CLIMATE CHANGE ADAPTATION PROGRAM

Fuel Management Pilot Business Case for High-Risk Agricultural Interface Areas

Project Summary

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Cariboo, Bulkley-Nechako & Fraser-Fort George, British Columbia, 2020

Fuel Management Pilot Business Case for High-Risk Agricultural Interface Areas

Project Summary

Cariboo, Bulkley-Nechako & Fraser-Fort George — Fuel Management Pilot Business Case for High-Risk Interface Areas: Project Summary

Prepared by ***Cabin Resource Management***,
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Cariboo Agricultural Adaptation Working Group included representatives representation from:

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- Cariboo Cattlemen's Association
- Cariboo Growers
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- Eaglet Lake Farmers' Institute
- Nechako Valley Regional Cattlemen's Association
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- Regional District of Bulkley-Nechako
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- Skeena Regional Cattlemen's Association
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Executive Summary

There is extensive wildfire risk to the agricultural producers in the Central Interior of BC because farming operations are often in close proximity to crown land. Fuel management is an effective means to reduce wildfire risk within the agriculture wildland interface (AWI). However, the wildfire risk in these areas is often not addressed due to economic, policy and regulatory challenges that make fuel management treatments difficult. This project – positioned within the Cariboo Regional District, the Regional District of Bulkley-Nechako and the Regional District of Fraser-Fort George - intends to:

1. Determine economic and adaptive approaches to fuel management for high-risk agriculture wildland interface.
2. Develop a complete process for selecting, initiating and planning collaborative fuel management pilot projects.
3. Complete the planning for three viable fuel management pilot projects.

This report summarizes best management practices for fuel management in the AWI and presents a business case for three fuel management pilot projects. Pilots are proposed for each regional district: Springhouse in the Cariboo Regional District, Kerr Road in the Regional District of Bulkley-Nechako, and Eaglet Lake in the Regional District of Fraser-Fort George.

The three pilots have high to extreme risk rating for wildfire, willing partners, are of suitable size and location, contain merchantable timber, are operable for mechanical harvest, and provide protection to valuable agricultural land. These criteria make these three pilots appropriate candidates for fuel management.

The proposed pilots represent a variety of conditions and characteristics including: variable size ranging from 36.6 ha to 184 ha, different partnerships including large licensees and a woodlot, as well as different stand types and timber volumes. The diversity of the three pilots is important for assessing the practicality and feasibility of fuel management across the variable rural landscape of Central BC. Scalability of these pilots is important, as they may become the template for future fuel management within the agriculture wildland interface.

Proposed fuel management prescriptions for each pilot includes the conventional harvest of merchantable timber to reduce overall timber density. Without the sale of timber these pilots are not economically viable – with total treatment cost per pilot ranging from $199,600 to $772, 800. Through collaboration with licensees and the sale of timber, the cost of treatment is reduced to $10, 800 - $41,400 per pilot site. Partnerships with local licensees, First Nations and BC Wildfire staff were facilitated to ensure pilot project success[1].

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List of Acronyms

AFRF – Alex Fraser Research Forest
ALUI – Agricultural Land Use Inventory
AOI – Area of Interest
AWI – Agriculture Wildland Interface
BCTS – BC Timber Sales
BCWS – BC Wildfire Service
BEC – Biogeoclimatic Ecosystem Classification
CF – Community Forest
CP – Cutting Permit
CRD – Cariboo Regional District
EVQO – Existing Visual Quality Objective
FMP – Forest Management Prescription
FSR – Forest Service Road
GAR – Government Action Regulation
GIS – Geographic Information System
MDWR – Mule Deer Winter Range
NPV – Net Present Value
RDBN – Regional District of Bulkley-Nechako
RDFFG – Regional District of Fraser-Fort George
TSL – Timber Sale License
TU – Treatment Unit
PSTA – Provincial Strategic Threat Analysis
VRI – Vegetation Resources Inventory
WUI – Wildland Urban Interface

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2.0 Introduction

Farming and ranching operations in the Cariboo, Bulkley-Nechako, and Fraser-Fort George regional districts are often surrounded by forested crown land with high wildfire risk. Years of fire suppression has created forests with excessive fuel loading (Government of BC, 2010). Additionally, the climate in Central BC is changing as summers are becoming longer and dryer. Over the past century (1900 – 2013) temperatures in the region have increased from 0.5 -1.4 ^{o}C (BC Ministry of Environment, 2015). The warmer summers are contributing to the increasing fuel load of the region's forests through impacts to forest health factors such as drought, bark beetles and defoliators. Moreover, the dryer summers are increasing the volume of forest fuels that accumulate on a seasonal basis. Ultimately, the proximity of agricultural operations to forests loaded with hazardous fuel types, in combination with climate change, places farming and ranching operations within Central BC under increasing pressure from wildfire.

There is currently no program or process to address the current wildfire pressures on agriculture within the agriculture wildland interface (AWI). Furthermore, there are multiple barriers that prevent farmers and ranchers from receiving the fuel management support they need. Barriers include current policy challenges, as well as the economic feasibility and lack of funding. Moreover, farmers are often lacking the resources – time, skills, and funds– to undertake fuel mitigation on their properties.

This project provides an opportunity to bridge the gap between agricultural producers needs and current government policy. The Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) is reponsible for both wildifre management and rural development. As such the Ministry has a responsibility to provide support and protection to agriculture and foster the development of rural areas (FLNRORD, 2019 a). However, agriculture is presently underserved as funding is directed towards areas of greater population and structure density. With the average farm size ranging from 188-410 ha the farms within the Districts do not meet thresholds for structure density, and fall outside of the wildland urban interface.

This *Fuel Management Pilot: A Business Case for High-Risk Agricultural Wildland Interface* project seeks to overcome these barriers through:

1. Determining economic and adaptive approaches to fuel management for high-risk agricultural wildland interface across the three Regional Districts.
2. Developing a process for selecting, initiating and planning collaborative fuel management pilot projects.
3. Completing the planning for three viable fuel management pilot projects.

The following report outlines all project elements undertaken to fulfill these objectives: determining the extent of threat to the agriculture wildland interface through creation of a geodatabase and risk mapping for each regional district; recommended best management practices for planning of a fuel mitigation project for the agriculture wildland interface, and choosing an appropriate treatment system.

This is followed by an evaluation of project outreach and a summary of pilot partners and potential future partners. One of the key partners identified is a research partnership with the University of British Columbia's Alex Fraser Research Forest.

Finally, the business case for the pilots is presented. The business case lays the groundwork for the three proposed pilots, and is followed by the recommended steps for implementation. This report concludes with recommendations for future agriculture wildland interface projects.

3.0 Background

The Cariboo Regional District (CRD) is situated in Central BC. The region contains an expansive plateau and multiple mountain ranges. It is bordered by the Cariboo Mountains in the east and the Coast Mountains in the west. The Cariboo Regional District is home to 61,988 people and covers an area of 8,060,975 ha of central interior British Columbia (BC Ministry of Agriculture, 2016 a).

Farmland in the Cariboo Regional District consitutes 14.6 % of the total farmland in BC. There are 919 farm operations in the region that employ 497 workers. In total there are 376,957 ha of farmland. Farms in the region are large – the average acerage is 410 ha. Primary agricultural activities are natural pasture land 266,311 ha and crop production of hay and field vegetables cover 44,957 ha. Livestock production in the Cariboo Regional District is mainly cattle, with 473 beef producers raising 18.5 % of the total share of beef for the province. Horse and poultry operations are also dominant in the region, with 447 farms raising horses and 343 poultry producers (BC Ministry of Agriculture, 2016 a).

The Regional District of Bulkley-Nechako (RDBN) is north of the Cariboo Regional District and is surrounded by the Hazelton Mountains in the west and the Omineca mountain range in the north. The District has the second largest land base, with a jurisdictional area of 7,336,100 ha, and has the smallest population of the three Districts, with 37,896 people (BC Ministry of Agriculture, 2016 c).

Farmland in the Regional District consitutes 3.6% of the total farmland in BC. There are 747 farm operations in the region that employ 470 workers. In total there are 245,379 ha of farmland. Farms in the region are large – the average acerage is 328 ha. Primary agricultural activities are natural pasture land covering 39,229 ha, and 21,933 ha of crop production including hay and field vegetables. Livestock production in the Regional District of Bulkley-Nechako is mainly cattle, with 376 beef producers raising 11% of the total share of beef for the province. Horse and poultry operations are also dominant in the region, with 352 farms raising horses and 278 poultry producers (BC Ministry of Agriculture, 2016 c).

The Regional District of Fraser-Fort George (RDFFG) is situated between the Alberta Border and the Regional District of Bulkley-Nechako. Covering an area of 5,061,600 ha, the RDFFG has the smallest land base of the three Districts. Despite the smaller land base, the region is home to 94,506 people and has the greatest population of the three Districts (BC Ministry of Agriculture, 2016 b).

Farmland in the Regional District consitutes 9.5 % of the total farmland in BC. There are 1,165 farm operations in the region that employ 270 workers. In total there are 62,695 ha of farmland. Farms in

the region are large – the average acerage is 188 ha. Primary agricultural activities are natural pasture land, 121,050 ha, and crop production of hay, field vegetables and greenhouse flower production, 55,265 ha. Livestock production is primarily beef and horses, 199 and 193 producers (BC Ministry of Agriculture, 2016 b).

3.1 Agriculture Wildland Interface

Agriculture operations in the Regional Districts are often surrounded by forested crown land with high wildfire risk. The rural nature and size of these operations situate them outside of the Wildland Urban Interface (WUI). As a result, protection of agriculture in these regions is a low priority for wildfire managers, and there is no government funding available. Moreover, farmers are unlikely to reduce fire threat on their properties due to several barriers. These barriers include the cost of treatment, the liability concern of burning slash generated from treatment, and ranchers' time is often limited. As such, fuel mitigation is "unlikley to rise to a high priority level" (Compass Resource Management, 2016). Furthermore, ranchers on crown land range tenures are unable to manage wildfire fuel loads within their tenure as they do not have jurisdiction over the timber within their range.

Prior to this project, the extent of the wildfire threat specifically to agriculture in the three Regional Districts had not been quantified. This project has identified that there is extensive threat to farmers along the agricutlure wildland interface (AWI) in these Districts. Through our assessment we have identified that there is a total of 33, 925 ha of AWI with high to extreme wildfire threat. The Cariboo Regional District has the greatest agricultural landbase at risk, with a total of 17,087.3 ha of high to extreme risk. The Regional District of Bulkley-Nechako ranks second highest, with 12,739.6 ha of high to extreme risk. Lastly, the Regional District of Fraser-Fort George has an estimated area of 4,098.1 ha of high to extreme risk.

The high wildfire risk within the Districts is attributable to extensive fire supression that has created an accumulation of hazardous fuels in forested areas. Much of the forests with the Regional Districts are fire maintained. Natural wildfires in these forests served to: reduce the build-up of flammable fuels; create a mosaic of young-to-old forest and range conditions and habitats; replace older forest stands susceptible to insects and disease; and limit the occurrence of large fires by creating natural fuel breaks. In fact, 500 000 ha of forest within BC would burn every year prior to active fire supression in the Province. With fire supression the area burned has been reduced to one tenth the historical average, resulting in forests that have greater fuel loads, and fires that are more intense and destructive (Government of BC, 2010).

Farming and ranching operations in the region provide several community services and are a valuable contributor to the economy. In addition to providing food security and employment, agricultural land creates fuel breaks and protects urban communities from wildfire. While providing these services to neighboring communities, agricultural producers are bearing the burden of wildfire threat. Farmers and their properties are not provided the same protection as the urban communities they serve (per comms Karen Tabe and Nicole Pressey, regional agrologists).

Moreover, as urban pressures increase there is greater spill over into the rural community. As this trend continues the burden on agricultural producers in the region will continue to increase (per comms John Stevenson, regional agrologist).

3.2 Local Climate Change Impacts

Across the three Regional Districts climate change is forecasted to result in changes to the magnitude, frequency and intensity of extreme events – for both temperature and precipitation.

In general there will be a warming in all seasons, with longer and warmer summers and shorter winters. In the Cariboo Regional District the greatest warming will occur on the leeward side of the Coast Mountains across the plateau and along the Fraser River. Annual average temperatures in the CRD are projected to increase 1.8 ^{o}C by 2050 (PCIC, 2013 a). In the Regional Districts of Bulkley-Nechako and Fraser-Fort George temperature increases will be the greatest in the valley bottoms and in the southern portions. Annual average temperatures are projected to increase 3.2% by 2050 in the RDBN and RDFFG (PCIC, 2013 b).

Annual average precipitation is forecasted to increase 6% in the CRD by 2050, and increase by 9% further north in the RDBN and RDFFG. The increased precipitation will not result in relief for forest fires, as the timing and type of precipitation will change. Less snow will accumulate over the winter and will be accompanied by an earlier spring melt, with more intense spring rains. In the Cariboo, winter snow fall could decrease 9% by 2050 (PCIC, 2013 a). This effect may be less pronounced in the northern districts as precipitation is projected to increase in all seasons. The greatest rainfall increases will occur during the spring and fall – with projected precipitation increases of +13% and +16% respectively by 2050. In turn, the summer precipiation in the north will only slightly increase with projections for 2050 of a 1% increase (PCIC, 2013 b).

Climate change will likely increase the wildfire threat within these Regional Districts through rising temperatures and changes in precipitation regimes. Rising temperatures coupled with less precipitation in the summer and smaller snow packs create warmer and drier weather conditions that are conducive to wildfire. Warmer temperatures and less precipitation will result in a longer fire season with increased fire intensity, frequency, distribution and size. The longer and dryer summers impact the moisture content of forest fuels and as such forest fuels will become dryer. The changing climate will also influence the amount of fuel load within forests. The longer growing season will cause greater productivity within forests and increased surface fuel accumulation. Moreover, the stress of altered temperature and moisture regimes will cause increased disease and tree mortality. Forest pests, including mountain pine beetle and spruce beetle, will become a greater problem as their ranges will be extended and their reproductive lifecycles may hasten. Increased insect and disease pressures will further increase the load of fine and coarse woody debris within forests through: limb die back and drop, needle and leaf loss, and standing dead timber (Flannigan, 2016).

4.0 Risk Analysis

To summarize the extent of agricultural wildland interface risk across the three Regional Districts a geodatabase and regional maps were created to identify areas within the area of interest (AOI) that have the greatest wildfire risk.

Risk is the sum of the probability / threat of wildfire occurring multiplied by the consequence of the wildfire (BC Wildfire Service).

To determine wildfire probability the Provincial Strategic Threat Analysis (PSTA) layer was used (FLNRORD, 2017). This threat analysis covers all crown land across the province of BC. Key inputs used to determine the threat within the AWI analysis include: fire density, head fire intensity and spotting impact (FLNRORD, 2017).

For the consequence component of the risk analysis, agricultural structure densities were derived using provincial datasets. Structure density raster categories were created that included four categories: low (1-4 structure), moderate (4-8 structures), high (9-12 structures and extreme (>12 structures).

A simplified process was developed to create the final risk profile. The final risk output involved the weighted sum of three components; PSTA, structure density and agricultural wildland interface (see Table 1).

Table 1. Risk Analysis Weighted Sums and Values

COMPONENT	WEIGHT	VALUES
PSTA	40%	Low=1 Moderate=2 High = 3 Extreme = 4
STRUCTURE DENSITY	30%	500 m = 3 1000 m = 2 2000 m = 1
AWI	30%	Low (0-4 structures) = 1 Moderate (4-8 structures) = 2 High (8-12 structures) = 3 Extreme (>12 structures) = 4

The weighted values were summed to produce a final risk output for the entire AOI from low to extreme. This strategic level output was used to guide the tactical location of the areas prioritized as fuel treatment pilots.

A collection of all relevant spatial datasets was compiled into a geodatabase to provide a visual, interactive tool to identify high-risk wildfire areas and to summarize the extent of the agriculture wildland interface across the Regional Districts. For a detailed summary of the GIS methodology see 14.0 Appendix B: Detailed GIS Methodology. The resulting agriculture wildland interface wildfire risk mapping for each Regional District are included in Appendix A: AWI Wildfire Risk Maps for Each Regional District. It is anticipated that this database will be used as a tool for future wildfire mitigation planning in the agriculture wildland interface.

Alternative methods were considered using more granular information regarding the consequence to producers. Consideration was given to using active farm status from BC Assessment to ensure inactive farms were removed from the analysis. However, this methodology was not pursued due to privacy concerns. Where coverage exists the Agricultural Land Use Inventories (ALUI) data can provide a more accurate depiction of the agricultural assets at risk. For future analyses and agricultural wildland interface projects, these more detailed assessments should be considered for future risk analyses in AWI (see 10.2 Recommendations).

4.1 Wildfire Risk Profile

The resultant risk profile revealed the CRD to have the most extensive area of high and extreme risk, at 17,087 ha. This result is due to the large number of rural agricultural properties in the District. The RDBN has the second largest area of high and extreme risk with 12,740 ha. This is mostly due to the overlap of ALR land with large tracts of timbered private land. The district with the lowest area of high and extreme risk polygons is the RDFFG. Due in part to the fact that producers near major urban centres, such as Prince George, fall within the wildland urban interface. Wildfire Risk maps can be found in Appendix G.

Table 2. Risk Profile for Area of Interest (ha)

RISK RATING	CRD	RDBN	RDFFG	TOTAL
LOW	5578	38906	2605	47088
MODERATE	67612	50635	25365	143613
HIGH	16838	12285	3726	32849
EXTREME	249	455	372	1076

5.0 Fuel Management Practices Evaluation

In this section, fuel management is explained from the planning and prescription to the industry accepted fuel management standards. Fuel Management is defined as:

"*the activities concerned with the protection of people, property, and forest areas from wildfire and the use of prescribed burning or the attainment of forest management and other land use objectives, all conducted in a manner that considers environmental, social, and economic criteria. Fire management represents both a land management philosophy and a land management activity. It involves the strategic integration of such factors as knowledge of fire regimes, probable fire effects, values -at-risk, level of forest protection required, cost of fire-related activities, and prescribed fire technology into multiple-use planning, decision making, and day-to-day activities to accomplish stated resource management objectives. Successful fire management depends on effective fire prevention, detection, and pre-suppression, having an adequate fire suppression capability, and consideration of fire ecology relationships"* (CIFFC, 2017).

5.1 Best Management Practices

Best management practices do not exist for fuel management in the agriculture wildland interface. This project aims to become the framework for future projects. As such the following best management practices have been established. These best management practices inform the criteria used to determine the three pilot locations (described in section 8.0 Business Case and Pilot Definition) and the fuel mitigation treatments prescribed.

Resources used to develop these best management practices:

- BC Wildfire Service, 2019. *Fuel Management Prescription Guidance.*
- BC Wildfire Service, 2016. *Wildfire Threat Assessment Guide and Worksheets.*
- Day, K., Blackwell, B., Wildeman, S., 2010. *Harvesting and Thinning Guidance Treatments in Wildland – Urban Interface Areas of TSA 29.*
- FLNRORDs *Standard for Developing Tactical Overview and Operational Unit Plans for Wildfire Risk Reduction*.

The objective of these best management practices is to reduce fire incidence, decrease fire spread, and create climate resiliency to protect agriculture values at risk.

5.1.1 Planning

Planning for fuel mitigation should consider six main criteria: values at risk, location suitability and size, land use objectives and other values, constraints, opportunities for collaboration, and long-term effectiveness.

Values at risk – protection of agriculture assets must be the focus. Priorities for the AWI should be agriculture values at a high or extreme wildfire risk. Agriculture values may include livestock, agriculturally purposed structures, equipment, and could extend to non-farm buildings such as primary residences.

Location suitability and size – treatments should be strategically placed and of adequate size to provide maximum protection. Selection of a location should consider the areas at risk to fire spread towards values. The location must also improve suppression efforts during a wildfire event. To determine effective locations, consideration must include analysis of wind patterns, topography, existing fire barriers and access. Wind patterns will influence both the spread of fire to values at risk, and the rate of spread and distance that burning embers will travel. Topography considerations should focus on treatments that are downhill from the values of risk as fires typically burn uphill. Effectiveness of treatments will be enhanced through utilizing or anchoring to existing barriers. Existing barriers are natural features including meadows, lakes and rock outcroppings, as well as manmade features such as roads, transmission line corridors, and pastures.

In general, larger areas are more effective fire breaks than smaller areas. Larger treatment areas may also offset the cost of treatment through the harvest of merchantable timber. At a minimum the treatment area should be 100 m in width providing a 30 m break with surface fuels removed and 70 m beyond that break with a reduced surface fuel load (< 4 kg / m^2).

Land use objectives and other values – treatment of crown land must align with broad land use goals, planning zones, land use objectives and other values of local importance. Land use objectives often include range use, riparian management areas, rare plant communities, red and blue listed species, ungulate winter range, community or domestic water supplies, first nations archaeological and heritage interests, and visual quality objectives. Identification of land use objectives should include review of available land use planning spatial data – Strategic Land and Resource Plans (SLRPs), or Land and Resource Management Plans (LRMPs). Other land uses often exist and should be considered; these often include recreational uses of crown land.

Constraints – operability of an area is critical. The ability to apply the desired treatments will be constrained by terrain, accessibility, and timber type. Terrain can influence the type of treatment, the difficulty and the cost of treatment. Steep ground presents unique challenges and may limit the feasibility of fuel treatment. Access is important to the implementation of fuel mitigation treatment, as costs of treatment increase remoteness. Timber type and stand structure will influence the treatment applied and the cost of treatment.

Opportunities for partnership and collaboration – to help advise the management plan and to explore options for collaboration with other fuel mitigation initiatives. Collaboration may include timber licensees, community forests, First Nations, post-secondary institutions, industry representatives, land users and farmers, as well as organizations and associations with similar objectives or interests. Collaboration will reduce treatment costs through the pooling of resources with overlapping initiatives and could also provide alternative funding sources. Collaboration will also increase the likelihood of replicability and treating more areas beyond the pilot project.

Long term effectiveness and climate resiliency – fuel mitigation often requires ongoing treatment to maintain low fuel loadings. Following treatment, tree growth and understory development continue the process of fuel accumulation. Moreover, climate change pressures may also reduce the long-term effectiveness of fuel treatments. Planning should consider how the maintenance of the fuel treatment will be executed.

5.1.2 Treatment Regimes

Fuel management treatments can either be conducted manually, mechanically or in combination. Mechanical treatment regimes have the benefit of much lower cost and increased scalability. The negative consequence is more site disturbance and an increased carbon footprint. Manual treatment regimes have a lower carbon footprint and less site disturbance; however, they are more costly and thus less easily applied to large treatment areas.

5.1.3 Treatment Methods

Prescribed fire – also referred to as broadcast burning (CIFFC, 2017). This type of treatment removes all types and sizes of surface, ladder fuels, smaller diameter trees, and can reduce ladder fuels through the scorching of lower limbs. It is the most natural option for fire evolved ecosystems as it removes shrubs and restores grasslands. Fire increases stem spacing by removing smaller diameter trees and selects for the most fire resilient species and larger diameter trees. Prescribed fire is also relatively cheap compared to other treatment options and can be applied to a large area (USDA Forest Service, 2004).

There are several barriers and limitations to the use of prescribed fire for fuel mitigation in the agriculture wildland interface. This treatment is less predictable, and there is little control in stand structure post treatment. Broadcast burning impacts to airsheds and negative public perception has led to its decreased use over the last two decades (USDA Forest Service, 2004).

However, recently there has been a push with the new Crown Land Wildfire Risk Reduction Program to initiate more prescribed fire. The program has earmarked $10M over the next three years for use of prescribed fire for fuel management (Pers Comm, Jonathan Murkin). When done with a proper

burn plan supervised by a certified Burn Boss, it is an ecologically sound and cost-effective means of fuel reduction.

Pile Burning – an alternative to prescribed fire that is an effective means of surface fuel loading reduction. Current regulatory changes to the Open Burning Smoke Control Regulation have allowed for decreased venting requirements, making it easier to burn piles for fuel management throughout the winter.

Pruning – the main treatment for reduction of the ladder fuels. Removal of the lower dead and live limbs on trees both decreases surface fire behaviour and reduces the chance of crown fire initiation. It forms an integral part of all fuel management prescriptions and the pruning height depends on factors such as the prescribed post-treatment fire behaviour outcomes, slope, stand type and surface fuel loading.

Overstory / Understory Thinning – results in a reduction of ladder fuels and minimizes the potential for crown fire spread through reduced stem density crown closure, thinning of branches plus removal of ladder fuels and slash, while retaining fire-resistant trees. Thinning may be either mechanical or manual or some combination of. The harvesting of merchantable timber and conventional logging is a form of thinning that will provide reduced fire hazard while producing marketable materials to offset treatment costs.

Thinning provides the greatest control over stand level attributes (tree density, species composition, retention of snags and downed wood). It can be implemented in a way that minimizes damage to leave trees and ensures fire resilient species are not damaged. In general, thinning is less damaging to soil than prescribed fire. Thinning may also be more suited to areas with multiple land management objectives or constraints. For instance, in the Cariboo with areas that are constrained by mule deer winter range for shallow and moderate snowpack thinning is allowable. Overall, thinning is lower risk than prescribed fire and is not constrained to limited weather window (USDA Forest Service, 2004; Day, Blackwell, & Wildeman, 2010).

Application of thinning as a fuel mitigation treatment is mostly limited by operability and economic feasibility. In general, steeper slopes will be the most limiting as the cost for mechanical harvest increases. Steeper slopes require more manual labor including the falling of trees. Stand type and composition may also influence the operability and whether mechanical or manual thinning is required. A low value stand with a high composition of small timber and non-merchantable types will become increasingly expensive to treat. These stand types require more brushing of limbs and the timber will not offset the cost of treatment (Day, Blackwell, & Wildeman, 2010).

Livestock grazing – may be used to effectively reduce ground and ladder fuels and prevent flashy grass fires. Grazing of cattle and horses is suitable for large fuel treatment areas (minimum 40 ha) that have a grass understory. Some reduction of shrubs and fine fuels may also be provided through browsing and trampling. Sheep and goats consume more shrubby and wooded vegetation than cattle and horses. Sheep and goats can remove fuels 1.5 – 2 m above the ground and provide an excellent option for understory brushing. Grazing with sheep and goats can be effective for areas of steep topography where mechanical operability is limited. Fuel treatment with a herd of

200-300 goats can graze up to 1 acre per day. Opportunities exist to utilize current range tenures or expand forage opportunities for producers who are adjacent to crown land to create a livestock grazing plan that will ensure long term maintenance and reduction of forest fuels (LSA Associates , 2008).

Limitations of fuel treatment through grazing include fencing requirements, access to water, protection from predation, stand type, potential disease transmission to wildlife, and management requirements. To ensure livestock grazing remains within the treatment area and out of riparian management areas requires installation and maintenance of either permanent or non-permanent (electric) fencing. Access to water may limit the feasibly of treatment or the cost if infrastructure is needed to provide water. Predation of livestock is a special concern with sheep and goats as fencing will not provide adequate protection. The additional cost of potential losses and the cost of maintaining guardian animals (dogs, lamas, donkeys) significantly reduce the applicability of this fuel treatment option (Newsome, 1995).

Stand type also limits the use of grazing for fuel treatment. Grazing is most appropriate for older aged stands with adequate spacing and canopy closure. In dense forest types mechanical thinning may be required and grazing used as maintenance for long term reduction of surface and ladder fuels. Moreover, goat and sheep browsing can cause damage or mortality to smaller diameter trees as sheep and goats can strip bark from trees. Grazing with sheep may be limited due to concerns over disease transmission to wildlife. Health protocols must be followed, including veterinarian inspection and approval of the Ministry of Environment (Newsome, 1995). Finally, the application of livestock grazing for fuel treatment should be managed and monitored by a qualified professional to determine the optimum stocking rate and duration. This will ensure fuel mitigation objectives are met and habitat values are not degraded or destroyed. The intense level of management required for livestock grazing presents both economical and practical barriers (LSA Associates , 2008).

Combination of thinning and prescribed fire – offers the benefit of providing merchantable timber salvage while reducing the cost of ground and ladder fuel removal, as well as underbrush management. This treatment method is appropriate for regions where mechanical harvesting is viable. The operability must be good (machines can safely and efficiently operate) and merchantable timber must be available. Additionally, the risks of prescribed fire and the smoke created must be permittable. This combination treatment method is at a lower risk for escaped fire than prescribed fire alone. Overall mechanical thinning of merchantable timber in combination with prescribed fire maximizes benefits and is the most cost-effective choice (Day, Blackwell, & Wildeman, 2010; USDA Forest Service, 2004).

5.1.4 Fuel Management Standards

When determining the appropriate treatment for fuel mitigation the prescribed treatment should:

A. Control / reduce surface area of fire
B. Reduce torching (initiation of crown fire)
C. Reduce the capacity of crown fire spread
D. Create long term resiliency through a fire-resistant stand

The following are recommended guidelines for surface fuel loading, canopy base height, canopy closure and stem spacing to achieve the above objectives. In the absence of a government standard these recommendations are a conservative approach with treatments that target fuel loadings that will not support greater than a rank 2 fire (Day, Blackwell, & Wildeman, 2010). A rank 2 fire is described as a low vigour surface fire with slow rate of spread and can often be controlled by ground crews using hand tools or heavy equipment (BC Wildfire Service, n.d.).

Surface fuels and canopy base height have the greatest influence on fire behavior. The ideal surface loading of fuels is less than 4 kg / m^2. To create stand resilience and fuel break conditions fuel loading should never exceed 8 kg / m^2. Canopy base height of 3 meters is ideal, however in some areas 2 meters may be sufficient. Table 3 summarizes the recommended surface fuel loads and canopy base heights depending on threat to values at risk (Day, Blackwell, & Wildeman, 2010).

Table 3. Recommended Surface Fuel Loading and Canopy Base Height

Close to Values at Risk	Surface Fuel Loading	Canopy Base Height
No	< 4 kg / m^2	> or equal to 3 m
Yes	< 4 kg / m^2	> or equal to 3 m
Yes	4 – 8 kg /m^2	> or equal to 3 m

Canopy closure and stem spacing are greatly influenced by surface fuel loading. Studies have shown that regardless of stand density when wind speeds exceed 15 km / h and fuel loadings exceed 8 kg / m^2 fire behavior will exceeds rank 3. Higher stand densities (up to 100 stems per ha) and greater canopy closure may be maintained if surface fuels are lowered (Day, Blackwell, & Wildeman, 2010).

Additional resources available for wildfire mitigation planning are: 1) The BC Wildfire Service (BCWS) has developed a suite of tools and resources to support fuel management activities, these tools can be accessed through the BCWS Tools for Fuel Management webpage and 2) the Association of British Columbia Forest Professionals ABCFP Interim Guidelines - Fire and Fuel Management.

6.0 Developing Collaborative Fuel Mitigation

Partnership establishment is an integral component to the success of collaboratively implementing fuel treatments, and will aid in identifying options for management, establishing priorities for pilot projects, identifying constraints, and are fundamental to producing viable pilots that are ready to implement.

Potential partnerships may include:

Timber Licensees – one of the most essential partners for the success of the pilot projects as the titleholder of cutting authority or crown tenure, thus their cooperation is essential. Fuel mitigation costs can be reduced or subsidized through the harvest of merchantable fibre during fuel management activities.

Community Forests – forestry operations managed by local governments, community groups or First Nations are another potential project partner. Fuel management costs may be reduced through harvest of timber on Community Forests. There could be opportunities to synergize with ongoing sustainable development projects.

Post-secondary Institutions – have potential to synergize current initiatives and studies with points of intersection to fuel management projects. There is also potential to create new research opportunities for academic institutions through collaboration on pilot projects.

First Nations – may provide knowledge on best practices including traditional ecosystem knowledge, there may also be opportunities for assistance in fuel management implementation.

Industry Professionals – from diverse backgrounds related to agriculture, land management, and wildfire will provide foundational knowledge and guidance.

Farmers – where applicable, there may be opportunities to work with adjacent landowners to mitigate fuel load on their properties.

6.1 Partnership Initiation

Partnership initiation began with compiling an exhaustive list of timber licensees, community forests, First Nations, post-secondary institutions, industry representatives and other organizations and associations with potential to partner within each Regional District. Working with the project steering committee the list of partnerships was refined to partner types that were deemed most essential and most likely to yield synergies. Key partners (as described above) include timber licensees, community forests, post-secondary institutions, industry professionals, First Nations, and farmers.

Initial outreach involved contacting licensees, community forests, and academic institutions to establish primary contacts, discuss options, and to learn if there were similar projects taking place. Licensees were identified as a priority for identifying potential constraints early on pilot planning. Academic partnership was identified as an important resource and so outreach to post-secondary institutions was also made a priority. As industry professionals are active members of the Oversite Committee initial outreach to these groups was not necessary. It was determined that outreach to First Nations and farmers would be undertaken once the pilot locations were finalized. These groups would inform the development of the pilots, but not the final locations.

The process for outreach included cold calling contacts and introducing the project. This was followed up by a 1 page introduction letter that was sent to further explain the project and create a line of communication (Appendix C: Outreach Letters). Once the extensive contact list was run through twice and if contacts were not reachable by phone, the introduction letter was sent to those contacts with an email on file.

From the initial outreach it was evident that there was a high interest in this project. Throughout the region there are varying degrees of experience with fuel mitigation, however projects have primarily focused on the urban wildland interface. Licensees were very receptive to the project. Initially it was a concern that licensees would not be supportive of an initiative that could result in reduced timber stocking. Instead, the outreach returned a high level of interest in the project from licensees and willingness to collaborate. Many of the licensees acknowledge the importance of protection for the agriculture wildland interface. Additionally, the project could provide access to timber within a licensee's tenure that may be subject to constraints and they were not planning to develop as a conventional clear cut. Initial outreach result in an academic partnership with the University of British Columbia's Alex Fraser Research Forest. The outreach was also beneficial in establishing contacts for the pilot projects, and to gauge the overall interest / need for such a project in the region. In the end, the outreach did not return any concurrent projects focused on the agriculture wildland interface, highlighting the need for such an initiative.

Challenges with this form of outreach included confusion over the stage that the project was in and the time required to address all contacts in the extensive list. The 1-page letter should be refined to clarify what stage the project is in. Although the objectives were outlined in the letter, this was not communicated effectively in the original document. Licensees often thought that there was a location already identified and wanted to know specifics about timber types and volumes. This

process was also time-intensive, in part due to the number of contacts on the list and also because of outdated contact information. To address the time required to reach out to the licensees, it would be preferable in the future to delay outreach until potential pilot locations are identified. This would also reduce the confusion of licensees who often questioned why they were being contacted when the pilot locations were not identified.

Once the initial outreach was complete and the three pilot locations were identified, the project partners for each pilot were contacted. Willing partners for the three pilots include: the licensees, contractors, academic partners, and local farmers / producers. Ongoing communications of the proposed site plans for each pilot is required as each pilot has its own unique constraints and concerns that will need to be addressed.

7.0 Research Partnership: Alex Fraser Research Forest

A key component to this project is establishing research partnerships, with the goal to identify possible multi-year research projects to document and assess the effectiveness of the pilot site treatments[2]. Through outreach to local universities a potential partnership with the University of British Columbia's Alex Fraser Research Forest (AFRF) was discussed.

The research forest is inclusive of 10 000 hectares of crown forest with a research center and office located in Williams Lake. The focus of the research forest is to create opportunities for research, education and demonstration of sustainable forest management. The AFRF is well acquainted in fuel hazard reduction for the WUI. Including planning, layout, and operations supervision and specializing in reducing visual and biodiversity impacts. This knowledge could be utilized for the pilot projects. Additionally, partnership with the AFRF offers an alternative pilot site location where fuel mitigation treatments could be tested and monitored. The office located at 795 Campbell Road Williams Lake is situated on a 55 acre parcel that has timber and agriculture use (per comms Stephanie Ewan).

In addition to providing a location to test and monitor fuel treatments, the AFRF also meets pilot criteria. The office is located on agricultural land and treatment would provide protection to the property as well as to the adjacent agricultural properties. Agriculture assets on the property include 2.87 km of farm fencing, 6.47 ha of land cleared for grazing / hay, 1000 ft of water line, a sheep barn (currently vacant), and chicken coop with 6 laying hens (See Appendix D: Site Drawing of Alex Fraser Research Forest). In addition to protecting these assets, the site is surrounded on three sides by agricultural operations:

- North – 80 acre parcel with residence, plus hay production and horses
- South – 55 acre parcel with 25 acres used as feed lot to cattle in the winter
- West – 40 acre parcel with 25 acres of hay production and 15 acres forest

The treatment area would be approximately 25 acres that consists of an overstocked fir timber type. The research forest manager would like to see treatment that included clearing out the smaller stems, maintaining a shaded condition from the overstory and indicated that there would be minimal limbing / pruning required.

Through communications with the manager at the AFRF potential opportunities with this partnership include:

A. Education and demonstration – showcasing a range of treatment options
B. Monitoring the long-term fuel load changes at the site over time
C. Assessing which treatments are most effective at self-maintaining / or needed less frequent re-entry

[2] Please note: establishing research study design and parameters are out of scope for this project, but could lead to a parallel project undertaken by a partner institution or research lead.

Other future uses of the site could include maintaining hay fields / grazing or practicing silviculture for education purposes.

Constraints and obstacles to fuel mitigation at the AFRF include the economic feasibility of the treatment required. Future planning should consider funding opportunities to offset the cost of treatment.

8.0 Business Case and Pilot Definition

Fuel management activities in the Agricultural Wildland Interface are not considered under current provincial funding regimes. One method to make fuel management economically viable is to conduct treatments concurrently with industrial logging operations (FPInnovations, 2012; Day, Blackwell, & Wildeman, 2010). Harvest systems and timing of harvest can have synergistic results with timber extraction and fuel management objectives. Silviculture systems can also allow for decreased fuel management maintenance costs through reduced stocking, site preparation and prescribe fire.

For the purposes of these pilots, the intent is to have the Licensee conduct: the overstory thinning and removal, surface fuel removal through site preparation or broadcast burning, a portion of the understory thinning and assist with the surface fuel removal. Broadcast burning and site preparation combined with pile burning will allow for significant reduction in surface fuel removal. To determine the economic viability of the pilots we determined the net present value of the stand[3]. Generally, stands with a positive value will yield profits for the Licensees and lead to their development

To ensure treatment economic viability, partnerships with local BCWS staff will need to be fostered. These crews can be used to conduct a portion of the surface and ladder fuel removal through manual pruning, pile burning or prescribed fire. The assistance of these crews and their in-kind contributions is integral to the success of the pilots. Historically, BCWS crews in most of the Fire Zones have done this type of work.

To make the treatments economical in the AWI, both the in-kind contributions from BCWS staff combined with key Licensee partnerships are integral to pilot project success. If these criteria can be met the remaining costs will be only for fuel management prescriptions (FMPs) and supervision. These costs are defined for each of the proposed pilot areas; however, there is potential for a portion of these additional costs to be carried by the either of the key partners. For example, BCWS staff conducting the surface fuel removal or pruning operations will have their own supervisor. Licensee partners can include thinning specifications or overstory and understory removal as well as broadcast burning as part of the Site Plan, Harvest Plan and Silviculture Prescription.

[3] The net present value was determined using three month rolling log market values as of February 2020 (FLNRORD, 2020 a)

8.1 Fuel Management Pilot Project Criteria

Through collaboration with local regional agrologists several locations in each Regional District were identified as potential pilot locations. A coarse filter approach was used to efficiently vet areas and determine if they met the five primary pilot criteria:

A. Partnership – licensee willing to harvest the proposed area
B. Size – medium (10 - 100 ha) to large (> 100 ha)
C. Timber Value – stand type, species comp and total volume
D. Operability – access, road building potential, topography
E. Risk – either high risk or extreme based on risk analysis mapping

These criteria are crucial to the development of a viable pilot, sites that do not meet these five criteria were not considered. The coarse filter approach identified nineteen potential pilot locations that met the primary pilot criteria. Further refinement of the pilot locations included a fine filter approach that examined the five primary criteria in greater detail, as well as considering additional parameters.

The parameters considered in greater detail in the fine filter approach – as per our recommended Best Management Practices – included:

1) Values at risk were further scrutinized to focus protecting high / extreme risk regions with active agricultural operations or intensive operations.
2) Location suitability was further examined to consider the wind direction, and existing fuel breaks.
3) Land use objectives and additional values were considered, these were unique to each of the pilot locations.
4) More detailed investigation was completed for the timber type using Vegetative Resource Inventory Data (VRI).
5) Constraints were identified to further refine the list of suitable pilots.
6) Opportunities for collaboration were considered, primarily focusing on opportunities for treatment on the adjacent private land.
7) Long-term effectiveness is a concern for all potential sites and was not used to determine a final pilot location.

These more detailed criteria were qualitatively analyzed to select potential pilot sites in areas that will be the most effective and provide the greatest benefit. A balanced approach was needed to proceed to the final pilot locations. As such, some compromises were made with respect to timber value, pilot location relative to the prevailing winds and operability.

Through a qualitative analysis of the fine filter, there were three pilots identified as the most suitable in each Regional District: Springhouse in the Cariboo Regional District, Kerr Road in the Regional District of Bulkley-Nechako, and Eaglet Lake in the Regional District of Fraser-Fort George.

See Appendix E: for the complete matrix of criteria considered for each of the 19 locations in the fine filter approach.

Table 4. Final Pilot Locations for Each Regional District

			PILOT CRITERIA				
	Area	Polygon	Partner	Size	Timber	Operability	Risk
CRD	Springhouse	S3	Yes	Yes	Yes	Yes	H or E
RDBN	Kerr Road	KR1	Yes	Yes	Yes	Yes	H or E
RDFFG	Eaglet Lake	EL1	Yes	Yes	Yes	Yes	H or E

8.2 Pilot Treatment Overview

The goal of the pilots is to reduce the wildfire risk to rural agricultural communities through fuel management. Based on the PSTA and risk analysis, each of the pilots will contain hazardous crown, ladder, and surface fuels resulting in the higher likelihood of sustained ignition and greater fire intensity. Fuel management treatments will reduce fire intensity and behaviour and therefore decrease the risk of crown fire initiation. In reducing fire intensity and behaviour, the surrounding producers will be protected, and a safe defensible space will be created for suppression crews.

Each of the pilots was planned with a 100m buffer that will have a post-treatment fire behaviour objective of maintaining surface fire intensity <2000kWh or Rank 3 fire (Personal Communication, Mike Aldred). This is the level of intensity of fire that can be suppressed by hand crews safely. Surface fires with higher intensity require mechanical and aerial support for suppression. Post-treatment fuel specifications are prescribed to meet this objective i.e. 5kg/m2 of fuels <7.0cm diameter and 4-5 kg/m2 of fuels >7.0 cm diameter. This also allows for reduced rate of spread and increased success of suppression through the creation of a defensible space.

The main objective of overstory removal is to reduce crown fire potential. Generally thinning-from-below to reduce both the overstory and ladder fuels is the most effective treatment. Overstory removal targets that reduce the crown closure to below 35% is shown to reduce crown fire spread (Day *et al,* 2010).

For a summary of the proposed treatments for the pilots see Table 5. General Pilot Treatment Regime, Methods, Objectives and Fire Behaviour Outcomes.

Table 5. General Pilot Treatment Regime, Methods, Objectives and Fire Behaviour Outcomes.

ITEM	SPECIFICATION	OBJECTIVE	FIRE BEHAVIOUR OUTCOMES	COMMENT
SIZE	Medium to Large	Treatment cost reduction	Reduction in extent of fire	
TREATMENT REGIME	Predominantly mechanical	Increase size of treatment and reduce cost	Reduction in extent of fire	
TREATMENT METHODOLOGY				
OVERSTORY THINNING	Reduction of overstory to <35% Crown closure	Reduce crown bulk density	Reduce crown fire intensity and risk of crown fire spread	Challenging to achieve in pilots with MDWR and Visual Resource values
UNDERSTORY THINNING	Variable	Reduced surface and ladder fuel loading	Reduction in crown fire initiation and surface fire intensity	
PRUNING	2-3 m	Reduced ladder fuels	Reduction in crown fire initiation	
SURFACE FUEL REMOVAL				
100M BUFFER	0.5 kg/m^2 (<7 cm) 4.0 kg/m^2 (>7 cm)	Reduction in surface fuels	Reduction in surface fire spread, intensity and flame length	Maintain surface fire intensity <2000 kW/m.
LARGER TU	1.1.– 2.2 kg/m^2 (<7cm) 4.0 kg/m^2 (>7cm)	Reduction in surface fuels	Reduction in surface fire spread, intensity and flame length	

8.3 Pilot Project 1: Springhouse (S3)

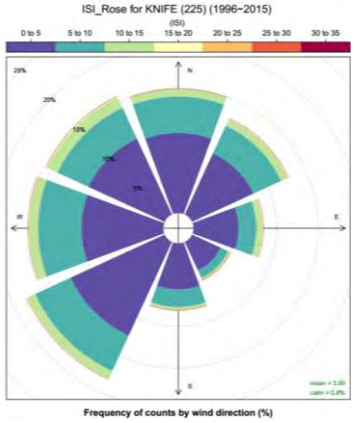
8.3.1 Criteria

The 36.6 ha treatment area of the Springhouse Pilot will provide protection to two large farm operations to the north and could increase forage for the range tenure that overlaps. The eastern parcel is a 173.5 acre property with hay fields that produce feed for a large commercial operation with approximately 250 head of cattle. The second parcel in the west is a 160 acre operation with multiple farm buildings, farm fencing, hay production and a small commercial herd of cattle. The treatment area also overlaps range tenure of a ranch that runs between 150 to 200 head of cattle (per comms Chris Armes, P.Ag., Range Officer; BC Assessment; Google Earth Imagery).

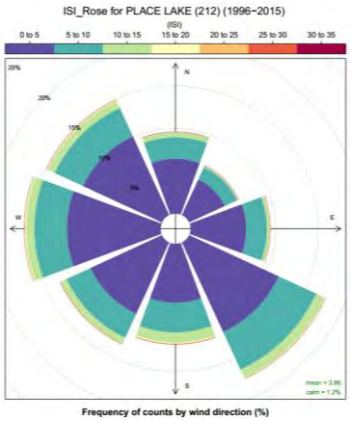
The Springhouse Pilot meets the criteria for location relative to prevailing winds are variable depending on the chosen weather station. Using the Knife station puts the treatment are downwind from the agricultural values.

Figure 1. ISI Wind Roses from Knife, Place Lake and Riske Creek Weather Stations (all within 25km)

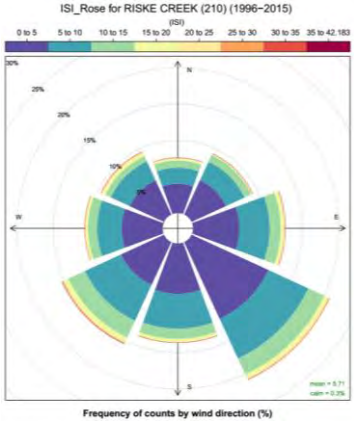
Knife: N of Treatment



Place Lake: S of Treatment



Riske Creek: W of Treatment



(BC Wildfire Service, 2020)

The timber in the planned treatment area has good value Douglas fir sawlog and peeler. It is in a high-risk polygon and agricultural assets are less than 300 m from the treatment area. The associated licensee has also been a willing partner from the outset.

8.3.2 Description

The Springhouse pilot is in the Cariboo Regional District, within the Cariboo-Chilcotin Natural Resource District. The site is situated 25 km south of Williams Lake on the gently rolling plateau east of the Fraser River, and south west of Westwick Lakes, in Springhouse BC. The treatment area is medium in size, 36.6 ha – the smallest treatment area of the three pilots. This pilot is within Tolko's operating area and just south of an Alkali Lake Indian Band woodlot (the Esketem'c First Nation).

The treatment area falls within the De Sous Creek watershed and the Interior Douglas-fir, dry cool subzone of the Fraser Variant (IDFdk3). This zone is characterized by warm, dry summers and cool, dry winters. Substantial moisture deficits are common during the growing season. This timber type is the most extensive variant of the IDFdk subzone in the Cariboo Forest Region; it covers more than half of the Interior Douglas-fir zone in the Cariboo – 8 953 km^2 of the total 16 860 km^2 (Steen, 1997).

8.3.3 Prescription

The follow table summarizes the proposed prescription recommendations for Springhouse. Final prescription parameters will be determined upon development of the area.

Table 6. Proposed Prescription Specification for Springhouse.

TREATMENT REGIME/METHOD	TYPE	SPECIFICATIONS
HARVEST METHOD	Partial Cut Conventional	
FUEL MANAGEMENT – TREE REMOVAL	Mechanical Overstory and Understory thin-from-below	50% B.A. Retention in overstory, 0-200 stems/ha in understory
FUEL MANAGEMENT – DEBRIS DISPOSAL	Manual broadcast or pile burning	Surface fuel reductions in TU-2 to 0.5 kg/m^2 (<7 cm diameter) and 4.0 – 5.0 kg/m^2 (>7.0 cm diameter) Surface fuel reduction in TU-1 to 1.1 – 2.2 kg/m^2 (<7 cm diameter) and 4.0 – 5.0 kg/m^2 (>7.0 cm diameter)
FUEL MANAGEMENT – DEBRIS DISPOSAL	Manual pruning	Increase crown base height to 3.0 m

8.3.4 Development

The treatment area contains good operable ground with gentle slopes ranging in elevation from 960-1000 m. The area is engineered for conventional ground-based harvesting system, with skid to roadside utilizing a feller buncher, rubber-tired skidder, and processor. A partial cut harvest system with thinning from bellow is prescribed where approximately 50% of the largest merchantable Douglas fir stems will be retained.

The proposed shape is planned to link in with an existing Forest Service Road – the Desous Mountain FSR. Approximately 1.4 km of newly constructed temporary road has been designed to minimize adverse skidding. Maximum skidding distances are 250 m adverse (uphill) and 300 m favorable (downhill) with an average distance of 150 m. Designated skid trails have not been designed at this time.

Development of this treatment unit must take into consideration visual resource values. Approximately 25.3 ha of this treatment unit overlaps a visually sensitive polygon with an Existing Visual Quality Objective (EVQO) of Modification (M) and an Existing Visual Condition of Retention (R). Prior to any development of this area, a preliminary Visual Impact Assessment (VIA) should be conducted. The VIA should determine the percent of alteration that is existing and determine if any further clearing of timber is allowed on this landform.

Table 7. Springhouse (S3) Pilot Project Summary Table

ITEM	DESCRIPTION
POLYGON ID	S3
TIMBER TYPE	$Fd_{95}Sx_{4}At_{1}$
TOTAL PLANNED AREA	36.6 ha (TU-1, 20 ha and TU-2, 16.6 ha)
TOTAL VOLUME	7548 m^3
HARVESTABLE VOLUME	3773 m^3
NATURAL RESOURCE DISTRICT	Cariboo-Chilcotin Natural Resource District
REGIONAL DISTRICT	Cariboo
BEC	Interior Douglas Fir Dry, Cool Fraser Variant (IDFdk3)
OPERATING AREA	Tolko Industries Williams Lake Division

Approximately 18 ha of this treatment unit falls in a RESULTS opening layer with a disturbance date of 1955 and disturbance end date of 1988. This is likely the result of partial harvesting. There is no other relevant information indicating harvesting activities in the area.

Occurrences of blue listed species include the western rattlesnake, Great Basin gopher snake and the desert night snake. The treatment area also overlaps fisher habitat and prescription must include considerations for Den Type II and Broom Habitat Type I and II.

The proposed polygon is in a Mule Deer Winter Range Polygon (MDWR) under the Government Actions Regulation (GAR) Order u-5-002. Timber harvest is limited in these polygons; however, an

exemption to the Order can be obtained from the District Manager. Exemptions to the Order include human safety, forest health and wildfire risk reduction.

8.3.5 Business Case

The net present value of the stand to ensure a viable harvest opportunity for the Licensee and the cost of the fuel management activities were analyzed to make a business case for each of the proposed pilot projects. The net present value of the stand was determined to be **$2.55/m³**. For this analysis it was assumed that:

- The Douglas-fir (Fd) component of stand was comprised of 40% peeler, 40% sawlog and 20% pulp;
- All Spruce (Sx) was sawlog and Aspen (At) was assumed to be pulp and available for harvest;
- A Mule Deer Winter Range exemption could be rationalized for wildfire risk reduction to reduce the basal area by 50%, and;
- Stumpage for the site will be similar to timbermark EG2905 (an Fd-leading partial cut in the Williams Lake area).

Estimated treatment costs without considering the sale of the timber would be **$6,238/ha**. By incorporating fuel management with timber management objectives and working in partnership with BC Wildfire Service staff, savings will be approximately **$5,900**. Treatment costs will only be for the creation of a fuel management prescription and potentially the supervision resulting in a cost of **$338/ha.**

Table 8. Springhouse Estimated Treatment Costs with and without Partners

FUEL MANAGEMENT ACTIVITY	HECTARES	COST/HA	TOTAL COST	BUSINESS CASE COST (W. PARTNERS)	SERVICE PROVIDER
FMP	36	$300	$10,800	$9,600[4]	Contractor
ADMIN/PM/SUPERVISION	36	$100	$3,600	0	BCWS or Licensee
THIN-FROM-BELOW	36	$3,000	$108,000	0	Licensee Logger
ADDITIONAL MANUAL	16	$1,000	$16,000	0	Licensee Logger/BCWS
PRUNING	36	$500	$18,000	0	BCWS
SURFACE FUEL REMOVAL (BROADCAST BURN)	36	$300	$43,200	0	BCWS or Licensee Silviculture Department
		TOTAL COST	$199,600	$10,800	
		COST/HA	$6,238	$338	
		TOTAL COST REDUCTION/HA	$-5,900		

[4] A portion or all of these costs could be covered with integration into the Licensee's Site Plan, Harvest Plan and Silviculture Prescription.

8.4 Pilot Project 2: Kerr Road (KR1)

8.4.1 Criteria

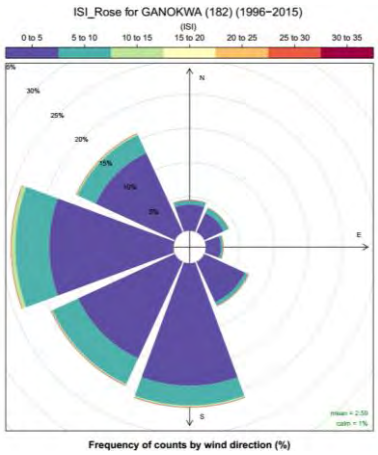
Agriculture activities in Telkwa are primarily forage production and pasture – comprising 95% of the cultivated land in the region (BC Ministry of Agriculture, 2004). The surrounding area to the treatment has three large dairies (located to the southwest of the treatment), and several large beef operations (100-300+ head). The gentle slopes, aspect and self-irrigating fields in the region make for valuable crop land (Per comms John Stevenson P.Ag.).

Treatment at this location will provide immediate protection to three private properties to the east and could increase forage for the overlapping range tenure. The northern property is a 79 acre parcel that is largely cleared for pasture and is surrounded by forested land on three sides. The western parcel is a 160 acre beef operation, with forage production, and multiple farm buildings and fencing. This property is surrounded on three sides with forest, the fuel treatment will provide protection on the north and eastern boundary of this property. The eastern property is a 160 acre parcel that is primarily cleared for forage production (BC Assessment; Google Earth Imagery). The treatment area also encompasses one active range tenure of 160 ha.

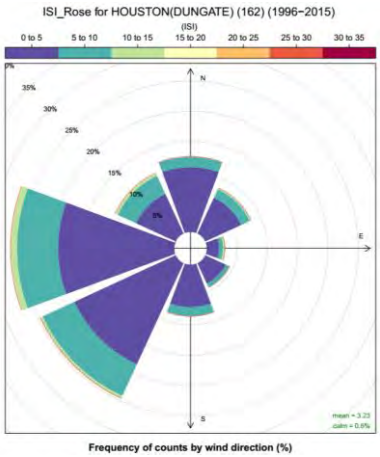
Each of the three weather stations shows highest ISI values coming from west to south. This puts the treatment area either downwind from the values or at a 270 degree offset. The secondary ISI values from the Pine Creek Station are from the east and northeast. This puts the treatments upwind from the values or at a 90 degree offset. This mainly puts the Kerr road treatment at risk from a flanking fire.

Figure 2. ISI Wind Roses from Ganokwa (<20km N), Houston (<60km SE) , and Pine Creek (<30km W)

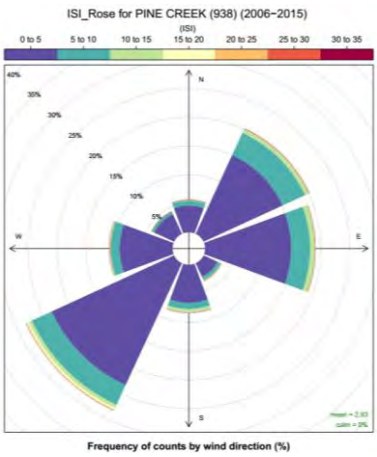
Ganokwa: N of Treatment



Place Lake: SE of Treatment



Pine Creek: W of Treatment



(BC Wildfire Service, 2020)

Additional project criteria used to select this site included a high to extreme risk, the medium to large size, willing partners with the timber licensees, multiple agricultural assets at risk and the potential to partner with a woodlot. Additional consideration was also given to the existing harvested areas, and creating a larger, landscape level fuelbreak.

8.4.2 Description

The Kerr Road pilot is in the Regional District of Bulkley-Nechako, within the Skeena Stikine Resource District. The site is situated south east of Smithers in the rural farming community of the Village of Telkwa (BC Ministry of Agriculture, 2004). The treatment is located to the east of round lake and the Bulkley River. The large treatment area, 96 ha, falls under two different licensees. The northern treatment of 68 ha is within BC Timber Sales (BCTS) Babine operating area. The western treatment area of 28 ha is a woodlot that is currently undergoing title transfer.

The treatment area falls within the Babine Moist Cold Sub-Boreal Spruce Zone (SBSmc2). This BEC zone is the wettest and snowiest climate of the Sub-Boreal Spruce units, with mean annual precipitation of 574 mm and 273 mm of that during the growing season. The elevation of this zone is between 850 - 1 350 m and there are on average 116 frost free days. This forest type is dominated by hybrid white spruce and subalpine fir. Forest productivity is moderate and limited by a relatively short growing season (DeLong C. T., 1993).

8.4.3 Prescription

The following table summarizes the proposed prescription recommendations for Kerr Road. Final prescription specifications will be determined upon development of the area.

Table 9. Proposed Prescription Specification for Kerr Road

TREATMENT REGIME/METHOD	TYPE	SPECIFICATIONS
HARVEST METHOD	Clearcut with Dispersed and Group Retention	
FUEL MANAGEMENT – TREE REMOVAL	Mechanical Overstory and Understory Thinning	Dependent of Visual Impact Analysis
FUEL MANAGEMENT – DEBRIS DISPOSAL	Broadcast burning	Surface fuel reductions in TU-1 and 2 to 0.5 kg/m^2 (<7 cm diameter) and 4.0 – 5.0 kg/m^2 (>7.0 cm diameter) Surface fuel reduction in TU-3, 4 and 2.2 kg/m2 (<7cm diameter) and 4.0 – 5.0 kg/m2 (>7.0 cm diameter)
FUEL MANAGEMENT – DEBRIS DISPOSAL	Manual pruning	Increase crown base height to 3.0 m

8.4.4 Development

The treatment area contains good operable ground with gentle slopes with an elevation gain of 100 m (880-980 m), resulting in lower harvesting costs. The area is suitable for conventional ground-based harvesting system, with skid to roadside utilizing a feller buncher, rubber-tired skidder, and roadside processor

Existing road networks on crown land allow for lower road construction costs. Approximately 3.2 km of newly constructed road has been designed to reduce the maximum skid distances. The adverse (uphill) and favorable (downhill) skid distances are less than 250 m. The status of the road will need to be discussed with BCTS as current planned roads may be useful for future passes and treatments.

Development of this treatment area must take into consideration visual resource values. The entire 96.2 ha of this treatment unit overlaps a visually sensitive polygon with an Existing Visual Quality Objective (EVQO) of Partial Retention (PR) and an Existing Visual Condition of Partial Retention (PR). Prior to any development of this area a preliminary Visual Impact Assessment should be conducted

to determine the percent of alteration existing and new that is allowed on this landform. The treatment area also overlaps fisher habitat and prescription must include considerations for Den Type II and Broom Habitat Type I and II.

Table 10. Kerr Road Pilot Project Summary Table

ITEM	DESCRIPTION
POLYGON ID	KR1
TIMBER TYPE	Sx_5Pl_3Bl (At, Atc, Ep)
TOTAL PLANNED AREA	96.2 ha (TU-1, 61.5 ha; TU-2, 6.6 ha; TU-3, 1.3 ha; TU-4, 26.7 ha)
TOTAL VOLUME	~17,000 m^3
HARVESTABLE VOLUME	Variable (dependent on Visual Impact Assessment)
NATURAL RESOURCE DISTRICT	Skeena Stikine Natural Resource District
REGIONAL DISTRICT	Bulkley-Nechako
BEC	Babine Moist Cold Sub-Boreal Spruce Zone (SBSmc2)
OPERATING AREA	BC Timber Sales - Babine, and Woodlot (ownership in transition)

8.4.5 Business Case

Both the net present value of the stand to ensure a viable harvest opportunity for the Licensee and the cost of the fuel management activities were analyzed to make a business case for each of the proposed pilot projects. The net present value of the treatment areas for Kerr Road was determined to be **$67.41/m³**. For this analysis it was assumed that:

- The Sx component of stand was comprised of 20% peeler, 60% sawlog and 20% pulp;
- The lodgepole pine (Pl) and Bl was 80% sawlog and 20% pulp;
- All Aspen (At) and Cottonwood (Act) would be retained;
- An average of upset and bonus bids were used for 5 separate BCTS-Babine Timber Sale Licenses in the Smithers area (TA0734, TA0397, A95560 and A95562);
- No net down on the volume for dispersed or grouped retention as this will be determined after the initial Visual Impact Assessment, and;
- The Woodlot TUs were analyzed together with the BCTS operating area.

Estimated treatment costs without considering the sale of the timber would be **$3,800/ha**. By incorporating fuel management with timber management objectives and working in partnership with BC Wildfire staff, savings will be approximately **$3,200**. Treatment costs will only be for the creation of a fuel management prescription and supervision.

Table 11. Kerr Road Estimated Treatment Costs with and without Partners.

FUEL MANAGEMENT ACTIVITY	HECTARES	COST/HA	TOTAL COST	BUSINESS CASE COST (W. PARTNERS)	SERVICE PROVIDER
FMP	96	$200	$19,200	$19,600	Contractor
ADMIN/PM/SUPERVISION	96	$100	$9,600	0	BCWS
THIN-FROM-BELOW	96	$3,000	$288,000	0	Licensee Logger
PRUNING	96	$500	$48,000	0	BCWS
SURFACE FUEL REMOVAL (BROADCAST BURN)	96	$300	$43,200	0	BCWS or BCTS Silviculture Department
		TOTAL COST	$364,800	$19,200	
		COST/HA	$3,800	$600	
		TOTAL COST REDUCTION	$-3,200		

8.5 Pilot Project 3: Eaglet Lake (EL1)

8.5.1 Criteria

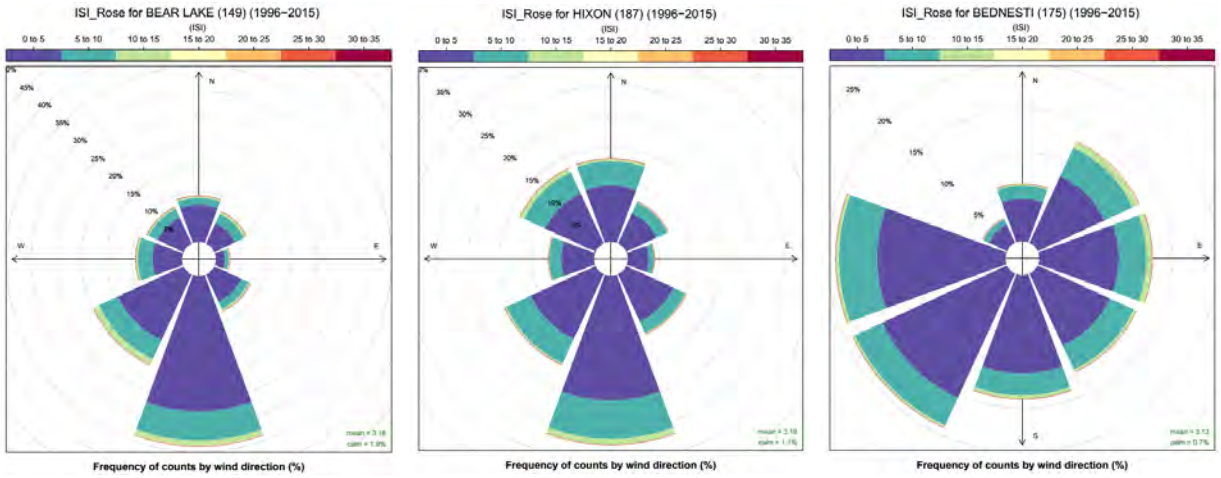
There are nine properties located to the south of the treatment, a total of 401 ha of farmland. The primary uses are organic food crop production, forage crops and pasture. Many of the properties have additional outbuildings and farms, in addition to private residences. Some of the properties would benefit from fuel mitigation and outreach to those producers should occur during the next phase of this project (Google Earth Imagery).

Weather stations located to the north (Bear Lake) and south (Hixon) of the Eaglet Lake TU indicate prevailing winds are from the south. This station data indicates the Eaglet Lake TU is located downwind of the values at risk and may not provide immediate protection to the headward movement of wildfire and only protection to the backing of a wildfire. The station to the west indicates more variable wind patterns with the prevailing winds from the westerly to south westerly direction. This station data indicates the Eaglet Lake TU would provide protection to a flanking fire.

Large wildfires can create their own weather systems and prevailing wind direction does not necessarily confirm that the treatment unit will not provide protection. The Shovel Lake Fire from 2018 produced a sizable flanking fire on its eastern side (BCWS website).

Figure 3. ISI Wind Roses from Bear Lake (N), Hixon (S) and Bednesti (W)

Bear Lake: N of Treatment | Hixon: S of Treatment | Bednesti: W of Treatment



(BC Wildfire Service, 2020)

Prevailing wind direction is just one factor of many to be considered when determining a suitable location. Timber values and total volume along with this size of the proposed treatment unit were also considered when selecting this location. This area is otherwise unencumbered by other resource values such as MDWR and Visuals. It is located in a high to extreme risk polygon.

Numerous active farms with woodlands will be protected by the fuelbreak. In addition, this treatment unit would offer opportunities for private land treatments with one of adjacent producers.

8.5.2 Description

The Eaglet Lake site is located in the Regional District of Fraser-Fort George, within the Prince George Forest District. The site is situated in the small farming community east of Eaglet Lake and north of Prince George within the Hay Creek watershed. This is the largest of the three proposed pilots, with a treatment area 184.4 ha. The treatment area overlaps with Canfor's operating area and Tree Farm License.

The treatment area falls within the Willow Wet Cool Sub-Boreal Spruce BEC zone (SBSwk1). One of the colder and wetter BEC units of the SBS zone, it has relatively large snow accumulation (334 mm mean snow fall) and considerable precipitation during the growing season (345 mm mean rain fall). Elevation range for this zone is 660 – 1 140 m. Forests are dominated by white spruce and subalpine fire, with lodgepole pine on the driest sites (DeLong C. , 2003).

Table 12. Eaglet Lake Pilot Summary Table

ITEM	DESCRIPTION
POLYGON ID	EL1
TIMBER TYPE	Sx_5Bl_4Fd (EpAcAtSb)
TOTAL PLANNED AREA	184.4 ha
TOTAL VOLUME	47 000 m^3
HARVESTABLE VOLUME	47,000 m^3
NATURAL RESOURCE DISTRICT	Prince George Forest District
REGIONAL DISTRICT	Fraser-Fort George
BEC	Willow Wet Cool Sub-Boreal Spruce (SBSwk1)
OPERATING AREA	Canfor Corporation

8.5.3 Prescription

The following table summarizes the proposed prescription recommendations for Eaglet Lake. Final prescription specifications will be determined upon development of the area.

Table 13. Planned Prescription Specification for Eaglet Lake

TREATMENT REGIME / METHOD	TYPE	SPECIFICATIONS
HARVEST METHOD	Clearcut with Dispersed and Group Retention	
FUEL MANAGEMENT – TREE REMOVAL	Mechanical Overstory and Understory Thinning	0-100 Dispersed Fd, Ac and Act Overstory Understory 0-200 (all spp.)
FUEL MANAGEMENT – DEBRIS DISPOSAL	Broadcast burning	Surface fuel reductions in TU-1 to 0.5 kg/m^2 (<7 cm diameter) and 4.0 – 5.0 kg/m^2 (>7.0 cm diameter) Surface fuel reduction in TU-2 to 6: 1.1 – 2.2 kg/m^2 (<7cm diameter) and 4.0 - 5.0 kg/m^2 (>7.0 cm diameter)

8.5.4 Development

The treatment area contains good operable ground with gentle slopes (elevation 620 – 660 m), resulting in lower harvesting costs. The site is suitable for conventional ground-based harvesting system, with skidding to roadside. Maximum skidding distances are 250 m adverse (uphill) and 200 m favorable (downhill) with average skidding distance of 150 m. Designated skid trails have not been designed at this time. Mechanical harvesting will utilize a feller buncher, rubber-tired skidder, and roadside processor.

Two possible road options exist for this treatment area, with all road options linking into Upper Fraser Road. Utilization of 3.5 km of existing roads, Fraser Rd or Eagle Rd, allows for two options to haul timber from the treatment units. Approximately 8 km of new road is planned between all the treatment units. Roads are designed to allow hauling from either private land or to the existing FSR. As such, not all planned roads will be built.

8.5.5 Business Case

The net present value of the treatment areas for Eaglet Lake was determined to be **$33.30/m³**. For this analysis it was assumed that:

- The Bl and Fd component of stand was comprised of 80% sawlog and 20% pulp;
- The Sx was 60% sawlog, 20% peeler and 20% pulp;
- All At, Act and birch (Ep) would be retained;
- Stumpage from Tree Farm License 30 for Timbermark 30/2F was used as a surrogate, and
- The two tenures (TFL and Forest License) were considered together.

Estimated treatment costs without considering the sale of the timber would be **$8,050/ha**. By incorporating fuel management with timber management objectives and working in partnership with BC Wildfire staff, savings will be approximately **$6,756**. Treatment costs will only be for the creation of a fuel management prescription and supervision.

Table 14. Eaglet Lake Estimated Treatment Costs With and Without Partners.

FUEL MANAGEMENT ACTIVITY	HECTARES	COST/HA	TOTAL COST	BUSINESS CASE COST (W. PARTNERS)	SERVICE PROVIDER
FMP	138	$200	$27,900	$27,900	Contractor
ADMIN/PM/SUPERVISION	138	$100	$9,600	$13,800	Contractor
OVERSTORY REMOVAL	138	$4,000	$690,000	0	Licensee Logger
SURFACE FUEL REMOVAL (BROADCAST BURN)	138	$300	$41,400	0	BCWS or BCTS Silviculture Department
		TOTAL COST	$772,800	$41,400	
		COST/HA	$8,050	$1,294	
		TOTAL COST REDUCTION	$-6,756		

8.6 Summary of the Pilots

The three pilots identified were developed to protect local agricultural operations that are at a high to extreme risk rating for wildfire. These pilots have willing partners, are of suitable size and location to provide protection, and also contain merchantable timber that is operable for mechanical harvest. The combination of these primary criteria makes these pilots suitable candidates for fuel management.

The proposed pilots represent a variety of circumstances and characteristics: variable size ranging from 36.6 ha to 184 ha, different partnerships including large licensees and a woodlot, as well as different stand types and timber volumes. The diversity of these pilots is important for determining the practicality and feasibility of fuel management treatments for the agriculture wildland interface. Scalability of these pilots is important, as they could become the template for future fuel management within the agriculture wildland interface.

Table 15. Summary of Treatment Costs for the Three Pilots

	LOCATION	AREA (Ha)	TREATMENT COST	COST W. PARTNER
SPRINGHOUSE	CRD	36.6	$199,600	$10,800
KERR ROAD	RDBN	92.6	$364,800	$19,200
EAGLET LAKE	RDFFG	184.4	$772,800	$41,400

Proposed fuel management prescriptions for each pilot include the conventional harvest of merchantable timber to reduce overall timber density, thinning-from-bellow, pruning to increase canopy base height to 3 m, and the removal of debris through either broadcast of pile burn.

Without the sale of timber these pilots are not economically viable – total treatment cost per pilot ranges from $199,600 to $772, 800. Through collaboration with licensees and the sale of timber, the cost of treatment is reduced to $10, 800 - $41,400 per pilot site.

9.0 Implementation of Pilots and Next Steps

1. Continued collaboration with UBC's Alex Fraser Research Forest to:
    a. Establish funding sources to offset cost of treatment at UBC
    b. Establish research study to determine effectiveness of pilots
    c. Establish educational / demonstrational program for AWI fuel mitigation
2. Contact local land users
    a. Adjacent land owners
    b. Range tenure holders
    c. Local guide and mineral tenure holder at Eaglet Lake.
3. Work with Regional First Nation Advisor to determine groups affected and interested in piloting with projects.
4. Work with pilot partners (Licensees and BCWS) for each pilot to undertake projects
    a. Layout / development of the TUs
    b. Implementation of treatments
5. Documentation of the process in a final report.
6. Communication of results and pursue future support to undertake similar projects.
7. On-going monitoring of effectiveness of treatments.

10.0 Conclusion

Agricultural communities across BC are underserved when it comes to wildfire planning and fuel management activities. This result is due to a policy framework that funds wildfire risk reduction activities in areas with the highest population - Wildland Urban Interface. The Agricultural Wildland Interface has lower population and structure density; however still requires protection from wildfire.

Partnerships are key to the successful implementation of the pilot projects. BC Wildfire Services staff can provide expertise and labour to assist with fuel management activities. Academic partnerships can be leveraged for further research into the efficacy of fuel management on reducing the risk to local producers. Most importantly and to ensure a business case can be made for managing fuels in the AWI, wildfire management objectives must be combined with other forest management objectives. Working with key partners such as Licensees to harvest timber will ensure the successful implementation of the pilots proposed in this report and future projects.

10.1 Challenges and Opportunities

Challenges:

- Economic feasibility of treatments. Fuel treatments range from $2 000 to 10 000 per ha (Day, Blackwell, & Wildeman, 2010). With changing market values and without ground truthing difficult to make concrete estimations.
- Meeting objectives for all land users / owners while providing the greatest reductions in wildfire risk.
- Prescribed burning may have negative public perception due to intolerance for the smoke, and concern of escaped fire.
- Long term effectiveness will need to be maintained as vegetation grows back.

Opportunities:

- Improve grazing for range tenures and create grazing opportunities for regions that do not have range tenure.
- Research and collaboration prospects with academic partners, non-profits and farmers.

10.2 Recommendations

Recommendations for the three proposed pilot projects:

1) Work with local biomass purchasers i.e. pulp mills and pellet plants, to cover additional treatment costs and increase utilization of sub-merchantable timber and slash.

2) Explore within the Crown Land Wildfire Risk Reduction Program to determine if provincial funding could be inclusive of Agricultural Wildland Interface Projects.

3) Establish a relationship with local Fire Zone staff to ensure treatments are completed shortly after harvesting operations.

4) Collaboration with the forest districts is important and they will be helpful with pilot implementation. The next phase should include outreach to the Cariboo-Chilcotin Natural Resource District, the Skeena Stikine Natural Resource District, and the Prince George Forest District.

5) The treatment units with the 100m buffer around agriculture land should be considered for conversion to a mixed coniferous / deciduous stand to create browse for moose and ungulates, where ecologically sound. This will require cooperation of licensee, and application for reduced stocking.

6) Ongoing maintenance of these sites should be further explored. There may be opportunities to work with the local range tenures or adjacent producers to implement a targeted grazing program. The proposed broadcast burns in the treatments is suitable for increasing the

browse available for cattle (Taylor Jr, 2006). As such, this treatment is well-matched the predominate agricultural operations near the pilots.

7) Further research opportunities should be explored with consideration of ground water resources. The pilot sites could provide research opportunities for studies on how fuel treatments impact subsoil water movement and aquifer recharge. This item is of special interest to the Cattlemen's Association.

Recommendations for future analysis and selection of AWI priority sites:

1) Establish a quantitative ranking for each criterion. Although qualitative assessment is crucial to determining the feasibility of a project and identifying obstacles, a quantitative ranking of pilot criteria could aid in determining priority for future AWI fuel treatment locations.
2) Quantify the value of agriculture assets. As part of identifying areas of priority the value of agriculture assets should be considered and ranked. The loss of infrastructure (farm buildings, greenhouses, fences), equipment (tools and machinery) and revenue due wildfire should be considered in cost benefit analysis.
3) Integrate Agriculture Land Use Inventory (ALUI) data for identifying priority areas for treatment. ALUI is a survey of data describing land use and land cover on agricultural land. The inventories include details on crop type, irrigation, livestock and land use as well as non-farm uses with the ALR (Government of BC, 2020). This information was not included in the geodatabase for this project because ALUI surveying is not complete throughout the province. Opportunities may exist where there is overlap between high-risk zones and ALUI data. This could provide useful information for future pilot planning.
4) Build upon the use of the BCWS PSTA data and risk analysis and further utilize the suite of BCWS guidelines for future pilots, such as Wildfire Threat Analysis to ensure that all aspects of the agricultural values at risk are incorporated into future pilots.
5) Where operationally and economically feasible and practicable, ensure harvesting plans and silviculture prescriptions for each of the Cutting Permits (CPs) and Timber Sale Licenses (TSLs) is incorporated into fuel management objectives.
6) Identify organizations / committees undertaking projects with overlapping objectives. This was not included in the initial partner outreach, however, later in the pilot planning process the prescribed burning for ecosystem restoration by the Cariboo-Chilcotin Ecosystem Restoration Committee (CCERC) was introduced by one of the project oversite committee members. Initiatives like this could expand this project. Future engagement with this group and identification of other entities with potential synergies should be explored.

11.0 Statement of Limitations

This project was a desktop planning exercise and no ground-truthing occurred. Final engineered shapes and locations may vary from the planned area. Use of the Vegetation Resource Inventory for timber management at the site level can lead to both under or over estimations of actual volumes and species compositions. Pricing of treatments used average industry costs and actual costs may vary depending on the contractor, timing of harvest and other factors outside the scope of this project. Net present value of the stands is subject to timber market fluctuations as well as stumpage calculations which could alter the costing of the business case for the pilot project areas.

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13.0 Appendix A: AWI Wildfire Risk Maps for Each Regional District

REGIONAL DISTRICT BULKLEY-NECHAKO RISK RATING POLYGON AREAS

RISK_RATING	AREA_HA
LOW	38905.7
MODERATE	50635.3
HIGH	12285.1
EXTREME	454.5

CARIBOO REGIONAL DISTRICT RISK RATING POLYGON AREAS

RISK_RATING	AREA_HA
LOW	5577.7
MODERATE	67612.2
HIGH	16838.2
EXTREME	249.1

REGIONAL DISTRICT OF FRASER-FORT GEORGE RISK RATING POLYGON AREAS

RISK_RATING	AREA_HA
LOW	2604.9
MODERATE	25365
HIGH	3726
EXTREME	372.1

NVRCA FUEL MANAGEMENT BUSINESS CASE
CARIBOO REGIONAL DISTRICT
RISK ANALYSIS FOR AGRICULTURAL WILDLAND INTERFACE

Legend

- CRD Cities
- CRD Structures
- BC MoT Highways
- ALR and Private Land Intersect
- Private
- Cariboo RD

Risk Rating

- Low
- Moderate
- High
- Extreme

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Nechako Valley Regional Cattlemens Association

CANADIAN AGRICULTURAL PARTNERSHIP

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N

1:375,000

0 5 10 20 30
Kilometers

CABIN
RESOURCE MANAGEMENT

Client: NVRCA
Consultant: Cabin Resource Management
GIS Consulted: Natalie Clark
Created on: 5/26/2020

NVRCA FUEL MANAGEMENT BUSINESS CASE
REGIONAL DISTRICT OF BULKLEY-NECHAKO
RISK ANALYSIS FOR AGRICULTURAL WILDLAND INTERFACE

Legend

- RD Bulkley Nechako Cities
- RD Bulkley Nechako Structures
- BC MoT Highways
- ALR and Private Land Intersect
- Private
- Fraser Fort George RD

Risk Rating

- Low
- Moderate
- High
- Extreme

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N

1:300,000

0 5 10 20 30 Kilometers

CABIN RESOURCE MANAGEMENT

Client: NVRCA
Consultant: Cabin Resource Management
GIS Consulted: Natalie Clark
Created on: 5/26/2020

NVRCA FUEL MANAGEMENT BUSINESS CASE
REGIONAL DISTRICT OF FRASER-FORT GEORGE
RISK ANALYSIS FOR AGRICULTURAL WILDLAND INTERFACE

Legend

- FFGRD Cities
- FFGRD Structures
- BC MoT Highways
- ALR and Private Land Intersect
- Private
- Fraser Fort George RD

Risk Rating

- Low
- Moderate
- High
- Extreme

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N

1:300,000

0 5 10 20 30 Kilometers

CABIN RESOURCE MANAGEMENT

Client: NVRCA
Consultant: Cabin Resource Management
GIS Consulted: Natalie Clark
Created on: 5/26/2020

14.0 Appendix B: Detailed GIS Methodology

AOI of Interest Includes 3 Regional Districts: Bulkley-Nechako, Cariboo, Fraser-Fort George

AREA OF INTEREST

1) AOI was clipped out of local 'WHSE_ADMIN_BOUNDARIES_EBC_REGIONAL_DISTRICTS_SP' layer that included Bulkley-Nechako, Fraser-Fort George, and Cariboo Regional Districts.
2) 2019 Provincial Strategic Threat Analysis (PSTA) Data Package was obtained that contained the PSTA and WUI.
3) ALR Polygon layer was downloaded from the Provincial Agricultural Land Commission https://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis and Clipped to AOI
4) Private Parcels were clipped out of the local 'Generalized Forest Cover Ownership' layer and then clipped to AOI
5) Private Parcels were then Intersected with the ALR layer
6) 2 km buffer was placed on the outside of the resulted layer in step 4 - ALR Private Land Intersect
7) WUI layer that was included in the data from step 1 was clipped out the 2 km buffer.
8) 2019 Fire Threat Rating was intersected with the resulted layer from step 7
9) Definition Query was placed on layer from step 8 to show areas of High and Extreme Threat Ratings.
10) Maps will be made for each of the 3 Regional Districts

METHODOLOGY SUMMARY

Determine the consequential Wildfire Risk Rating using ALR/Private Land, Structure Density, and the PTSA Threat layers, within the AOI of interest which includes 3 Regional Districts: Bulkley-Nechako, Cariboo, and Fraser-Fort George.

LAYERS NEEDED FOR THIS ANALYSIS

1) PSTA Public Threat Rating and WUI
2) Agricultural Land
3) Generalized Ownership Layer (Queried to Private Land)
4) EDM Buildings Polygon (Structures)

ANALYSIS METHODOLOGY FOR BULKLEY-NECHAKO RD

Needed to Create three Rasters to make a Risk Analysis for the Agricultural Wildland Interface

1) Intersected ALR and Private Land (Generalized Ownership Layer), and clipped out WUI

2) Created 2km outside buffer on polygon created in step 1

3) PSTA data clipped to 2km buffer from Step 2 then queried to Low, Moderate, High, and Extreme ratings.
    a. Layer was processed into a Raster and then Reclassed into these values:

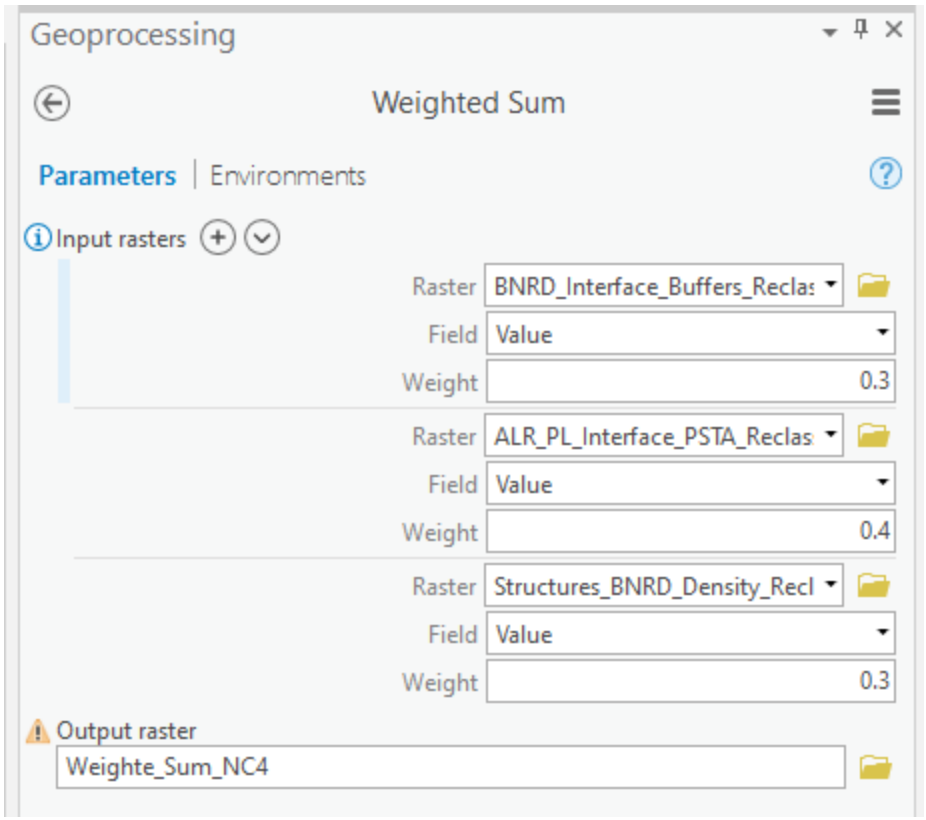
Low =1
Moderate = 2
High = 3
Extreme = 4
(Raster #1 = **ALR_PL_Interface_PSTA_ReClassed**)

4) Created point layer from EDM Structure polygon (Feature to Point tool)
    a. Clipped to Polygon created in Step one
    b. 500, 1000, and 2000 meter buffers were created on '4.a' layer
    c. Layer was processed into a Raster and then Reclassed into these values:
    500 meters = 3
    1000 meters = 2
    2000 meters = 1
    (Raster #2 = **RDBN_Interface_Buffers_Reclass**)

5) Used Point layer created in Step 4 (**Structures_RDBN_ALR_PL**) to create Structure Density
    a. Used Point Density tool, Parameters were 'Output Cell Size' = 5, Circle, Radius = 1000, Area Units = Square Kilometers
    b. Reclassed into these values
    Low 0 – 4 Structures = 1
    Mod 4 – 8 Structures = 2
    High 8 – 12 Structures = 3
    Extreme >12 Structures = 4

    (Raster #3 = **Structures_RDBN_Density_Reclass**)

6) Used all 3 Rasters in Weighted Sum Tool to come up with 'Risk Rating'. Using Parameters as seen below.



a. Reclassed Raster from step 6 into equal classes and used values 1, 2, 3, and 4.
   1 = Low Risk
   2 = Moderate Risk
   3 = High Risk
   4 = Extreme Risk
b. This resulted layer shows the final Risk Rating.

15.0 Appendix C: Outreach Letters

Fuel Management Pilot Business Case for High-Risk Agricultural Interface Areas – Partnership Opportunity.

[INSERT DATE]

Dear **[INSERT NAME],**

Farming and ranching operations in the Cariboo, Bulkley-Nechako, and Fraser-Fort George regional districts are often surrounded by forested crown land with high wildfire risk, and with a changing climate this risk is increasing. Located outside of the wildland urban interface, these rural areas face policy and economic barriers that prevent them from receiving the fuel management support they need for wildfire risk mitigation. This project seeks to overcome these barriers, potentially with your involvement and support. The project oversight committee – made up of provincial and regional district representatives, industry professionals, and cattlemens association members – intends to address the following objectives:

1. Determine economical and adaptive fuel management approaches in high-risk agricultural interface areas within the 3 regional districts.
2. Develop a process for selecting, initiating, and planning collaborative fuel management pilot projects.
3. Complete planning for 2-3 viable fuel management projects.

An integral component to the success of this project is to establish partnerships and collaborations to fulfill the above objectives. The project team is looking to engage with prospective partners that are:

- Interested in sharing ideas;
- Have projects underway to synergize with, or
- Have the capacity and desire to partner in the delivery of a pilot project.

Please reach out to the contact listed below by **[INSERT DATE]**. This will become a mutually beneficial partnership that will develop future fuel mitigation projects for the agricultural interface.

[CONTACT]

Climate Action Initiative
BC AGRICULTURE & FOOD

Nechako Valley Regional Cattlemens Association

CANADIAN AGRICULTURAL PARTNERSHIP

ardcorp

Investment Agriculture Foundation of British Columbia

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Fuel Management Pilot Business Case for High-Risk Agricultural Interface Areas – Partnership Opportunity.

Specific Asks:

FLNRORD First Nations Coordinator: We are looking to collaborate with Ministry First Nation Coordinators to develop connections with First Nations. First Nations are an integral partnership for identifying suitable locations for fuel management pilot projects, project implementation, and knowledge on best practices including traditional ecosystem knowledge.

Community Forests Agreement Holders: CFA partnerships will be a unique asset to this project, please identify if your CFA has:

a) Any projects underway to synergize with, or
b) The capacity, characteristics, and desire to partner in the delivery of a pilot project.

Industry Professionals: We are contacting industry professionals and representatives for guidance and input on all aspects of the project. Moreover, we are interest in gaining insight on any potentially suitable locations for pilot projects. Any documents, reports, or projects of similar grounds brought to our attention would also be an asset.

Academic Institution: Is your institution:

a) Currently conducting any initiatives with points of intersection to the project, or
b) Interested in collaborating on the project from a research standpoint.

Major and Minor Licensees: Please identify your interest/capacity to purchase and procure logs and fibre obtained from the fuel management projects

Private Land Owner: *the general 1 pager fulfills private land owner asks*

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[INSERT DATE]

Dear **[INSERT NAME],**

I am contacting you to inform you of a much-needed fuel mitigation project near your property.

This project has been created to identify and protect agricultural assets in the Cariboo, Bulkley-Nechako, and Fraser-Fort George regional districts that are at a high-risk for wildfire. The project intends to address the following objectives:

1. Determine economical and adaptive fuel management approaches for high-risk agriculture wildland interface.
2. Develop a process for selecting, initiating, and planning fuel management pilot projects.
3. Complete the planning for 2-3 viable fuel management pilot projects.

A pilot project location has been identified near your property. [**Describe specific project location here].**

We are working with local ministries, agrologists and the timber licensee to design a fuel-mitigation treatment for this site to protect your agricultural assets. **[Describe proposed treatment].** All planning for this location is preliminary and timeframe for implementation has not been set.

Collaboration is an integral component of this pilot project. We would like to work in partnership with farmers to reduce the fuel load on their properties and use this pilot to inform future projects. At this time, we ask if you:

- Have forested portions of your property and would like to reduce the fuel load / wildfire risk.
- Are willing to describe the agriculture activities on your property and the agriculture assets / infrastructure that are vulnerable to wildfire damage (ie. fencing, barns, livestock, farming equipment, water sources).
- Have any questions or concerns regarding fuel treatment.

Thank you for your time, please reach out to the contact listed below by **[INSERT DATE]** if you would like to contribute or be involved in this project.

[Outreach Coordinator Contact Name and Information]

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Kerr Rd

Project Description:

The Kerr Rd pilot location has a high / extreme wildfire risk. The recommended treatment area is approximately 200 ha of crown land that is forested with spruce and subalpine fir.

Proposed Treatment

This treatment would likely involve thinning out 50 percent of the overstory / mature trees to create a buffer between forested land and your property.

Eaglet Lake

Project Description:

The Eaglet Lake pilot location has a high / extreme wildfire risk. The recommended treatment area is approximately 165 ha of crown land that Is forested with spruce, subalpine fir, and Douglas-fir.

Proposed Treatment

This treatment would likely involve thinning out 50 percent of the overstory / mature trees to create a buffer between forested land and your property.

Springhouse

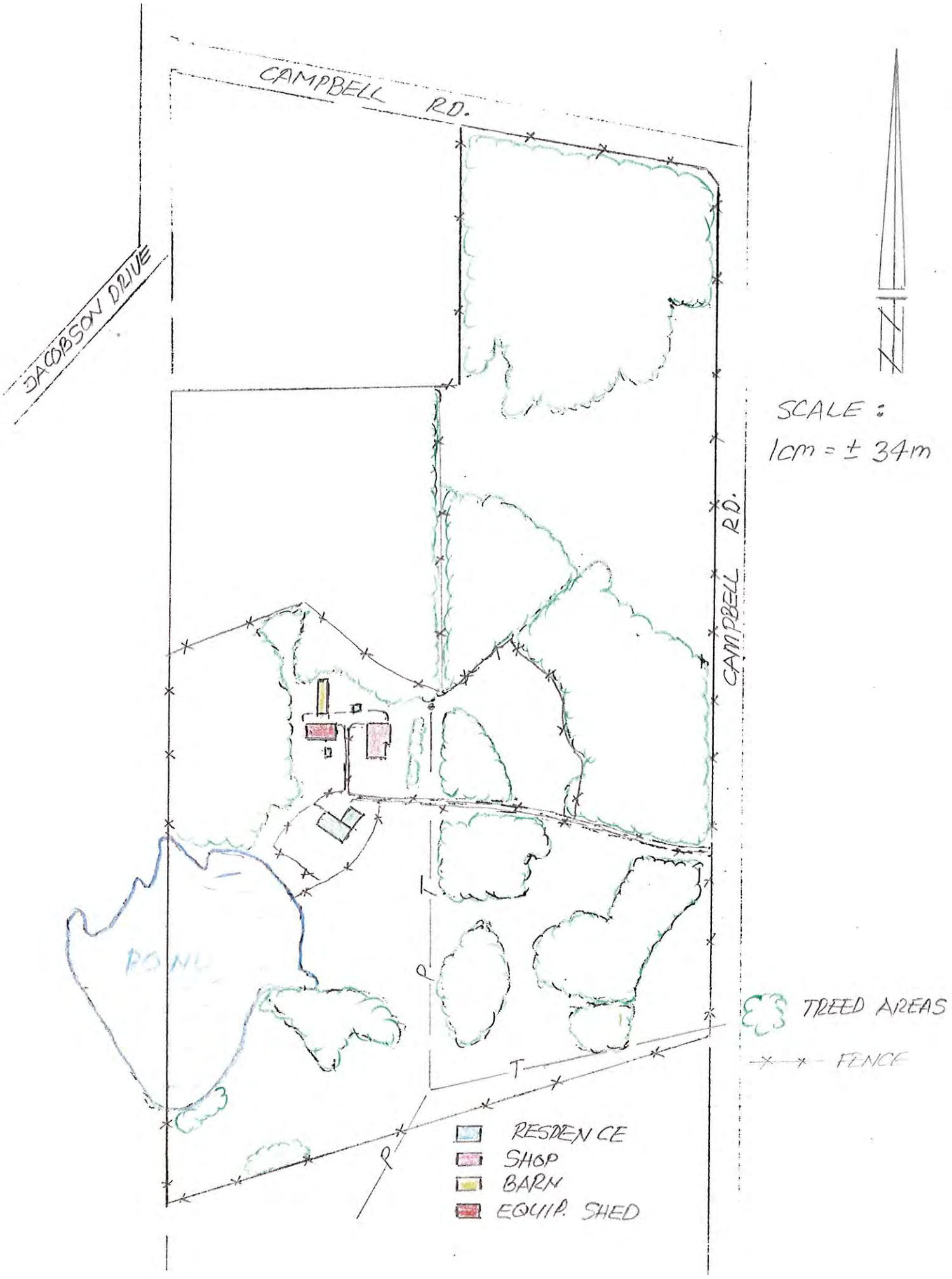
Project Description:

The Springhouse pilot location has a high / extreme wildfire risk. The recommended treatment area is approximately 25 ha of crown land that Is forested with Douglas-fir and spruce.

Proposed Treatment

This treatment would likely involve thinning out 50 percent of the overstory / mature trees to create a buffer between forested land and your property.

16.0 Appendix D: Site Drawing of Alex Fraser Research Forest


CAMPBELL RD.
JACOBSON DRIVE
CAMPBELL RD.
SCALE :
1cm = ± 34m
POND
TREED AREAS
FENCE
RESIDENCE
SHOP
BARN
EQUIP. SHED

17.0 Appendix E: Criteria Matrix of all Locations Considered

Area	Polygon_ID	Candidate	Ownership	Forest Tenure	Willing Partners	Size (ha)	Est. Harvestable Size (not including operable restraints)	Rationale for Area Loss (based on imagery)	Stand Type
Woodmere	W1	Maybe	Crown Mis. Reserve	Bulkey FSP; Timber Sales Manager Babine	Yes	58.68	56	Existing road & pockets of no timber	TBD
Houston	H1	Maybe	Crown Tenure Woodlot & Crown Misc. Reserve	Canadian Forest Products	Yes	79	45	Previous harvest, riparian & no timber	-
Telachik	T1	Maybe	Crown Tenure	Sinclar Group Forest Products Ltd Forest Stewardship Plan 10 Replacement with multiple clients (PG FDU)	Yes	72	67	Wet/marshy ground	TBD
Springhouse	1	No	Crown	-	Yes	-	-	-	-
Springhouse	2	No	Crown	-	-	-	-	-	-
Forest Grove	FG1	No	Crown	-	-	-	-	-	-
Tatalrose	T1	No	Crown	-	-	-	-	-	-
Forest Grove	FG5	No	Crown	-	-	-	-	-	-
Springhouse	S3	Yes	Crown Tenure	Tolko Industries LTD.	Yes	25.57	25.57	N/A	FdSxAt
Springhouse	S4	Yes	Crown Tenure with **Misc. Reserves**	Tolko Industries LTD.	Yes	39.01	37.5	Rd ROW, Npwet, cleared area	FdSxAt
Forest Grove	FG2	Yes	Crown Tenure & **Private Land**	Kenkeknew Forest Tenures LTD.	Yes	29.7	29	Timberless area	FdSx(PliAtEp)
Forest Grove	FG3&4 (FG34)	Yes	Federal Indian Reserve	Kenkeknew Forest Tenures LTD.	Yes	22.2	17	Previous harvest	FdiSx(At,Ep,Pli)
Forest Grove	FG6	Yes	Crown Tenure, First Nations Woodland Licence	Kenkeknew Forest Tenures LTD.	Yes	47.85	47.85	N/A	FdSx(AtEp)
Kersely	K1	Yes	Crown Tenure with **Misc. Reserves & Private**	West Fraser Mills Quesnel TSA	Yes	82.33	82.33	N/A	FdSxAt(ActEpPli)
Glentanna	G1	Yes	Crown - Conservancy Area, Ecological Reserve Protected Area, Provincial Park	Unknown	Yes	55.43	52	Pockets of no timber	SxBl(PlActEp)
Glentanna	G2	Yes	Crown - Conservancy Area, Ecological Reserve Protected Area, Provincial Park	Unknown	Yes	107.57	107.57	N/A	TBD
Kerr Road	KR1	Yes	Crown Tenure, Crown Woodlot Licence, **Crown Lease Misc.**	Timber Sales Manager Babine (FDU Deep Creek)	Yes	208.81	150	Previous harvest	SxPliBl(At,Atc,Ep)
Eaglet Lake	EL1	Yes	Crown, Crown Tenure: Tree Farm License & "Unknown"	Multiple (see word document for more info.)	Yes	192.26	165	Previous harvest, no timber, wet	SxBlFdi(EpAcAtSb)
Punchaw	P1	Yes	Crown Tenure	Sinclar Group Forest Products Ltd Forest Stewardship Plan 10 Replacement with multiple clients (PG FDU)	Yes	125.11	125.11	N/A	SxPlAt(AtcFd)

	Pilot Criteria														
Area	Fd	Sx	At	Act	Pli	Bl	Ep	Ac	Sb	Total Est. Volume (m3)	Operatbility (Poor, Fair, Good) (based on imagery)	Possible Operable Restrictions	Private Land Adjacent	Location of Private Land (from treatment)	Private Land Type (assumed from imagery)
Woodmere	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Good	Access, Terrain, riparian	Yes	West & South	Agicultural, some timber
Houston	-	-	-	-	-	-	-	-	-	-	Fair	Riparian & recent openings within polygon	Yes	West, South and North	Agricultural land, cleared for timber, some timber
Telachik	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Good	Wet ground, winter harvest, riparian & wetlands	Yes	Surrounding	Oil and gas
Springhouse	-	-	-	-	-	-		-	-	0		-	-	-	-
Springhouse	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
Forest Grove	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
Tatalrose	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
Forest Grove	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-
Springhouse	5350	288	202	-	-	-	-	-	-	5840	Good	Terrain	Yes	North	Agriculture, no timber
Springhouse	2687	2608	653	-	-	-	-	-	-	5948	Good	Terrain	Yes	East	Agriculture (or oil & gas), some timber
Forest Grove	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0	Fair	Access, Terrain, **steeper slopes**	Yes	West & South	Crown Tenure Woodlot (Licence, Schedule A) & Agriculture
Forest Grove	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	<5000	Good	Access, terrain	Yes	West & South	Agriculture, no timber
Forest Grove	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0	Poor	**Access**, Terrain, **steeper slopes,** riparain adjacent	Yes	North & West	Agriculture, houses
Kersely	13311	5502	1627	47	939	-	908	-	-	22334	Fair	Access, Terrain, steeper slopes	Yes	All aspects; except SW corner	Agriculture, Misc. Reserves, some timber
Glentanna	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0	Good	Access, Terrain, riparian	Yes	South	Forested
Glentanna	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	0	Good	Access, Terrain, riparian	Yes	South, East & West	Agriculture
Kerr Road	-	15792	1994	63	9430	2365	0	-	-	29644	Good	Access, Terrain, riparian	Yes	South & West	Agricultural, cleared for timber, minimal-not forested
Eaglet Lake	4020	21678	1682	-	-	16364	3437	231	2	47414	Good	Access, Terrain, riparian & wet areas	Yes	South	Agricultural, some forested
Punchaw	196	16380	1563	74	1516	-	-	-	-	19729	Good	Access, Terrain, riparian	Yes	North & East	Agricultural land, cleared for timber, some timber

Area	Closest Main Road Access (staight line)	Wind Direction	Existing fuel breaks	Location of fuel break in relation to treatment & Description
Woodmere	<100	-	Yes	Minor fuel breaks surrounding treatment, mainly the eastern and NW. Cleared land and previous harvest. Two lakes located north of treatment polygon (500m from norther edge).
Houston	>0, <300	-	Yes	Agricultural land in the south/SW, major S class stream to the north & recent harvest within polygon
Telachik	<0	-	Yes	Wetland(s) between treatment polygons and to the north. Existing road through treatment. Recent harvested land to the south/east.
Springhouse	-	-	-	-
Springhouse	-	-	-	-
Forest Grove	-	-	-	-
Tatalrose	-	-	-	-
Forest Grove	-	-	-	-
Springhouse	<600m	npacted by flankir	Yes	Agricultural land located to the north of the treatment.
Springhouse	through treatment polygon	-	Yes	Agricultural land located to the east of the treatment.
Forest Grove	>500m	-	Yes	Agiculture land to the south of the treatment. Woodlot to the west appears to have been treated (strip or partial cut with some clear).
Forest Grove	>500, <1000	-	Yes	Agricultural land to the west of the treatment
Forest Grove	<500m	-	Yes	Natural meandering stream to the west of the treatment. Agricultural land to the NW of treatment.
Kersely	<200m	-	Yes	Fuel breaks are located to the NE, S and portions of the west of treatment, mainly agricultural or cleared land & main road/hwy. Large river located within 2km interface.
Glentanna	>1200	-	No	Closest fuel break is agricultural land >600m away.
Glentanna	<500m	-	Yes	Fuel break exists along the western portion, north/east of values. Appears to be a cat-fuel break or seismic line.
Kerr Road	>0, <500m	npacted by flankir	Yes	**Ajacent land heavily cleared in recent years.** Existing openings present along the eastern & western edges (mainly centrally located). No major fuel breaks to the north or south.
Eaglet Lake	>0, <1500	alues at risk upwi	Yes	Mainly along the southern portion of the polygon, however much more timber/fuels exist compared to other areas.
Punchaw	<100m	-	Yes	Adjacent land heavily cleared in recent years. Large class stream to the north of treatment.

Area	Location of values to treatment area	Other Resource Values	Visual Constraints	Priority Setting (based on findings; 1=Good, 2=Fair, 3=Poor)
Woodmere	NW		No visual constraints but adjacent to a PR polygon on both sides. Would assess further.	2
Houston	SW and N		Partiall within VLI#1228, with EVQO = PR, EVC = PR, VSC = 3 & VLI#1192 with EVQO = PR, EVC = R, VSC = 3	3
Telachik	South & North		No visuale constriants.	2
Springhouse	-	-	-	-
Springhouse	-	-	-	-
Forest Grove	-	-	-	-
Tatalrose	-	-	-	-
Forest Grove	-	-	-	-
Springhouse	North	pe I (4.2 ha), Type II (21.4 ha);Critical H	Majority of the polygon is located within VLI# 998, with ECQC=M EVC=R VSC=3	2
Springhouse	East		Entirely located of the polygon is located within VLI# 998, with ECQC=M EVC=R VSC=3	2
Forest Grove	South		Partially located within PR polygon. VI1#288, with EVQC = PR, EVC = PR VSC = 2	3
Forest Grove	West		No visual constraints.	3
Forest Grove	West/North		No visual constraints, however treatment exists along side hill adjacen to main road.	3
Kersely	West, South and East		Almost entire polygon is located within VLI#190, with EVQC =, EVC = PR, VSC = 2	2
Glentanna	South/west		VLI# 1739, with EVQC = , EVC = R, VSC = 2 & new area added based on Bulkey LRMP recommendation; VLI#1748 with EVQO = , EVC = , VSC = 4	3
Glentanna	West, South and S.E		VLI# 1739, with EVQC = , EVC = R, VSC = 2 (Rationale = Includes part of park/also visible from Telkwa HWY).	3
Kerr Road	West, South and East		VLI#1803, with EVQC = PR, EVC = PR, VSC = 4	3
Eaglet Lake	South		No visual constraints.	1
Punchaw	North		No visual constraints.	1

18.0 Appendix F: Pilot Project Area Drilldowns

CRD SPRINGHOUSE FINAL DRILLDOWN

AREA (ha)	MGNT LEVEL	NAME	DETAILS
36.6	DCC	FOREST DISTRCIT - NOW NATURAL RESOURCE DISTRICTS	Central Cariboo Forest District
36.6	FADM	TIMBER SUPPLY AREA	TSA = 29 - Williams Lake TSA TSB = 29H - Wms Lk TSA Springhouse Block
36.6	FDU	FSP	Forest Development Unit
36.6	FDU	FSP	Williams Lake TSA
36.6	FDU	FSP	Cariboo
36.6	FDU	FSP	WL FSP
36.6	FDU	FSP	BCTS FDU
36.6	FDU	FSP	FDU 1&2
1.1	FHF	Forest Health - 2017	FHF = IBD SEVERITY = M
36.6	FHF	FOREST HEALTH - 2011	FHF = IDW SEVERITY = L
35.1	FHF	FOREST HEALTH - 2010	FHF = IDW SEVERITY = L
8.8	FHF	Forest Health - 2018	FHF =IBD SEVERITY = L
12.4	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Mountain Pine Beetle PEST CODE = IBM SEVERITY = Trace
16.1	FHF	PEST INFESTATION (POLYGON)	PEST NAME = Mountain Pine Beetle PEST CODE = IBM SEVERITY = Light

Date: 26/05/2020

AREA (ha)	MGNT LEVEL	NAME	DETAILS
		2019	
36.6	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Western Spruce Budworm PEST CODE = IDW SEVERITY = Light
36.6	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Non-Biological (Abiotic) Injuries PEST CODE = N SEVERITY = Moderate
20.3	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Douglas-fir Beetle PEST CODE = IBD SEVERITY = Trace
8.8	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Douglas-fir Beetle PEST CODE = IBD SEVERITY = Light
1.1	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Douglas-fir Beetle PEST CODE = IBD SEVERITY = Moderate
0.5	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Mountain Pine Beetle PEST CODE = IBM SEVERITY = Severe
36.6	FSP	RANGE	NAME = DONALD GUNDERSON FOREST_FILE_ID = RAN073936 STATUS = RETIRED
35.1	FSP	RANGE	NAME = CORRINA THOMPSON FOREST_FILE_ID = RAN076886 STATUS = ACTIVE
35.1	FSP	RANGE	NAME = DONALD GUNDERSON FOREST_FILE_ID = RAN073468 STATUS = RETIRED
36.5	FSP	RANGE	NAME = JON HERRICK FOREST_FILE_ID = RAN073942 STATUS = RETIRED
36.6	FSP	RANGE	NAME = CORRINA THOMPSON FOREST_FILE_ID = RAN076871 STATUS = RETIRED
36.6	FSP	FWA NAMED WATERSHEDS	De Sous Creek

AREA (ha)	MGNT LEVEL	NAME	DETAILS
36.6	FSP	FWA NAMED WATERSHEDS	Fraser River
25.5	FSP	VISUAL LANDSCAPE INVENTORY	VLI# = 183857 EVQO = M EVC = R VSC = 3
11.1	FSP	VISUAL LANDSCAPE INVENTORY	VLI# = 182971 EVQO = EVC = VSC = UA
36.6	GAR	UNGULATE WINTER RANGE	M-ODHE TAG = u-5-002 PLANNING CELL = dwl_26 CONDITIONAL HARVEST ZONE
36.6	INFO	GUIDE	TR0502T018
36.6	INFO	FOREST COVER OWNERSHIP	SCHEDULE = C OWN = 62 DESC = Crown - Forest Management Unit
36.6	INFO	SEED PLANNING UNITS	SPEC = SX ELEVATION RANGE = 700 - 1300 ZONE = TO
36.6	INFO	SEED PLANNING UNITS	SPEC = PY ELEVATION RANGE = 300 - 1000 ZONE = SI
20.5	INFO	RESULTS OPENINGS	- - STATUS = APP Previous SS code = MAT
36.6	INFO	NON-LEGAL PLANNING AREAS	NLFID = 3925 NLFProvided = CAR_27_351 OBJECTIVE = CCLUP Zones and Subunits - updated 2003
0.3	INFO	NON-LEGAL PLANNING AREAS	NLFID = 517677 NLFProvided = CAR_27_311067 OBJECTIVE = Riparian Management Areas
36.6	INFO	UTM ZONE	10
13.9	INFO	MAPSHEET	092O100
22.8	INFO	MAPSHEET	092O099
32.3	INFO	Fisher Habitat Type	Den Habitat Type = Type II Broom Habitat Type = Type II

AREA (ha)	MGNT LEVEL	NAME	DETAILS
4.3	INFO	Fisher Habitat Type	Den Habitat Type = Type II Broom Habitat Type = Type I
36.6	INFO	CRITICAL HABITAT AREAS	HAB_ID = - SPECIES = Western Rattlesnake
36.6	INFO	CRITICAL HABITAT AREAS	HAB_ID = - SPECIES = Great Basin Gophersnake
36.6	INFO	CRITICAL HABITAT AREAS	HAB_ID = - SPECIES = Desert Nightsnake
21.9	INFO	SPECIES AT RISK - MASKED	Warning: Secured CDC data in this area: provide project details to cdcdata@gov.bc.ca
36.6	LRMP	BEC 7.0	IDFdk3
36.6	LRMP	BEC 5.0	IDF dk 3
36.6	LRMP	PSYU	SP_CRUS_NO = 123
36.6	LRMP	LANDSCAPE UNIT	Chimney BDEO = High SUBTYPE = N
36.6	LRMP	NATURAL RESOURCE DISTRICTS	Cariboo-Chilcotin Natural Resource District

RDBN KERR ROAD FINAL DRILLDOWN

AREA (ha)	MGNT LEVEL	NAME	DETAILS
96.2	DSS	FOREST DISTRCIT - NOW NATURAL RESOURCE DISTRICTS	Skeena Stikine Forest District
96.2	FADM	TIMBER SUPPLY AREA	TSA = 03 - Bulkley TSA TSB = 03B - Bulkley TSA Block B
96.2	FDU	FSP	Deep Creek
68.1	FDU	FSP	Bulkley 8 - 25
96.2	FDU	FSP	Bulkley
96.2	FDU	FSP	Bulkley - 3
96.2	FDU	FSP	Bulkley - 1
6.6	FHF	Forest Health - 2017	FHF = ID6 SEVERITY = L
6.6	FHF	FOREST HEALTH - 2014	FHF = ID6 SEVERITY = S
4.9	FHF	FOREST HEALTH - 2014	FHF = IBB SEVERITY = T

AREA (ha)	MGNT LEVEL	NAME	DETAILS
0.1	FHF	FOREST HEALTH - 2013	FHF = IBB SEVERITY = T
26.7	FHF	FOREST HEALTH - 2013	FHF = IBM SEVERITY = S
0.3	FHF	FOREST HEALTH - 2013	FHF = ID6 SEVERITY = L
21.5	FHF	FOREST HEALTH - 2013	FHF = ID6 SEVERITY = S
0.3	FHF	FOREST HEALTH - 2013	FHF = DLV SEVERITY = L
2	FHF	FOREST HEALTH - 2012	FHF = DLV SEVERITY = L
1	FHF	FOREST HEALTH - 2012	FHF = ID6 SEVERITY = L
65	FHF	FOREST HEALTH - 2011	FHF = IBM SEVERITY = L
22.3	FHF	FOREST HEALTH - 2010	FHF = IBM SEVERITY = L
96.2	FHF	Forest Health - 2018	FHF =ID6 SEVERITY = L
96.2	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Aspen Leaf Miner PEST CODE = ID6 SEVERITY = Light
86.2	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Mountain Pine Beetle PEST CODE = IBM SEVERITY = Light

AREA (ha)	MGNT LEVEL	NAME	DETAILS
2	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Spruce Beetle PEST CODE = IBS SEVERITY = Moderate
2.2	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Aspen-Poplar Twig Blight PEST CODE = DLV SEVERITY = Light
95.6	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Mountain Pine Beetle PEST CODE = IBM SEVERITY = Trace
28.1	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Aspen Leaf Miner PEST CODE = ID6 SEVERITY = Severe
26.7	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Mountain Pine Beetle PEST CODE = IBM SEVERITY = Severe
96.2	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Western Balsam Bark Beetle PEST CODE = IBB SEVERITY = Light
4.9	FHF	PEST INFESTATION (POLYGON) 2019	PEST NAME = Western Balsam Bark Beetle PEST CODE = IBB SEVERITY = Trace
96	FSP	RANGE	NAME = DEBORAH ILLES FOREST_FILE_ID = RAN075644 STATUS = ACTIVE
66.8	FSP	RANGE	NAME = WOODMERE CATTLE COMPANY LTD. FOREST_FILE_ID = RAN072091 STATUS = RETIRED
96.2	FSP	FWA NAMED WATERSHEDS	Bulkley River
96.2	FSP	FWA NAMED WATERSHEDS	Skeena River
96.2	FSP	FWA NAMED WATERSHEDS	Lemieux Creek

AREA (ha)	MGNT LEVEL	NAME	DETAILS
96.2	FSP	FWA NAMED WATERSHEDS	Robin Creek
26.7	FSP	FWA NAMED WATERSHEDS	Gardner Creek
96.2	FSP	VISUAL LANDSCAPE INVENTORY	VLI# = 191477 EVQO = PR EVC = PR VSC = 4
40.6	INFO	GUIDE	TR0608T050
55.6	INFO	GUIDE	TR0608T014
3.5	INFO	SURVEY PARCELS	E1/2, SECTION 21, TOWNSHIP 7, RANGE 5 COAST DISTRICT
44	INFO	SURVEY PARCELS	NE1/4, SECTION 16, TOWNSHIP 7, RANGE 5 COAST DISTRICT
5.9	INFO	SURVEY PARCELS	SECTION 10, TOWNSHIP 7, RANGE 5 COAST DISTRICT
23.3	INFO	SURVEY PARCELS	SECTION 15, TOWNSHIP 7, RANGE 5 COAST DISTRICT
19.3	INFO	SURVEY PARCELS	DISTRICT LOT 1238, RANGE 5 COAST DISTRICT.
44.2	INFO	SURVEY PARCELS	SECTION 16, TOWNSHIP 7, RANGE 5 COAST DISTRICT.
5.9	INFO	SURVEY PARCELS	N1/2, SECTION 10, TOWNSHIP 7, RANGE 5 COAST DISTRICT, EXCEPT BLOCK A.

AREA (ha)	MGNT LEVEL	NAME	DETAILS
3.5	INFO	SURVEY PARCELS	SECTION 21, TOWNSHIP 7, RANGE 5 COAST DISTRICT.
19.3	INFO	ParcelMap BC Polygons	PID = 15103803 PIN = 2351720 Owner Type = Crown Provincial Updated = 1/10/2019 6:25:39 PM
5.8	INFO	ParcelMap BC Polygons	PID = 17038197 PIN = Owner Type = Crown Provincial Updated = 1/10/2019 6:25:43 PM
23.4	INFO	ParcelMap BC Polygons	PID = PIN = 2633490 Owner Type = None Updated = 2/13/2019 11:48:33 PM
3.5	INFO	ParcelMap BC Polygons	PID = PIN = 1736671 Owner Type = None Updated = 2/13/2019 11:48:33 PM
44	INFO	ParcelMap BC Polygons	PID = PIN = 35667621 Owner Type = None Updated = 2/20/2019 11:20:43 AM
68.2	INFO	FOREST COVER OWNERSHIP	SCHEDULE = C OWN = 62 DESC = Crown - Forest Management Unit
28	INFO	FOREST COVER OWNERSHIP	SCHEDULE = B OWN = 77 DESC = Crown Tenure - Woodlot Licence, Schedule B
96.2	INFO	SEED PLANNING UNITS	SPEC = PLI ELEVATION RANGE = 700 - 1400 ZONE = BV
96.2	INFO	SEED PLANNING UNITS	SPEC = SX ELEVATION RANGE = 500 - 1400 ZONE = BV
0.6	INFO	RESULTS OPENINGS	W0104 - A - 1 STATUS = FG Previous SS code =
0.6	INFO	FOREST COVER INVENTORY	SU_ID = A SILV_NUM = 1 SS_CODE = IMM ST_CODE = ART

AREA (ha)	MGNT LEVEL	NAME	DETAILS
96.2	INFO	NON-LEGAL PLANNING AREAS	NLFID = 75278 NLFProvided = SKE_12_202 OBJECTIVE = Visual Quality Objectives
95.6	INFO	NON-LEGAL PLANNING AREAS	NLFID = 128516 NLFProvided = SKE_16_108 OBJECTIVE = RMZ:Settlement/Integrated Resource Management
28	INFO	FTEN - MANAGED LICENCE	W0104 A SCHEDULE_B STATUS = ACTIVE
28	INFO	CUTBLOCKS - FTEN	LICENCE = W0104 STATUS = LC
28	INFO	CUTBLOCKS - FTEN	LICENCE = W0104 STATUS = S
96.2	INFO	UTM ZONE	9
87.4	INFO	MAPSHEET	093L067
8.8	INFO	MAPSHEET	093L066
87.3	INFO	Fisher Habitat Type	Den Habitat Type = Type II Broom Habitat Type = Type II
8.9	INFO	Fisher Habitat Type	Den Habitat Type = Type II Broom Habitat Type = Type I
96.2	LRMP	BEC 7.0	SBSmc2
96.2	LRMP	BEC 5.0	SBS mc 2

AREA (ha)	MGNT LEVEL	NAME	DETAILS
96.2	LRMP	PSYU	SP_CRUS_NO = 133
96.2	LRMP	LANDSCAPE UNIT	Deep Creek BDEO = Low SUBTYPE = N
96.2	LRMP	NATURAL RESOURCE DISTRICTS	Skeena Stikine Natural Resource District

RDFFG EAGLET LAKE FINAL DRILLDOWN

AREA (ha)	MGNT LEVEL	NAME	DETAILS
184.4	DPG	FOREST DISTRCIT - NOW NATURAL RESOURCE DISTRICTS	Prince George Forest District
131.5	FADM	TIMBER SUPPLY AREA	TSA = 24 - Prince George TSA TSB = 24I - Prince George TSA Block I
52.8	FADM	TFL	TFL30 -Canfor Corporation
52.6	FDU	FSP	TFL30
52.8	FDU	FSP	FDU2
131.8	FDU	FSP	NRFL A88972
131.5	FDU	FSP	Prince George FDU
131.5	FDU	FSP	Chunzoolh
131.8	FDU	FSP	A
5.1	FHF	FOREST HEALTH - 2015	FHF = IDF SEVERITY = S

Date: 26/05/2020

AREA (ha)	MGNT LEVEL	NAME	DETAILS
14.3	FHF	FOREST HEALTH - 2014	FHF = IBB SEVERITY = T
13.8	FHF	FOREST HEALTH - 2014	FHF = IDF SEVERITY = S
6	FHF	FOREST HEALTH - 2011	FHF = ID6 SEVERITY = M
3.8	FHF	FOREST HEALTH - 2010	FHF = IDF SEVERITY = L
184.4	FSP	FWA NAMED WATERSHEDS	Willow River
184.4	FSP	FWA NAMED WATERSHEDS	Hay Creek
43	FSP	FWA NAMED WATERSHEDS	Ogilvie Creek
184.4	FSP	FWA NAMED WATERSHEDS	Fraser River
184.4	INFO	GUIDE	NAME = PICHETTE, John CERTIFICATION_NO = 700617 STATUS = ACTIVE
184.4	INFO	GUIDE	TR0707T007
25.1	INFO	SURVEY PARCELS	DISTRICT LOT 2701, CARIBOO DISTRICT
19.8	INFO	SURVEY PARCELS	DISTRICT LOT 2700, CARIBOO DISTRICT

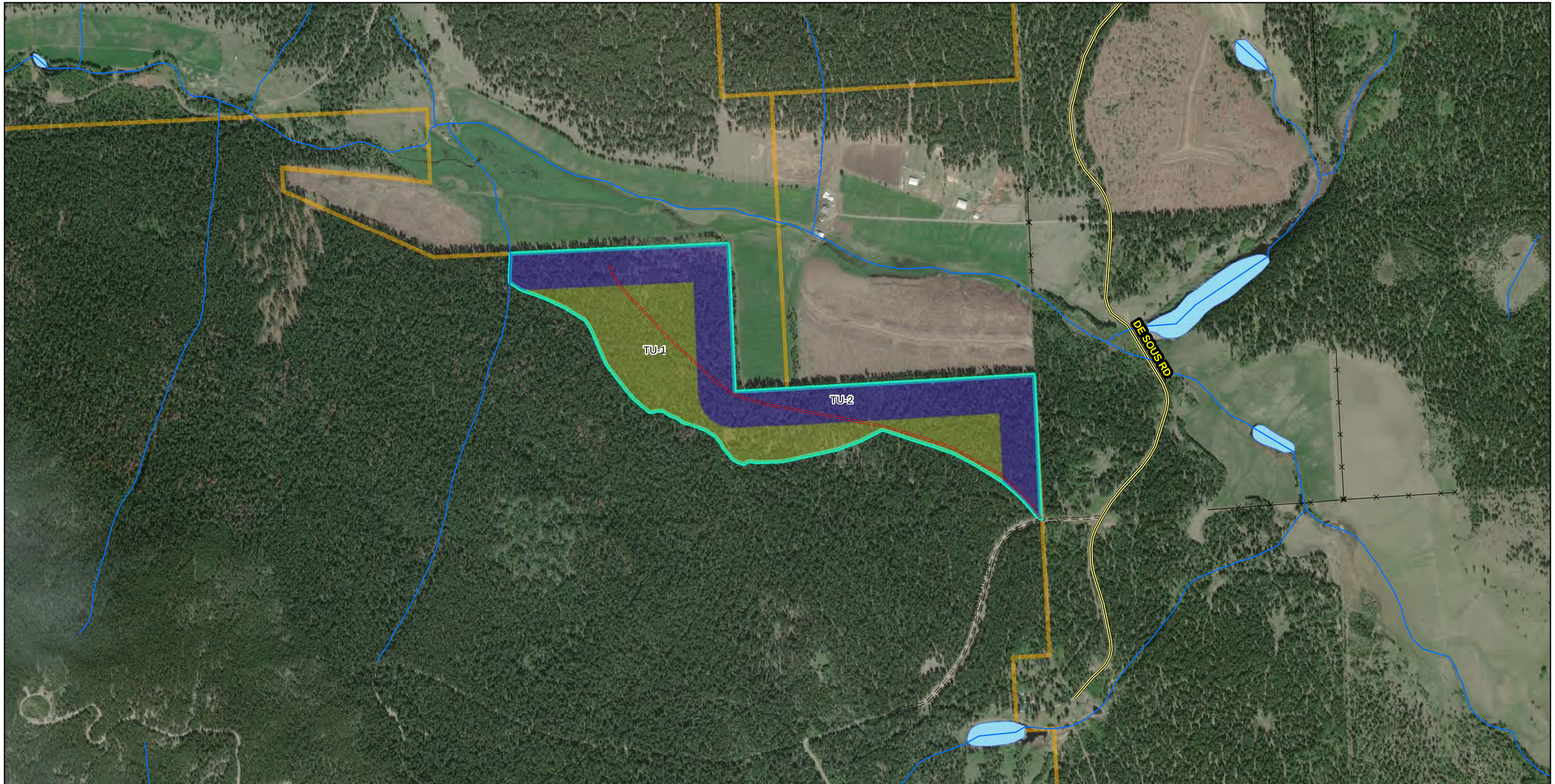
AREA (ha)	MGNT LEVEL	NAME	DETAILS
40.1	INFO	SURVEY PARCELS	DISTRICT LOT 8369, CARIBOO DISTRICT
69.2	INFO	SURVEY PARCELS	DISTRICT LOT 8368, CARIBOO DISTRICT
30.1	INFO	SURVEY PARCELS	S1/2, DISTRICT LOT 8372, CARIBOO DISTRICT
20.1	INFO	SURVEY PARCELS	NW1/4, DISTRICT LOT 8369, CARIBOO DISTRICT
36.2	INFO	SURVEY PARCELS	SW1/4, DISTRICT LOT 8368, CARIBOO DISTRICT
30.1	INFO	SURVEY PARCELS	DISTRICT LOT 8372, CARIBOO DISTRICT
30.1	INFO	ParcelMap BC Polygons	PID = 10962492 PIN = 4825941 Owner Type = Crown Provincial Updated = 1/9/2018 12:19:05 PM
20.1	INFO	ParcelMap BC Polygons	PID = 10962646 PIN = 4825811 Owner Type = Crown Provincial Updated = 1/9/2018 12:11:21 PM
33.9	INFO	ParcelMap BC Polygons	PID = PIN = 5210600 Owner Type = None Updated = 2/14/2019 12:22:10 AM
20	INFO	ParcelMap BC Polygons	PID = PIN = 5210730 Owner Type = None Updated = 2/14/2019 12:22:10 AM
25.2	INFO	ParcelMap BC Polygons	PID = PIN = 4855690 Owner Type = None Updated = 2/13/2019 11:48:21 PM
19.8	INFO	ParcelMap BC Polygons	PID = PIN = 4855560 Owner Type = None Updated = 2/13/2019 11:48:21 PM

AREA (ha)	MGNT LEVEL	NAME	DETAILS
35.4	INFO	ParcelMap BC Polygons	PID = PIN = 4825491 Owner Type = None Updated = 2/13/2019 11:48:32 PM
1.2	INFO	ParcelMap BC Polygons	PID = 13095404 PIN = 90021243 Owner Type = Crown Provincial Updated = 2/5/2019 3:31:25 PM
0.7	INFO	ParcelMap BC Polygons	PID = 13095331 PIN = 90021250 Owner Type = Crown Provincial Updated = 2/5/2019 3:31:25 PM
131.5	INFO	FOREST COVER OWNERSHIP	SCHEDULE = C OWN = 62 DESC = Crown - Forest Management Unit
52.8	INFO	FOREST COVER OWNERSHIP	SCHEDULE = B OWN = 72 DESC = Crown Tenure - Tree Farm Licence, Schedule B
184.1	INFO	SEED PLANNING UNITS	SPEC = SX ELEVATION RANGE = 600 - 1200 ZONE = PG
19.8	INFO	RESULTS OPENINGS	TFL30 - - STATUS = FG Previous SS code = MAT
28.3	INFO	RESULTS OPENINGS	TFL30 - - STATUS = FG Previous SS code = MAT
28.2	INFO	FOREST COVER RESERVES	TFL30 - - RESERVE CODE = D OBJECTIVE = OTH
132.5	INFO	NON-LEGAL PLANNING AREAS	NLFID = 65669 NLFProvided = PRG_54_59 OBJECTIVE = Resource Management Zones
184.4	INFO	UTM ZONE	10
151.2	INFO	MAPSHEET	093J020

AREA (ha)	MGNT LEVEL	NAME	DETAILS
33.1	INFO	MAPSHEET	093J019
2.9	INFO	MINERAL TENURE AND ACQUIRED MINERAL TENURE	TYPE = Placer
114.9	INFO	Fisher Habitat Type	Den Habitat Type = Type II Broom Habitat Type = Type II
69.5	INFO	Fisher Habitat Type	Den Habitat Type = Type II Broom Habitat Type = Type I
184.4	LRMP	BEC 7.0	SBSwk1
184.4	LRMP	BEC 5.0	SBS wk 1
52.8	LRMP	PSYU	SP_CRUS_NO = 325
131.5	LRMP	PSYU	SP_CRUS_NO = 251
52.8	LRMP	LANDSCAPE UNIT	Averil BDEO = Low SUBTYPE = N
131.5	LRMP	LANDSCAPE UNIT	Willow BDEO = Low SUBTYPE = N
184.4	LRMP	NATURAL RESOURCE DISTRICTS	Prince George Natural Resource District
0.4	LRMP	FWA WETLANDS	NAME = WATERSHED CODE = FCODE = GC17100000

AREA (ha)	MGNT LEVEL	NAME	DETAILS
0.2	LRMP	FWA LAKES	NAME =

19.0 Appendix G: Pilot Project Area Mapping



NVRCA FUEL MANAGEMENT BUSINESS CASE
CARIBOO REGIONAL DISTRICT: SPRINGHOUSE

Legend

- Forest Tenure Roads
- Proposed Roads
- Streams
- Transmission Lines
- BC MoT Highways
- Eaglet Lake Pilot Area
- ALR and Private Land Intersect
- Lakes

Treatment Units

- TU-1
- TU-2

Treatment Units Summary Table

Treatment Unit	Date	Area (ha)
TU-1	2020	16.3
TU-2	2020	20.3
	Net Area	36.6
	Project Boundary	**36.6**

Climate Action Initiative
BC AGRICULTURE & FOOD
Nechako Valley Regional Cattlemens Association
CANADIAN AGRICULTURAL PARTNERSHIP
ardcorp
BRITISH COLUMBIA
Canada

**Funding for this project has been provided by the governments of Canada and British Columbia under the Canadian Agricultural Partnership, a federal-provincial-territorial initiative. Funding is administered by the Investment Agriculture Foundation of BC and the BC Agricultural Research & Development Corporation. This project is part of the Regional Adaptation Program delivered by the BC Agriculture & Food Climate Action Initiative.

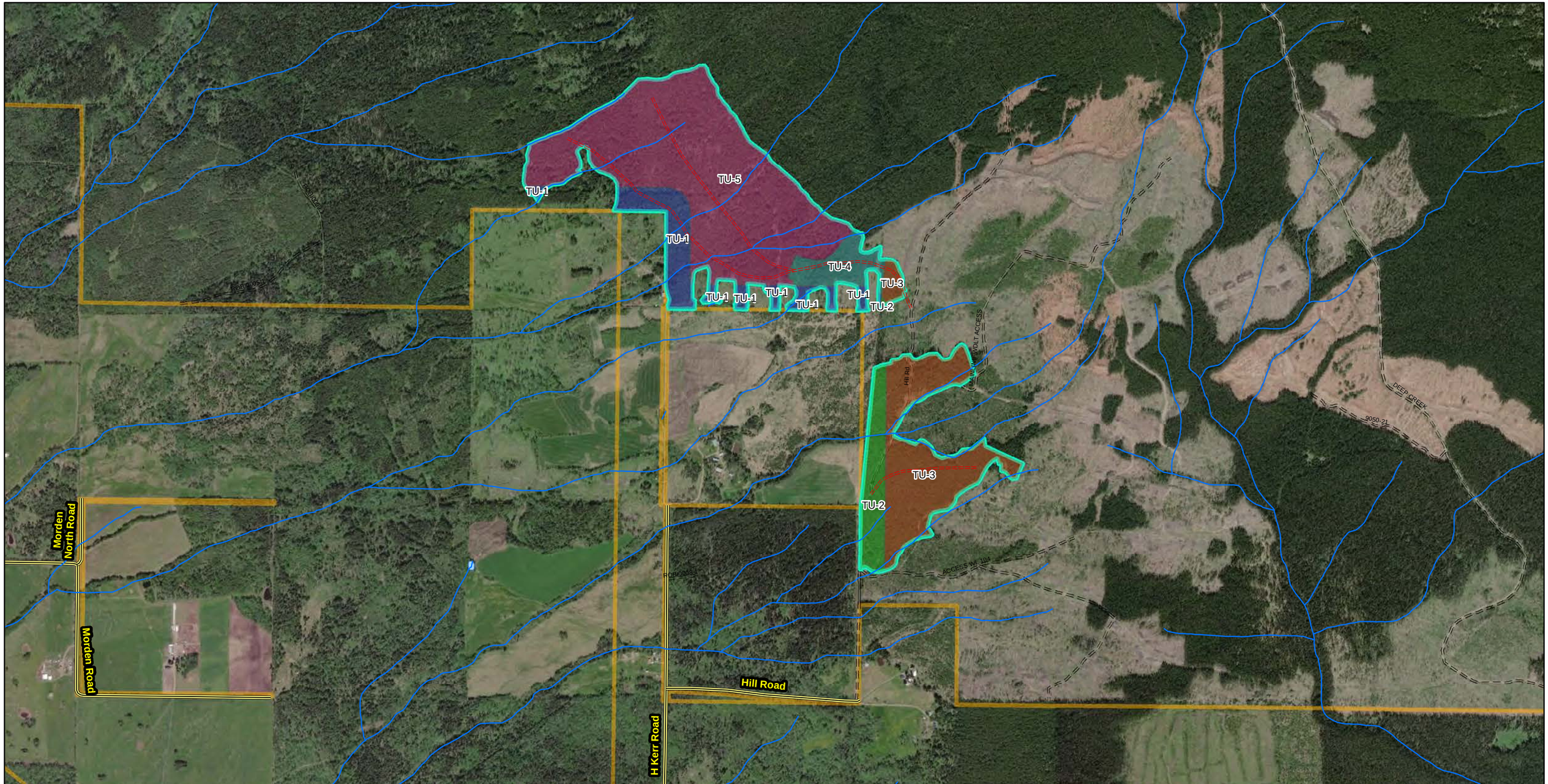
N

1:10,000

0 125 250 500 Meters

CABIN RESOURCE MANAGEMENT

Client: NVRCA
Consultant: Cabin Resource Management
GIS Consulted: Natalie Clark
Created on: 5/26/2020



NVRCA FUEL MANAGEMENT BUSINESS CASE
REGIONAL DISTRICT OF BULKLEY-NECHAKO: KERR ROAD

Legend

- Forest Tenure Roads
- Proposed Roads
- Streams
- Transmission Lines
- BC MoT Highways
- Eaglet Lake Pilot Area
- ALR and Private Land Intersect
- Lakes

Treatment Units

- TU-1
- TU-2
- TU-3
- TU-4
- TU-5

Treatment Units Summary Table

Treatment Unit	Date	Area (ha)
TU-1	2020	9.9
TU-2	2020	7.0
TU-3	2020	21.1
TU-4	2020	5.2
TU-5	2020	53.1
	Net Area	96.2
	Project Boundary	**96.2**

Climate Action Initiative

Nechako Valley Regional Cattlemens Association

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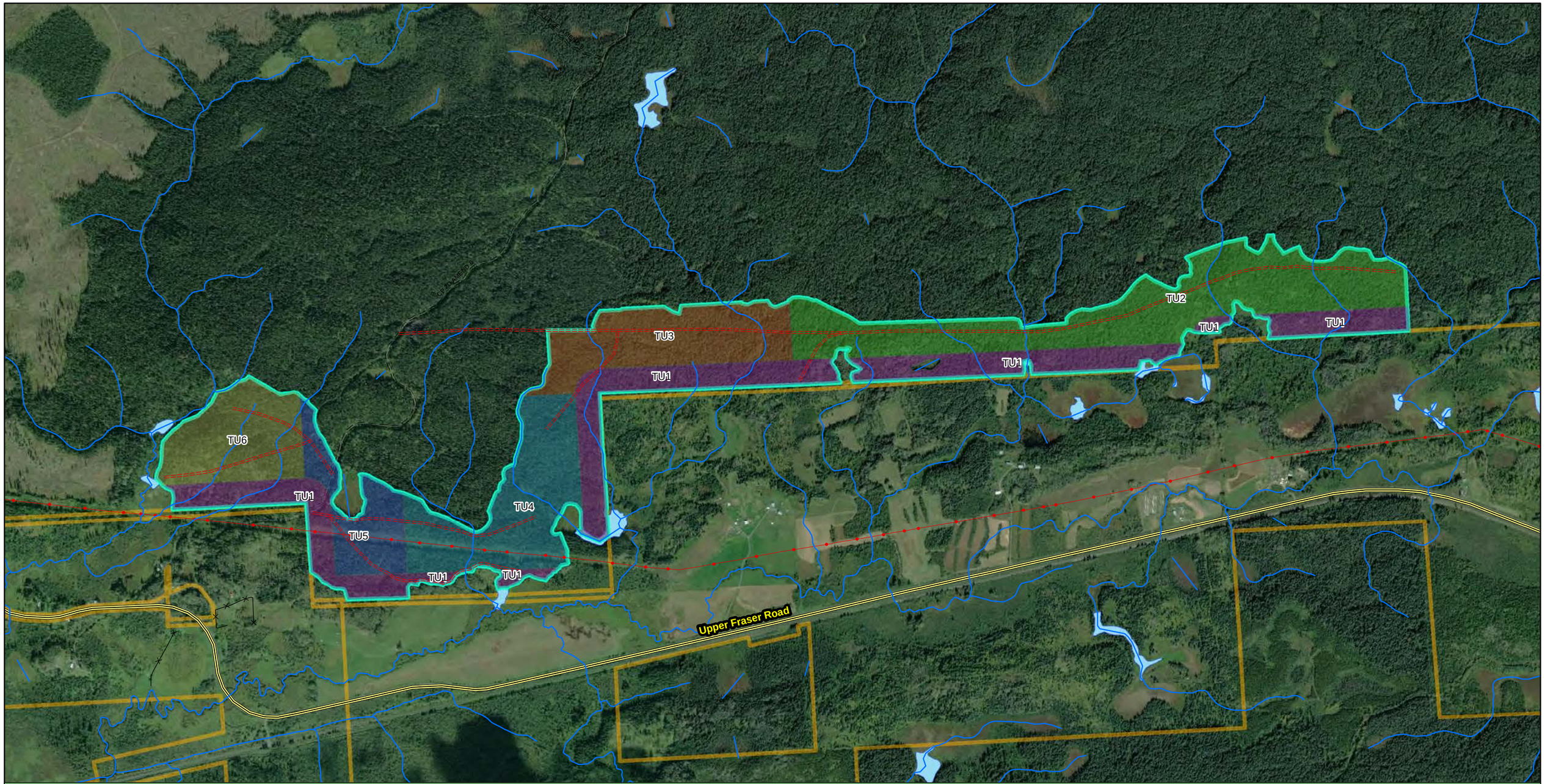
N

1:15,000

0 200 400 800 Meters

CABIN RESOURCE MANAGEMENT

Client: NVRCA
Consultant: Cabin Resource Management
GIS Consulted: Natalie Clark
Created on: 5/26/2020



NVRCA FUEL MANAGEMENT BUSINESS CASE
REGIONAL DISTRICT OF FRASER-FORT GEORGE: EAGLET LAKE

Legend

- Forest Tenure Roads
- Proposed Roads
- Streams
- Transmission Lines
- BC MoT Highways
- Eaglet Lake Pilot Area
- ALR and Private Land Intersect
- Lakes

Treatment Areas

- TU-1
- TU-2
- TU-3
- TU-4
- TU-5
- TU-6

Treatment Units Summary Table		
Treatment Unit	Date	Area (ha)
TU-1	2020	49.9
TU-2	2020	49.4
TU-3	2020	24.3
TU-4	2020	28.2
TU-5	2020	12.9
TU-6	2020	19.7
	Net Area	184.4
	Project Boundary	**184.4**

Climate Action Initiative
Nechako Valley Regional Cattlemens Association
CANADIAN AGRICULTURAL PARTNERSHIP
ardcorp
Canada

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N

1:15,000

0 200 400 800 Meters

CABIN RESOURCE MANAGEMENT

Client: NVRCA
Consultant: Cabin Resource Management
GIS Consulted: Natalie Clark
Created on: 5/26/2020

20.0 Appendix H: Detailed Costing Tables and Methodology

NET PRESENT VALUE CALCULATIONS:

PILOT AREA	ID	TOTAL AREA (HA)	SPECIES VOLUME (M3)							TOTAL VOLUME	SPECIES COMPOSITION (%)						
			Fd	Sx	Bl	Pl	At	Act	Ep		Fd	Sx	Bl	Pl	At	Act	Ep
SPRINGHOUSE	S3	36	7548	302			81			7967	95	4	0	0	1	0	
KERR ROAD	K1	96		9899	1338	5717	956	120		17910	0	55	7	32	5	1	0
EAGLET LAKE	EG1	138	2380	21491	18498	0	809	302	2679	42369	6	51	44	0	2	1	6

PILOT AREA	FD GROSS VALUE X SORT			SX GROSS VALUE X SORT			BL SORT %			PL SORT %		AT SORT
	Peeler	Sawlog	Pulp	Peeler	Sawlog	Pulp	Peeler	Sawlog	Pulp	Sawlog	Pulp	Pulp
SPRINGHOUSE	$169,116.40	$133,777.52	$35,180.38		$23,946.05							
KERR ROAD	0	0	0	$219,995.38	$471,707.15	$526,349.63		$85,011.17	$14,439.70	$363,235.31	$61,697.86	$0.00
EAGLET LAKE		168732.48	25684.96	$477,615.98	$1,024,089.13	$695,792.62		$1,175,288.93	$199,630.42			

PILOT AREA	TOTAL GROSS VALUE	LOGGING	LAYOUT	ADMIN	HAULING	BASIC SILVICULTURE	STUMPAGE/BONUS BID	ROAD		TOTAL COST	TOTAL NPV	NPV/M3
								New Construction	Re-construction			
SPRINGHOUSE	$362,020.35	$0.00	$0.00	$0.00	$0.00		$205,401.19	$0.00		$205,401.19	$156,619.16	$38.43
KERR ROAD	$1,742,436.19	n/a	n/a	n/a	n/a	n/a	599493.44	n/a	n/a	$599,493.44	$1,142,942.75	$67.41
EAGLET LAKE	$3,766,834.52	0	0	0	0	0	763065.69	0		$763,065.69	$3,003,768.83	$70.90

AVERAGE LOG PRICES 3 MONTH ROLLING AVERAGE ENDING FEB 2020:

	Product [1]	Species Group						Total/Avg
		SPF [2]	Df-Larch	Hem-Bal [3]	Cedar "* White Pine Yellow Pine	Deciduous	Other [5]	
Volume (m3)	Sawlog	2,830,294	629,458	140,413	105,641	449	-	3,706,255
	Peelers	61,853	139,207	-	-	- - -	-	201,059
	Poles / House	4,958	-	-	1,122	- - -	-	6,080
	Minor Products [6]	-	-	-	-	- - -	-	-
	Pulpwood	460,792	54,529	74,367	-	- - -	-	589,688
	Other	-	-	-	-	- - -	146,080	146,080
	Total	3,357,897	823,194	214,779	106,763	449	146,080	4,649,163
Average Price ($/m3)	Sawlog	79.42	88.62	80.48	135.89	77.96	-	82.64
	Peelers	111.12	112.03	-	-	---	-	111.75
	Poles / House	106.47	-	-	251.55	---	-	133.25
	Minor Products	-	-	-	-	---	-	-
	Pulpwood	53.96	46.61	47.88	-	---	-	52.51
	Other	-	-	-	-	- - -	54.03	54.03
	Wtd. Average	76.55	89.79	69.19	137.11	77.96	54.03	79.24