the timber harvest planning area without roads or timber harvest areas.

Thirty harvest blocks have been identified and mapped based on areas with large amounts of beetle-killed spruce, which is targeted primarily for fuel wood use. The total volume of merchantable dead spruce is estimated to be 130,274 cubic metres and the total volume of merchantable spruce (green and dead) is estimated to be 212,369 cubic metres. These volumes reference the estimated merchantable volume, actual timber volumes available for harvest will be influenced by factors such as retention requirements, market conditions, fuel abatement objectives and other site specific factors. The total volume of timber available for timber harvest is estimated to be 156,070 cubic metres.

On March 10, 2020, the Yukon Government submitted a draft version of the Quill Creek Timber Harvest Plan to the Yukon Environmental Assessment Board (YESAB) Executive Committee (project number 2020-0051). The purpose of submitting the draft plan to YESAB was to identify and evaluate all possible effects of the plan and to allow all First Nations and stakeholders to comment on the entire project. This process included: multiple information requests to Yukon Government, two public comment periods, and consultation with Champagne Aishihik First Nations. On September 10, 2021 The Executive Committee of the Yukon Environmental and Socio-economic Assessment Board published a Final Screening Report.

On September 10, 2021, the Executive Committee recommended that the project be allowed to proceed, subject to specified terms and conditions outlined in the Final Screening Report. The decision body for this project is the Government of Yukon, Executive Council, Major Projects Yukon Branch. The decision body accepted the recommendations and on November 4, 2021 the decision body issued a Decision Document.

The final Quill Creek Timber Harvest Plan includes the thirty mitigations and five monitoring protocols outlined in the YESAB 2020-0051 Decision Document. Appendix 4 details additional terms and conditions that will be applicable to cutting permits and/or licences within the Quill Creek Timber Harvest Plan area, in accordance with the mitigations detailed in the Decision Document (2021). Additionally, the representations summary includes all of the comments received throughout the environmental assessment process (Appendix 5). All publicly available information pertaining to the Yukon Environmental and Socioeconomic Assessment Board's assessment of the Quill Creek Timber Harvest Plan can be found on the YESAB online registry.

1. Introduction

1.1. Plan purpose and direction

The Quill Creek Timber Harvest Plan has been prepared to meet the requirements of the *Forest Resources Act* and associated *Forest Resources Regulation*. Under Section 20(3) of the *Forest Resources Act*, a timber harvest plan is required before issuing cutting permit or forest resources permit that authorizes harvesting in an amount greater than 25 cubic metres. The Quill Creek Timber Harvest Plan is guided by the Champagne and Aishihik Traditional Territory Strategic Forest Management Plan as the highest-level plan for the area, and the Integrated Landscape Plan for the Champagne and Aishihik Traditional Territory. Comments received from first nations and stakeholders during the development of the draft Timber Harvest Plan (THP) provided guidance in developing a plan that attempts to address the public concerns identified.

Commercial operators in the Champagne and Aishihik First Nations Strategic Forest Management Planning area have harvested an average of 12,600 cubic metres of timber per year over the 15 years between 2004 and 2018, resulting in a total harvest of 189,000 cubic metres since 2004. Approximately 95% of the reported harvest has been dead spruce for fuelwood. From 2011-2018 there was an average of 34 licencees per year. The majority of licensees are small volume operators who harvest less than 100 cubic metres of timber per year and 5-10 operators who harvest between 100-500 cubic metres of timber per year. These small volume operators account for approximately 15-20% of the annual timber harvest. For larger operations, there are usually 2-4 operators harvesting between 500-2000 cubic metres of

timber per year and 1-3 operators harvesting between 2000-7000 cubic metres of timber per year. These larger operators account for approximately 80-85% of the annual timber harvest.

The Quill Creek Timber Harvest Plan is the successor to the Forest Development Project for the Quill Creek Bench Harvest Planning Area in the Haines Junction Area (Yukon Government, 2006). The Quill Creek timber harvest planning area overlaps with the Forest Development Project for the Quill Creek Bench. The timber harvest plan is consistent with the Haines Junction Community Fuel Abatement Plan (Yukon Government 2008a) within the interface fuel abatement zone and addresses its objectives within the timber harvest plan.

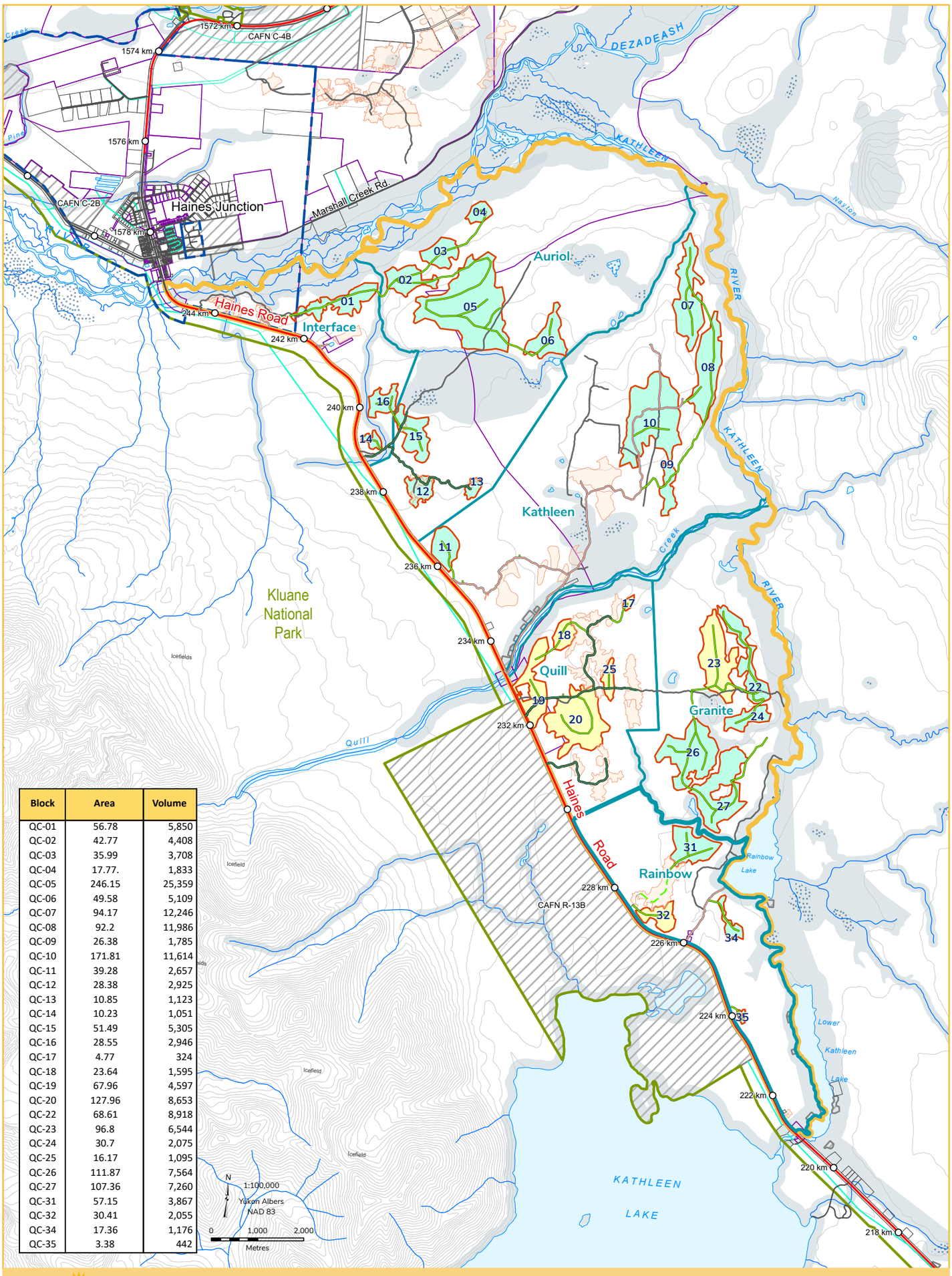
The Quill Creek Timber Harvest Plan is located south of the community of Haines Junction (Figure 1), along the Haines Highway, which is Yukon Highway 3. The timber harvest plan covers approximately 11,596 hectares of largely spruce forest, with some aspen and mixed aspen/spruce stands. The mature spruce stands include numerous spruce beetle killed trees resulting from an epidemic that occurred from approximately 1990 to 2012. (Yukon Government 2013). The timber harvest planning area is located immediately east of the Kluane National Park boundary and a large block of Champagne and Aishihik First Nations Settlement Land (CAFN R-13B), with the Haines Highway separating the timber harvest planning area from the Park and Champagne and Aishihik First Nations Settlement Land. The south, east, and north boundaries are defined by the Kathleen River and Dezadeash River (Figure 1). The timber harvest planning area generally consists of level to gently sloping terrain punctuated by knolls and breaks-in-slope, with cliffs along some parts of the Kathleen River.

Throughout Yukon, including the Haines Junction area, there is a strong demand for dry dead wood that can be harvested for fuel wood, typically used for home heating. The Quill Creek timber harvest planning area is relatively easy to access, and contains large volumes of merchantable standing dead timber, which is in high demand for firewood in Yukon communities. There is also a small local demand for whole logs for log building construction, and a potential demand for saw logs for lumber. The purpose of the Quill Creek Timber Harvest Plan is to set the framework for commercial harvesting activities within the Quill Creek harvest area, create economic opportunities for other harvesting activities, and support the supply of firewood to communities throughout Yukon. This timber harvest plan includes mapping of previously harvested areas and all harvest areas proposed for the next 10 or more years. The Quill Creek timber harvest planning area is 11,596 hectares, of which 372 hectares (3.2%) has been harvested, and 1767 hectares (15.2%) is proposed for additional harvesting under this timber harvest plan.

1.2. Champagne and Aishihik First Nations Final Agreement

The Champagne and Aishihik First Nations Final Agreement sets the framework for forest resources management in the Champagne and Aishihik First Nations Traditional Territory. The Strategic Forest Management Plan for the Champagne and Aishihik Territory was developed in accordance with the provisions of Chapter 17 of the Final Agreement. This timber harvest plan was developed to be consistent with the *Forest Resources Act* and *Regulation*, the Strategic Forest Management Plan, and the Integrated Landscape Plan.

While Chapter 17 sets out forest resources management in the Champagne and Aishihik First Nations Final Agreement, the entire Final Agreement applies to the timber harvest planning area. Other applicable chapters in the Final Agreement may include Chapter 6 Access, Chapter 11 Land Use Planning, Chapter 12 Development Assessment, Chapter 13 Heritage, Chapter 14 Water Management, Chapter 16 Fish, and Wildlife and Chapter 18 Non-renewable Resources.



Block	Area	Volume
QC-01	56.78	5,850
QC-02	42.77	4,408
QC-03	35.99	3,708
QC-04	17.77.	1,833
QC-05	246.15	25,359
QC-06	49.58	5,109
QC-07	94.17	12,246
QC-08	92.2	11,986
QC-09	26.38	1,785
QC-10	171.81	11,614
QC-11	39.28	2,657
QC-12	28.38	2,925
QC-13	10.85	1,123
QC-14	10.23	1,051
QC-15	51.49	5,305
QC-16	28.55	2,946
QC-17	4.77	324
QC-18	23.64	1,595
QC-19	67.96	4,597
QC-20	127.96	8,653
QC-22	68.61	8,918
QC-23	96.8	6,544
QC-24	30.7	2,075
QC-25	16.17	1,095
QC-26	111.87	7,564
QC-27	107.36	7,260
QC-31	57.15	3,867
QC-32	30.41	2,055
QC-34	17.36	1,176
QC-35	3.38	442

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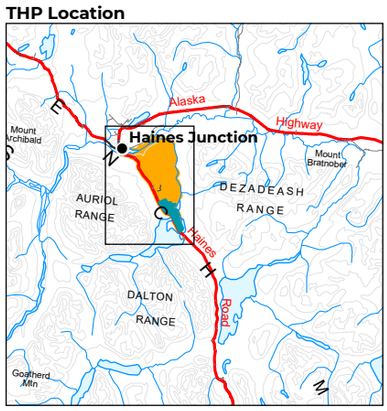
Figure 1 - Quill Creek Timber Harvest Plan

THP INFO
THP Area: 11596 ha ±
FRMP: Champagne and Aishihik Traditional Territory (CATT)
Strategic Forest Management Plan
Kluane NRO District

Date: December 01, 2021

For more timber harvest information, visit our website: www.yukon.ca
Forestry spatial data managed and maintained by the Forest Management Branch, Yukon Government. All other spatial data provided by Geomatics Yukon.

THP Location



Project Specific Features
- Current Forest Resources Road
- Public Access
- Proposed Roads
- Decomissioned Access
- Local Trails
- THP Boundary
- Operating Units
- Previously logged areas
- Connectivity Corridors

Harvest Blocks
- Dry Ground
- Frozen Ground

Land Administration
- Municipal Boundaries
- Parks and Campgrounds
- Land Dispositions
- Surveyed Land Parcels

First Nation Administration
- First Nation Settlement Lands
- A: Surface and Subsurface Rights
- B: Surface Rights
- FS: Fee Simple

1.3. Champagne and Aishihik traditional territory Strategic Forest Management Plan

The Strategic Forest Management Plan is a joint plan between Champagne and Aishihik First Nations and the Government of Yukon. This plan was the outcome of nearly 10 years of community input coordinated by the Alsek Renewable Resource Council. It states that, "The development of this plan has led to a strong working relationship and cooperative approach to forest management in this Traditional Territory".

The Champagne and Aishihik Traditional Territory Strategic Forest Management Plan is the highest-level forest management plan for the area. The Quill Creek Timber Harvest Planning area is within the Haines Road North Landscape Unit, which is identified as a high planning priority within the Strategic Forest Management planning area. The Strategic Forest Management Plan notes that one purpose of developing timber harvest plans, such as the Quill Creek Timber Harvest Plan, is to encourage developing the economic potential of forest resources in the region.

The Quill Creek Timber Harvest Plan represents Stage 3, harvest development planning of the Strategic Forest Management Plan that designs the general harvest activities consistent with the outcome of landscape planning, which is described in the next section. Harvest development planning includes identifying main road and harvest block locations. Stage 4 is site planning, which is administered by the Forest Management Branch through the issuance of licences, cutting permits, and site plans consistent with the Quill Creek Timber Harvest Plan.

1.4. Integrated Landscape Plan

The Integrated Landscape Plan was developed as a supplementary plan to the Strategic Forest Management Plan, and provides a technical assessment of resources, management priorities and guidelines for timber harvest project planning. The Quill Creek timber harvest planning area is within the forest resource management zone, where timber harvesting can occur with a primary focus of harvesting stands with over 30% spruce beetle mortality. The northwest corner of the timber harvest planning area is within the interface fuel abatement zone, where timber harvest planning must include forest fuel management as a primary objective.

The remaining area north of Quill Creek is within the landscape fuel abatement zone, where all timber harvest must consider fuel management as a priority. Harvesting is planned so that the size, shape and location of developments will enhance fuel discontinuity and silvicultural activities should support the regeneration of a deciduous or mixed-wood stand.

The following is a brief summary of the planning and operational requirements prescribed by the Integrated Landscape Plan. About half of the timber harvest planning area is mapped as having high wildlife values (Figure 1); this area generally corresponds to the key wildlife areas discussed

in Section 5.10.4 with the addition of an area along Quill Creek that is focused on the riparian area and a wetland complex. Timber harvesting within this area will emphasize the management of wildlife values, with integration of fuel management objectives where the fuel abatement zone overlaps areas with high wildlife values. High wildlife areas will average 25% retention of stand structure, and the range of retention can be 10-30% of stand structure depending on site characteristics.

Harvest block boundaries are designed to emulate the natural disturbance patterns of the area, with harvest block areas up to 200 hectares. Retention strategies for harvest blocks inside high wildlife areas will be targeted at an average of 25% of the volume or stems. The retention strategy specifies the type, amount and spatial configuration of the structure to be retained. The retention can be in groups of mature trees or in single trees. Where windthrow risk is high, group retention may be prescribed. As the forest is opened up through timber harvesting, blow-down of green timber may occur, creating opportunities for spruce beetle populations to build. The configuration of cut-blocks and reserves must consider wind-firmness as one of the site plan objectives, with the first priority being protection of riparian values and water quality. Efforts will be made to salvage and utilize blown-down timber while permits are active. Inspections for blowdown prior to fire season will highlight areas of blowdown for salvage harvest. It is anticipated that there will be a large amount of blowdown of dead stems in the unharvested forest as these stands further decay. This coarse woody debris will contribute to the structure and function of soils in these areas. The timing of harvest within a season will be influenced by site specific wildlife concerns (for example, calving season), or other land use activities (for example; tourism, recreational, or cultural use).

Once areas have been selected for harvesting, consideration for heritage and cultural values must become part of the planning process. This includes a pre-harvest field assessment of cultural and heritage values in snow and frost-free conditions by qualified personnel from the Champagne and Aishihik First Nations Heritage Department and the Heritage Unit of Yukon Government. Heritage Resource Impact Assessments will sequence site assessment and prioritize Areas of Potential as determined by Champagne and Aishihik First Nations Elders, citizens, and representatives. This will be coordinated by Forest Management Branch staff in order to allow sufficient time in advance of harvesting operations for heritage assessment to be completed. Identified heritage sites must be protected, with no timber harvesting allowed in the immediate site area. Winter timber harvest operations on frozen ground may be permitted if the site(s) of concern consist solely of sub-surface archaeological deposits.

Additional guidance from the Integrated Landscape Plan is incorporated into the remainder of the timber harvest plan. The Integrated Landscape Plan should be consulted for more details or to clarify aspects of this timber harvest plan.

1.5. Connectivity corridor planning

The Integrated Landscape Plan identifies the need to provide appropriate wildlife movement corridors between important habitats and key landscape features. The Connectivity Planning Sub-Group (2008) developed a riparian habitat and connectivity corridor map based on riparian habitats and local knowledge of important wildlife use areas. The map includes primary and secondary wildlife habitat and movement corridors. The primary corridors are generally along significant watercourses and include riparian corridors enhanced by key topographic features and other ecologically significant features such as known areas of animal concentration and important habitat. Secondary corridors were identified to facilitate upland habitat connectivity and as corridor alternatives around known areas of high disturbance related to development. This network represents a core area throughout the forest resource management zone to address landscape scale wildlife movement issues (Connectivity Planning Sub-Group 2008).

In this timber harvest plan, harvest blocks and access roads within the planning area have been strategically located to minimize impacts to the connectivity corridors. This resulted in only one new road crossing and no new harvesting within the connectivity corridors. There are a few pre-existing roads across the corridors in the Quill Creek area, which are under the authority of the Government of Yukon, Department of Highways and Public Works and are outside the authority of this timber harvest plan.

2. Environmental setting

2.1. Climate

The Quill Creek timber harvest planning area is located within the Ruby Ranges Ecoregion, in the shadow of the St. Elias Mountains. The ecoregion is characteristically dry and cool. Annual precipitation is 25-30 centimetres, which predominantly occurs during the summer months as rain. Snow cover occurs from late October to mid-April in the valleys and a month longer on higher elevations, with frost occurring year-round. Mean annual temperatures are -3 to -7°C. Mean January temperatures are -30 to -35°C, while mean July temperatures range from 7 – 12°C. Extreme temperature ranges occur in the lower valleys from -62 to 32°C. Southern gale force winds are common, and strong northwesterly winds can occur during the winter (Smith et al. 2004).

2.2. Physiography

The Ruby Ranges Ecoregion is a large area of rounded summits and broad valleys, and contains Kluane Lake, the largest lake in Yukon. A distinguishing characteristic of the ecoregion is the

Shakwak Trench, a valley demarcating the Denali Fault, which separates the western active mountains from the low mountains and wide valleys to the east. The elevation ranges from 575 to 2745 metres, with a mean elevation of 1200 metres (Smith et al. 2004).

The ecoregion includes the Kluane Plateau, the Shakwak Trench, and the Kluane Ranges. In general, its topography varies from the wide, undulating upland of the Kluane Plateau to the major valley of the Shakwak Trench, and the steep sided mountains of the Kluane Ranges (Smith et al. 2004). The topography was shaped by the glacial ice flows of the McConnell Glaciation (Bostock 1966; Hughes et al. 1969), which covered lowland areas by sometime after 26,000 BP and had receded prior to 9,000 BP (Jackson et al. 1991). In the postglacial period, rivers and streams cut into the thick deposits of till, glaciofluvial gravels, and glaciolacustrine clay and silt deposited during the McConnell Glaciation, creating steep-sided canyons and flights of terraces (Smith et al. 2004). The highest points in the ecoregion are the summits of Mount Cairnes and Mount Vulcan which surpass 2700 metres. Numerous other peaks are over 2200 m.

2.3. Hydrology

The Ruby Ranges Ecoregion primarily drains northward through rivers such as the Yukon River and Takhini River and their tributaries. The southwestern portion of the ecoregion, including the Kluane Ranges, falls within the Western Hydrologic Region. The Dezadeash River and its tributaries, such as the Kathleen River, are representative of the western hydrologic region drainage (Smith et al. 2004).

2.4. Bedrock and surficial geology

The bedrock geology of the Ruby Ranges Ecoregion is composed primarily of metamorphosed sedimentary and granitic rocks. There are three distinct geological terranes within the ecoregion separated by two north-west trending faults. In the southwestern portion of the ecoregion, the seismically active Duke River Fault, separates the Alexander Terrain (dominated by Paleozoic graywacke, argillite, and limestone), from the Gravina-Nutzotin Belt. This belt includes the Mesozoic Dezadeash Formation, which includes biotite schist, granitic gneiss, quartzite, and marble. Further northeast of the Shakwak Valley, the bedrock is dominated by a broad zone of metamorphosed rocks including foliated granodiorite and biotite quartz diorite (Smith et al. 2004).

The surficial geology is dominated by steep bedrock exposures at high elevations, while mid-elevation slopes are generally covered in moraine ridges, ice deposits, and meltwater channels. The ecoregion has been affected by the Cordilleran Ice Sheet and the glaciers from the St. Elias Mountains. Ice caps dominated the higher elevation terrain, while the valleys were affected by a complex series of ice tongues. Various glaciers covered 50-90% of the ecoregion, causing drainages to divert and the formation of glacial lakes. Glacial Lake Alsek is the most recent

example, with Haines Junction and the northern edge of the Quill Creek timber harvest planning area having been inundated a few hundred years ago when the current route of the river through the mountains to the Pacific Ocean was blocked by glaciation (Smith et al. 2004). The glaciolacustrine clay and silt cliffs along the Kathleen River, along the east edge of the timber harvest planning area, may have been formed when post-glacial Lake Champagne drained and the river cut down through the sediments of the lake bottom.

2.5. Vegetation

The soils of the ecoregion are generally formed on glacial parent material within the semi-arid climate conditions characteristic of the ecoregion; the resulting soils are alkaline and support mixed forests of aspen, pine, and spruce (Smith et al. 2004). The Ruby Ranges ecoregion is mainly boreal forest, dominated by white spruce below the treeline, and subalpine meadows above 1400 metres. The most common cover of the ecoregion is white spruce and willow with a groundcover of moss and shrubs. Drier sites also include soapberry and grasses, while wetter sites contain willow, shrub birch, and sedges (Smith et al. 2004). Trembling aspen is common within the Quill Creek timber harvest planning area. Black spruce is absent and lodgepole pine is rare within the timber harvest planning area.

2.6. Wildlife

The ecoregion is home to a wide diversity and abundance of wildlife, including the Aishihik caribou herd; however, caribou, bison, and elk are not known to occur within the Quill Creek timber harvest planning area. The ecoregion also sustains large Dall's sheep populations as well as mountain goats. Some of the highest densities of coyote, wolf, and wolverine in the Yukon are within the ecoregion. Moose and grizzly bear occur throughout the region. The Shakwak Trench serves as a migration corridor for various birds, including swans, geese, and ducks. Mature white spruce forests support habitat for many breeding songbirds such as red-breasted nuthatch, golden-crowned and ruby-crowned kinglets, Swainson's thrush, yellow-rumped and Wilson's warblers, dark-eyed junco, varied thrush, and pine siskin. Year-round resident birds include northern goshawk, spruce grouse, great-horned and boreal owl, three-toed and black-backed woodpeckers, gray jay, black-capped and boreal chickadees, and the common raven (Smith et al. 2004).

2.7. Fish

The smaller tributaries of the upper Dezadeash River drainage that occur within the Quill Creek timber harvest planning area may support Dolly Varden, rainbow trout, Arctic grayling, and slimy sculpin (Environmental Dynamics Inc., 2005). There are four mapped drainages within the timber harvest planning area, three of which have not been specifically assessed to determine whether they are fish-bearing. Environmental Dynamics Inc. (2005) has completed an assessment of the

streams in one watershed within the northern part of the timber harvest planning area, with one Dolly Varden captured during fish inventory. It is important to recognize that some fish, especially rainbow trout, may spawn in seasonal spring flows that may dry up in the late summer. It is assumed all drainages are fish bearing unless specifically assessed by a fish biologist and determined that the stream is not fish bearing.

2.8. Species at Risk– Listed species of Conservation Concern

The federal *Species at Risk Act* (SARA) provides legal protection of species across Canada. Species listed under this act are managed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The species listed under SARA are continually changing as new information is obtained. The Yukon Conservation Data Center collects information on species at risk and provides a publication called *Yukon Species at Risk* which is updated annually. For up to date information, the most recent version of this publication should be referenced. The following tables show species listed in SARA (2020) that are known to be in or immediately adjacent to the timber harvest planning area.

SPECIES	SARA STATUS	HABITAT	RELEVANT MITIGATIONS	IMPACTS ON HABITAT FROM HARVEST
Little brown bat	Endangered	Buildings, rock crevices, tree cavities, under tree bark.	In-block retention; large areas of undisturbed mature forest; seasonal harvest restrictions	None anticipated
Rusty blackbird	Extirpated	Brushy wetland areas	Connectivity corridors and riparian buffers; seasonal harvest restrictions	None anticipated
Bank swallow	Threatened	Vertical banks including river banks	Seasonal harvest restrictions, connectivity corridors and riparian buffers	None anticipated
Grizzly bear	Special Concern	Open tundra, sub-alpine, throughout boreal forest.	Connectivity corridors; restricted road access and road deactivation; large areas of undisturbed mature forest; additional buffers on active dens	None anticipated. Active roads and high traffic roads can be a threat; however, travel usage is below impact thresholds
Wolverine	Special Concern	Boreal forest, alpine tundra and barren lands.	Connectivity corridors; restricted road access and road deactivation; large areas of undisturbed mature forest	None anticipated. Active roads and high traffic roads can be a threat

Table 1. Species at risk known to be in or adjacent to harvest areas

SPECIES	SARA STATUS	HABITAT	RELEVANT MITIGATIONS	IMPACTS ON HABITAT FROM HARVEST
Gypsy cuckoo bumble bee	Endangered	Requires open areas with abundant wildflowers	Proposed roads avoid meadows and open areas	May improve habitat in harvested areas
Barn swallow	Threatened	Mostly manmade structures, and open grassy fields and wetlands	Riparian buffers; Proposed roads avoid meadows and open areas	None anticipated
Common nighthawk	Threatened	Nest in open forests, including logged areas	Seasonal harvest restrictions	May improve habitat in harvest areas
Olive-sided flycatcher	Threatened	Open forest, edges of burns or peatlands with standing trees	Riparian buffers; Seasonal harvest restrictions; large areas of undisturbed mature forest	May improve habitat in harvest areas
Transverse lady beetle	Assessed Special Concern	Coniferous and deciduous forests and meadows	Proposed roads avoid meadows and open areas; large areas of undisturbed mature forest	None Anticipated
Western bumble bee	Assessed Special Concern	Mixed woodlands, willow, kinnikinnick, sweet vetch, sweet clover	Proposed roads avoid meadows and open areas; large areas of undisturbed mature forest	May improve habitat in harvest areas

Table 2. Species at risk potentially in or adjacent to harvest areas

There are no known plant species listed in SARA that occur in the harvest areas. Rare vascular plants do not typically occur in mature spruce forests where this proposed timber harvesting occurs (B. Bennett, personal communication, Jan. 15 2020). Proposed road locations avoid wetlands, meadows and riparian areas where plant species of conservation concern may occur.

3. Forest health

3.1. Introduction

The Forest Management Branch releases an annual forest health report, which summarizes the current state of forest health in Yukon. The Forest Health Report and information relating to forest pests and diseases in Yukon are publically available on Government of Yukon's website. Spruce beetle (*Dendroctonus rufipennis*) is the primary forest health concern within the Quill Creek timber harvest planning area; they are currently present at normal or endemic levels.

The most recent spruce bark beetle outbreak is believed to have started in Kluane National Park and Reserve around 1990, and was first noted in 1994 when over 32,000 hectares of trees had experienced spruce bark beetle related mortality. The beetle outbreak moved into forests north and south of Haines Junction, and continued to affect large areas of spruce within and west of Kluane National Park. By 2007, over half of the mature spruce trees had been killed over an area of 380,000 hectares. By 2012 the infestation had significantly subsided, with only small areas of infestation noted in the West Aishihik River Valley and between Frederick Lake and Kusuwa Lake (Yukon Government 2013). Since 2018, Yukon Government has undertaken a ground-based spruce beetle pheromone trapping program in Haines Junction timber harvest planning areas to monitor the endemic levels of spruce bark beetles to better understand pest disturbances and inform risk management (Yukon Government 2019).

Warm summers may have contributed to the outbreak, causing desiccation of spruce trees, which then became stressed and attractive to the spruce bark beetles. Warmer winters resulted in reduced mortality of larvae hibernating under the tree bark. The warmth also allowed the beetles to mature in a single year, rather than the normal 2-3 year life cycle in Yukon, which greatly increased the population growth rate. Spruce bark beetles can withstand winter temperatures of around -27°C but usually die when temperatures below -40°C last for a week or more. The beetles carry a fungus, which results in a blue-grey stain to beetle-killed wood. The beetles prefer to attack larger trees, but trees down to 12 centimetres in diameter at breast height may be killed, especially at high beetle population densities.

Spruce bark beetle outbreaks may occur again, especially if forest management practices are not designed to minimize the risk. Key considerations in the Quill Creek timber harvest planning area are provided below, with additional considerations provided in the Spruce Bark Beetle Pamphlet.

- Spruce bark beetles are attracted to recently killed and stressed spruce and slash materials; therefore, disturbance in spruce stands increases the likelihood of attack in adjacent spruce stands.
- Large diameter spruce trees are more attractive habitat for beetles and a higher proportion of large diameter spruce trees increases the likelihood of attack in a stand.

- Spruce bark beetles are attracted to recently killed and stressed spruce; therefore, stands under stress or with recent windthrow of live trees are more likely to host high beetle populations.
- During and after a spruce beetle outbreak, wildfire hazard increases in the short term while the dead needles remain on the spruce. It then decreases in the medium term when the needles have dropped. The hazard increases again in the long term when the dead trees fall to the forest floor and contribute large diameter fuels to the regenerating spruce fuel complex.

3.2. SPRUCE BARK BEETLE MANAGEMENT

Harvesting and silviculture considerations to reduce the risk of spruce bark beetle outbreak are:

- Time harvesting operations to occur outside the spring beetle flight period, and remove or dispose of green logs/debris prior to the next beetle flight period.
- Minimize the amount of large diameter (greater than 20 centimetres) green debris left on site more than one year after harvest. This is best implemented through pile-and-burn or chipping.
- Where green debris is left, leave in full sunlight to dry.
- Minimize windthrow hazard when designing the harvest area. Following harvest, survey windthrow in mid to late June to determine if it is being attacked and/or monitor populations with pheromone traps.
- Salvage of green windthrow in the years following harvesting if possible.
- Minimize stump height to reduce the amount of host material.
- If possible, debark green logs to be decked so they do not provide habitat for beetles.
- Minimize site disturbance to ensure hydrology is not affected (which will stress live trees) and ensure that residual trees are not mechanically damaged or under stress.
- When burning slash piles avoid damaging the roots and boles of nearby trees. This will minimize the number of stressed trees on site and decrease the amount of suitable host material.
- Increase stand biodiversity by utilizing a range of preferred and acceptable species for reforestation activities, including lodgepole pine when ecologically appropriate.

4. Forest resources management planning

4.1. Sustainable Forest management

Sustainable forest management is a way of using and caring for forests to maintain their environmental, social and economic values and benefits over time (Canadian Forest Service, 2018). The primary activity regulated under this timber harvest plan is salvage harvesting of beetle-killed timber, with allowance for harvesting some green timber. Spruce beetle epidemics have historically been rare in Yukon due to the cold winters, but may become more frequent due to the warming climate (Yukon Government 2008).

Southwestern Yukon has been less affected by fire than central and southern Yukon, with a fire cycle of over 1,000 years in some localized areas in the general region (Applied Ecosystem Management 2002). However, considering the beetle outbreak, a recent warmer weather trend, and the potential of lightning or human-caused fire events, a major fire could occur in the area. There has recently been increased fuel hazard due to a change in the structure of the healthy, live, mature, white spruce forest to abundant dead wood due to the extensive spruce beetle infestation (Garbutt et al. 2006).

The development process of this plan included consultation and engagement with various departments of Government of Yukon, Champagne and Aishihik First Nations, the Alsek Renewable Resource Council, traditional land users, and members of the public. The intent of this consultation was to account for the multiple interests and values present in the planning area, and to ensure that these values are not negatively affected by forest resource harvesting operations. The input received during consultation was incorporated into this plan and the values identified are discussed in greater detail in subsequent sections of the timber harvest plan.

Other forest values in the area include recreational pursuits such as cross-country skiing, biking, wildlife viewing, hiking, and camping. Although there are no designated sites for these activities within the timber harvest planning area, there are many features and areas conducive to these types of pursuits. It is not anticipated that timber harvesting will have a negative long-term effect on any of these activities.

Some non-timber forest products within the timber harvest planning area include mushrooms, berries, and medicinal plants. Timber harvesting activities are focused in areas with a high percentage of dead timber and account for 15.2% of the area. Harvesting will aim to remove the dead timber and most of the green timber will remain. This will make for a more open forest stand. 73% of the forested area of the timber harvest plan is not proposed for timber harvesting and will continue to support non-timber forest products (Table 3). Other interesting features such as open meadows, wetlands, grassy hills and cliffs are not targeted for harvest and have buffers to protect them where necessary.

All of the values within a given area may not have been specifically identified during the timber harvest planning process. Many values such as wildlife features are dynamic in nature or difficult to identify during the planning stages of a timber harvest plan and therefore were not identified. The Forest Management Branch has an extensive suite of standards and guidelines to direct harvest activities when additional values are identified. All of the standards and guidelines that apply to forest operations in Yukon can be found on Yukon.ca.

	Total Forested	Harvested	Proposed Harvest	Forested No Harvest	Roads	Wetland	TOTAL THP Area (ha)
Area (ha)	10,707	372	1,767	8568	26.3	639	11,596
% of Area	92.3%	3.2%	15.2%	73.9%	0.2%	5.5%	100%

Table 3: Timber harvest planning area – land status and proposed harvesting area

4.2. Integrated Resource Management

Within the timber harvest planning area there are three gravel pit reservations located adjacent to the Haines Road, the Quill Creek gravel pit is the only currently active gravel pit. Commercial timber harvest opportunities overlap with the Quill Creek gravel pit. Coordination will be required between Forest Management Branch and the Department of Highways and Public Works to ensure that timber harvesting and planned quarrying activities do not conflict.

There are several Champagne and Aishihik First Nations Site Specific Settlement land parcels within the planning area, located along the north side of Quill Creek and in the southern sections of the planning area near Lower Kathleen, Rainbow, and Crescent Lakes. There is also titled private property located along Rainbow Lake, Crescent Lake, Quill Creek, and the Haines Road. Proposed timber harvesting is not located closer than 400 meters to any settlement land or titled land, and shared access is generally limited.

As of November 2021, there are no active placer or quartz claims in the timber harvest plan area. There are existing exploration roads that are now public roads and are proposed for upgrading to facilitate timber harvesting, refer to section 6.4 and Appendix 3 for more information.

4.3.Traditional Knowledge

During the YESAB screening of the draft timber harvest plan (project 2020-0051), the Champagne and Aishihik First Nations submitted a Traditional Land Use Study for the Proposed Quill Creek Timber Harvest Plan. The purpose of the Traditional Land Use Study is to document Champagne and Aishihik First Nations traditional knowledge and oral history related to the Quill Creek area; document any perceived benefits or impacts of the proposed timber harvest plan; and to better understand the Champagne and Aishihik First Nations community's vision for this

area, including how it should be managed for current and future generations. Recommendations from the study, and comments submitted by the Champagne and Aishihik First Nations to the YESAB online registry on July 2, 2020, July 27, 2020, and July 9, 2021 were considered in the Final Screening Report developed by the Executive Committee. The recommended mitigations to preserve Traditional Land Use and Sense of Place have been incorporated into the Quill Creek Timber Harvest Plan.

4.4. Economics of timber supply

Much of the timber harvesting in Haines Junction occurs under commercial fuel wood licences, with a smaller volume harvested under permits for personal use. The timber harvest planning area contains large volumes of merchantable beetle killed timber that is potentially available for salvage. The presence of existing access and the proximity to markets in Haines Junction and Whitehorse makes this area ideal for supporting varying degrees of commercial and personal use harvesting activities.

Many residents of Whitehorse acquire firewood from commercial operations based out of Haines Junction, with some of the volume harvested in this region staying in Haines Junction or going to other Yukon communities. This timber harvest plan provides a significant opportunity for commercial timber harvesting operators to access an economically viable wood supply to provide Yukon communities with firewood. Commercial harvesting activities within this timber harvest planning area may also benefit local consumers by potentially providing a reliable and affordable wood supply source close to their community, or by providing improved access for personal use fuel wood harvesting.

4.5. Commercial and Personal Use Harvesting

Prior to commencing commercial timber harvesting activities, operators must obtain a licence and cutting permit from the Forest Management Branch as per Sections 22 and 24 of the *Forest Resources Act*. The cutting permit will have terms and conditions, and a site plan, which must be followed during harvesting operations.

The site plan will outline the specific harvesting plan in the permit area and will contain detailed information on the timber resources in the area and the harvesting methods to be applied. Site plan requirements are defined in Section 22 of the *Forest Resources Regulation*.

All applications for harvesting licences and cutting permits within this timber harvest plan will be issued in accordance with the commercial timber harvest allocation procedure. This will ensure all allocations of timber are conducted in a transparent, fair, and equitable manner.

Personal use harvesting opportunities are highly sought after by community members. Personal use fuel wood areas will be designated and managed by the Forest Management Branch on an

ongoing basis. This will help provide an accessible firewood source for the community. The rate of harvest in the personal use fuel wood areas will be monitored by the Forest Management Branch and areas made available as needed.

Personal use fuel wood designated areas are not included in the formal block layout and volume summaries in this timber harvest plan. The intent of this timber harvest plan is to provide for economic development of commercial wood harvesting opportunities. As new access is developed, many kilometres of road have potential to open previously inaccessible areas to personal firewood harvesting.

A person wishing to harvest fuel wood for personal use within these personal use fuel wood areas must obtain a permit from the Forest Management Branch. As stated in Section 48(a) of the *Forest Resources Regulation*, a person may harvest up to 25 cubic metres of personal use fuel wood per year under a forest resources permit free of stumpage fees.

4.6. FUEL ABATEMENT

Harvesting areas were selected based primarily on the incidence of spruce bark beetle-infested and killed timber. Fuel abatement is an objective of the Quill Creek Timber Harvest Plan in the interface and landscape fuel abatement zones. The Integrated Landscape Plan has fuel abatement guidelines, which are summarized below:

1. To reduce canopy cover to an acceptable level so that crown fire potential is significantly reduced;
2. To reduce fuels at or near the forest floor to levels that reduce surface fire intensity and interrupt vertical fuel continuity with the forest canopy;
3. To encourage the development of a stand that is less susceptible to attack from the spruce bark beetle; and
4. To retain a stand structure and composition that will respect values for wildlife, ecosystem function, aesthetic and cultural aspects as much as possible without compromising public safety.

In addition to the guidelines from the Integrated Landscape Plan, the following mitigations from the Decision Document will also contribute to fuel abatement in the planning area. Audits will be completed to ensure:

- Operators have removed fine slash from harvest blocks prior to the start of the fire season.
- No more than 1.0kg/m2 or the equivalent of 1.0 metric tons per hectare, of fine fuel slash (<12.5cm), is left behind.
- No more than 4.0kg/m2 or the equivalent of 4.0 metric tons per hectare, of coarse slash (>12.5cm) is left behind.

Trees will be processed at the landing and not at the stump to reduce fuel loading within the cutblocks. Alternative methods for disposal of woody debris may be considered, so long as there is no increase in ground fuel loading. Forest regeneration will focus on supporting deciduous or mixed-wood stands where possible.

Timber harvesting within the Interface and Auriol operating units (see section 6.3) must prioritize fuel abatement as a primary objective within the site plan. In addition to the generalized fuel abatement treatment options listed below, the site plan must address reducing forest floor fuels. General fuel abatement prescriptions have been developed in previous fuel abatement plans (Yukon Government 2008a) and are summarized below:

a) Thinning dense stands of trees: changing the horizontal and vertical structure of the forest stand to a more open condition by removing most of the large trees, including all the dead trees, leaving only the smaller healthy trees. The retained live large trees must have a low risk of windthrow, to minimize the risk of promoting a new beetle outbreak.
b) Patch cutting and thinning: removing all conifers in a selected area, varying in size from 0.2 ha to 10+ hectares, with the objective of breaking up the continuity of canopy cover and leaving small patches of well-spaced trees within these patches.
c) Clear-cutting with reserves: removing a strip of larger trees leaving only small islands of trees so that fire is less likely to jump across the harvested area to start a new fire inside the protected area.

4.7. WILDFIRE RISK

Due to the proximity of the timber harvest plan to the community of Haines Junction, other values in the area and prevailing winds, this plan will put into place seasonal restrictions and other requirements to minimize the risk of fire occurrence. The mitigations that must be followed are as follows.

Signage:

Fire Danger Rating is assessed and posted by Wildland Fire Management Branch. In accordance with the Decision Document, weather resistant signs will be posted at the junction of the Haines Highway and any road used to access harvest blocks. These signs will communicate: fire danger rating class, fire safety information, access restrictions related to public access and fire risk, and contact information for land users to register their concerns and report wildfire.

Summer Harvesting Restrictions:

- No timber harvesting is to occur from May 1 to August 15, however hauling of timber and processing at landings may occur during this period (see Table 4).

- All harvesting, hauling and processing of timber will be prohibited when the fire danger rating is moderate, high, or extreme.
- Any timber harvesting activity or processing occurring during the fire season will require that fire suppression equipment be located on site, as specified in the licence and/or cutting permit.
- Timber harvesting and processing will be subject to forest closures and fire bans put in place by the forest supervisor as per the *Forest Protection Act* and *Regulation*.
- No burning of piles will occur during the fire season.

Winter Burning Requirements:

- Burn piles must be located on cleared mineral soil on approved landings as shown in the site plan.
- In snow free conditions, burn piles shall have a minimum 5-meter wide mineral soil fireguard located around the burn pile.
- Burn piles will be located the greater of 10 meters or twice the width of the burn pile away from standing timber.
- Prior to burning the licensee must notify a Natural Resource Officer (Forest Officer) and provide coordinates or a map showing the locations of all burning.
- All burn piles must be fully extinguished prior to the fire season.
- Licensee must monitor slash burn piles throughout all seasons, until the fires are entirely extinguished.

Fuel Break Construction:

A 300-metre wide fuel break will be constructed as per mitigation 2 of the Decision Document of YESAB project 2020-0051. The purpose of the fuel break is to slow or stop the spread of wildfire, and help protect the village of Haines Junction in the event of a wildfire. The location and design of the fuel break will be determined by the Forest Fuels Working Group. No project activities except road building will take place during the fire season (April 1 to Sept 30) until a fuel break is constructed.

After the fuel break is completed, harvesting activities may take place in low fire danger rating conditions. Fire danger rating conditions must be measured daily. If there are harvest blocks located between the Village of Haines Junction and the fuel break, harvesting shall only be allowed in winter.

4.8. SOIL CONSERVATION AND HYDROLOGY

Protecting the integrity of soils and their hydrological function is essential to maintaining a healthy and productive forest ecosystem. The Forest Management Branch Soil Conservation

Standards and Guidelines (2012) have been established to conserve soil productivity and hydrological function during harvesting operations. All activities carried out under this timber harvest plan must adhere to these standards. These standards can be found on Yukon.ca

Site-specific soils information and protection measures are outlined in the site plan of commercial cutting permits issued under this timber harvest plan. The Soil Conservation Standards and Guidelines determine the season of harvest based on the hazard ratings of the soil type within the harvest area and clearly state mitigation strategies for the protection of soil properties.

4.9. Visual Quality & Sensory Disturbance

A desktop assessment of the potential visual quality effects of the proposed harvesting was completed using Google Earth. “Street View” is available for the Haines Highway, and “Ground Level View” was used for the Marshall Creek Road. In general, both the Haines Highway and the Marshall Creek Road have low visual quality impacts due to terrain, tall deciduous and coniferous trees and shrubs, and partial cut techniques.

The Forest Management Branch completed drone surveys along the creek and river corridors within the Quill Creek planning area. Through the use of drone footage it was determined that minimal harvest area will be visible from the rivers, creeks, or surrounding riparian areas.

Sensory disturbance from the vantage point of adjacent trails and river corridors will be considered when designing in-block retention and stand structure. Sensory disturbance means discernable changes in ambient noise conditions or to aesthetic conditions that may have potential adverse effects on the quiet enjoyment of land users.

Visual Quality from Haines Highway:

The following proposed harvest blocks are near the Haines Highway:

- QC-14 is not visible from the highway.
- QC-16 is not visible from the highway.
- QC-19 block is flat to slightly down-sloping extending away from the highway. A high proportion of the forest along the highway edge is aspen and green spruce. The only trees removed near the highway should be dead spruce (leaving dead trees where required to avoid impacts to live trees), which will result in a low initial visual impact that will decline with the regeneration of deciduous tree species. The forest between the highway and the existing borrow pit should have only dead spruce removed, with harvesting done in a manner that maintains a visual screen between the highway and the borrow pit.
- QC-20 is not visible along the highway; the land slopes gently downward from the highway.

- QC-32 is partially visible from the highway, and the block is flat extending away from the highway. A high proportion of the forest along the highway edge is aspen and green spruce. The only trees removed near the highway should be dead spruce (leaving dead trees where required to avoid impacts to live trees), which will result in a low initial visual impact that will decline with the regeneration of deciduous tree species.
- QC-35 is mostly not visible from the highway, it is screened by a forested wetland. The south end is likely partially visible, with broken screening by a wetland and scattered trees and shrubs. The visual quality of the view of the block from the highway will be protected through retention of green spruce and deciduous trees. The proposed access road will have good screening beyond the entrance by curving through tall trees and shrubs.

Visual Quality from Kluane National Park – Auriol Trail

Some of the existing logged areas and some of the proposed new blocks may be visible from the Auriol Trail, once the trail steepens about 2 kilometers west of the Haines Highway. Due to the irregular block shape, and high retention levels through the targeted removal of deadwood, it is anticipated that the visual impact will be low. Previously harvested areas are difficult to identify from this vantage point.

Visual Quality from Marshall Creek Road

"Street View" (Google Earth) is not available for the Marshall Creek Road. "Ground Level View" and a brief drive-through were used to assess potential visual quality impacts. Most of the road is well screened, with deciduous and conifer tall shrubs and forest, and the blocks will be viewed at a low angle which will reduce visual impacts. QC-01, -02, -03, -04, -05, and -06 may be visible from some vantage points along the road and from some residences. The closest edge of these blocks to the road is about 1.5 kilometers. Some of these blocks may also be visible at over 3 kilometers distance from some residences in Haines Junction. Consideration will be given to the visual appearance of these blocks from the road, and especially from the residences, during road and harvest planning. The access roads may have the greatest visual impacts, which should be minimized by green tree retention along the north and west sides.

4.10. WILDLIFE AND BIODIVERSITY

4.10.1 Biodiversity

The Yukon Bioclimate Ecosystem Classification is based on climate and site-level ecosystem classification, with climate considered to be the primary influence on ecosystem development and distribution, providing detailed site-level ecological mapping and interpretation. The Quill

Creek timber harvest planning area is in the Boreal Low Zone, with the ecosites described in the field guide of Environment Yukon (2017). Ecosites are the site-specific ecosystems that determine optimal forest practices, and must be assessed and recorded for each harvesting site plan. The timber harvest planning area is on the west edge of the area the field guide applies to; hence, there are some differences; for example, black spruce and lodgepole pine are absent or rare in the Quill Creek timber harvest planning area but are common in most of the area covered by the field guide.

Live trees that survived the beetle epidemic will typically be excluded from harvest and contribute towards biodiversity and varying wildlife habitat. Some live aspen and spruce harvesting will occur where it is necessary for access development. Live spruce trees will be removed during harvesting operations in select circumstances: where there is a high risk of wind throw, incidental to the harvesting of dead timber, or where there may be fuel abatement or other objectives. The majority of the total timber harvest planning area will not be harvested in the foreseeable future and will continue to provide for wildlife habitat and structural diversity. As the areas regenerate, new habitat niches will emerge, and the area will continue to be used by a wide variety of wildlife species.

4.10.2 Salvage harvesting effects on wildlife

Salvage harvested forests in the Haines Junction area (including the Quill Creek timber harvest planning area) do not provide the same habitat function as unlogged beetle-killed areas (Thomas et al. 2019). Some species such as snowshoe hare, lynx, and coyote avoid salvage blocks, regardless of the level of retention of live and/or dead trees. This is due to a loss of cover for hares, resulting in lack of prey for lynx and coyote. Large portions of the timber harvest planning area will be retained as no-harvest-zones. This has been done in an effort to maintain healthy wildlife populations of various species, knowing that some species will avoid areas affected by harvesting. This includes but is not limited to the wildlife connectivity corridor discussed in section 1.5, connectivity corridor planning.

Some wildlife species, such as furbearers (for example, marten and weasels) and woodpeckers, are especially dependent on standing and downed dead trees. Most of the dead trees will be removed from the harvest blocks and road areas, reducing the habitat for such species within the harvested areas. This is not expected to have an impact on the populations, as there is a minimum of 73% of the forested area within the timber harvest plan area with no proposed harvesting.

For moose and deer, the harvest areas will have less cover and a corresponding increased risk of predation by wolves, especially when calving. Calving areas will likely concentrate in the

unharvested forest with abundant downed trees to impede wolf and coyote movement. The harvesting will result in new growth of shrubs and aspen regeneration, which will provide improved winter browse for moose. Late winter habitat for moose has been identified as “high wildlife values” within the timber harvest planning area.

The changes in quality of wildlife habitat will be mitigated over time due to annual new recruits of dead trees within the mature spruce forest within and outside the harvest blocks. Over time, the browse will decrease as new spruce shades the willows and the aspen regeneration becomes mature. It will take many decades for the harvested areas to return the habitat to mature forest. There is currently an abundance of downed and standing dead trees as a result of the mortality from the spruce bark beetle epidemic.

4.10.3 Wildlife features

Wildlife features include mineral licks, bear and wolverine dens, nest sites, beaver dams, cavity nests and wildlife trees, game trails, cliff faces, and fish over-wintering or spawning areas. Within the Quill Creek timber harvest planning area, bear dens, cavity nests, wildlife trees, and game trails are the most likely features to be encountered. One possible bear den was identified in 2018 by a timber cruising crew. The cliff faces along the Kathleen River have bank swallow nests, and mineral licks and beaver ponds are possible but rarely encountered. The Forest Management Branch Wildlife Features Standard (2014) provides management guidelines for several wildlife features that may be encountered within the timber harvest planning area. Several raptor species were noted in the area and two nests found during reconnaissance for the previous timber harvesting plan are noted and will be shown on cutting permit maps for this plan, they must be avoided if they are still active.

4.10.4 Key wildlife habitat areas

Wildlife Key Areas have been mapped by the Department of Environment to highlight known areas that are critical to wildlife populations. Within the timber harvest planning area there is a grizzly bear wildlife key area (WKA 826 - spring, summer and fall range) along the eastern edge of the timber harvest plan area. Three moose wildlife key areas (late winter range) overlap the timber harvest planning area – WKA 4716 for the eastern half of the timber harvest planning area and WKA 4715 and WKA 750 for the north edge of the timber harvest planning area. The moose wildlife key areas are based on aerial survey data and they are reasonably accurately defined. The wildlife key areas are generally incorporated into the high wildlife values area of the Integrated Landscape Plan (see Section 1.4). On the Auriol Branch Road and Quill Creek Road the number of permitted operators will be limited to reduce activity in critical winter habitat for moose.

4.10.5 Riparian management and fish habitat

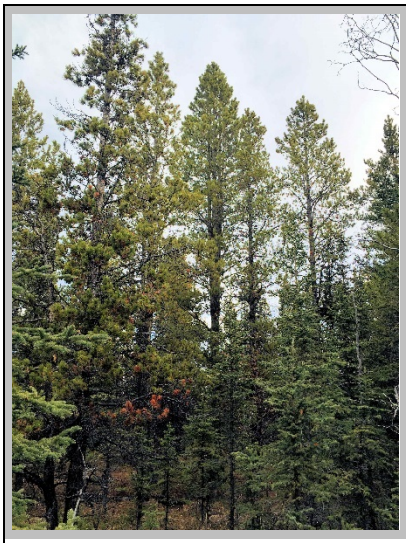
The most significant riparian features within this timber harvest plan are associated with Quill Creek, the Kathleen River, Rainbow Lake, Lower Rainbow Lake, and the Dezadeash River. The Forest Management Branch standards and guidelines on Riparian Management on Streams and Lakes (2011) will be followed to maintain the integrity of riparian features. The buffers placed on the riparian features will meet or exceed the maximum reserve zone width buffers set out in the standards and guidelines. In addition, the placement of access roads and harvest areas to avoid the habitat connectivity corridor plan has resulted in protecting most of the riparian area. The buffer has been increased to 350 metres adjacent to harvest blocks QC-27 and QC-24 based on recommended mitigations from the Decision Document. The buffer near these blocks has been increased to incorporate the many stakeholder interests in the area.

Within this timber harvest planning area, there are four small streams, Quill Creek, and many small wetlands. Wherever harvesting operations have the potential to impact riparian features, the Forest Management Branch's operational standards must be followed. The Riparian Management on Streams and Lakes and the Wetlands Riparian Management Standards and Guidelines are available on Yukon.ca.

One small watershed within the northern part of the timber harvest planning area has been assessed for fish and is classified in accordance with the Forest Management Branch Riparian Management on streams and lakes standard (2011). The previous timber harvest plan states that Quill Creek is known to have fish in its lower reaches near the Kathleen River, but steep gradients prevent fish from accessing Quill Creek through most of the timber harvest planning area. However, Quill Creek is treated as fish bearing for its entire length within the timber harvest planning area and no impacts to the creek are proposed.

4.10.6 Lodgepole pine

Lodgepole pine is a rare tree species in the Haines Junction area. Known occurrences of lodgepole pine include one tree along the Haines Highway, and a few to the south at St. Elias Lake (Yukon Conservation Data Centre, personal communication). Lodgepole pine is also naturally occurring in the Quill Creek timber harvest planning area; their presence was first documented by the Forest Management Branch in 2018 while doing a timber cruise. The lodgepole pine stands appear to have high wildlife values, as shown in Figure 2.



Pine stand.

Young pine, about 100 metres from the main pine stand.

Wildlife trail in the pine stand. Note pine seedlings.

Bear mark tree on edge of pine stand. Note pine seedlings and the wildlife trail beside the tree.

Moose antler rub tree – young lodgepole pine in a pine stand.

Aspen within pine stand, with bear claw marks on bark (from climbing).

Figure 2. Pine stand with signs of wildlife.

4.11. HERITAGE RESOURCES

Heritage features and historic resources are culturally important to all Yukon people and their preservation is an important consideration when planning any type of development or resource management activity. There is relatively little current data on existing heritage features and archaeological potential within the area encompassed by this timber harvest plan. However, there are areas within this timber harvest planning area that may have significant heritage value or contain undiscovered archaeological features. In particular, areas near riparian features and

the top of slopes may have high heritage potential, although heritage resources are not always associated with these landscape features.

There is potential for negatively affecting heritage resources during harvesting operations. Heritage inventories or assessments will be required prior to the approval of these activities. A heritage resources overview assessment desktop review of the timber harvest planning area was completed separately during the development of the timber harvest plan. The heritage resources overview assessment identified areas with potential for historic resources and will be used by the Forest Management Branch and the Champagne and Aishihik First Nations to identify, together with local and traditional knowledge, locations where heritage and/or archaeological resources may occur.

A heritage resources impact assessment field review will be completed prior to any new harvesting or road development approvals. The heritage resources impact assessment will assess any areas identified by the heritage resources overview assessment as having the potential for heritage resource values. Heritage resource impact assessments will prioritize areas of potential as determined by Champagne and Aishihik First Nations Elders, citizens, and representatives. Additionally, Yukon Government will support Champagne and Aishihik First Nations to develop a Heritage 101 training resource to aid fieldwork staff in identifying brush structures. The Forest Management Branch will coordinate with Champagne and Aishihik First Nations to complete the pre-harvest heritage resources impact assessment during snow and frost free conditions. The work will likely be completed in stages, as required for proposed road and timber harvest developments. All operations must comply with the Forest Management Branch Historic and Archaeological Resources Standards and Guidelines (2011). A copy of these standards and guidelines can be found at Yukon.ca.

4.12. TRAPPING

The Quill Creek timber harvest planning area is overlapped by three trapping concessions, numbers 271, 272, and 410. Harvesting will include consideration for the maintenance of the quality of trapping opportunities within the timber harvest planning area. The primary considerations for maintaining the quality of trapping opportunities are:

1. Where appropriate, maintain routes for snowmobile access throughout the timber harvest planning area;
2. To the extent feasible within the context of harvesting and fuel abatement, maintain an abundance of standing dead and old live trees, as denning habitat for marten and other furbearers;
3. To the extent feasible, maintain an abundance of coarse woody debris on the ground and elevated above the ground, as habitat for rodents, and to provide winter shelter and hunting opportunities under the snow for furbearers; and
4. To the extent feasible, maintain an abundance of live spruce and pine trees, to provide cones for food for squirrels, as furbearer prey.

Figure 3. Marten den in dead spruce tree, within the timber harvest planning area.

Effects on trapping-related values will be partially mitigated by the partial cut or patch cut harvesting system. Most of the timber harvest planning area will remain unharvested under this plan, which is anticipated to provide continued trapping opportunities.

5. MONITORING AND ADAPTIVE MANAGEMENT

The Strategic Forest Management Plan defines adaptive management as “a dynamic approach to forest management in which the effects of treatments and decisions are continually monitored and used, along with research results, to modify management practices on a continuing basis to ensure that management objectives are being met.” The Strategic Forest Management Plan sets the framework for adaptive management through the use of a monitoring program and outlines 102 indicators that can be selected from to create a monitoring program. It aims to look at higher level strategic management goals and objectives across the Champagne and Aishihik traditional territory that can then be refined to achieve more specific results.

Supported by the 2019 Implementation Agreement with Champagne and Aishihik First Nation, this monitoring program is currently being developed and will provide guidance to this timber harvest plan through the adaptive management principals. Monitoring and adaptive management of the area within this plan will be directed by the monitoring program. Smaller scale indicators may then be measured within this timber harvest plan and others.

5.1 Forest Fire Monitoring

To reduce the risk of forest fires in the planning area, Forest Management Branch will implement the following monitoring protocols: will be implemented by the Forest Management Branch:

- During harvesting, post harvesting, and once roads are decommissioned and rehabilitated the Forest Management Branch shall monitor the effectiveness of access control measures;
- The timber harvest planning area will be inspected regularly to ensure that no operator camps are present;
- Speed limits on forest resources roads will be monitored and implemented;
- Decommissioned and rehabilitated roads will be monitored for 5 years to ensure access has been sufficiently blocked; and
- Road densities within the planning area will be monitored and recorded

6. TIMBER HARVESTING

6.1 General considerations

There is a high demand for fuel wood in the Yukon, and much of the wood harvested within the Quill Creek timber harvest planning area will be used throughout the territory. Sometimes fuel wood is shipped outside of Yukon, in the winter of 2018-19 some fuel wood was exported to Inuvik, Northwest Territories. The primary objective of timber harvesting within this timber harvest plan is to create opportunities for fuel wood harvesting that can meet the needs of both local communities and all Yukon people. Fuel wood harvested in the Haines Junction area is sold in the form of logs, cut-to-length firewood, chips for boilers, and pellets for pellet stoves. Building logs are also harvested in the Haines Junction area.

The season of harvest is restricted and dependent on the fire risk, as well as the status of the fuel break. All timber harvesting activities will occur outside the fire season until the fuel break is constructed. Please see Table 4 for more information regarding seasonal authorization of activities.

Activities that may occur after a fuel break is constructed						
Activity	F I R E S E A S O N – Post Fuel Break Construction					WINTER
	May to Aug 15	**Aug 15th to September 30th**				**Oct 1 to Thaw. (April 1)**
		Low	**Moderate**	**High**	**Extreme**	
Timber Harvest	Not Authorized	Summer (Fall) Blocks	Not Authorized	Not Authorized	Not Authorized	Winter blocks
Processing at landings	Authorized in Low	Authorized	Not Authorized	Not Authorized	Not Authorized	Authorized
Timber Hauling	Authorized in Low	Authorized	Not Authorised	Not Authorized	Not Authorized	Authorized
Road R/W clearing	Not Authorized	Authorized	Not Authorized	Not Authorized	Not Authorized	Authorized
Road building	Authorized in *low and **moderate	*Authorized	**Authorized	Not Authorized	Not Authorized	Authorized
Burning Slash	Not Authorized	Not Authorized	Not Authorized	Not Authorized	Not Authorized	Authorized
Warming Shelters	Not Authorized	Not Authorized	Not Authorized	Not Authorized	Not Authorized	Authorized

* Requires a 1 hour firewatch following activity
** Requires a 2 hour firewatch following activity and wind speeds less than 15km/hr.

Note- All activities within fire Season must comply with additional terms and conditions within the cutting permit with regards to fire fighting equipment.

No project activities except road building will take place during the fire season (April 1 to Sept 30) until a fuel break is constructed.

All burn piles have special requirements- see page 27 of the Quill Creek THP for details

Table 4: Harvest Season Restrictions

The Quill Creek Timber Harvest Plan provides general information regarding timber stands that are suitable for harvesting fuel wood and other products. Clients who submit an application for a commercial harvesting licence or cutting authority may propose specific locations for timber harvesting within the timber harvest planning area. The Forest Management Branch will evaluate these applications, and the proposed harvesting activities and locations for harvesting. The Forest Management Branch will either authorize the proposed activities subject to terms and conditions, vary the proposed harvesting, or reject the application.

Areas within the timber harvest planning area that have significant ecological value such as riparian areas or areas containing significant wildlife features will be protected from harvesting disturbance in accordance with this timber harvest plan and the Forest Management Branch operational standards and guidelines. These values and features, and the mitigations or reserve areas created to protect them will be included in the site plan of any commercial cutting permit. As per the Integrated Landscape Plan, high wildlife areas (Figure 1) should average 25% retention of stand structure, and the range of retention can be 10-30% stand structure depending on site characteristics. It should be noted that retention can be measured as percent of volume or as a percent of stems, for the purposes of this timber harvest plan retention will be calculated as a percent of volume.

These factors will be taken into consideration when deciding on the issuance of any forest harvesting authorizations such as licenses or cutting permits.

6.2 Timber cruising And timber types

In 2018, the Forest Management Branch identified areas that had a high proportion of white spruce with a significant component of harvestable dead spruce. A timber cruise was conducted by taking sample measurements of the timber to estimate stand volumes and timber characteristics. White spruce (SW), trembling aspen (AT) and balsam poplar (AC) were the tree species found during cruising. For estimating the available timber, the minimum measurements considered to be merchantable were as follows: diameter at breast height of 17.5 centimetres, top diameter of 10 centimetres, log length of 5 metres, and stump height of 30 centimetres. The detailed cruise data is available upon request from the Forest Management Branch.

The Forest Management Branch and Champagne and Aishihik field crews collected data at the cruise plots to determine the tree composition of those areas, and the characteristics of the timber (stem sizes, volume of wood, quality, etc.). The Forest Management Branch cruise compilation should be referred to for further details.

Timber type areas were grouped into three classes with potential for harvesting dead spruce. The net merchantable timber cruise volumes are in Table 5, including the volumes of live and dead stems. Dead spruce comprises 62% of the total merchantable spruce volume in the identified areas.

Timber Type	Description	Total Area (ha)	Net Spruce Volume (m^3/ha)*	Net Spruce Volume (total m^3)*	Net Dead Spruce Volume (m^3/ha)*	Net Dead Spruce Volume (total m^3)*
1	85% white spruce with 60% dead	930	98	130	60	55,794
2	100% white spruce with 60% dead	578	130	75,244	76	43,989
3	100% white spruce with 70% dead	258	178	45,995	118	30,491
Total		**1767**		**212,369**		**130,274**

*The volumes are estimates with an associated cruise error of under 15%.

Table 5: Cruise volume summaries by timber type in spruce-leading harvest blocks

Harvest blocks have been identified and mapped based on areas with large amounts of beetle-killed spruce, which is targeted for fuel wood use. For the purpose of this timber harvest plan, adjacent forest cover polygons with similar amounts of dead spruce have been lumped together into 30 harvest blocks, 14 blocks south of Quill Creek and 16 blocks north of Quill Creek. Refer to Figure 4 for an overview map and Appendix 1 for more detailed maps.

The harvest block boundaries were initially drawn as forest timber type boundaries, which were then modified to reduce the complexity of the boundaries. The simpler boundaries will make it easier to locate and mark harvest area boundaries in the field and provides flexibility in the placement of in-block trails.

All of the proposed harvest blocks are predominantly comprised of standing living, dead and/or downed white spruce. There are patches of trembling aspen and scattered balsam poplar in some of the harvest blocks and lodgepole pine is rare. Timber harvesting will primarily focus on removing spruce fuel wood of merchantable size, with allowance for harvesting for other purposes such as building logs, and saw logs. Harvest of aspen and cottonwood is expected to

be avoided except where necessary for roads, trails, and landings. The deciduous species will be retained wherever possible for biodiversity and to reduce wildfire risk. The cruise plots are points on the landscape and may or may not reflect the overall characteristics of a harvest block.

Harvest blocks with the highest density and volumes of standing dead wood can be best used for larger commercial firewood harvesting operations. Smaller size patches with moderate to high density of dead wood may be better for small commercial firewood harvesting operations. Many of the stands with higher volumes of dead wood are more economically viable for larger commercial firewood harvesting operations, given the investments in machinery and access road construction required.

Detailed stand descriptions are not provided in this document, it is impractical due to the large areas covered by this plan and the diversity of stand and site conditions within these areas. Detailed stand descriptions will be included in the site plans developed for each commercial cutting permit issued.

General comments on the timber types are provided in the following sections of this plan. The total available spruce harvest volume under the THP is estimated to be 156,070 cubic metres, based on an assumption of a complete harvest of the dead spruce, an incidental harvest of green spruce and the potential for a targeted harvest of green spruce in fuel abatement areas. All harvest percentages are based on merchantable volume, to allow calculation of the timber volume available for harvest.

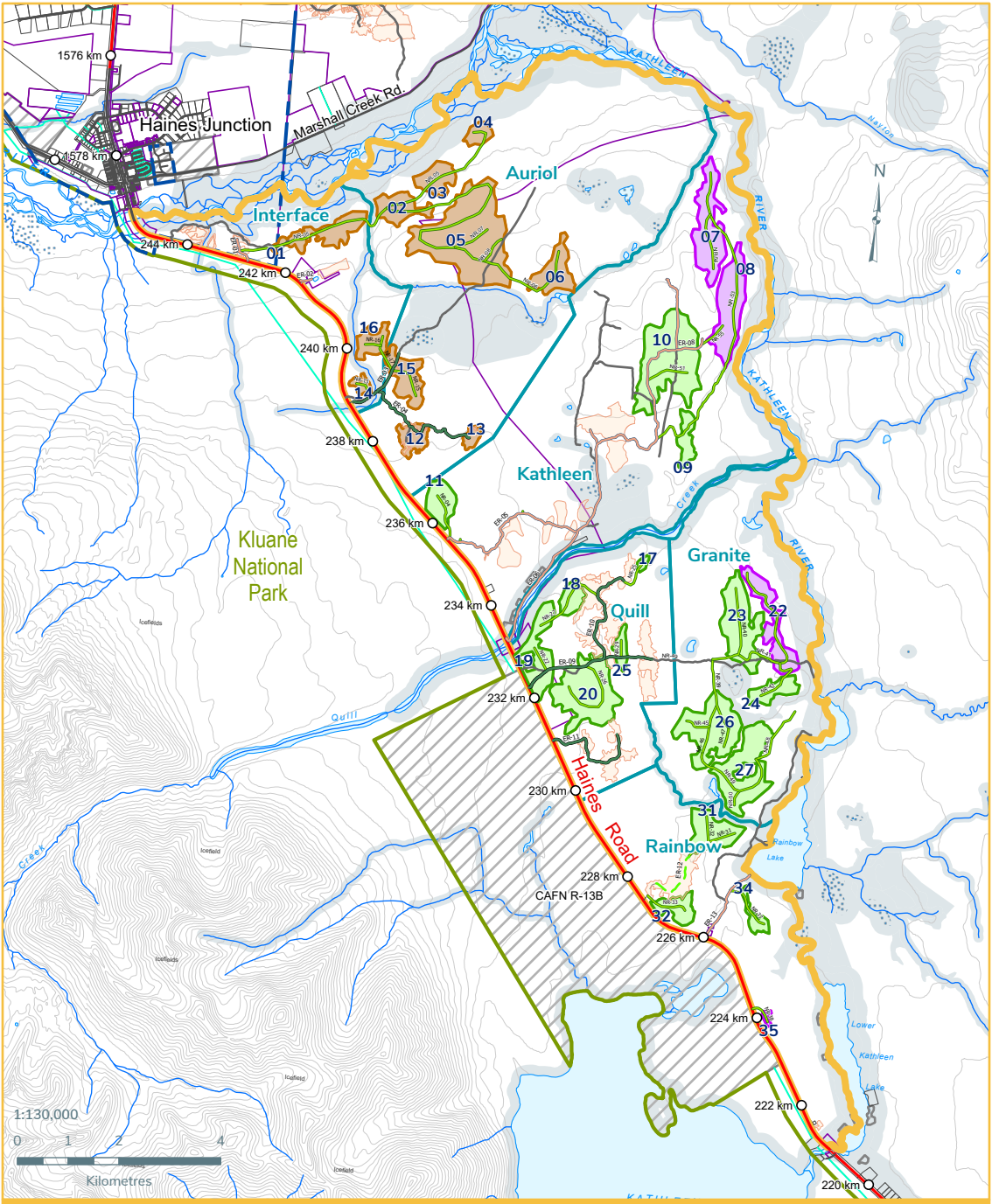


Figure 4 - Timber Type

- THP Boundary
- Operating Units
- Previously logged areas
- Connectivity Corridors

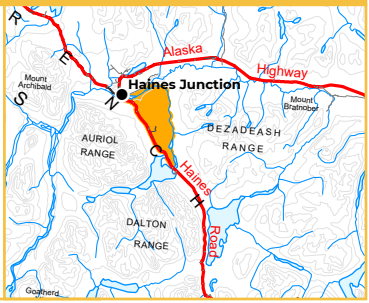
Harvest Blocks

- Type 1: 40% Retention
- Type 2: 23% Retention
- Type 3: 28% Retention

- Current Forest Resources Road
- Public Access
- Proposed Roads
- Decomissioned Access
- Local Trails

First Nation Settlement Lands

- A: Surface and Subsurface Rights
- B: Surface Rights
- FS: Fee Simple



6.2.1 Timber type 1

Timber type 1 occurs in 15 variably sized harvest blocks north and south of Quill Creek. These harvest blocks are around 85% white spruce (most of the rest being aspen) and just over 60% of the spruce is dead. The estimated harvest for timber type 1 stands in this timber harvest plan is a harvest rate of 100% of the dead spruce volume, 20% of live spruce and 0% of aspen. Therefore, a typical harvest block in this timber type should have about 60% of the merchantable trees available for harvest. Approximately 40% of the merchantable timber volume will be retained in each block for biodiversity, wildlife, visual quality, and other non-timber values. The presence of a considerable amount of aspen may indicate that these blocks have relatively dry soils, and hence may have the potential for both summer and winter harvesting.

These harvest blocks may be good for small commercial fuel wood harvesters, with small machines that can move around between the aspen and the live spruce. QC-23, QC-24, QC-26, QC-27, QC-31, and QC-34 are within the high wildlife values area, the anticipated retention level of 40% for timber type 1 harvest blocks exceeds the management objectives for high wildlife values areas. Several harvest blocks are large and may need to be divided between multiple operators.

TREE TYPE	LIVE VOLUME (M^3/HA)	DEAD VOLUME (M^3/HA)	MERCHANTABLE STEMS PER HA	AVERAGE DIAMETER AT BREAST HEIGHT (CM)	UNDERSTORY* (STEMS/HA)
Spruce	38	60	422	24.1	536
Aspen	14	1	112	22.7	100

* Understory was measured as all stems 10 to 17.5 centimetres diameter at breast height.

Table 6: Timber type 1 stand characteristics

6.2.2 Timber type 2

Timber type 2 occurs in 11 harvest blocks in the northern sections of the timber harvest plan. These harvest blocks are almost 100% white spruce, but slightly less than 60% of the spruce is dead. The dead spruce is uniformly distributed with the live spruce, making a targeted dead removal difficult. Due to the fuel abatement objectives for these areas the estimated harvest for timber type 2 stands in this timber harvest plan is harvest rate of 100% of the dead spruce volume, 50% of live spruce and 0% of aspen. A typical harvest block in this timber type should have approximately 80% of the merchantable trees available for harvest.

All of the timber type 2 harvest blocks are within the interface or landscape fuel abatement zones where fuel abatement is an objective. Many harvest blocks are also in the high wildlife values

area, which typically requires an average of 25% retention. Due to the fuel abatement objectives of these areas, less retention may be prescribed in these blocks, however, even with lower retention in these areas, average retention throughout the high wildlife value areas will exceed 20%. Small patch-cuts with grouped retention may be the best harvest method for these areas.

If a market for saw logs develops, these areas may be suitable for larger-scale commercial harvesting operations, by patch cutting both the dead fuel wood and the live trees. This would be consistent with the objectives of both the interface fuel abatement zone and the landscape fuel abatement zone in which all these harvest blocks occur.

Timber type 2 has some potential for personal use fuel wood areas, with the ability to drive motor vehicles such as trucks and ATVs between the many live spruce trees. However, it will be costly to construct roads for personal use fuel wood areas because many of the harvest blocks are far from existing access.

All of the timber type 2 harvest blocks are a high priority for harvesting (section 6.6); however, they may not be currently economically viable to harvest without a green wood market.

These harvest blocks will also likely be partly visible from the Marshall Creek Road and residences, and perhaps from some residences in Haines Junction. Visual quality impacts must be considered in designing the site plans for these blocks.

TREE Species	Live Volume (m^3/ha)	Dead Volume (m^3/ha)	Merchantable stems per ha	Average Diameter at Breast Height (cm)	Understory* (stems/ha)
Spruce	54	76	542	23.2	575
Aspen	3	0	10	28.1	0

* Understory was measured as all stems 10 to 17.5 centimetres diameter at breast height.

Table 7: Timber type 2 stand characteristics

6.2.3 Timber type 3

Timber type 3 occurs in five harvest blocks north and south of Quill Creek. These harvest blocks are 99% white spruce (with the rest a mix of aspen and balsam) and approximately 66% of the spruce is dead.

The estimated harvest for type 3 stands within this timber harvest plan is set at a harvest rate of 100% of the dead spruce volume, 20% of live spruce and 0% of aspen. A typical harvest block should therefore have 73% of the merchantable trees available for harvest. Approximately 27%

of merchantable volume will be retained in each block for biodiversity, wildlife, visual quality, and other non-timber values.

Timber type 3 is the best for larger-scale fuel wood commercial harvesting operations, because the number, diameter, and volume of dead spruce stems is high. These harvest blocks are also located farthest from existing access and the larger operators have the equipment and capacity to develop access.

These harvest blocks are within the high wildlife values area. While the high volume of dead spruce means that it may not be possible to have high retention of live trees in each harvest block, the average level of retention in this timber type should still exceed 25%.

TREE TYPE	LIVE VOLUME (M^3/HA)	DEAD VOLUME (M^3/HA)	MERCHANTABLE STEMS PER HA	AVERAGE DIAMETER AT BREAST HEIGHT (CM)	UNDERSTORY* (STEMS/HA)
Spruce	60	118	632	25.0	550
Aspen	1	0	7	27.6	0
Balsam Poplar	1	0	2	30.4	3

* Understory was measured as all stems 10 to 17.5 centimetres diameter at breast height.

Table 8: Timber type 3 stand characteristics

6.3. OPERATING UNITS

Six operating units have been identified, based primarily on the proposed patterns of road access and fuel abatement zones, with the boundaries between operating areas generally corresponding to riparian corridors that will seldom be crossed by roads and road networks. These operating units are numbered from 1 to 6, and a name is assigned to each operating unit for convenience (Table 9). These operating units are not the same as those defined in the previous timber harvesting plan for this area (Yukon Government 2006).

The harvesting under this timber harvest plan will start after plan approval, and all harvest operations are anticipated to be completed within 10 years, provided that harvesting is economically feasible and wood demand is sufficient. If harvesting is slower than expected, or areas are not immediately economically viable, harvesting may occur for up to 15 years. Silvicultural activities, such as surveys or treatments, may occur for up to 15 years post-harvest.

The operating units are ordered by priority to reduce fuel loads near the community of Haines Junction, assuming that all harvest blocks are economically feasible to develop which may not be the case. Lower priority areas may need to be developed before a higher priority area. Some

areas have a larger proportion of green wood compared to dead wood. These areas, even when relatively high priority, may not be economically feasible to harvest until there is a green wood market, and the priorities will be shifted accordingly. In the absence of a higher value green wood market, consideration could be given to the economics of harvesting and decking green wood for use as firewood the following year.

In general, small-scale operators will tend to work closer to the Haines Highway, and larger scale operators will work further from the highway. This will result in higher quality roads with multiple users and all season use near the Haines Highway, and lower quality and seasonal use roads (with less footprint), and fewer operators further from the highway.

No.	Name	Name Reason
1	Interface	Within the Interface Fuel Abatement Zone
2	Auriol	Access across from Auriol Trail
3	Kathleen	Near Kathleen River
4	Granite	Near Granite Creek
5	Quill	Near Quill Creek
6	Rainbow	Near Rainbow lake

Table 9: Operating unit names

Operating Unit	Harvest block Areas (ha)	Green Spruce Harvest (m^3)	Dead Spruce Harvest (m^3)	Estimated Total Harvest (m^3)
1	95.6	2,581	7,266	9,847
2	483.2	13046	36,723	49,770
3	423.9	4,042	36,246	40,288
4	415.4	3,459	28,903	32,361
5	240.6	1,829	14,436	16,256
6	108.4	839	6,701	7,540
Total	**1767**	**25,796**	**130,274**	**156,070**

Table 10: Operating unit summary

6.3.1. Operating unit 1 – interface

Operating unit 1 is within the interface fuel abatement area, where timber harvest planning includes fuel management through integrated resource management. This zone has the highest priority for harvesting, to reduce wildfire risk to the community of Haines Junction, under the Integrated Landscape Plan.

The harvest blocks within operating unit 1 are 100% spruce with approximately 57% beetle killed timber (see Table 11 for more detail and Appendix 1 for maps). The dead timber is

uniformly distributed with the green timber, therefore, to harvest most of the dead wood, live spruce will need to be harvested where operationally required. As the market for green wood may be required in order to harvest these blocks, the harvest priority may not be achievable. Consideration should be given to using some of the green wood for firewood, where economically feasible, in the absence of a higher value green wood market.

This operating unit will likely have a large fuel break within it- see section 4.7 on wildfire risk. The fuel break will consist of an area that is continuous with a low volume of fuel that provides safe access for fire crews. The Forest Fuels Management Working group will decide on the parameters of the fuel break.

Timber harvesting in this operating unit must incorporate fuel abatement as a primary objective, while also considering high wildlife values and visual quality. The objectives outside the fuel break suggest a harvesting design of patch cut harvesting with the removal of dead spruce in the green tree retention areas, with at least 20% volume retention within the block. Other designs may be considered, provided the system meets the requirements of at least 20% average retention, and mitigation of visual impacts, with the reduction in fuel loading being the primary objective for these blocks.

HARVEST BLOCK	TIMBER TYPE	AREA (HA)	SPRUCE VOLUME (M^3/HA)		ESTIMATED HARVEST VOLUME (M^3) (AREA X VOLUME X HARVEST LEVEL*)		
			Live	Dead	Live	Dead	Total
QC-01	2	56.8	54	76	1,534	4,317	5,851
QC-14	2	10.2	54	76	275	775	1,050
QC-16	2	28.6	54	76	772	2,174	2,946
total		**95.6**			**2,581**	**7,266**	**9,847**

*Harvest level estimated at 50% green spruce, 100% dead spruce.

Table 11: Operating unit 1 harvest block summary

6.3.2. Operating unit 2 – Auriol

Operating unit 2 is within the landscape fuel abatement area, where all timber harvesting must consider fuel management as an objective. This operating unit may have as much fuel abatement value as operating unit 1 and timber harvesting must incorporate fuel abatement as a primary objective. To increase fuel discontinuity, a wider cleared road right of way may be considered to link harvest blocks 01, 02, 03, and 04 as part of the fuel break, which may be partially located within this operating unit. Harvesting in the fuel break has the primary objective of reducing the volume of fuel; all other values are secondary to this. The parameters of this fuel break will be decided by the Forest Fuels Management Working Group.

All harvest blocks are within the high wildlife values area of the Integrated Landscape Plan. Harvest planning will require 10-30% retention within each block, depending on site characteristics, with an average of at least 20% in this operating unit to meet the requirements of the Integrated Landscape Plan, and to reduce visual impacts. These blocks may be visible from some residences along Marshall Creek Road and perhaps within Haines Junction. Retention of live trees should be planned to minimize visual impacts, especially from roads.

These harvest blocks are 100% spruce with approximately 57% beetle killed timber (see Table 12 for more detail and Appendix 1 for maps). The dead timber is uniformly distributed with the green timber; therefore, in order to harvest most of the dead wood, some live spruce will need to be harvested. As a market for green wood may be required to harvest these blocks, the harvest priority may not be achievable. Consideration should be given to using the some of the green wood for firewood where economically feasible, in the absence of a higher value green wood market.

The objectives suggest a harvesting design of small patch cut harvesting with removal of dead spruce in the green tree retention areas, with at least 20% retention within the block. Other designs may be considered, provided the system meets the requirements of at least 20% average retention and mitigation of visual impacts, with a reduction in long-term fuel loading being an objective for these blocks.

HARVEST BLOCK	TIMBER TYPE	AREA (HA)	SPRUCE VOLUME (M^3/HA)		ESTIMATED HARVEST VOLUME (M^3) (AREA X DENSITY X HARVEST LEVEL)		
			Live	Dead	Live	Dead	Total
QC-02	2	42.8	54	76	1,156	3,253	4408
QC-03	2	36.0	54	76	972	2,736	3708
QC-04	2	17.8	54	76	481	1,353	1833
QC-05	2	246.2	54	76	6647	18,711	25359
QC-06	2	49.6	54	76	1339	3,770	5109
QC-12	2	28.4	54	76	767	2,158	2925
QC-13	2	10.9	54	76	294	828	1123
QC-15	2	51.5	54	76	1391	3,914	5305
total		**483.2**			**13,046**	**36,723**	**49,770**

*Harvest level estimated at 50% green spruce, 100% dead spruce.

Table 12: Operating unit 2 harvest block summary

6.3.3. Operating unit 3 – Kathleen

Operating unit 3 is within the landscape fuel abatement area, where all timber harvest must consider fuel management as an objective. These harvest blocks are located further from Haines Junction and other values, so this area is a lower priority than operating units 1 and 2, although this area may be more economically feasible (see Table 13 for more detail and Appendix 1 for maps). Harvest planning will require 10-30% retention within each block, depending on site characteristics, with an average of at least 25% in this operating unit to meet biodiversity, wildlife, visual quality, and other non-timber values.

Harvest blocks QC-07 and QC-08 are within the high wildlife values area of the Integrated Landscape Plan, where harvest planning requires 10-30% retention within each block, depending on site characteristics. Most of the mature spruce are dead, and live mature spruce will be harvested when there is a high risk of windthrow of individual trees. Live spruce in clumps (reduced windthrow risk) will be retained even if there are dead trees within the clump, and damage to regeneration will be avoided by machinery as much as possible. Retention of all trees including aspen will be approximately 28%.

QC-09 and QC-10 should be harvested at roughly the same time as QC-07 and QC-08, so that the entire road system can be deactivated at the same time. They have no required harvesting restrictions, but, given the current lack of a green wood market, they should primarily be harvested for dead spruce. Retention is estimated to be 40%.

As QC-11 is located close to the Haines Highway, high retention to minimize visual impacts will be considered. Small volume commercial operations or personal use fuelwood cutting should be considered for this block.

HARVEST BLOCK	TIMBER TYPE	AREA (HA)	SPRUCE VOLUME (M^3/HA)		ESTIMATED HARVEST VOLUME (M^3) (AREA X VOLUME X HARVEST LEVEL)		
			Live	Dead	Live	Dead	Total
QC-07	3	94.2	60	118	1,130	11,116	12,246
QC-08	3	92.2	60	118	1,106	10,880	11,986
QC-09	1	26.4	38	60	201	1,584	1,785
QC-10	1	171.8	38	60	1,306	10,308	11,614
QC-11	1	39.3	38	60	299	2,358	2,657
total		**423.9**			**4042**	**36,246**	**40,288**

*Harvest level estimated at 20% green spruce, 100% dead spruce.

Table 13: Operating unit 3 harvest block summary

6.3.4. Operating unit 4 - Granite

This operating unit is mostly within the high wildlife values area of the Integrated Landscape Plan, except for the western parts of harvest blocks QC-23 and QC-26 (see Appendix 1 for maps). Most of the mature spruce within QC-22 and QC-28 are dead, and live mature spruce will be harvested together with the dead wood if there is a high risk of windthrow of individual trees. Live spruce in clumps (reduced windthrow risk) will be retained even if there are dead trees within the clump, and damage to regeneration will be avoided by machinery as much as possible. Retention of all trees will be approximately 28% in these blocks. The remaining harvest blocks will have approximately 40% retention, to bring the average well above 25% retention as required for the high wildlife values area (see Table 14 for detailed harvest block data).

There are two road systems within this operating unit. Harvesting will only occur within harvest blocks that are accessible from one road system during a given season, to provide a refuge area for wildlife (especially moose) when the other road system has active harvesting. All harvest blocks along each road network should be harvested at approximately the same time so that the entire road system can deactivated in a timely manner.

HARVEST BLOCK	TIMBER TYPE	AREA (HA)	SPRUCE VOLUME (M^3/HA)		ESTIMATED HARVEST VOLUME (M^3) (AREA X VOLUME X HARVEST LEVEL)		
			Live	Dead	Live	Dead	Total
QC-22	3	68.6	60	118	823	8,095	8,918
QC-23	1	96.8	38	60	736	5,808	6,544
QC-24	1	30.7	38	60	233	1,842	2,075
QC-26	1	111.9	38	60	850	6,714	7,564
QC-27	1	107.4	38	60	816	6,444	7,260
total		**415.4**			**3,458**	**28,903**	**32,361**

*Harvest level estimated at 20% green spruce, 100% dead spruce.

Table 14: Operating unit 4 harvest block summary

6.3.5. Operating unit 5 - Quill

There are no specific harvest restrictions for this operating unit. This operating unit is higher priority than the operating unit 6 (Rainbow) because Rainbow will provide wildlife habitat while operating unit 4 (Granite) is being harvested. The harvest blocks within this operating unit may be suitable areas to develop for multiple small operators due to their proximity to existing access (see Table 15 for more detail and Appendix 1 for maps).

HARVEST BLOCK	TIMBER TYPE	AREA (HA)	SPRUCE VOLUME (M^3/HA)		ESTIMATED HARVEST VOLUME (M^3) (AREA X VOLUME X HARVEST LEVEL)		
			Live	Dead	Live	Dead	Total
QC-17	1	4.8	38	60	36	288	324
QC-18	1	23.6	38	60	179	1,416	1,595
QC-19	1	68.0	38	60	517	4,080	4,597
QC-20	1	128.0	38	60	973	7,680	8,653
QC-25	1	16.2	38	60	123	972	1,095
total		**240.6**			**1828**	**14,436**	**16,265**

*Harvest level estimated at 20% green spruce, 100% dead spruce.

Table 15: Operating unit 5 harvest block summary

6.3.6. Operating unit 6 - Rainbow

The area of harvest blocks QC-31, QC-32, QC-34, and QC-35 will not be harvested while operating unit 4 (Granite) is being harvested, which will provide a large undisturbed area for wildlife to use within the high wildlife values area. Timber harvesting will result in approximately 40% average retention throughout these blocks, depending on site characteristics.

QC-35 is accessed directly from the Haines Highway in isolation from other harvest blocks. Retention of green trees is a priority, to minimize the visual impacts when viewed from the Haines Highway, and to meet the high wildlife values area objective of retention of at least 25% of total merchantable stems (spruce and aspen, live and dead) (see Table 16 for more detail and Appendix 1 for maps).

HARVEST BLOCK	TIMBER TYPE	AREA (HA)	SPRUCE VOLUME (M^3/HA)		ESTIMATED TIMBER HARVEST (M^3) (AREA X VOLUME X HARVEST LEVEL)		
			Live	Dead	Live	Dead	Total
QC-31	1	57.2	38	60	435	3,432	3,867
QC-32	1	30.4	38	60	231	1,824	2,055
QC-34	1	17.4	38	60	132	1,044	1,176
QC-35	3	3.4	60	118	41	401	442
Sum		**108.4**			**839**	**6,701**	**7,540**

*Harvest level estimated at 20% green spruce, 100% dead spruce.

Table 16: Operating unit 6 harvest block summary

6.4 Access roads and Landings

6.4.1 Access management

The Quill Creek Timber Harvest Plan area is to be accessed by existing access roads and proposed new roads. The proposed new roads in this plan will be constructed as forest resources roads under the authority of the *Forest Resources Act*. Prior to the development of any new road or road network, an access management plan will be developed with Champagne and Aishihik First Nations, the Alsek Renewable Resource Council, local stakeholders, and the Forest Management Branch. The Access Management Plan procedure is described in section 6.4.3.

Forest Management Branch has authority over all forest resources roads, and will control access and decommission forest resources roads in accordance with the access management plan once they are no longer in use. Access control can minimize environmental impacts and damage to the roads by unauthorized vehicles. It can also increase safety to the public and the licensee while limiting timber harvesting to the permitted areas. The Forest Management Branch may require access beyond the period of active harvest operations for reforestation activities, rehabilitation of roads may be delayed until silviculture objectives are met.

To enforce road restrictions, effective gates will be installed on all new roads within this timber harvest plan. The gates shall be placed at the access points to all new forest resources roads. The gates will remain locked and only accessible by license holders and permitted personnel. Gates will remain in place until access roads are impassable to vehicles, including off-road vehicles.

Decommissioning of roads can be done through deactivation (restoration of natural drainage; access blocked; road able to be used again through reactivation) or rehabilitation (possibly ripping road surface; rollback of organic materials and coarse woody debris; access blocked). All forest resources roads developed within this timber harvest plan will follow the applicable operational standards and guidelines of the Forest Management Branch. Deactivation will generally occur within two years of harvest completion, unless otherwise agreed upon by Champagne and Aishihik First Nations, the Alsek Renewable Resource Council, and local stakeholders as part of the access management plan.

When decommissioning roads, the main goals are to:

- Stabilize the road prism and clearing width;
- Restore or maintain surface drainage patterns, and control subsurface drainage, consistent with natural drainage patterns; and
- Minimize the impact of silt or sediment transport on other resources, minimize water quality degradation and restrict access to resources

Decommissioning will not always need to occur along the entire length of a forest resources road, but will focus on three key areas: water crossings, sensitive sites, and access points.

Signage will be posted at entrance points to the planning area. Signage will include the following information:

- Speed limits (lower speed limits in areas through and adjacent to sensitive wildlife areas)
- Sites of potential wildlife crossing or seasonal use
- Potential of multiple vehicles/users
- General fire safety information and fire danger rating class
- Access restrictions related to public access and fire risk
- Contact information for land users to register their concerns and report wildfire observation
- Periods of active timber harvest
- Indicating large trucks turning ahead
- Indicating a multi-use road

Existing access roads within this area are comprised of public roads classified as unmaintained highways, and forest resources roads. All existing public roads are managed under the authority of the Department of Highways and Public Works. Unlike forest resources roads, the Forest Management Branch does not have the authority to manage public access or conduct deactivation on these roads. The existing roads range from minimal quality suitable for winter use only, to moderate quality gravel roads suitable for all season use.

Harvesting may require some upgrades to existing roads – widening, re-sloping, and minor changes to the alignment. Existing and new roads may also require routine maintenance and snowplowing to maintain access and ensure road integrity. New access that is developed that connects to the Haines Highway will require an access permit from the Department of Highways and Public Works. Additionally, any work that is to be done within a highway right of way will require a permit. During snow plow operations gaps in snow berms are important features to allow for wildlife escapement, particularly in areas where high snow depths are encountered. Snowplowing will require periodic gaps in snow berms along any winter roads.

The maps in Appendix 1 show existing roads and trails, some of which may need to be upgraded, and new road alignments. Alternative road alignments can be proposed by the licensee in the site plan, and must be approved by the Forest Management Branch. Appendix 3 includes more detailed information regarding existing and proposed roads.

Due to the generally small scale of timber harvesting, roads in this timber harvest plan may be constructed to a lower road class than what is described in the current standards and guidelines. Traffic volume and traffic type will be considered by the Forest Management Branch prior to

approving the use of a lower road class. An example of a lower road class that may be proposed is shown in Table 20.

ROAD CLASS	ROAD TYPE	DURATION	RUNNING SURFACE (M)	ROAD PRISM (M)	CLEARING WIDTH (M)	PERMITTED RIGHT OF WAY (M)
5	Light Haul Road	1-5 years	4	6	8	12

Table 20: Road Class 5 example

Cumulative disturbance from road development must not affect more than 5% of the gross harvest block area as per the Forest Management Branch Soil Conservation Standards and Guidelines.

6.4.2 Access roads

Access roads to each proposed harvest area, and major roads within the harvest areas, are shown in the maps in Appendix 1. Some of the roads are existing roads that may require upgrading. The locations of most of the proposed roads are approximations only. The proposed access routes were generally selected using Google Earth imagery and elevation data (parts of NR-39 and NR-53 were assessed by field crews).

All in-block roads are suggested locations only. Final road layout is dependent upon the licensee's equipment to be used for logging and the harvesting system proposed (landings or roadside). Final road layout is also contingent on the access management plan. The applicant must submit a map, indicating the location of in-block roads, landings and other development particular to their proposed operation. In all cases, site disturbance for in-block roads and landings will be minimized and must be less than 5% of the gross harvest block area.

The proposed gross harvest block area for this timber harvest plan is 1767 hectares, and the proposed in-block road area is 22.3 hectares, which is 1.2% of gross harvest block area. With the addition of landings during site planning, the total road and landing area will be well under the required maximum of 5%. The total road disturbance for all existing and proposed roads is 0.3% of the plan area. The lengths and areas of the existing and proposed access roads are provided in Table 17 and Table 18 provides road densities within the plan area.

	Existing			Proposed		
	Length (km)	**Cleared Area (ha)**	**Ground disturbance Area (ha)**	**Length (km)**	**Cleared Area (ha)**	**Ground Disturbance Area (ha)**
Roads within blocks	4.5	N/A	1.6	32.3	N/A	13.4
Roads outside blocks	25.1	3.6	9.0	18.3	22.9	7.8
Roads total	**29.6**	**3.6**	**10.6**	**50.6**	**22.9**	**21.2**

Table 17: Access road length and area summary

Access Control			
Road Type	***Open Roads (km/km²)**	**Restricted Roads (km/km²)	Total(km/km²)
Haines Hwy	**0.211**	0.000	0.211
Existing Road	**0.191**	0.106	0.297
Existing Trail	**0.120**	0.070	0.191
Proposed New	**0.001**	0.497	0.497
Total Road Density	**0.523**	0.673	1.196

*Open roads' are roads that are open to everyone (industry and the public). Existing access roads from the Haines Highway into the timber harvest plan are comprised of roads classified as unmaintained public highways and are managed under the authority of Highways and Public Works.

**Restricted roads in this table refer to forest resources roads and are gated.

Table 18: Road Densities

6.4.3 Access management planning

In accordance with the Decision Document developed for YESAB project 2020-0051, the Forest Management Branch will collaboratively develop an access management plan with Champagne and Aishihik First Nations and the Alsek Renewable Resource Council. The access management plan will provide opportunity for local stakeholder and public input.

The access management plan will provide guidance on the development, management, control, and decommissioning of access roads in the project area. The effectiveness of the access management plan will be continually monitored and adapted as required. This will allow for

greater certainty that potential negative effects from access will be reduced, eliminated, and/or controlled.

A notification system will be developed to update Champagne and Aishihik First Nations, the Alsek Renewable Resource Council, stakeholders, and operators on site permitting; anticipated new roads; central processing areas; road restrictions; and road decommissioning plans. The notification system is not intended to fulfill consultation on planning, but it will allow for community and stakeholder feedback and input.

In conjunction with the access management plan, the Forest Management Branch will maintain a current road density record within the planning area. This record will be available to Champagne and Aishihik First Nations and the Alsek Renewable Resource Council.

The access management plan shall include the following:

- A description of all proposed access including:
    - New access and classifications of roads;
    - Upgrades and associated changes to road classifications;
    - Overview maps;
    - Access control locations and mechanisms;
    - Road decommissioning and rehabilitation plans including sequencing, decommissioning and/or rehabilitation methods;
    - A description of wildlife habitat and overview maps of access in critical wildlife habitat; and
    - A monitoring plan for forest resource roads

6.4.4 Central processing areas

Central processing areas are identified areas where a licensee may temporarily deck and process harvested timber. Central processing areas are used as an alternative to conventional landings at the harvest site. The benefits of central processing areas include:

- Facilitating extended access to timber harvested in winter-only areas;
- Reduction in the amount of slash, tops and rotten timber located in-block;
- Safer disposal of debris through chipping or burning in a large cleared area;
- Reducing the amount of roads and landings into and within harvest blocks; and
- Disturbance is concentrated in one area, resulting in less overall disturbance.

The licensee will apply for central processing areas within this timber harvest plan prior to harvesting. The criteria listed below include terms and conditions from the Quill Creek Decision Document. To be approved for a central processing area the following criteria must be met:

- The cleared area shall not exceed 2 hectares in size;

- There will be a maximum of 4 central processing areas permitted within the timber harvest plan;
- A central processing area will only be considered for cutting permit(s) greater than 5,000 cubic metres;
- The central processing area must be fully reclaimed within two years of the completion of timber harvesting under the cutting permit;
- The central processing area must be adjacent to existing all season access;
- The central processing area must be on dry level ground;
- The central processing area must include a minimum 5-meter wide mineral soil fireguard surrounding burn piles in all weather conditions, including frozen ground;
- Active operations can only occur during low or moderate fire danger rating and with wind speeds less than 15 kilometers per hour;
- A 2-hour fire watch must follow active operations within a central processing area;
- There must be weekly inspections during the fire season and monthly inspections outside the fire season;
- The central processing area must be located near a water tanker containing a minimum of 1500 litres to aid in emergency fire suppression;
- Fire suppression kits must be available eat each central processing area, and all workers onsite must receive training on the use of the kits, as well as emergency response procedures;
- Electric fencing must enclose fuel storage and waste disposal locations on central processing areas; and
- Compliance, Monitoring, and Inspections Branch must inspect central processing areas prior to the start of the fire season to ensure the areas are not conducive to wildfires.

6.5 TIMBER HARVESTING METHODS

Harvesting operations will focus on salvaging merchantable standing dead and downed stems to be utilized as fuel wood. It is expected that a wide range of timber harvesting methods will be used within this timber harvest plan. Applicants that wish to harvest fuel wood within this timber harvest plan must propose the method they intend to use for harvesting to the Forest Management Branch. The site plan submitted by each applicant under a commercial cutting permit must include the proposed harvesting methodology, and must be approved by the Director of the Forest Management Branch.

Considerations of acceptable harvesting methodologies will be based on how the proposed activities meet the following:

- The requirements and intent of this timber harvest plan;

- The requirements of the Integrated Landscape Plan for the Champagne and Aishihik Traditional Territory;
- The requirements of the *Forest Resources Act* and *Forest Resources Regulation;* and
- The requirements of the Forest Management Branch' operational standards and guidelines.

6.6 GUIDELINES FOR MANAGEMENT OF NESTING MIGRATORY BIRDS

The *Migratory Birds Regulation (2009)* states:

> 6. Subject to subsection 5(9), no person shall
>
> (a) disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or
>
> (b) have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird except under authority of a permit therefor.

The primary issue with respect to timber harvesting is the potential to "disturb, destroy or take a nest, egg …" of a migratory bird that is located in brush or trees. Most bird species are protected under the *Migratory Birds Regulation*, and many of them will regularly nest in the harvest and road construction areas within the timber harvest planning area. Some bird species at risk (also protected under the *Species at Risk Act*) may nest in the area.

Currently, there is no legal mechanism available to authorize via a permit or exemption the incidental take of nests or eggs of migratory birds in the course of industrial or other activities (forestry, mining, agriculture, development, etc.). In the absence of a regulatory system for authorizing incidental take, the Canadian Wildlife Service provides advice related to the application of the current *Migratory Birds Regulation.*

Generally, Environment and Climate Change Canada provides the following advice:

- To avoid engaging in potentially destructive activities during key periods in order to reduce the risk of nest destruction (In Yukon, the general breeding season for most, although not all, bird species listed under the *MBCA*, is from approximately May 1 to July 31);
- To develop and implement a management plan to minimize the risk of impacts, and to mitigate any unavoidable impacts on nests using the following measures to protect and conserve migratory birds:
    - ensure awareness of the relevant provisions of the *Migratory Birds Convention Act* and *Migratory Birds Regulation*;

- monitoring for the presence of migratory birds and nests before activities are carried out and throughout the nesting season, based on scientifically credible surveys or other monitoring/inventory methods;
- adoption of migratory bird protection measures and incorporation of such measures in policies, procedures, plans, directives and compensatory plans relevant to the project or infrastructure; and
- active management ensuring best efforts to avoid incidental take through the implementation of migratory bird protection measures

6.7 GUIDELINES FOR SENSITIVE AREAS

6.7.1 Permafrost areas

There are small areas of near-surface permafrost in saturated soils present on some east-facing and north-facing slopes and hollows throughout the planning area. These can be recognized by usually having only white spruce growth (no aspen, and black spruce is absent from the timber harvest planning area), wet soils, and many of the trees not standing vertically but being tilted at various angles because of slope movement and soil settling. There are other indicators of slope movements, such as torn vegetation mats that have opened as a result of cracks in the surface soil, unusual hummocks and hollows, and intact fallen trees. The temperature of the permafrost is likely only slightly below zero because most of the surrounding area has no surface permafrost. Only a slight increase in summer soil temperatures could result in the permafrost melting. When the surface permafrost melts, the soil may move down-slope, creating a landslide. The size of the landslide will depend on the size of the permafrost area and angle of the slope. Soil movements may directly affect other forest areas, wetlands or streams downslope. Mud from the slide may erode and result in sediment entering streams. The slide may leave a visual scar on the landscape, and change the area from a forested landscape to a muddy non-forested landscape. Once a slide has occurred, the soil is directly exposed to warming from the sun, and permafrost thaw may continue indefinitely with the affected area widening and deepening with continued erosion.

Permafrost areas with unstable soils must be identified during site plan development, and managed to prevent permafrost warming and thaw. This should be done by maintaining shade from wind-firm trees and shrubs, and an insulating surface of organic soils, mosses, and debris. No standing or downed trees (alive or dead) should be removed from sensitive permafrost areas. Trees near permafrost areas should be protected from increased risk of windthrow resulting from adjacent harvesting, usually by reducing or entirely avoiding harvesting within a buffer zone around the permafrost area.

Figure 5: Permafrost in the forest.

There are also areas of permafrost that occur in rocky and well-drained soils. These areas generally remain stable when the permafrost melts, and therefore do not require special management. Winter harvesting under frozen conditions may be preferable, in case there are pockets of frozen mud.

Areas with permafrost are potentially sensitive to road construction and harvesting. Sensitive areas are those where the frozen ground is composed of soils such as fine silts and organics. These soils generally have high water content, and they may include pockets that are mostly water. The sensitivity of the soils increases if the sites are on slopes, where the thawed muddy soils may flow downhill. Insensitive areas are soils that are sandy, gravelly, rocky, or shallow over bedrock. They tend to have little water content, and when the permafrost thaws there is little change in the character of the soils.

For the areas with thaw-sensitive permafrost terrain, roads will be designed in such a way that they minimize disturbance (including compression and removal) to the insulating surface organic layers overlying permafrost, and avoid alterations to existing surface water and groundwater drainage. This will be achieved by constructing winter-access only roads to thaw-sensitive areas, which will limit traffic to periods when surficial organics are frozen and resistive to compression. Road construction will avoid areas of permafrost with high soil erosion potential.

The following are guidelines designed to protect sensitive permafrost areas from impacts that may result in adverse consequences from permafrost thawing:

- Identify and mark the boundaries of sensitive permafrost areas within a harvest block prior to access construction or harvest.
- Within a 10-meter buffer around sensitive permafrost areas:
    - Avoid constructing new access or landings, and do not upgrade or use existing access or landings to avoid soil disturbance and to maximize retention of natural regeneration;
    - Avoid harvesting live trees to reduce the windthrow risk to trees within the permafrost area;
    - Limit harvesting of dead trees to those whose removal will not increase the risk of windthrow within the 10-metre buffer and the permafrost area;
    - Maximize the retention of natural regeneration; and
    - Avoid soil disturbance or disturbance to the surface mosses and debris.
- Avoid directing ditch water into sensitive permafrost areas.

Some permafrost areas, especially those that are insensitive, may be suitable for timber harvesting during winter/frozen ground conditions with winter-only access. Rocky, dry permafrost areas may be suitable for summer harvesting.

The majority of the proposed timber harvest blocks are located on level ground with soils that are not fine textured or saturated. Based on mapping and local knowledge, the presence of permafrost likely occurs on the north-facing slope along the Dezadeash River (operating unit 1 - Interface and 2 - Auriol) and possibly along the Kathleen River (the east edge of operating unit 3 - Kathleen and 4 - Granite). A geotechnical consult will be completed prior to any harvesting or access development into timber harvest blocks 01, 02, 03, 04, 05, 07, 08 and 22.

6.7.2 Wildlife features

Game trails occur throughout the Quill Creek timber harvest planning area. The harvesting of dead spruce can generally be assumed to increase the ability of large wildlife (primarily moose and bears) to use these trails, by reducing barriers from existing windthrow and by reducing future windthrow. There are no known significant wildlife migration trails within the timber harvest planning area; generally, significant trails are worn down to mineral soil over many hundred meters, although not all significant trails exhibit this characteristic.

Management standards for wildlife features are detailed in the Wildlife Features Standard, which will be referred to for further management guidelines. Sections 6.7.3 through 6.7.6 speak to specific areas within the timber harvest plan that may have high ecological value, and management strategies to mitigate potential adverse effects on these areas.

The following is a list of mitigations from the Decision Document pertaining to wildlife features:

- Access shall be restricted in critical winter moose habitat. In areas where access is required (Auriol branch road, Quill Creek road) speed limits will be reduced from February 1st to March 1st;
- Grizzly bear dens will have a 400-meter no disturbance buffer when determined occupied by a qualified professional; and
- Prior to timber harvest in harvest blocks QC-27 and QC-28 detailed habitat mapping of these harvest blocks will be conducted with grizzly bear as a focal species.

6.7.3 Wetlands, streams and lakes

Management standards for riparian areas (wetlands, streams and lakes) designed to protect riparian areas are described in the Standards for Wetlands Riparian Management and the Riparian Management on Streams and Lakes, which will be followed when planning harvesting near riparian areas. Of note for the Quill Creek timber harvest planning area is that the small grassy or shrubby wetlands throughout the plan area are of particular importance to wildlife. Wildlife trails associated with the wetlands will be kept as free of debris as possible to allow wildlife access to the wetlands, and existing natural regeneration and living trees around the wetlands will be retained as much as possible to provide visual cover and shelter from heat and cold. Access will be built as far from wetlands as possible. The standards will be referred to for further management guidelines.

6.7.4 Dry grass, shrub and open aspen slopes

There are a few dry grassy, shrubby or open aspen slopes within the Quill Creek timber harvest planning area, these areas are generally mapped within the high wildlife values in section 2.7 of the Integrated Landscape Plan. The south-facing areas are of particularly high ecological value. Wildlife (birds, ungulates, bears) use these areas for feeding, denning, nesting and breeding. They may also have a higher probability of being habitat for species at risk, because they are comparatively rare habitat types in the Haines Junction area.

Access roads and landings should not be built in these areas, except when absolutely necessary. Road development should be avoided to limit soil disturbance, prevent the introduction of invasive plants, and to avoid long-term disturbance to wildlife use. These areas are located outside of proposed harvest blocks and roads.

6.7.5 Kathleen River cliffs/ swallows and raptors

The Kathleen River has cliffs along much of the northeast side of the timber harvest planning area. The cliffs were surveyed in June 2019 by a qualified Registered Professional Biologist to determine the presence or absence of raptors nesting on the cliffs. No raptors, raptor nests or signs of raptors were observed in the survey. The unstable cliffs are formed of sediments making the cliffs generally unsuitable for nesting by raptors.

Bank swallows have been observed nesting along southern portions of the cliffs in locations that would not be affected by proposed timber harvesting. If bank swallows are observed nesting closer to the harvest blocks the Wildlife Features Standards and Guidelines will be followed.

Figure 6 – Kathleen River Cliffs

6.7.6 Lodgepole Pine

The boundary of the rare stands of lodgepole pine as described in 5.10.6 will be marked as a reserve prior to timber harvest operations. Known locations of lodgepole pine are provided in Table 19. If additional locations of lodgepole pine are identified in the planning area prior to or during harvest they will also be reserved from harvest. Pine regeneration will be protected, including leaving 'branchy' dead logs over areas of pine regeneration to partially protect their new growth from grazing by snowshoe hares and/or moose. Machinery will not be permitted within pine stands at any time of year, to protect pine regeneration and general biodiversity values.

Harvest Block	Site #	Latitude	Longitude	Comments
Between QC-23 & QC-26	LP-01	60.672666	137.281219	single young pine tree; slope crest
	LP-02	60.672105	137.280432	mature pine stand; high wildlife; slope crest
	LP-03	60.671569	137.279963	pine stand
N/A	LP-04	60.647593	137.307507	pine stand
	LP-05	60.647104	137.315338	pine tree

Table 19: Known lodgepole pine locations

6.8 Reforestation

Silviculture activities will be guided by the Silviculture Strategic Plan. Standards and guidelines for silviculture and reforestation, used to guide forest management activities within Yukon are being developed. Any applicable silviculture or reforestation standards and guidelines that are developed for the Yukon by the Forest Management Branch will be applied to operations within this timber harvest planning area.

Natural regeneration is the preferred method of reforestation; however, it may be desirable to supplement natural reforestation processes in some of the harvested areas to encourage forest stand development and meet silviculture stocking standards. A reforestation plan may propose activities such as tree planting or scarification to achieve reforestation goals. Where planting or fill planting is required, all seedlings are to be grown from locally collected seed stock. If an area is found to be underperforming and is not likely to reach the identified reforestation goals, a silviculture treatment plan may be implemented.

6.9 Schedule for Timber Harvesting

Detailed schedules for timber harvesting will be provided in the site plan of each cutting permit issued within this timber harvest plan. Prior to the construction of a fuel break harvesting will only occur between October 1 and March 30. Additionally, once a fuel break is constructed harvesting opportunities will become available in specific operating units between August 15 and October 1. As specified in Section 6.3, Operating Units, some areas are not to be active at the same time to maintain movement corridors and refuge for wildlife.

The Integrated Landscape Plan provides guidance regarding the season and timing of harvest. It is expected that most harvesting will be on winter frozen ground. Once a fuel break is constructed harvest opportunities will become available starting on August 15, these fall harvesting opportunities are particularly important for small volume operators. There are limited summer and fall harvesting options in the region, and early fall harvesting opportunities in this

timber harvest plan will help support businesses that want to operate for larger portions of the year. Initial assessments of values such as soil conservation within this timber harvest planning area indicate that harvesting operations may be considered in any season.

The timing of harvesting operations may be restricted by factors related to soil conservation, nesting migratory birds, wildlife values, heritage values, traditional activities, forest fire risk, and other factors as described in this timber harvest plan. In particular, the high wildlife values area of the timber harvest plan will be managed for moose late winter range value (especially near wetland, stream and aspen areas), and grizzly bear spring, summer, and fall use (especially associated with the major river riparian areas). All harvesting schedules will be consistent with the Forest Management Branch operational standards and guidelines and the Decision Document.

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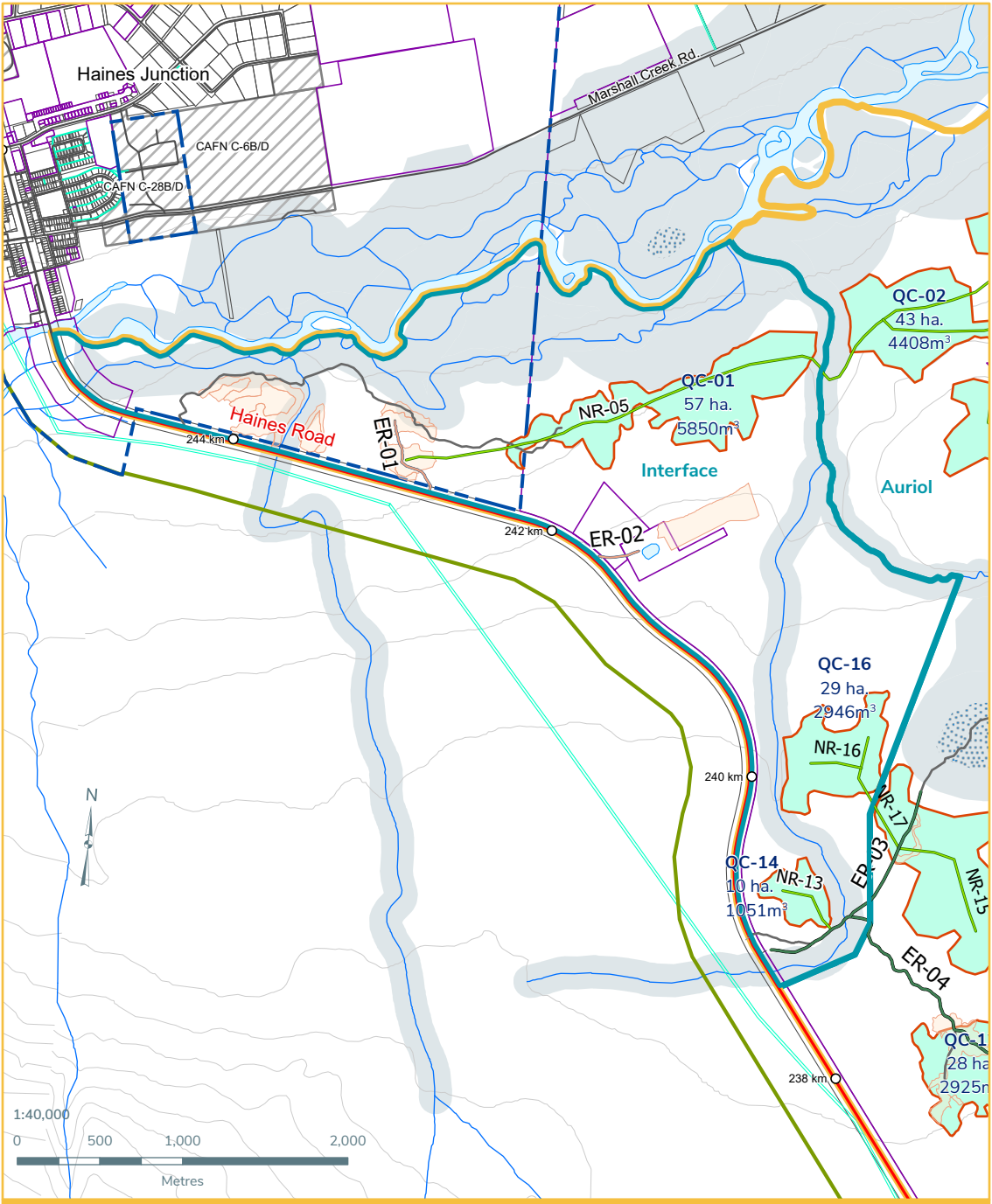


Operating Unit - Interface

- THP Boundary
- Operating Units
- Previously logged areas
- Connectivity Corridors

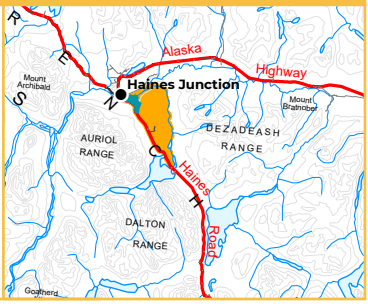
Proposed Harvest Blocks

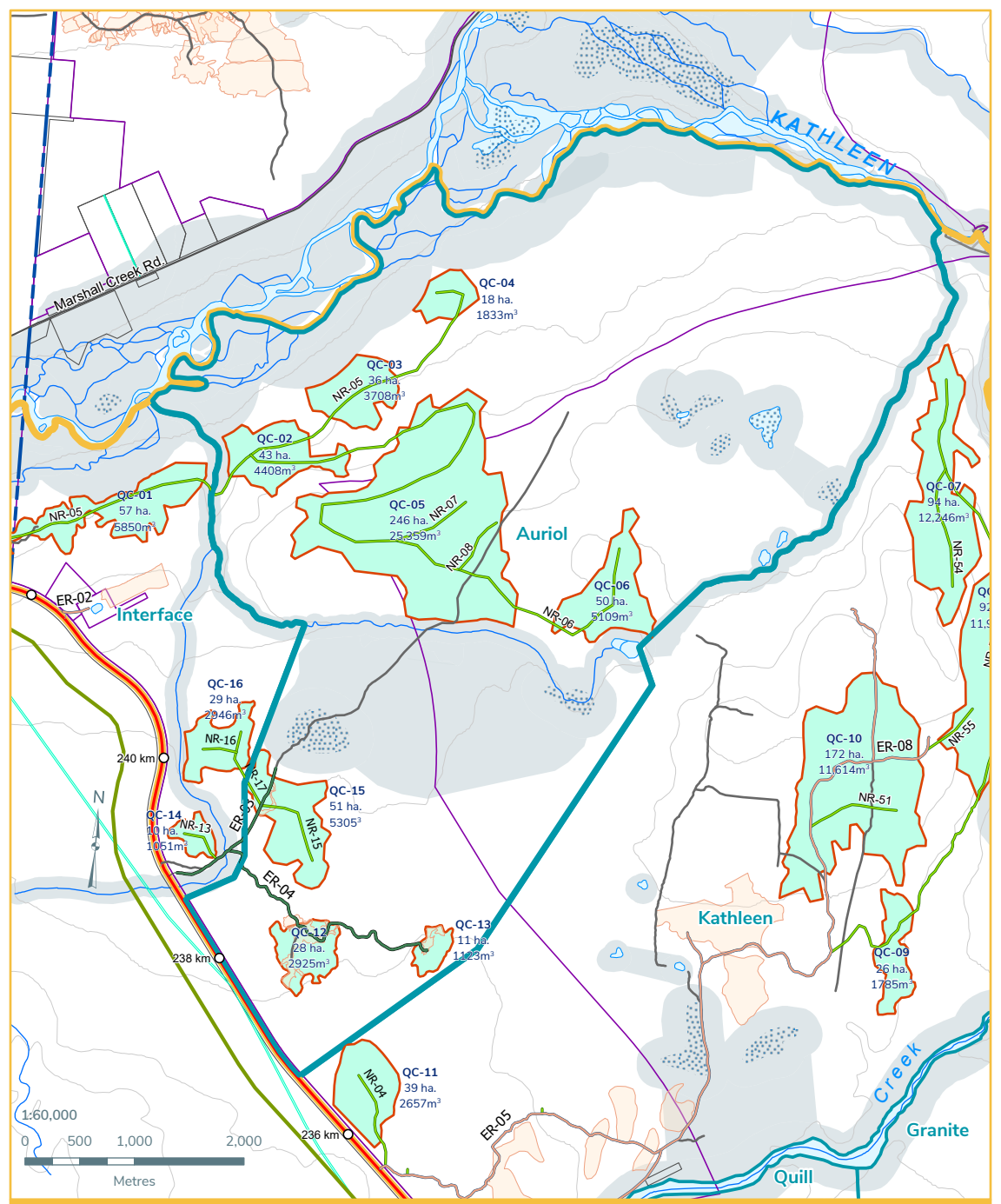
- Dry Ground
- Frozen Ground

- Current Forest Resources Road
- Public Access
- Proposed Roads
- Decomissioned Access
- Local Trails

First Nation Settlement Lands

- A: Surface and Subsurface Rights
- B: Surface Rights
- FS: Fee Simple





Operating Unit - Auriol

- THP Boundary
- Operating Units
- Previously logged areas
- Connectivity Corridors

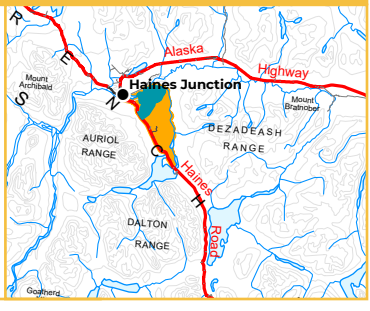
Harvest Blocks

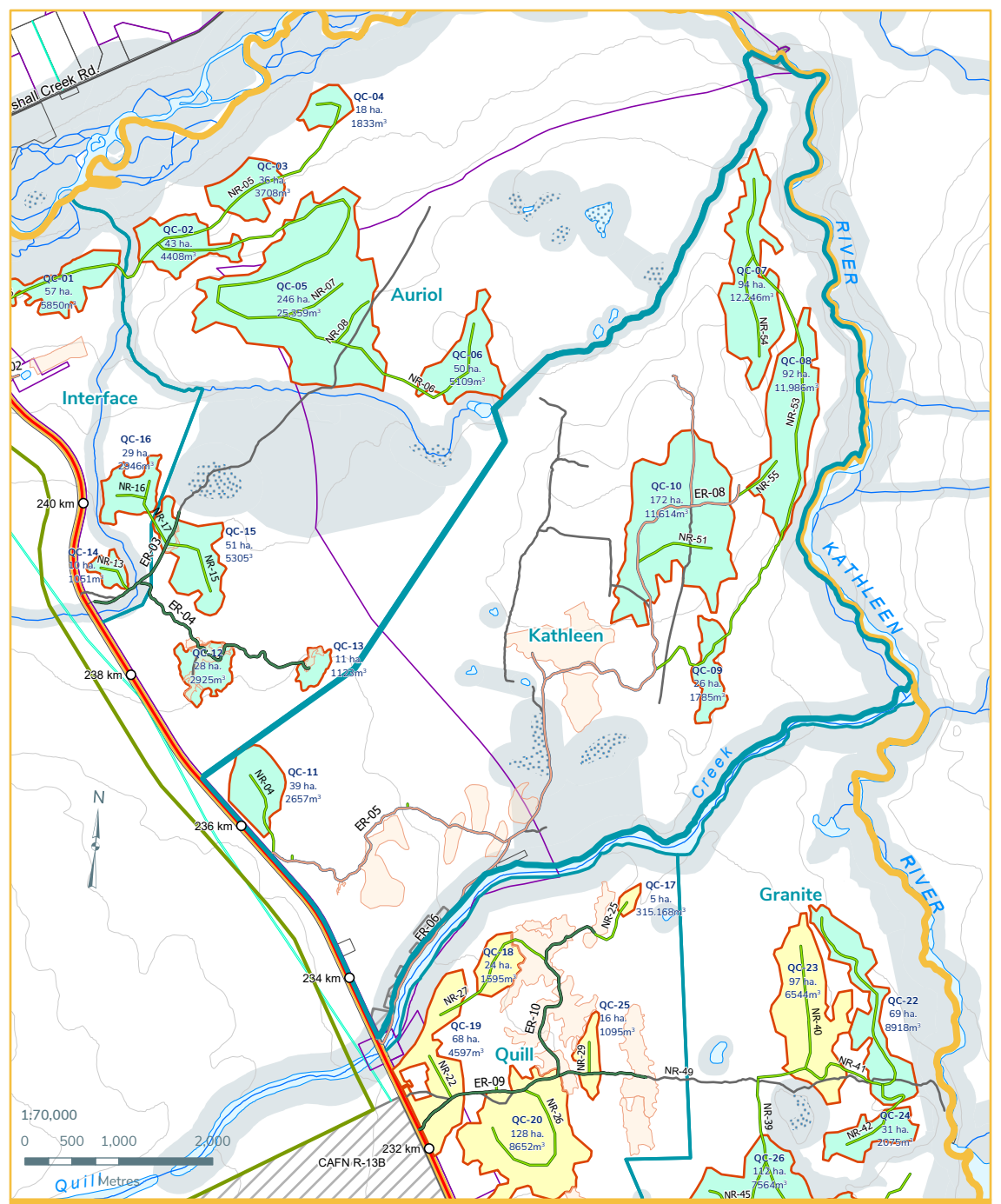
- Dry Ground
- Frozen Ground

- Current Forest Resources Road
- Public Access
- Proposed Roads
- Decomissioned Access
- Local Trails

First Nation Settlement Lands

- A: Surface and Subsurface Rights
- B: Surface Rights
- FS: Fee Simple





Operating Unit - Kathleen

- THP Boundary
- Operating Units
- Previously logged areas
- Connectivity Corridors

Harvest Blocks

- Dry Ground
- Frozen Ground

- Current Forest Resources Road
- Public Access
- Proposed Roads
- Decomissioned Access
- Local Trails

First Nation Settlement Lands

- A: Surface and Subsurface Rights
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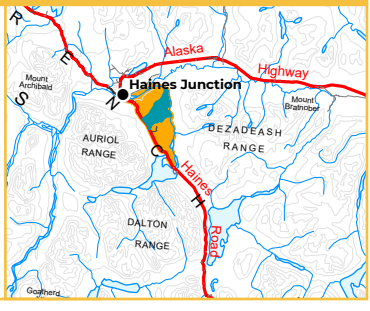

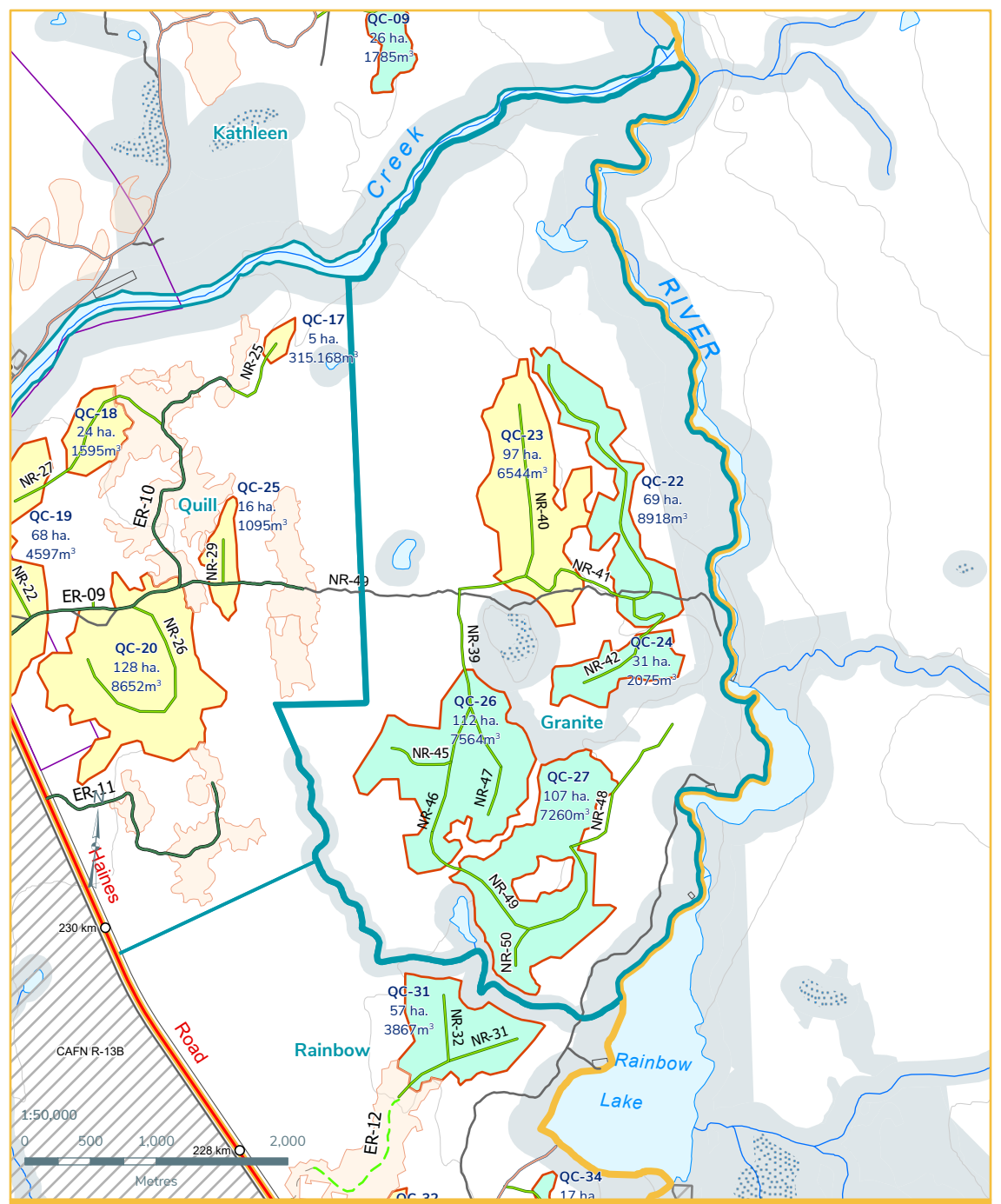

Operating Unit - Granite

- THP Boundary
- Operating Units
- Previously logged areas
- Connectivity Corridors

Harvest Blocks

- Dry Ground
- Frozen Ground

- Current Forest Resources Road
- Public Access
- Proposed Roads
- Decomissioned Access
- Local Trails

First Nation Settlement Lands

- A: Surface and Subsurface Rights
- B: Surface Rights
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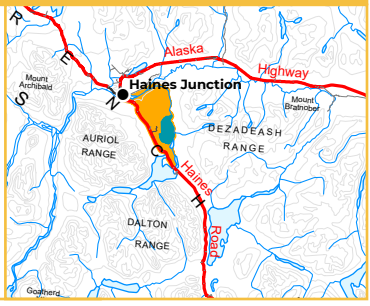
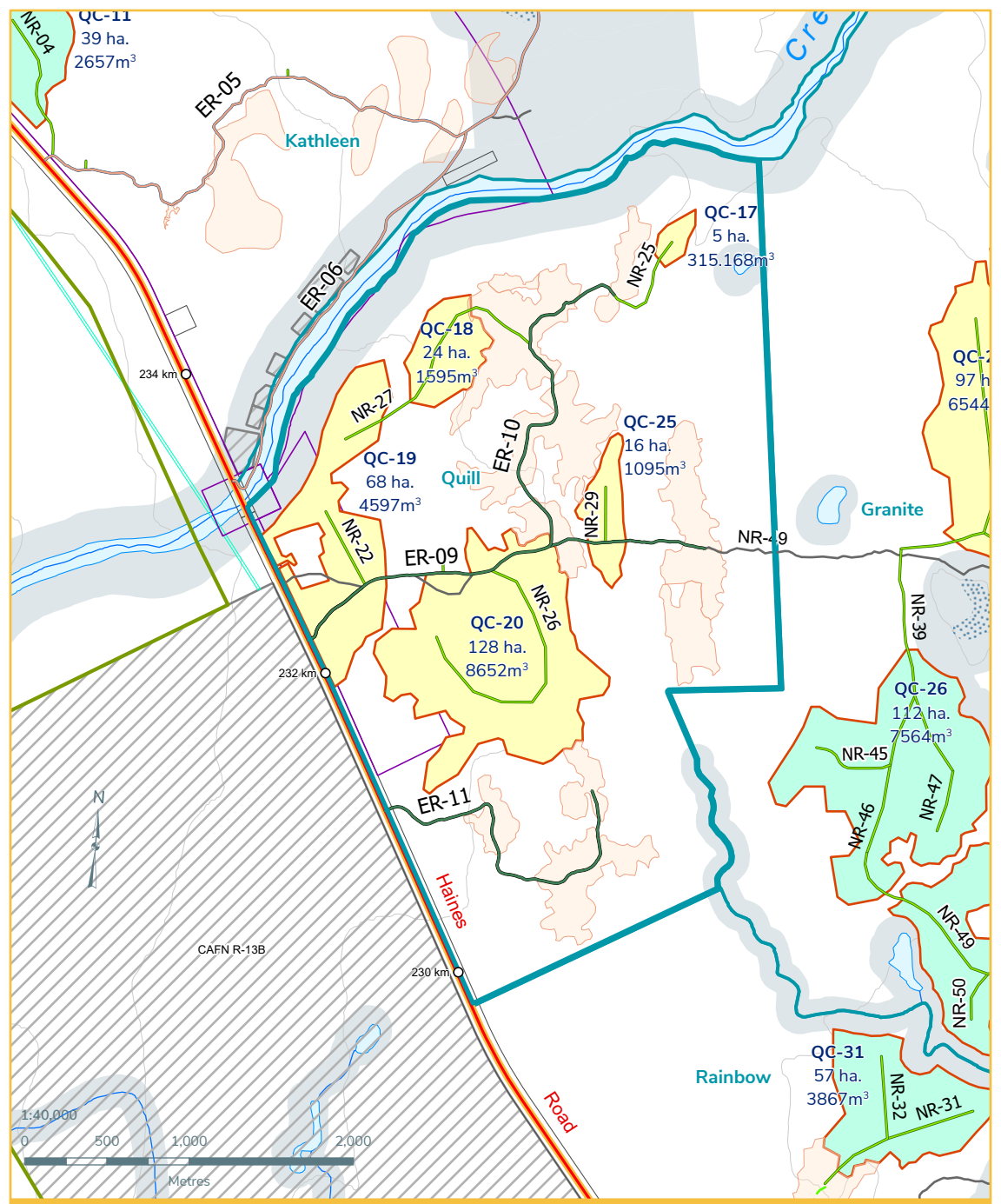




Operating Unit - Quill

- THP Boundary
- Operating Units
- Previously logged areas
- Connectivity Corridors

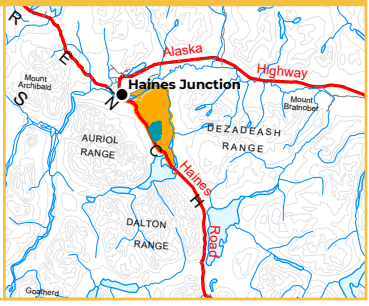
Harvest Blocks

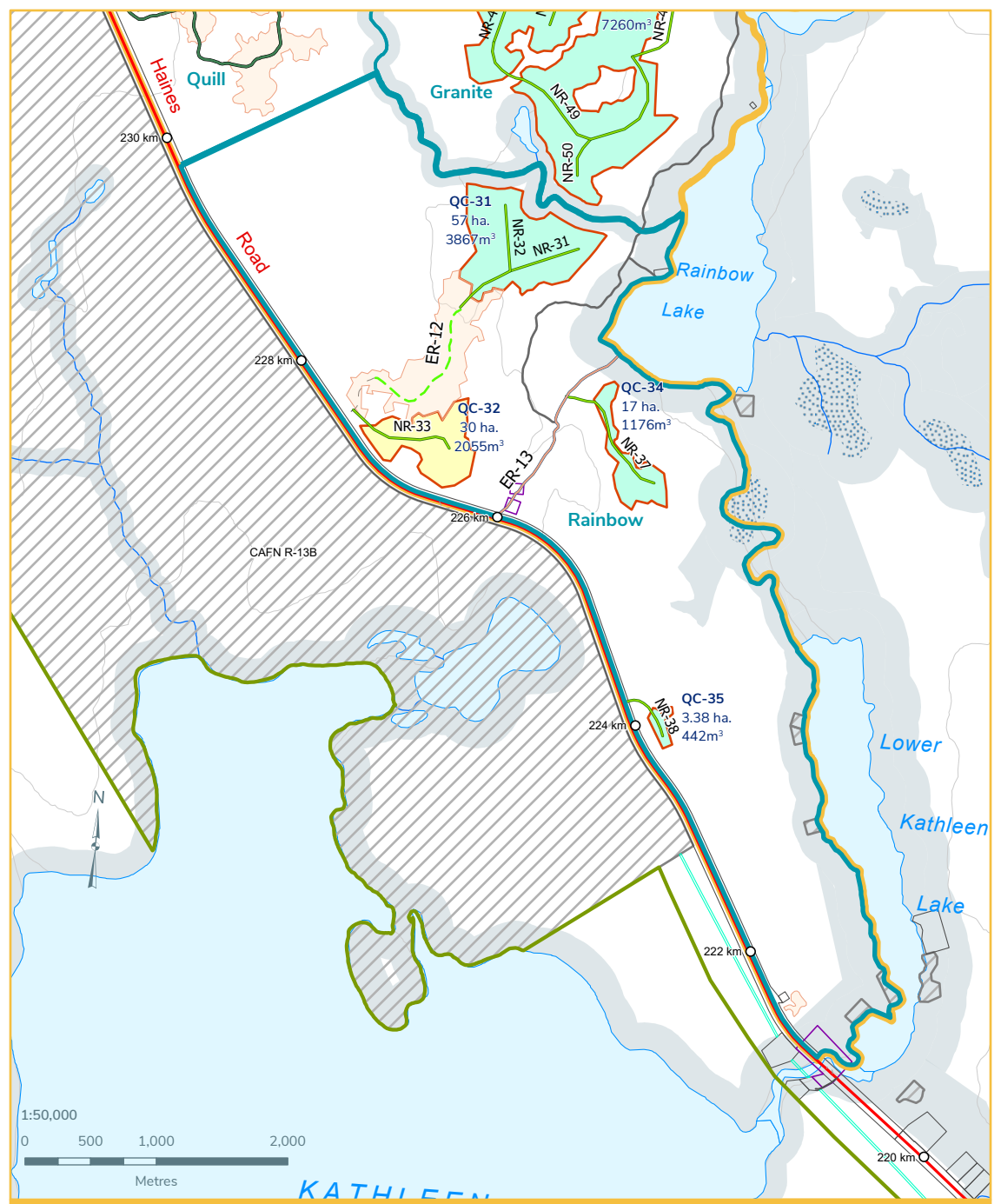
- Dry Ground
- Frozen Ground

- Current Forest Resources Road
- Public Access
- Proposed Roads
- Decomissioned Access
- Local Trails

First Nation Settlement Lands

- A: Surface and Subsurface Rights
- B: Surface Rights
- FS: Fee Simple





Operating Unit - Rainbow

- THP Boundary
- Operating Units
- Previously logged areas
- Connectivity Corridors

Harvest Blocks

- Dry Ground
- Frozen Ground

- Current Forest Resources Road
- Public Access
- Proposed Roads
- Decomissioned Access
- Local Trails

First Nation Settlement Lands

- A: Surface and Subsurface Rights
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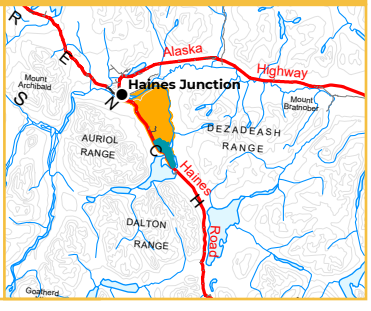

APPENDIX 2: Harvest block summary table

Harvest Block	Timber Type	Probable Ground Conditions	Area (ha)	Total Green Spruce Volume (m3)	Total Dead Spruce Volume (m3)	Total Spruce Volume (m3)	Total Timber Volume (m3)	Estimated Retention (%)	High Wildlife Value (Y/N)	Visual Quality Objectives (Y/N)	Estimated Green Harvest (m3)	Estimated Total Harvest Volume(m3)	Estimated Spruce Retention (%)	Estimated Total Retention (%)
Operating Unit 1 - Interface														
QC-01	2	Frozen Ground	56.8	3,067	4,317	7,384	7,554	23	Y	Y	1534	5850	21	23
QC-14	2	Frozen/Dry Ground	10.2	551	775	1,326	1,357	23	Y	Y	275	1051	21	23
QC-16	2	Frozen/Dry Ground	28.6	1,544	2,174	3,718	3,804	23	Y	Y	772	2946	21	23
Sub-total			95.6	5,162	7,266	12,428	12,715				2581	9847		
Operating Unit 2 – Auriol														
QC-02	2	Frozen Ground	42.8	2,311	3,253	5,564	5,692	23	N	Y	1156	4408	21	23
QC-03	2	Frozen Ground	36	1,944	2,736	4,680	4,788	23	N	Y	972	3708	21	23
QC-04	2	Frozen Ground	17.8	961	1,353	2,314	2,367	23	N	Y	481	1833	21	23
QC-05	2	Frozen Ground	246.2	13,295	18,711	32,006	32,745	23	N	Y	6647	25359	21	23
QC-06	2	Frozen Ground	49.6	2,678	3,770	6,448	6,597	23	N	Y	1339	5109	21	23
QC-12	2	Frozen Ground	28.4	1,534	2,158	3,692	3,777	23	N	Y	767	2925	21	23
QC-13	2	Frozen Ground	10.9	589	828	1,417	1,450	23	N	Y	294	1123	21	23
QC-15	2	Frozen/Dry Ground	51.5	2,781	3,914	6,695	6,850	23	N	Y	1391	5305	21	23
Sub-total			483.2	26,093	36,723	62,816	64,266				13046	49770		
Operating unit 3 – Kathleen														
QC-07	3	Frozen Ground	94.2	5,652	11,116	16,768	16,956	28	Y	N	1130	12246	27	28
QC-08	3	Frozen Ground	92.2	5,532	10,880	16,412	16,596	28	Y	N	1106	11986	27	28
QC-09	1	Frozen/Dry Ground	26.4	1,003	1,584	2,587	2,983	40	N	N	201	1785	31	40
QC-10	1	Frozen Ground	171.8	6,528	10,308	16,836	19,413	40	N	N	1306	11614	31	40
Sub-total			423.9	20,209	36,245	56,454	60,390				4042	40287		
Operating unit 4 - Granite														
QC-22	3	Frozen Ground	68.6	4116	8,095	12,211	12,348	28	Y	N	823	8918	27	28
QC-23	1	Frozen/Dry Ground	96.8	3678.4	5,808	9,486	10,938	40	N	N	736	6544	31	40
QC-24	1	Frozen Ground	30.7	1166.6	1,842	3,009	3,469	40	Y	N	233	2075	31	40
QC-26	1	Frozen/Dry Ground	111.9	4252.2	6,714	10,966	12,645	40	N	N	850	7564	31	40
QC-27	1	Frozen/Dry Ground	107.4	4081.2	6,444	10,525	12,136	40	Y	N	816	7260	31	40
Sub-total			415.4	17294.4	28902.8	46197.2	51,536				3459	32362		
Operating Unit 5 - Quill														
QC-17	1	Frozen/Dry Ground	4.8	182.4	288	470.4	542.4	40	N	N	36	324	31	40
QC-18	1	Frozen/Dry Ground	23.6	896.8	1416	2312.8	2666.8	40	N	N	179	1595	31	40
QC-19	1	Frozen/Dry Ground	68	2584	4080	6664	7684	40	N	N	517	4597	31	40
QC-20	1	Frozen/Dry Ground	128	4864	7680	12544	14464	40	N	N	973	8653	31	40
QC-25	1	Frozen/Dry Ground	16.2	615.6	972	1587.6	1830.6	40	N	N	123	1095	31	40
Sub-total			240.6	9142.8	14436	23578.8	27187.8				1829	16265		
Operating Unit 6 - Rainbow														
QC-31	1	Frozen/Dry Ground	57.2	2173.6	3,432	5,606	6,464	40	N	N	435	3867	31	40
QC-32	1	Frozen/Dry Ground	30.4	1155.2	1,824	2,979	3,435	40	Y	N	231	2055	31	40
QC-34	1	Frozen Ground	17.4	661.2	1,044	1,705	1,966	40	Y	N	132	1176	31	40
QC-35	3	Frozen/Dry Ground	3.4	204	401	605	612	28	Y	Y	41	442	27	28
Sub-total			108.4	4194	6701.2	10895.2	12,477				839	7540		
Totals			**1767.1**	**82,095**	**130,274**	**212,369**	**228,571**				25796	156070		

APPENDIX 3: Access summary tables

New Road Summary

Road Name	Probable Ground Conditions	Estimated Road Class	Clearing Width (m)	Running Surface (m)	In Block Length (km)	Out of Block Length (km)	Total Road Length (km)	Out of Block Area (ha)
NR-01	dry or frozen	5	8	4	0	0.05	0.05	0.04
NR-02	dry or frozen	5	8	4	0	0.06	0.06	0.04
NR-03	dry or frozen	5	8	4	0	0.05	0.05	0.04
NR-04	dry or frozen	4	12	4	0.65	0.25	0.90	0.30
NR-05	frozen	4w	16	4	3.88	2.18	6.06	3.49
NR-06	frozen	4w	12	4	6.73	1.06	7.78	1.27
NR-07	frozen	4w	12	4	0.73	0.00	0.73	0.00
NR-08	frozen	4w	12	4	0.56	0.00	0.56	0.00
NR-13	dry or frozen	5	8	4	0.38	0.03	0.41	0.02
NR-15	dry or frozen	4	12	4	0.68	0.00	0.68	0.00
NR-16	dry or frozen	4	12	4	0.31	0.00	0.31	0.00
NR-17	dry or frozen	4	12	4	0.64	0.11	0.75	0.13
NR-22	dry or frozen	5	8	4	0.51	0.00	0.51	0.00
NR-25	dry or frozen	5	8	4	0.13	0.50	0.63	0.40
NR-26	dry or frozen	3	16	6	1.74	0.00	1.74	0.00
NR-27	dry or frozen	5	8	4	0.95	0.64	1.59	0.51
NR-29	dry or frozen	5	8	4	0.34	0.00	0.34	0.00
NR-31	dry or frozen	4	12	4	0.55	0.00	0.55	0.00
NR-32	dry or frozen	4	12	4	0.87	0.11	0.98	0.13
NR-33	dry or frozen	5	8	4	0.68	0.17	0.85	0.14
NR-37	frozen	5w	8	4	0.80	0.22	1.02	0.18
NR-38	dry or frozen	5	8	4	0.21	0.24	0.45	0.20
NR-39	dry or frozen	3	16	6	0.02	2.23	2.25	3.57
NR-40	dry or frozen	4	12	4	0.02	1.81	1.83	2.17
NR-41	frozen	4w	12	4	0.04	3.20	3.24	3.84
NR-42	frozen	5w	8	4	1.10	0.10	1.20	0.08
NR-45	dry or frozen	5	8	4	0.50	0.00	0.50	0.00
NR-46	dry or frozen	4	12	4	1.00	0.00	1.00	0.00
NR-47	dry or frozen	4	12	4	0.38	0.00	0.38	0.00
NR-48	dry or frozen	4	12	4	1.31	0.00	1.31	0.00
NR-49	dry or frozen	4	12	4	0.02	2.68	2.70	3.22
NR-50	dry or frozen	4	12	4	0.31	0.00	0.31	0.00
NR-51	frozen	4w	12	4	0.83	0.00	0.83	0.00
NR-53	frozen	4w	12	4	3.93	2.48	6.41	2.98
NR-54	frozen	4w	12	4	1.11	0.00	1.11	0.00
NR-55	dry or frozen	5	8	4	0.43	0.13	0.56	0.11
Total					**32.3**	**18.3**	**50.6**	**22.9**

Existing Road Summary

Road Name	Common Name	Road Type	Road Length	Proposed Upgrading/Maintenance	Ground Conditions	Notes
ER-1	Block 0 road	FRR	0.54	Yes - May require minor upgrades to improve off highway access	Frozen	Winter road - gated and locked
ER-2	Gun Range Road	Public Road	0.25	No - road not to be used for purposes of this THP	Dry and Frozen	
ER-3	Auriol Branch	FRR/Public	1.46	Yes - May require minor brushing	Dry and Frozen	Start of road is an FRR - gated and locked. Joins a previously existing trail at which point road is a public road.
ER-4	Auriol Branch Spur	FRR	2.63	Yes - May require brushing and realignment where the road crosses a gully.	Dry and Frozen	
ER-5	Quill Creek Winter Road	Public Road	3.37	Yes - May require brushing and realignment on sharp corners and down a short, steep section.	Dry and Frozen	Road suitable for frozen ground or dry. Name refers to original use as Quill Creek Road sometimes glaciates in winter.
ER-6	Quill Creek Road	Public Road	9.87	Yes - May require brushing and realignment of sharp corners. Start of road, to where it intersects with the Quill Creek Winter Road, does not require any upgrading and is not anticipated to be used.	Dry and Frozen	Start of road sometimes glaciates in winter. Road crosses a meadow which is often wet until later in the summer.
ER-7	N/A	Public Road	0.33	No - road not to be used for this THP	Dry and Frozen	
ER-8	N/A	Public Road	0.66	Yes - May require brushing	Dry and Frozen	Road not currently passable by vehicles due to brush and windfall.
ER-9	Crescent Branch	FRR/Public	2.65	No upgrading anticipated, routine maintenance	Dry and Frozen	Start of road is a FRR - gated and locked. Joins a previously existing trail at which point road is a public road.
ER-10	Crescent North	FRR	2.29	No upgrading anticipated, routine maintenance	Dry and Frozen	
ER-11	Central Branch	FRR	2.23	No - road not to be used for this THP	Dry and Frozen	Majority of road likely to be decommissioned 2020.
ER-12	QC-60	FRR	1.66	Yes - road would need to be reactivated and bladed	Dry and Frozen	Road was decommissioned - would need to be reactivated.
ER-13	Rainbow Lake road	Public Road	1.64	Upgrading not proposed for this road	Dry and Frozen	
Totals			29.58			

Road Type	Total Length (km)
FRR	9.35
Public	19.65

Appendix 4: Terms & Conditions for Cutting Permits or Licences within the Quill Creek Timber Harvest Plan

This appendix details terms and conditions that will be applicable to cutting permits and/or licences within the Quill Creek Timber Harvest Plan, in accordance with the Decision Document (2021). The terms below are numbered consistently with the Decision Document.

4. As the project area has a moderate to high fire behaviour ignition potential rating, the Proponent shall prohibit the use of operator camps. Exception: temporary warming shelters may be permitted upon prior approval from an inspector for operations during the harvest season.

5. The Proponent shall mandate that operators monitor slash burn piles, throughout all seasons, until the fires are entirely extinguished.

8. Central Processing Areas (CPAs) hold large accumulations of fine slash, which present a higher likelihood of fire ignition and spread. To reduce the likelihood of a fire ignition within a CPA, the Proponent shall:
    a. limit processing activities at CPAs to times when the fire danger rating is low or moderate, while implementing a 2-hr fire watch and limiting operations to wind speeds less than 15km/hr when in moderate fire danger rating,
    b. conduct weekly inspections (with approval from a qualified forest and fuel management professional) during the fire season, and monthly inspections during the winter season, of active CPAs and remove excessive fine slash loading to reduce the fire hazard,
    c. conduct weekly inspections (with approval from a qualified forest and fuel management professional) during fire season, and monthly inspections during the winter season, of the active CPAs and landings and ensure there are no holdover fires. If there are fires, the inspector shall extinguish them, and
    d. ensure a minimum 5-meter-wide mineral soil fireguard is in place surrounding burn piles in all weather conditions, including frozen ground.

9. In the event of a fire within a CPA, to reduce its spread and intensity, the Proponent shall:
    a. locate CPAs near a tanker or body of water containing a minimum of 1500 liters to aid in emergency fire suppression,
    b. ensure that Fire suppression kits are available at each CPA and that workers onsite have received training on the use of the kits, as well as emergency response procedures, and
    c. mandate Compliance Monitoring and Inspections Branch to inspect all CPAs prior to the start of the fire season (April 1) to ensure the areas are not conducive to

wildfires. A qualified forest and fuel management professional shall sign and seal the inspections for approval.

14. The Proponent shall, where feasible, avoid driving machines through and adjacent to residual/retained patches of advanced regeneration or retained stems of mature spruce and deciduous trees to protect root systems.

16. Gaps in snow berms are important features to allow for wildlife escapement particularly in areas where high snow depths are encountered. As such, the Proponent shall provide period gaps (ex. Every 100-200 m) in snow berms along any winter roads established that are subject of ongoing maintenance (i.e., plowing).

19. The Proponent shall include conditions in operator permits around the management of attractants and the storage of fuels and waste disposal at landing sites and CPAs. The Proponent shall ensure that electric fencing encloses these areas for the duration of their use and until sites are decommissioned.

Appendix 5: Representations Summary

Multiple public consultation periods took place throughout the development of this timber harvest plan and throughout the environmental assessment process. Representation tables are available upon request from the Forest Management Branch.

The following is a list of public consultation periods, representation has been compiled for each of these processes.

Forest Values Surveys:

- The Forest Management Branch undertook forest value surveys at the CAFN General Assembly on July 20, 2019. Surveys were also available for pickup at the Haines Junction Compliance Monitoring and Inspections office and the Forest Management Branch in Whitehorse from July 20, 2019 to August 30, 2019.
- The Yukon Bureau of Statistics hosted an online survey between November 13, 2019 and December 13, 2019.

Open Houses:

- Two open houses were held in Haines Junctions. The Forest Management Branch held an open house on November 5, 2019.
- The Alsek Renewable Resource Council hosted a multi-agency open house on December 12, 2019.
- The Forest Management Branch also had an information booth at the CAFN General Assembly on July 20, 2019

The information compiled from the Forest Values Surveys and Open Houses are available in the format of a 'What We Heard Report'. This report is available from the Forest Management Branch upon request.

Following the incorporation of the results from the Forest Values Surveys and the Open Houses into the draft timber harvest plan, the plan was submitted for YESAB Executive Committee screening. The following public consultation periods occurred during the YESAB screening:

- Public comment period on proposal from May 20, 2020 to July 20, 2020
- Public comment period on the draft screening report June 8, 2021 to July 9, 2021

The public comments received during the YESAB public comments periods can be requested from the Forest Management Branch. These comments are in the form of representations tables.