

Dawson City

Community Wildfire Protection Plan

Wildland Fire Management



Adoption of the Dawson City Community Wildfire Protection Plan

The Dawson City CWPP was developed between 2022-2024 and represents a collaborative effort between the Tr'ondëk Hwëch'in, City of Dawson, and Government of Yukon to take action to address the threat of wildland fire to the community of Dawson City. As directed by this CWPP, extensive fuels reduction and fire prevention and mitigation activities will be completed on public and Settlement Lands in and around Dawson City.

This plan is intended to serve as a planning tool for fire and land managers and residents to assess risks associated with wildland fire, identify strategies, and make and implement recommendations for reducing those risks.



Alice McCulley

Director of Natural Resources

Tr'ondëk Hwëch'in

August 30, 2024

Date



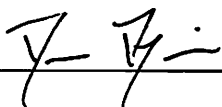
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Executive Summary

The Dawson City Community Wildfire Protection Plan (CWPP) is a non-binding set of recommendations for increasing fire resiliency efforts for the community and surrounding area. The CWPP identifies the wildfire risks surrounding the community, potential consequences of a wildfire to the community, and recommends possible ways to reduce the risk.

The recommendations in this plan are based on a review of best practices from other jurisdictions, gaps identified through community engagement, the local wildfire risk analysis, prevention of human-caused ignitions, and integration of FireSmart program principles. Forest fuel management is recommended both within the wildland-urban interface immediately surrounding developed areas, as well as at the landscape level. Community education, awareness and buy-in to the recommendation presented plays a critical role in reducing the wildfire risk. Community education focuses on FireSmart principles, understanding fire use restrictions, emergency preparedness, and regularly sharing fire safety-related information with the community.

This plan makes recommendations to improve the wildfire resilience of the community and its residents. The recommendations should be further prioritized by the local, First Nations and territorial governments depending on local strengths, opportunities, and the availability of human, financial and physical resources.

Proposed fuel treatments in this plan are identified areas of interest using the best available spatial data, fire science research and local knowledge. Actual areas and treatment will be decided on a later date based on knowledge gathered, including recreational and social values, wildlife, heritage, riparian features, etc. If applicable, proposed work will be subject to assessment by the Yukon Environmental and Socio-economic Assessment Board.

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1. Purpose

Wildfire is an essential and natural process in the Yukon's boreal forests. It is a key ecological driver for plant and animal species and other ecosystem processes. Wildfire also poses a threat to human life, homes, infrastructure and, when at unusually high severity or frequency, the natural environment. As humans expand further into natural ecosystems, more communities and industries are at risk of wildfire impacts.

The purpose of the Dawson City Community Wildfire Protection Plan (CWPP) is to provide a wildfire risk management strategy to support Dawson City and the surrounding area. It also aims to provide tools for stakeholders and the community to increase their wildfire resiliency by:

- 1) Contextualizing the active governance, community, social and cultural aspects of the community, as well as the environment it inhabits to identify the wildfire risk potential.
- 2) Proposing tools to reduce factors identified in the risk assessment. The goal of these tools is to manage forest fuels surrounding the community; allow safe and operational spaces for wildfire crews to respond to fire; and prepare community members, stakeholders and local infrastructure to become fire resilient.

The recommendations and proposed actions developed in this CWPP aim to be integrated with present and future land and community management plans, and with the help of community members and relevant stakeholders.

2. Planning Area

2.1 Socio-economic Description

Dawson City is located at the confluence of the Yukon and Klondike Rivers in the heart of the Tr'ondëk Hwëch'in Traditional Territory. It is approximately 536 kilometres northwest of Whitehorse, at the end of the Klondike Highway. See Figure 1: Dawson City Community Wildfire Protection Plan Planning Area for a detailed map of the area encompassed under this plan.

The Yukon Bureau of Statistics reported the total population, including surrounding rural areas, as 2,321 (Government of Yukon, 2022). Summer seasonal employees roughly double the total permanent population.

Tourism draws roughly 60,000 visitors annually to the Dawson area, most of which come during summer months for the rich arts, heritage and wilderness experiences the area has to offer. Government and service industries provide a large sector of employment. Placer mining also contributes to the local economy. There is one major sawmill servicing the forest industry in Dawson and several fuelwood operators. Many residents of Dawson City rely on fuelwood as a heating method during winter.

Governance

The entire area of the CWPP lies upon Tr'ondëk Hwëch'in Traditional Territory and thus, the Tr'ondëk Hwëch'in are a key partner in the planning process. The Tr'ondëk Hwëch'in achieved self-government in 1998, establishing the terms by which aspects of land management (e.g., heritage management, fish and wildlife management, forestry, etc.) will be carried out jointly by the Tr'ondëk Hwëch'in and other levels of government. The Self-Government Agreement also provides the Tr'ondëk Hwëch'in with the ability to determine the future of their Settlement Lands. This makes Tr'ondëk Hwëch'in an active player in lands management planning, including wildfire preparedness. The Tr'ondëk Hwëch'in Final Agreement ensures that the Tr'ondëk Hwëch'in participate in the management of heritage sites pertaining to their culture anywhere within their traditional territory, and that they must be consulted on aspects that may impact heritage resources.

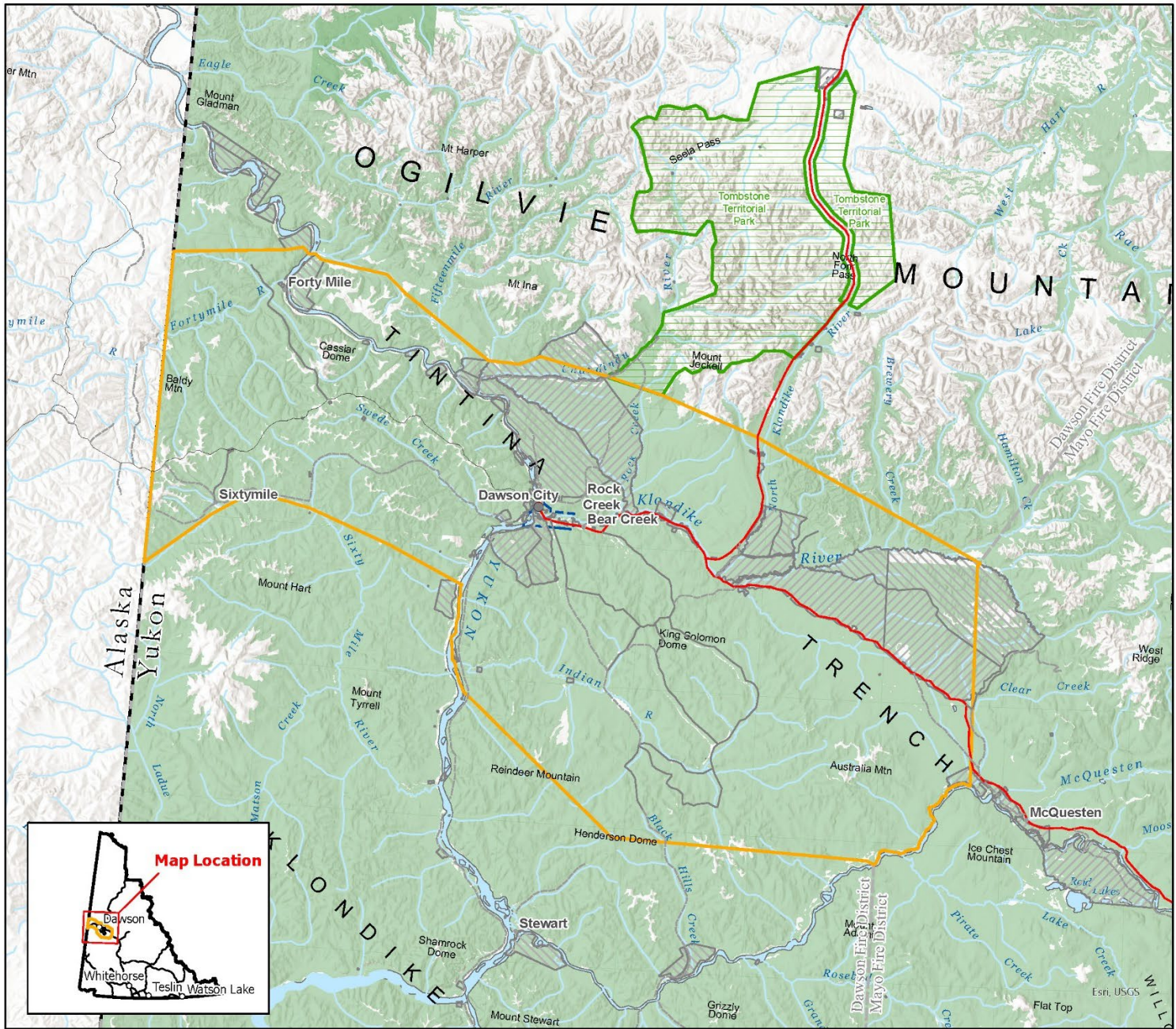
Interviews with the Tr'ondëk Hwëch'in done for this plan indicate that their focus is on the region's natural and cultural heritage and on the spirit of the place, rather than on the built heritage. The Tr'ondëk Hwëch'in are particularly interested in preserving visual and physical connections between places which their people value. This includes connections to the rivers, traditional use sites and camps, and valued places such as the Moosehide Slide and the Dawson-to-Moosehide trail. Tr'ochek was designated a National Historic Site by the Government of Canada in 2002 and is also of key importance to the Tr'ondëk Hwëch'in. In 2023, much of the area was inscribed as a UNESCO World Heritage site known as the Tr'ondëk-Klondike.

Tr'ondëk Hwëch'in Settlement Lands occur throughout the planning area and the Tr'ondëk Hwëch'in government have been, and will continue to be, consulted throughout the planning process.

2.2 Ecological Description

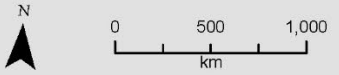
The CWPP area is part of the Klondike Plateau Boreal Low subzone. The climate of the Klondike Plateau subzone is strongly continental, which means warm summers and very cold winters. Most of the planning area lies along the relatively wide Klondike or Yukon River valleys and is flat and low-lying. The surrounding area is characterized by deep and narrow V-shaped valleys and smooth hilltop ridges.

Forested areas are dominated by black and white spruce, trembling aspen and white birch forests. Stands may be pure or mixed with other species. Wildfire is a key ecological driver for these forests. Floodplain ecosystems are common and include white spruce, balsam poplar or river alder, with excellent growth due to high nutrient levels. Wetlands are also common and may host white and black spruce with stunted growth. Non-treed wetlands are composed of shrub or graminoid vegetation such as spruce musky sedge, bluejoint reedgrass and cottongrass.



Dawson CWPP Planning Area

- Dawson CWPP Planning Area
- Fire District Boundaries
- Waterbodies
- Watercourses
- First Nation Settlement Lands - Surveyed**
 - A: Surface and Subsurface Rights
 - B: Surface Rights
 - FS: Fee Simple
- Transportation**
 - Primary Highway
 - Secondary Highway
 - Road
 - Resource Road/Historical Road/Trail



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 Wildland Fire Management
 Department of
 Community Services
 Government of Yukon
 October 23, 2024



Figure 1: Dawson City Community Wildfire Protection Plan Planning Area.

Drier sites on fluvial materials are aspen-dominated and the driest sites, occurring on steep south-facing slopes, are grasslands. Changes in elevation play a key role, with higher elevation sites having cooler climates and nutrient-poor soils, resulting in more shrub birch in the Boreal High Zone.

Permafrost is an important driver of wetland development and can also be present on moist sites.

2.3 Natural Disturbance and Forest Succession

Wildfire has historically been the dominant agent of disturbance of the boreal ecosystems found in and around the planning area. These wildfire events can be characterized as relatively infrequent, but they often burn with a high intensity and are stand-replacing when they occur. Flooding is also a significant disturbance for low-lying forests. It is most common in spring and occurs due to ice jams that form during spring break-up.

Interacting with wildfire on the landscape are other agents of disturbance such as pests, pathogens and windthrow. These have generally been incidental to forest succession in the Yukon, although some insect outbreaks have caused stress and subsequent mortality to large tracts of forest, which, in turn, could affect wildfire resilience of an area.

Yukon's Forest Management Branch conducts annual aerial surveys to monitor forest health in the territory through a zonation approach. Areas are surveyed once every 3-7 years (Government of Yukon, 2020). The Dawson area (Forest Health Zone 3) was last surveyed in 2021 (Government of Yukon, 2021). Prior to that, it was done in 2015. Areas of concern are compared between the two years.

3. Introduction to Wildfire

3.1 Drivers of a Wildfire

There are three interacting elements that drive a wildfire, commonly referred to as the 'fire triangle' (Figure 2): fuel, weather and topography. These three factors determine how a wildfire behaves, including how fast it spreads and how intensely it burns.

Fuel refers to any flammable material, including vegetation (e.g. leaves, bark, trees, duff) that are burned and contribute to the fire. It can also include man-made fuels, such as buildings. The fuel type, dryness, size and arrangement can all influence the speed, size and severity of a wildfire. Fuel is the only component of a wildfire that we can control (i.e., no fuel, no fire).

Weather influences how fast a fire moves and how intensely it burns. It also influences whether an ignition, like a lightning strike, will extinguish or develop into a large fire. Winds will drive a fire forward, enable the spread of embers and supply the fire with oxygen to increase combustion. Further, atmospheric dryness, lack of rain and high air temperature will contribute to the degree and rate of fuels drying, making them more available to burn. At extreme weather conditions, weather becomes a more significant factor in fire growth than the type of fuel (Cruz et al, 2022).

Topography describes land shape, elevation, steepness and the direction of a slope. Topography also includes land features such as canyons and valleys. All these features can speed or slow wildfire spread. Elevation

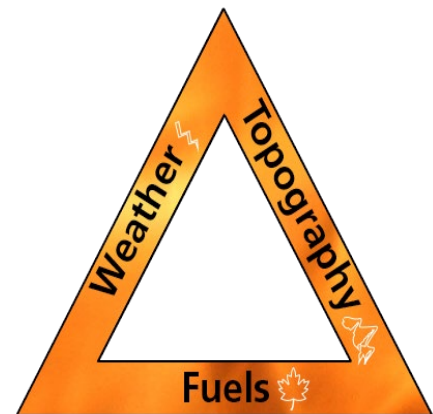


Figure 2. The fire triangle – interacting components that drive a wildfire.

influences weather conditions (like air temperature). Aspect influences vegetation growth and dryness (e.g. south-facing slopes have more heat from the sun and are drier). Slope also influences how fast a fire moves: faster uphill due to pre-heating of vegetation from rising hot air and flame, and slower downhill. Features such as valleys influence wildfire spread by directing wind flow.

3.2 Components of a Wildfire

Wildfire can negatively impact a value, such as a home, through direct flame contact, radiant heat exposure, convective energy output (i.e., 'fire smoke column'), embers and smoke exposure.

Figure 3 illustrates how direct flame contact, embers and radiant heat from nearby fuel can impact a home. Convective energy refers to the heat energy produced by a wildfire that rises into the atmosphere. Visible as a fire smoke plume (or 'convection column') this energy can create strong winds that increase fire growth and damage structures. It can also generate lightning storms, sparking more fires.

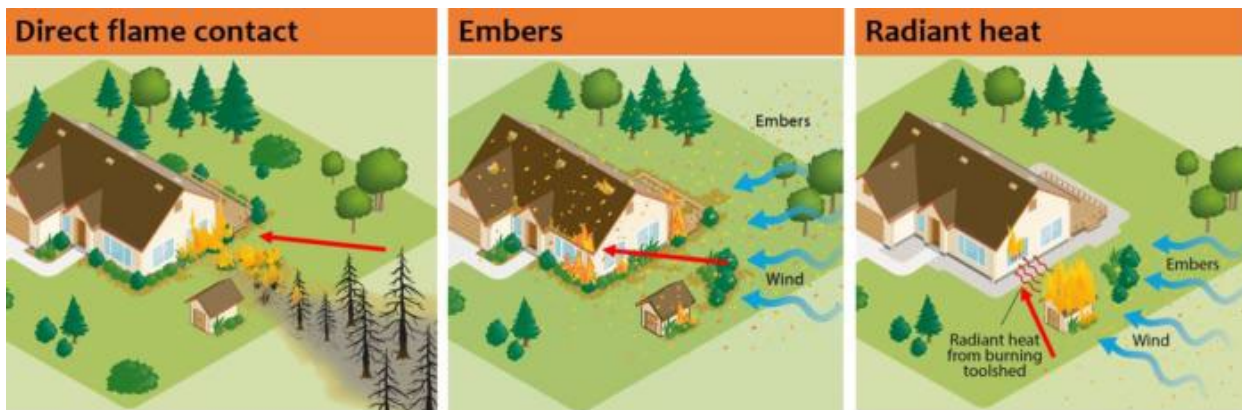


Figure 3. Example of how a wildfire can impact a home.

3.3 Wildfire Regime

A 'wildfire regime' is the pattern of fire frequency, size, intensity, type and severity in an area. Boreal forests are a fire-dependent ecosystem, adapted to wildfire as the main forest disturbance and driver of ecological processes.

Boreal forests are closed canopy forests, with a moist and shaded forest floor, limiting most fires to small areas with high moisture levels and lowered wind speeds within forest stands. These conditions most often result in the following fire types:

Ground fires burn beneath the surface (deeper duff layers, tree roots). These fires can 'overwinter,' which means they can continue to smoulder underground during winter and, when the right conditions arrive, can appear above ground by burning up through drying fuels. These fires can be difficult to suppress completely and need monitoring.

Surface fires spread along the forest floor, burning fuels on the ground (leaf litter and duff layer) and woody debris. The intensity of surface fires is typically at a manageable level for successful wildfire suppression.



Figure 4. Types of wildfires from least to most severe.

Crown fires are those which travel through the tree canopies and most often completely burn fuel at all levels in the forest from the ground up. Crown fires are typically high-intensity, large wildfires that occur during warm and dry weather patterns that remain long enough to dry out vegetation and cause extreme fire conditions.

Crown fires typically spread at an extreme rate and cause long-distance spotting of embers. Long-distance spotting occurs when significant embers are lifted into the atmosphere due to strong winds and convective energy, then projected up to kilometres in front of the main fire. These embers can start new fires well ahead of the main fire, rapidly increasing fire spread. These fires are the most intense type of fire and are often difficult or impossible to suppress without changes to fuel and/or weather conditions.

3.4 Wildfire Risk

Wildfire risk can be described as a function of the following risk components:

$$\text{Wildfire Risk} = \text{Likelihood} \times \text{Severity} \times \text{Exposure} \times \text{Values} \times \text{Vulnerability}$$

Likelihood	The chance of a wildfire occurring, often examined by analyzing past ignition trends, the frequency of destructive climatic and weather events, and trends forecast under a changing climate.
Severity	Severity usually refers to how much fuel is consumed by the fire and how much heat energy is produced. A high-severity fire consumes almost all vegetation, often moves quickly and produces enough energy to be difficult to suppress or control. Severity is driven by the fire triangle components: fuel, weather and topography.
Exposure	The seasonal and diurnal time and duration that a value is vulnerable to likelihood and severity. It is primarily determined by the proximity of the value to the likelihood, the topography, direction and rate of spread, embers, smoke dispersion and what the duration of fireline intensity will be upon arrival.
Value	A 'value' is any social, environmental or economic asset that is considered valuable by a community, land manager or industry.

Vulnerability	How predisposed to damage from a wildfire is a value if it is exposed to the assessed likelihood and severity discussed above.
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It should be noted that this risk equation follows the zero properties law of multiplication that states any number multiplied by zero equals zero. In this case, if any one of the risk components can be eliminated (zero) then the wildfire risk is also eliminated (zero). For example, there is no wildfire risk if there are no values to impact.

Completely eliminating wildfire risk is extremely difficult to achieve and it is the task of land managers and communities to identify which controls or mitigations they can employ to reduce the components that make up wildfire risk. Table 1 below provides examples for each component of wildfire risk and potential controls.

Table 1. Wildfire Risk Matrix with examples for risk drivers (risk analysis) and mitigation examples (potential controls).

	Likelihood	x	Severity	x	Exposure	x	Value(s)	x	Vulnerability
Risk Analysis	<ul style="list-style-type: none"> • Ignition History • *Lightning • *Human • Seasonality • Fuel Hazard • Fire Cycle • Fire Interval • Historic Weather • Climate Change 		<ul style="list-style-type: none"> • Rate of Spread • Crown Fraction Burned • Fuel Consumption • Fire Intensity • Radiant Heat Flux • Embers • Smoke 		<ul style="list-style-type: none"> • Proximity to value • *Direction • *Distance • *Topography • Length/Breadth Ratio • Property Density • Smoke transport • Severity Duration 		<ul style="list-style-type: none"> • Public Response Resources • Property (WUI) • Infrastructure • Industry • Cultural • Environment • Watersheds 		<ul style="list-style-type: none"> • Human Physiology • Property Construction • Property Maintenance • Subdivision Design • Socio – Economics • Biodiversity • Fire Effects • Resilience
Potential Controls	<ul style="list-style-type: none"> • Education • Engineering • *Spark Arresters • *Power Grid Mgnt • Enforcement • *Fire Bans • *Area Closures 		<ul style="list-style-type: none"> • Fuel Management • *Hazard Reduction • *Ecological Burning • *Mechanical 		<ul style="list-style-type: none"> • Community Layout & Design • Defensible Space • Strategic Fuel Breaks • Area Closures • Fire Response • Warnings • Evacuations 		<ul style="list-style-type: none"> • Education • Harvesting • Salvage 		<ul style="list-style-type: none"> • Building Controls • Land Use • Resilience • Ecological prescribed fire

Appendix 3: Mitigation Methods to Reduce Wildfire Risk to Values offers a worksheet for stakeholders and wildfire professionals to address mitigation methods for the above risk factors in the planning area. Residents are encouraged to use a similar matrix to assess mitigation to address wildfire risk on their own properties or look at FireSmart Canada’s website for information on addressing wildfire risk on their properties: firesmartcanada.ca/

4. Wildfire Risk Assessment: Dawson City

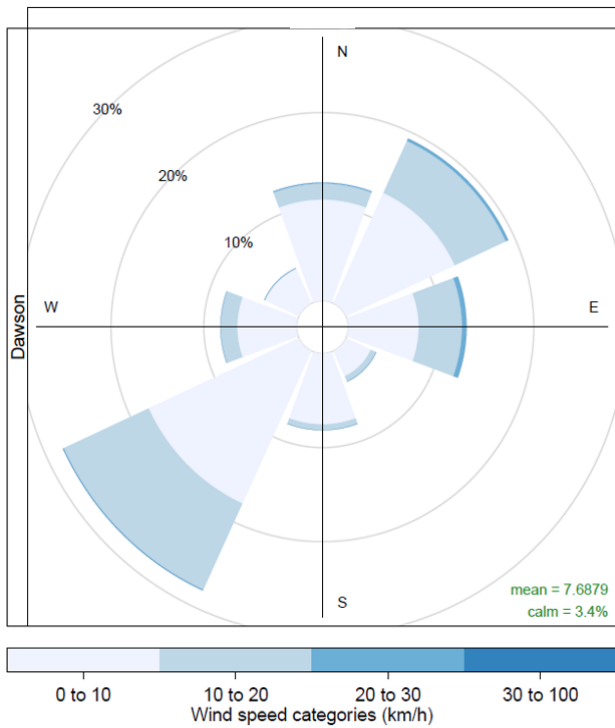
The following section describes the landscape-level factors that contribute to wildfire risk in the planning area. This includes environmental factors such as weather and wind, fire history, fuel types, ignitions risk, climate change, and socio-economic factors that play into risk assessment of the planning area, including wildfire response, values at risk and key vulnerabilities.

4.1 Environmental Factors

4.1.1 Weather

The most relevant weather station is located at the Dawson Airport and has approximately seventeen years of records that have been analyzed to provide a recent history of weather patterns (Table 2). Weather data was analyzed from May 1st every year until the station is turned off in winter.

Weather data can be summarized into percentiles. A percentile is a measure used to indicate the value below which a given percentage of observations fall (e.g., 70th percentile is the value below which 70% of the data can be found). A 99th percentile high temperature record is one that 99% of other temperature records are below. This is a useful way to compare weather records against the maximum and other percentiles to gauge how high or extreme values are (Table 3).



Frequency of counts by wind direction (%)

Figure 5. Wind rose using Dawson weather station historic data.

An important set of weather data is wind speed and direction. Wind is a key driver of fire behaviour and the path it spreads. Geographical influences on wind direction around Dawson include river valleys, with the Yukon River having the largest impact, as well as valleys and mountainous terrain.

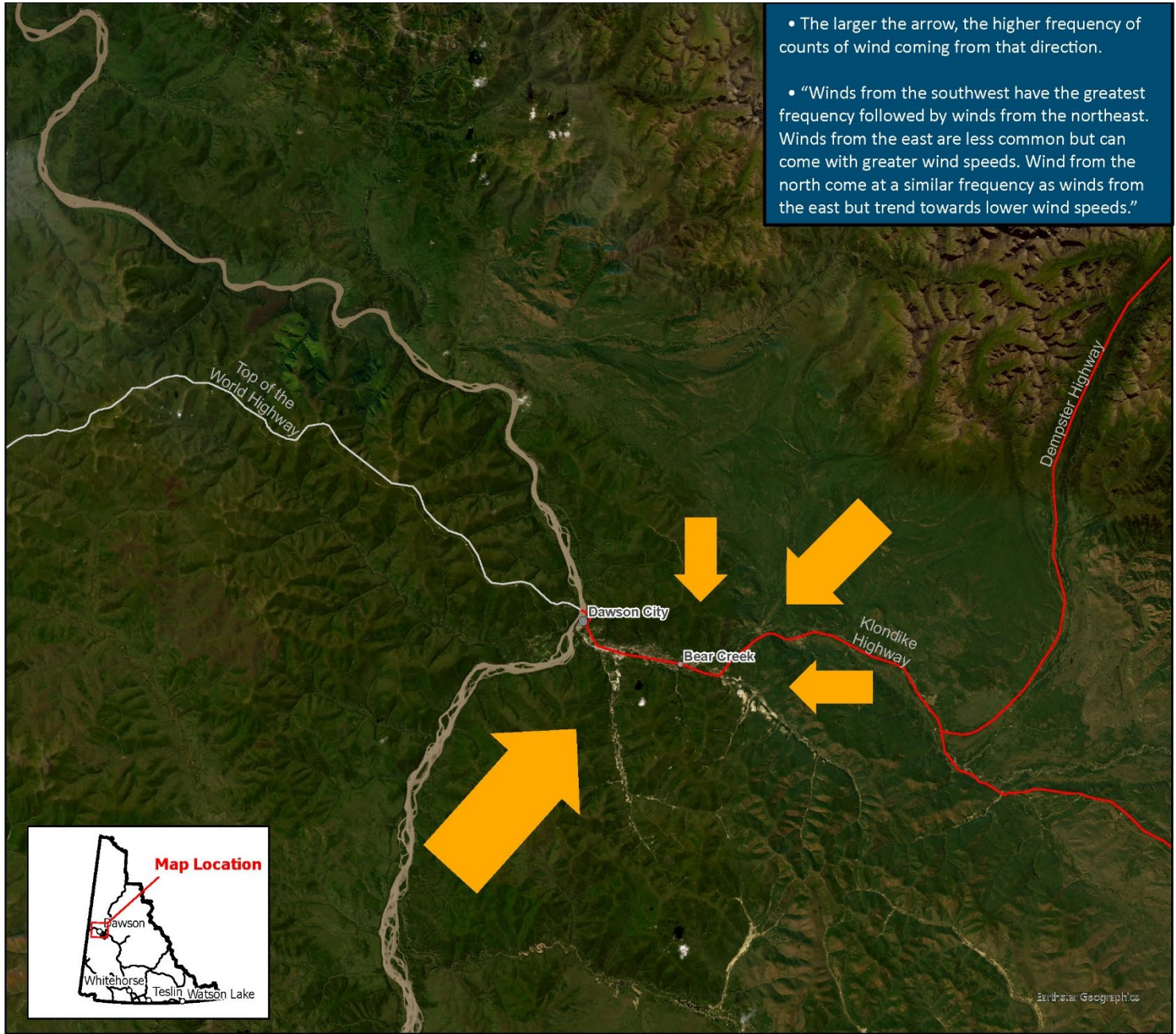
Wind records can be analyzed to show the number of times a wind direction was recorded at the weather station to gain an understanding of which wind directions are most frequent. Wind records were formatted into a visual. Figure 5 and Figure 6 show that the Dawson weather station predominantly recorded winds from the southwest and the northeast. The colour of the wind rose displays the frequency of wind speeds recorded in each direction.

The Dawson weather station also calculates Fire Weather Index (FWI) and Fire Daily Severity Rating (DSR) values for the weather records available. The FWI is a rating of potential fire intensity. For detailed information regarding Fire Weather Index and Fire Daily Severity for the planning area, see Appendix 1.

Table 2. Summary of high percentile weather data for Dawson weather station.

Season	Mean	SD	Max	Median	Percentiles								n
					70th	80th	90th	95th	97th	98th	99th		
Temperature (°C)													
Spring	16.7	6.0	30.9	17.2	20.3	22.1	24.2	26.1	26.8	27.3	28.0	2270	
Relative Humidity (%)*													
Spring	53.3	21.1	0.0	51.0	40.0	33.0	27.0	24.0	22.0	20.0	18.0	2270	
Wind Direction (°)													
Spring	150.0	102.8	360.0	177.0	227.0	240.0	268.0	317.9	340.1	350.0	359.0	2263	
Wind Speed (km/h)													
Spring	7.7	4.7	28.0	7.0	9.3	12.0	14.0	16.0	17.9	19.0	20.0	2270	
Precipitation (mm)													
Spring	1.3	3.2	42.9	0.0	0.7	1.7	4.1	7.1	9.7	11.6	14.8	2269	

* Relative Humidity values were reversed for calculations



- The larger the arrow, the higher frequency of counts of wind coming from that direction.
- “Winds from the southwest have the greatest frequency followed by winds from the northeast. Winds from the east are less common but can come with greater wind speeds. Wind from the north come at a similar frequency as winds from the east but trend towards lower wind speeds.”

Planning Area Wind Map

Transportation

- Primary Highway
- Secondary Highway

N

0 500 1,000 km

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 Government of Yukon
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Figure 6: Most frequent wind directions recorded at Dawson City weather station.

4.1.2 Fire History

A characteristic of the boreal forest is a mosaic of burnt and unburned patches. The Dawson area has significant and frequent fire occurrence due to the influence of the Tintina Trench. The Tintina Trench topography influences weather in the region. From mid-June to mid-July, frequent lightning occurs and causes multiple ignitions.

The fire regime also fluctuates with seasons. Spring wildfire risk can be high between the time of snow melt and when green-up occurs, when deciduous trees produce leaves and dead, cured grasses turn green. This is particularly true for the Henderson Corner area. Once grasses and deciduous trees reach the green-up stage, then the wildfire risk can lower for a period until warm summer conditions persist long enough to dry fuels.

Table 3. Summary of Wildfire History in the Planning Area (1946 – 2023)

Number of fires	Area burned	Median Fire Size	Maximum Fire Size
646	541,891 ha	826.6 ha	48,139 ha

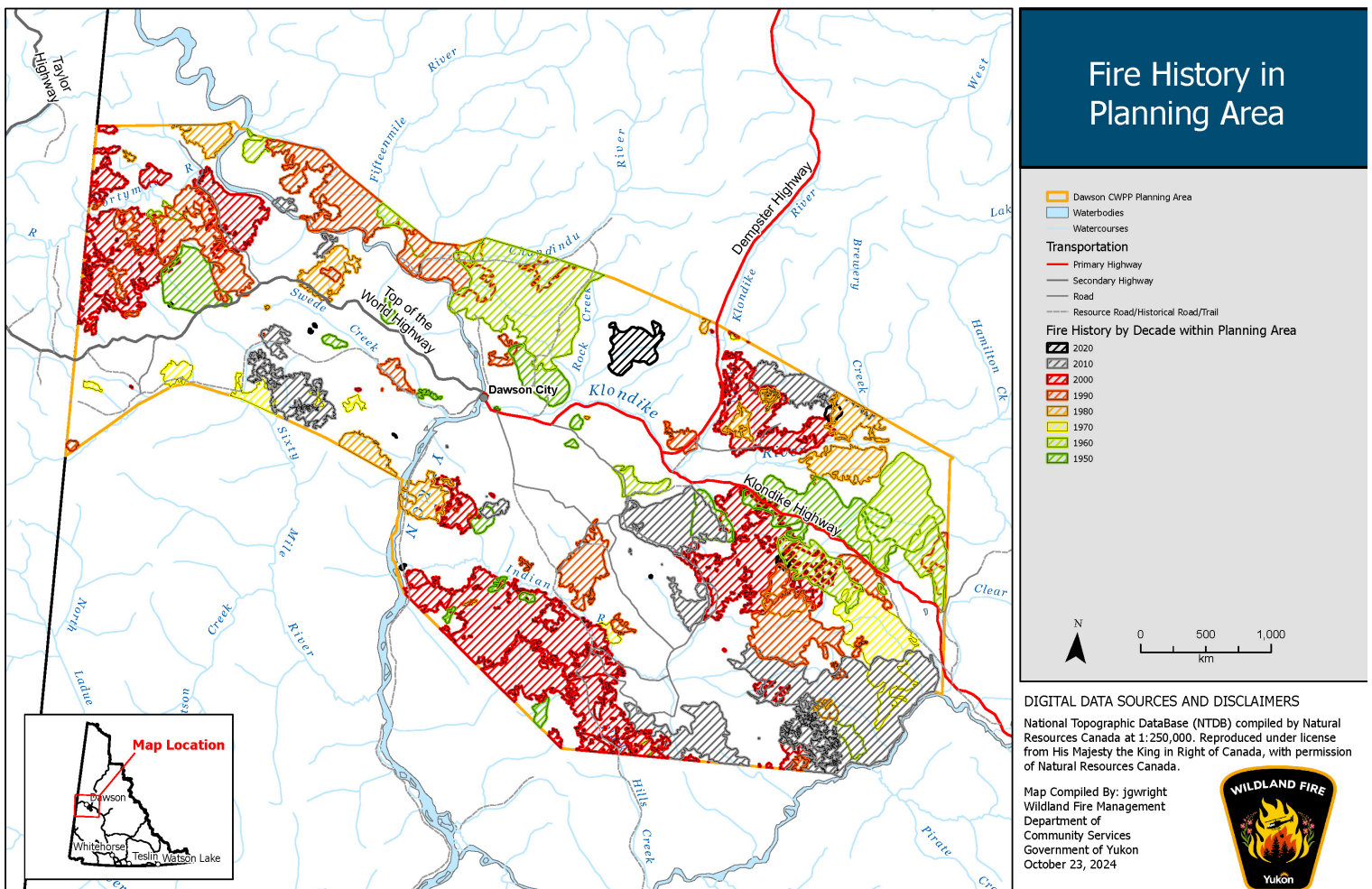


Figure 7: Fire History in the Planning Area 1946-2023.

4.1.3 Fuel Types

For the purpose of fire behaviour analysis, Canadian forests and grasslands are categorized into different fuel types using Natural Resources Canada’s Fire Behaviour Prediction (FBP) System. These fuel types are categorized by vegetation and tree species that correlate to an expected fire behaviour. When observing these

fuel types, emphasis should be focused on the behaviour and not the species. For example, C2 (boreal spruce), which is common around Dawson, indicates pure black spruce forest. However, locally it is more common to have pure white spruce forest, though fire will behave similarly in both types. As a result, fuel types should be regarded as a 'best fit.' The FBP system is used as a planning tool by wildland fire management professionals.

4.1.4 Ignition Risk

Wildfire ignitions can be divided into two main categories: human-caused and lightning-caused. Figure 8 shows historic distribution of wildfire ignitions by cause in the planning area. Human-caused ignitions include accidental and malicious causes and make up 19.9% of recorded ignitions, but account for only 5.1% of the total area burned. This is because human ignitions were generally self-extinguished or received a rapid response time for suppression, resulting in a small total area burned.

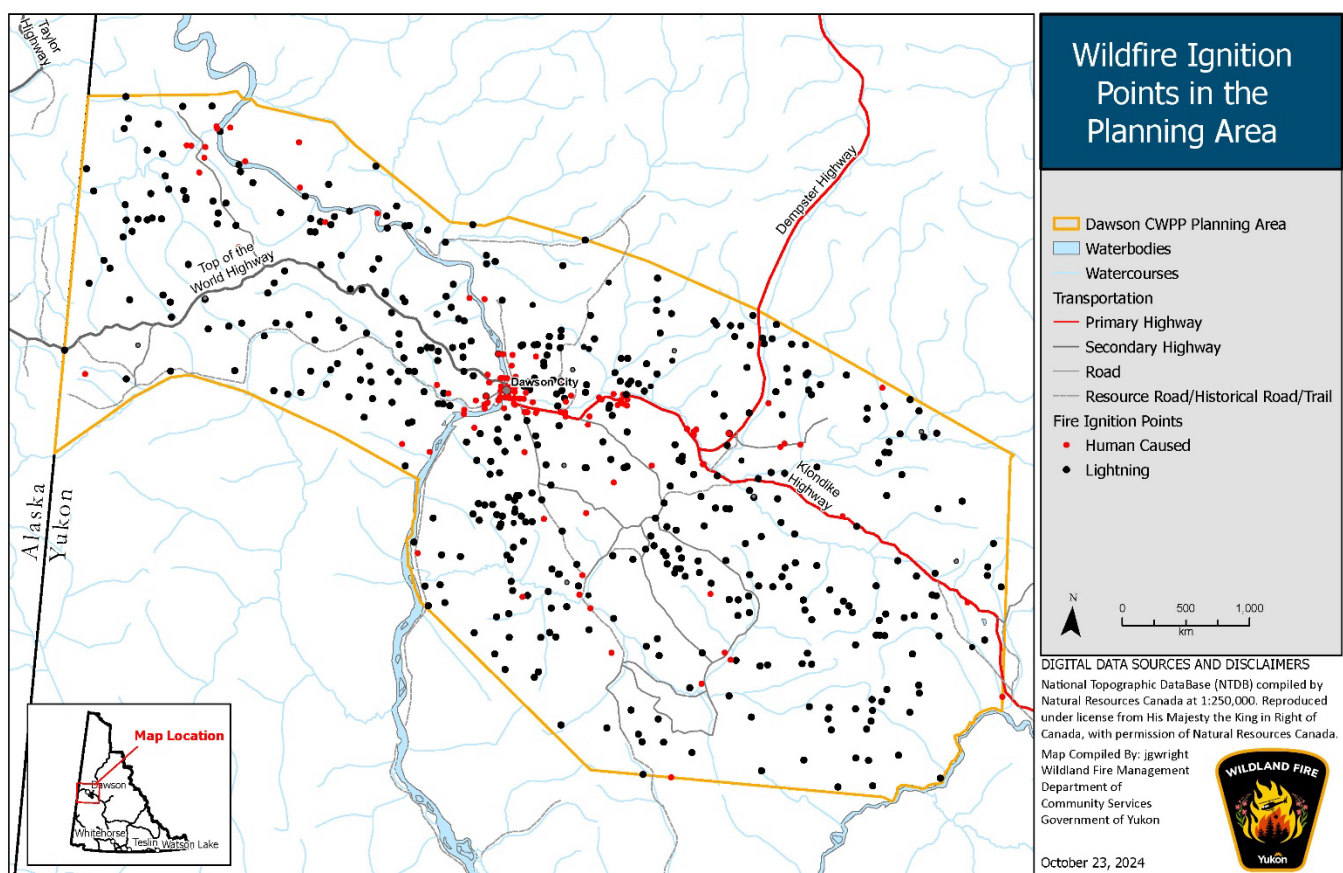


Figure 8: Wildfire Ignitions Points in the Planning Area (1946-2023).

Table 4. Ignition History Summary (1946 – 2022).

Cause	Number of ignitions	Percent of total ignitions*	Area burned (ha)	Percent of total area burned
Human	129	19.9%	29,199	5.1%
Lightning	467	72.2%	529,836	94.3%

*Remaining percentage is 'miscellaneous,' 'not specified' or 'NULL.'

Factors that affect the potential for an ignition to develop into a large wildfire include:

- The season of the ignition (influencing fuel moisture and temperature).
- Success level of initial attack.
- What fuel type the ignition occurs in (refer to Section 4.1.3. Fuel Types).
- Terrain and the weather conditions following ignition.

4.1.5 Climate Change

Fire regimes in boreal forests are changing. By the end of this century, the annual area burned by forest fires in Canada is predicted to increase by 74–118% (Flannigan et al, 2005).

Research into changing weather patterns observed in recent history generally agrees that boreal forests will become more fire prone as climate change impacts become more prevalent (Wotton et al, 2017). This is due to decreased fuel moisture and an increase in extreme fire weather occurrence, including heat and wind. A recent study examining potential changes in fire intensity and type in Canada’s boreal forests concluded that by the end of the century we can expect:

- An increase in the number of days where crown fires are likely.
- An increase in the number of days when fire intensity is greater than suppression capabilities.

Climate change impact of fire weather was also modelled for the Yukon specifically (AECOM, 2021). Results found that temperature, precipitation and humidity annual averages will all increase. Table 5 predicts changes in climate over two warming scenarios. According to this report, the potential for wildfire spread days might decrease around Dawson.

Table 5. Future Climate Trends for Yukon—April to October.

		Temperature (°C)	Precipitation (mm)	Relative humidity (%)	Wind (km/h)
Mid-Century Analysis #1 2019-2048	RCP4.5	+1.14	+20.31	+4.07	-0.21
	RCP8.5	+1.31	+20.18	+3.91	-0.07
Mid-Century Analysis #2 2049-2078	RCP4.5	+2.35	+38.68	+4.33	-0.30
	RCP8.5	+3.04	+83.57	+5.75	-0.14

An increase in precipitation has also been predicted in other research. However, there was not a similar prediction in a reduction of spread event days. One study proposes that the precipitation increase is not substantial enough to reduce the impact of warmer temperatures on drying fuels. Warmer temperatures increase evapotranspiration and lower water tables and decrease fuel moisture and surface soil moisture content. Significant increases in precipitation would be required to balance an increase in temperature. It is far more difficult to model the impact of climate change on precipitation quantities than it is for temperature (Wotton et al, 2010).

Both studies agree that the Yukon should expect warmer temperatures and an increase in fire season length as the impacts of climate change progress.

4.2 Socio-economic Factors

4.2.1 Wildfire Response

Wildfire response in the Dawson area relies on several different jurisdictions taking responsibility where appropriate. This includes the Dawson City Fire Department, Klondike Valley Fire Department and Government of

Yukon, Wildland Fire Management. A mutual aid agreement is in place wherein the different departments will provide additional fire service coverage, when necessary.

For wildland fire response, Government of Yukon, Wildland Fire Management staffs the Dawson Fire Centre, which is located at the Dawson Airport. This is a regional operations centre, and several staff and crews are located here, including Response Officers, Initial Attack crews and Air Tankers when required.

Wildland fire resources, including gear and personnel, are based at the Dawson Fire Centre, with the option to provide additional resources from the territory and/or nationally and internationally. Yukon Wildfire Management Branch and the Dawson Fire Centre will monitor resource availability for Dawson according to wildfire hazard.

4.2.2 Values at Risk

Major values are identified within the planning area that can have significant impacts to the livability and way of life within the region. These major values can be categorized as human life, cultural, infrastructure, environmental and economic. Examples for each category include but are not limited to:

- **Human Life:** Direct risks to residents in the area.
- **Cultural:** First Nations Settlement Land, pristine wilderness, recreation, food gathering, physical health, Tr'ondëk Hwëch'in heritage routes, TR'O-JU-WECH'IN Heritage Site, Moosehide Village, historic mining sites, Dawson historic town, Tr'ondëk-Klondike UNESCO World Heritage Site.
- **Infrastructure:** Dawson City Community Hospital, water treatment plant, Yukon University Tr'odëk Hätr'unohtän Zho Campus, Robert Service School, Rock Creek & Yukon River Campground, communications towers, airport, wind energy and YEC power substation, Tr'ondëk Hwëch'in Community Hall, Dänojà Zho Cultural Centre.
- **Environmental:** Rare plant species and CDC Species of Conservation Concern, caribou and other species habitat, permafrost and watershed effects.
- **Economic:** Tourism and campgrounds, transportation and freight, mining sites, forestry.
- **Recreational:** Yukon Quest Trail, off-road recreation, canoeing, fishing, hunting, camping, hiking, flight seeing, etc.

These values may be directly impacted by wildfire (e.g., radiant heat/embers) or indirectly (e.g., loss of tourism, exposure to smoke, ash, firefighting chemicals, runoff, permafrost melt, etc.).

4.2.3 Key Vulnerabilities

Values at risk can be further identified as key vulnerabilities within the larger planning area to assist with preparing mitigation and preparedness strategies. Below are key values identified in the planning area that, if impacted, can have significant results on people living in or near Dawson. Key vulnerabilities by neighbourhood can be found in Section 5 of this plan.

Table 6. Values and their vulnerabilities in the planning area.

Value	Vulnerability
Homes	Homes are constructed within the Wildland-Urban Interface. Homes are near continuous forests, except for Dawson City itself, which can support elevated fire behaviour and risk house loss (and possibly loss of life).

Evacuation routes and access routes for firefighting resources	Sunnydale subdivision has limited access/egress routes towards North Klondike Highway. West Dawson Subdivision Road has one way in/out. Other subdivisions have multiple roads towards North Klondike Highway.
	It is important to know any specific access challenges before a fire and report to property owners, including long driveways and small turnaround points that are difficult for a fire engine.
Drinking water supply	There are 11 public supply or private water supply wells around Dawson. Rock Creek / Airport has 6 and are all within the Wildland-Urban Interface and near continuous forest fuels. Bear Creek has 1. There are several that are well-protected within Dawson City and 2 supplying the campground in West Dawson. Water supply wells can be impacted by wildfire through several processes. First, contamination from particles after a wildfire seeping into wells (because of the fire or from fire retardant). Secondly, well infrastructure can be impacted, depending on well design.
Firefighting water supply	Water sources for firefighting appliances may limit efficiency of firefighting—if wells cannot be accessed and there is no nearby hydrant system, firefighting appliances will have to leave the fire to re-fill elsewhere, such as the Yukon or Klondike Rivers.
Health facilities	If the Community Hospital were to be directly impacted by fire, or if Dawson were to be temporarily disconnected from supplies/staff, the community might not be able to access health care. The Yukon healthcare facility nearest to Dawson is in Mayo (230 kilometres).
School facilities	If the school were to be directly impacted by fire, or if Dawson were to be temporarily disconnected from staff, the community might not be able to access school and facilities. The Yukon school nearest to Dawson is in Mayo (230 kilometres).
Economic: tourism, forest products	Loss of environment assets and increased smoke in the area can reduce tourism. Loss of forest harvest opportunities will impact jobs within Dawson. Loss of historic buildings, including those in Dawson and in Moosehide, will also significantly impact tourism.
Infrastructure	Chemical changes such as increased acidity from fire product runoff can impact biological treatment of sewage.
	Historic wooden structures in Dawson and Moosehide are particularly vulnerable.
	Impacts to powerlines and telecommunications (e.g., internet, telephone services, radio repeaters) that affect the public, as well as communications and coordination of wildfire response.
Environmental Values	Forests and river inlets around the areas of interest provide regional biodiversity values and support species at risk. Loss of habitat can occur not only when forests are burned at too high a severity or too frequently, but also when soil properties are altered, and chemicals and sediments infiltrate nearby rivers.

5. Plan Implementation

The following section highlights actionable tools proposed for wildfire risk management in Dawson City, including forest fuel treatments and other risk management tools. It also describes the risk factors and key vulnerabilities for each area of interest (i.e., subdivisions) and proposed methods to reduce those risks.

5.1 Proposed Forest Fuel Treatments

Proposed forest fuel treatment areas are positioned to take advantage of existing terrain features and infrastructure as well as linear breaks in the fuels, and access such as trails and roads. The areas were

additionally selected based on the most likely direction of an encroaching wildfire based on weather, winds, forest fuels, fire history, ignitions, and ability to protect the areas of interest and values at risk. These proposed forest fuel treatment areas enable a reduction in expected wildfire behaviour.

This plan identifies areas for fuel treatments based on the above factors. However, the actual area to be treated will be based off heritage assessments, public input and a site plan that considers fuels, topography, etc. In addition, wildfire professionals will identify which combination of treatments may be utilized: FireSmart, fuel abatement techniques, prescribed fire and/or stand conversion.

5.1.1 FireSmart

FireSmart is a national program that helps Canadians increase community and individual resilience to wildfire. It was founded over 20 years ago to address common concerns about wildfire in the Wildland-Urban Interface. The FireSmart program introduces several principles on how property owners and land managers can make their properties or neighbourhoods more fire resilient.

All property owners are strongly encouraged to visit FireSmart Canada's webpage to get up to date on the resources available and learn what they can do to increase their own resiliency: firesmartcanada.ca/. Fuel treatments on public lands are more effective when combined with work completed on homeowners' properties to increase the resiliency of individual homes and entire neighbourhoods. Additionally, informational booklets are available at the Klondike Fire Centre managed by the Government of Yukon, Wildland Fire Management.



Figure 9: FireSmart Project at Moosehide.

One FireSmart principle states treatment of forest fuels in volatile fuel types (i.e. coniferous trees) can help to reduce risk of wildfire by reducing the potential intensity, severity and rate of spread. FireSmart projects on public lands are commonly implemented as 3-5 metre spacing of conifer species stems, retention of less flammable deciduous species, pruning limbs of remaining timber to a minimum height of 2 metres, and piling and burning debris. These programs generally target the Wildland-Urban Interface zone where human development meets or intermingles with the natural environment.

FireSmart projects have been completed throughout the planning area and will continue to be implemented in the planning area. This includes conducting new FireSmart forest thinning projects in strategic areas within the Wildland-Urban Interface as well as utilizing FireSmart forest thinning techniques cohesively with other fuel abatement techniques listed in Section 5.1.2 to buffer trails or on challenging terrain.

5.1.2 Fuel Abatement

Fuel abatement is a term to describe large-scale forest fuel treatments that extend through the Wildland-Urban Interface zone and into the landscape zone. Fuel abatement projects tend to be larger in size than FireSmart projects, with more aggressive removal of forest fuels.

These larger fuel treatments remove and/or reduce surface, ladder and crown fuels to reduce the rate of spread, fire intensity and the likelihood of a transition from a manageable surface fire to an aggressive crown fire.

Larger fuel treatments provide strategic anchor points and tactical opportunities for firefighting operations. The treated areas enable safer access and egress (i.e., escape) for firefighters to suppress a wildfire. They also enable a strategic location for tactics such as backburning, which removes the fuels between the fuel treatment area and an approaching wildfire.

The following describes the fuel abatement tools proposed under this plan:

A **Fire Guard** is a linear feature where all vegetation and organic matter is removed down to mineral soil. Linear fuel treatment areas can provide some fire behaviour reduction benefits. However, they mostly provide tactical, operational outcomes. These linear units enable safer access and egress (i.e., escape) for firefighters and necessary equipment into fuel treatment areas and into high-risk areas to attack a wildfire. They also enable strategies such as backburning to remove fuels between the fire guard and an approaching wildfire.



Figure 10: Example of a Fire Guard.

A **Fuel break** is typically a larger parcel of land on which the forest fuels and ground vegetation have been reduced or modified to reduce the fire's ability to spread rapidly. A fuel break may include:

- **Shelterwood thinning** the forest through hand falling and/or mechanical cutting. A shelterwood thinning treatment includes an increased spacing (5-8 metres) between stems of trees to reduce the potential for sustained crown fire and reduce the spread rate of fires that travel through the forest canopy.
- **Variable retention** includes full removal of all coniferous stems and retention of healthy deciduous stems to create a landscape-scale fragmentation in forest fuels.
- **Mastication and mulching** using machinery to remove and/or reduce fuels on the surface to reduce the potential for fire to reach critical surface intensity/potential to spread to a crown fire.



Figure 11: Example of the Mary Lake Shaded Fuel break in Whitehorse showing various fuel treatment techniques, including shelterwood thinning, variable retention (clearcuts), mastication (mulching) and prescribed burning.

5.1.3 Prescribed Fire

Prescribed fire involves the introduction of a planned and controlled fire to an area under specific weather conditions. Prescribed fire offers an efficient and cost-effective method to reduce fuels and is often used after a fuel treatment, such as a clearcut, has been conducted to remove additional surface fuels. It may also be used as a removal treatment in a mixedwood forest to eliminate more flammable conifers and stimulate deciduous growth (i.e., forest fuels). Individual prescribed burn plans will be developed based on site requirements. They will include an operational plan that considers safety and optimal weather conditions.



Figure 12: Prescribed burn in Duke Meadows near Burwash Landing.

Prescribed fire makes it difficult for a natural fire to ignite as fuels are already burnt. They are also used as a strong tool to enrich and prepare the ground for stand conversion.

5.1.4 Stand Conversion

Stand conversion has been supported by research as a strategy to reduce the risk of a catastrophic wildfire. Stand conversion involves removal of volatile coniferous species and replacing with fire-resistant deciduous species like aspen and/or birch. This can be conducted through tree planting projects or manipulation to encourage deciduous to regenerate naturally through suckering and other techniques.

Native deciduous trees (trembling aspen or white birch) may be damaged from fire but seldom have significant contribution as a fuel to the wildfire unless under extreme fire conditions (see Figure 13). This is due to their higher moisture content (trunks and thick branches) as well as the green leaves retaining more moisture than spruce needles. Additionally, these species rarely have 'ladder fuels' (i.e., branches/leaves) on the lower two thirds of a mature native deciduous species. 'Ladder fuels' are a key driver of whether a fire on the surface can travel to the crown of the tree and become more aggressive and difficult to suppress.

Therefore, stand conversion from spruce to native deciduous species has the benefits of:

- Having the potential to slow or stop a wildfire in certain conditions.
- Buying wildland firefighters more time to conduct a response to an approaching wildfire.
- Increasing safety for the wildland firefighters initiating a response by reducing the intensity of wildfire.
- Reducing frequency of maintenance in a fuel break.
- Increasing aesthetics following a fuel treatment.



Figure 13: Photo depicting a 2023 wildfire where lodgepole pine trees were completely charred from bottom of the tree to crown, whereas fire resilient aspen only burned approximately a quarter of the stem and leaves remained intact (Credit: Government of Yukon).

5.2 Areas of Interest for Fuel Treatments

This section outlines the areas of interest identified as priority areas within the planning area for wildfire risk assessment and risk management planning. The areas of interest were selected for having high concentration of values at risk and key vulnerabilities, as well as where much of the population of people within the planning area live, work and recreate. The following section summarizes the areas of interest with details of wildfire risk, values and key vulnerabilities. See Figure 14 for an outline of completed and proposed fuel treatments. The areas of interest are general areas that highlight the most populated places that are targeted for risk reduction.

Due to the geographic spread and jurisdictional separation between areas of interest, sections of this plan are separated into the following four planning areas: West, Moosehide, City and East:

Table 7. Area of Interest Groupings.

	West	Moosehide	City	East
Parcels/subdivisions included	West Dawson, Upper West Dawson, Sunnydale	Moosehide	Dawson City, Dome Subdivisions (including C4-Trondëk Subdivision), Callison/Dredge Pond	Bear Creek, Airport, Rock Creek, Henderson Corner

Completed and Proposed Fuel Break /FireSmart Areas and Existing and Proposed Fire Guards

- Proposed Fire Guard
- Existing Fire Guard
- Proposed Fuel Treatment Areas
- Completed Fuel Treatment Areas
- First Nation Settlement Lands - Surveyed
- A: Surface and Subsurface Rights
- B: Surface Rights
- FS: Fee Simple
- Watercourses
- Waterbodies
- Transportation
- Highway
- Primary Road
- Local Road
- Resource/Recreation Road
- Alley/Service Lane

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 Map Compiled By: jgwright
 Wildland Fire Management
 Department of Community Services
 Government of Yukon

October 30, 2024

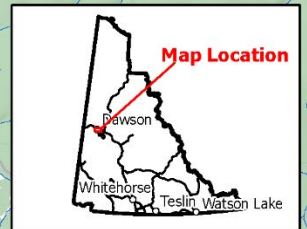
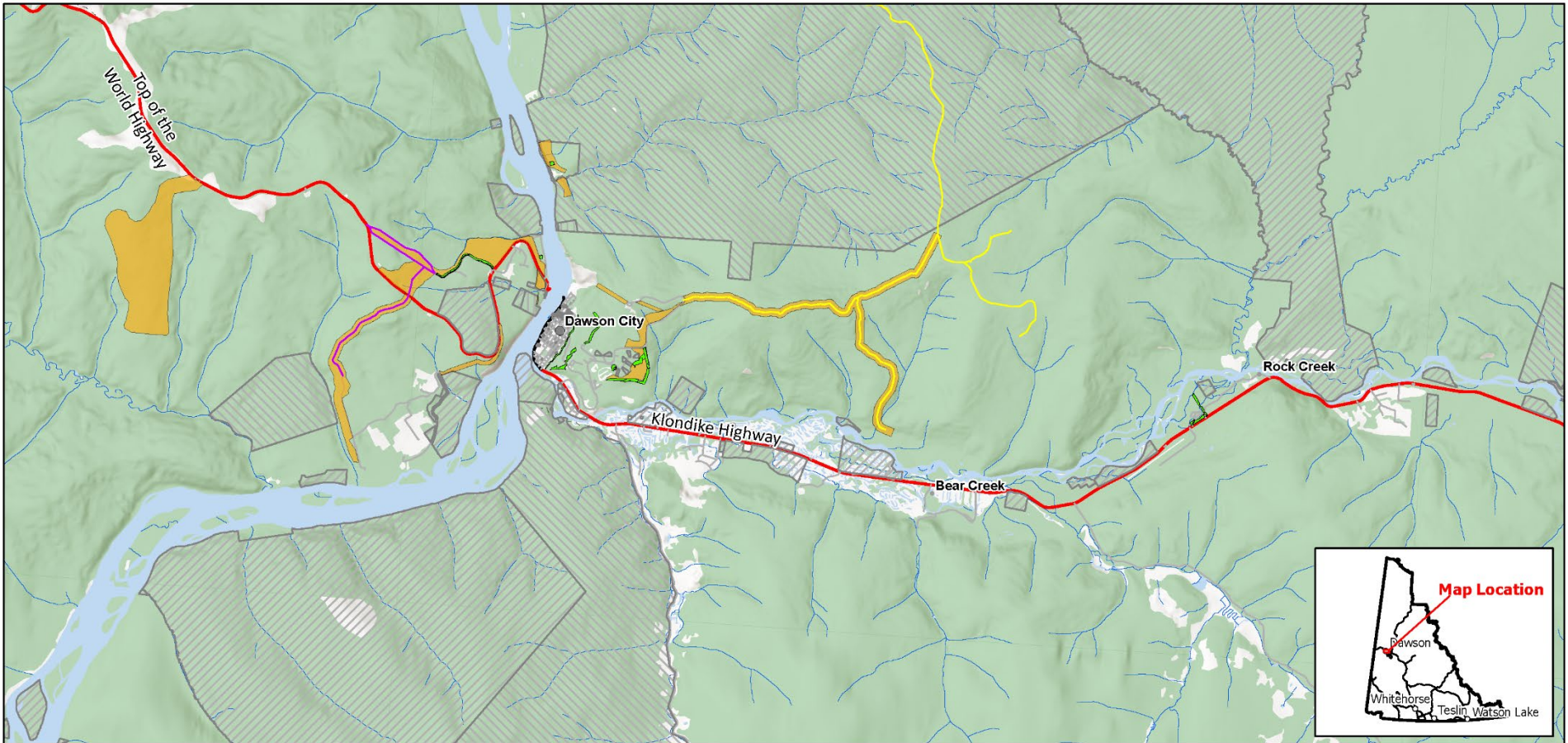


Figure 14: Completed and Proposed Fuel Treatments in the Planning Area.

5.1 West Grouping

Wildfire Risk and Key Vulnerabilities: West Dawson and Upper West Dawson are situated off the Top of the World Highway with lot sizes averaging about 1.5-2 hectares. Sunnydale is situated down the Sunnydale Road and is comprised of larger lot sizes, many over 10 hectares. Many of the larger lots have been cleared for agricultural purposes. Large clearings for agriculture offer a break in forest fuels which can be helpful for responders during a wildfire event and in reducing local wildfire risk, if fuels are maintained.

Fuels consisting of dense spruce are present to the north and northwest and often run right up into residential areas. Areas surrounding Sunnydale and to the west of Upper West Dawson and West Dawson offer a relatively high density of mixedwood forest consisting of mature white spruce and white birch. White birch tends to be more resistant to wildfire due to high moisture content, except in high and extreme fire conditions. Active logging in the Top of the World Timber Harvest Plan has also created fragmentation in the forest fuels (See Section 5.3.2 Management Plans) that can help decrease risk.

Access and amenities are limited in the West Grouping. There is no bridge across the Yukon River, so residents rely on ferry passage during summer months. As a result, emergency egress is restricted if a wildfire were to approach from the west or northwest. Residents of Sunnydale, West Dawson and Upper West Dawson lack a secondary escape route should the Top of the World Highway become blocked, particularly in Sunnydale where there is one main road to the highway.

There are currently no structural fire protection facilities or equipment that officially service this area; therefore, residents must be self-reliant or experience a slow response in the event of an emergency. For example, human-caused fires that can typically be quickly extinguished have the potential to burn out of control without available resources. The West Dawson and Sunnydale Local Area Plan recognizes a need for the establishment of a local fire protection mechanism, particularly due to access and egress constraints in the area.

Proposed Fuel Treatments: Strategic forest fuel treatments are particularly important in the West Grouping due to the key vulnerabilities that are present, as well as the significant amounts of available fuels (i.e. intact mature spruce forest) and trend of ignitions to the west and northwest. For those reasons, the West Grouping is the primary focus of fuel treatments for the planning area. The proposed areas also take advantage of existing access and plan to connect to more fire-resistant, intact deciduous forest and fragmentation in the landscape.

The forest fuel treatments presented may be a combination of FireSmart, shelterwood and variable retention. Existing FireSmart adjacent to West Dawson may be extended, while areas further from the subdivisions may receive treatments that result in more fuel removal. Local trails shall be identified during site planning and consideration will be taken to buffer or reduce impacts accordingly.

Areas labelled as 'Fire Guard' would provide an alternate egress route for residents in the event of an emergency evacuation, particularly for Sunnydale. Additionally, these fire guards would provide improved access for firefighters and equipment to conduct fuel treatments. When not in use, fire guards may be designated as forest resource roads and gated to reduce impacts. Any access that is already existing will not be gated. Forest treatments are also proposed adjacent to the Sunnydale Road to reduce radiant heat to residents during an evacuation.

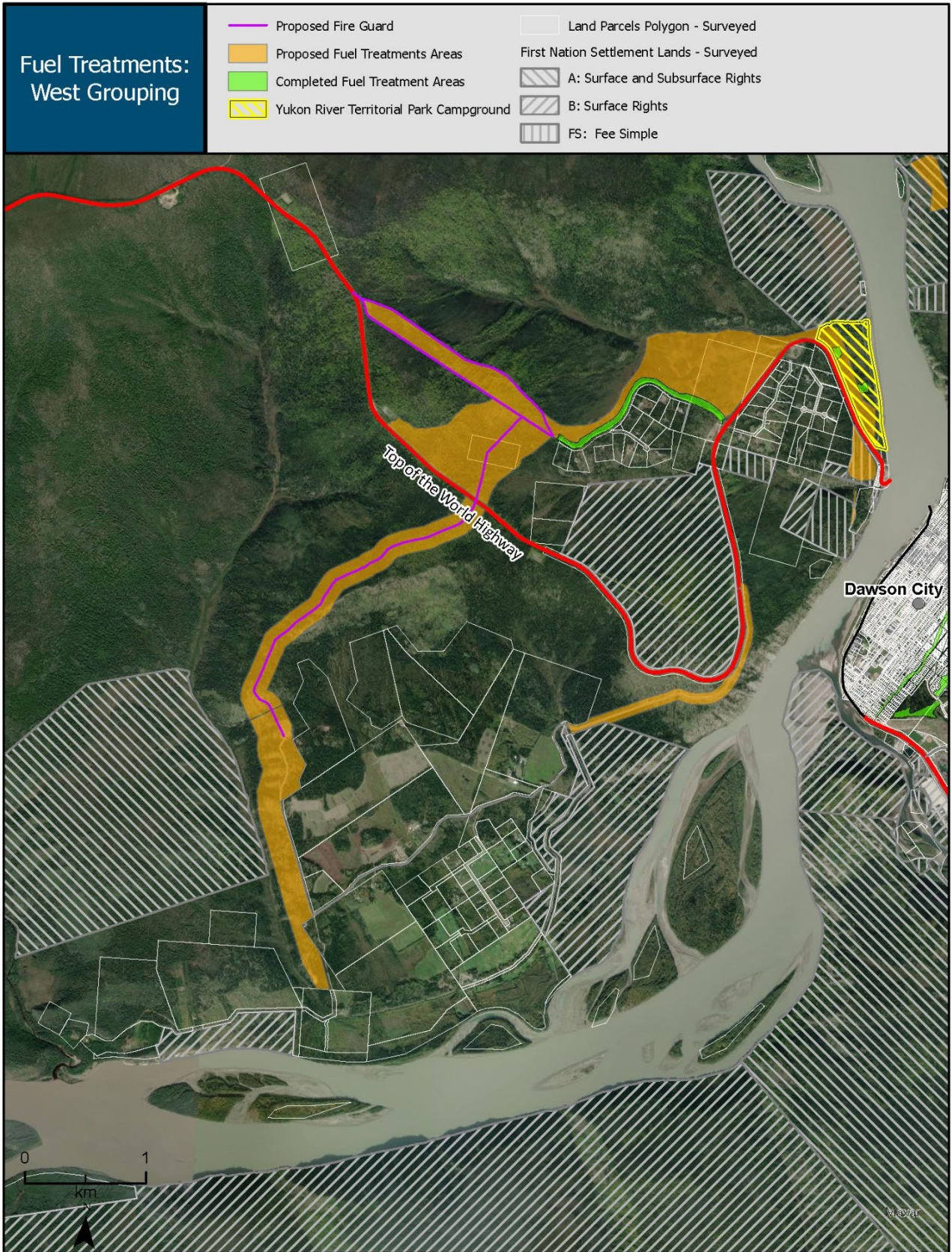


Figure 15. Fuel Treatments in West Grouping: Sunnydale, Upper West Dawson and West Dawson subdivisions.

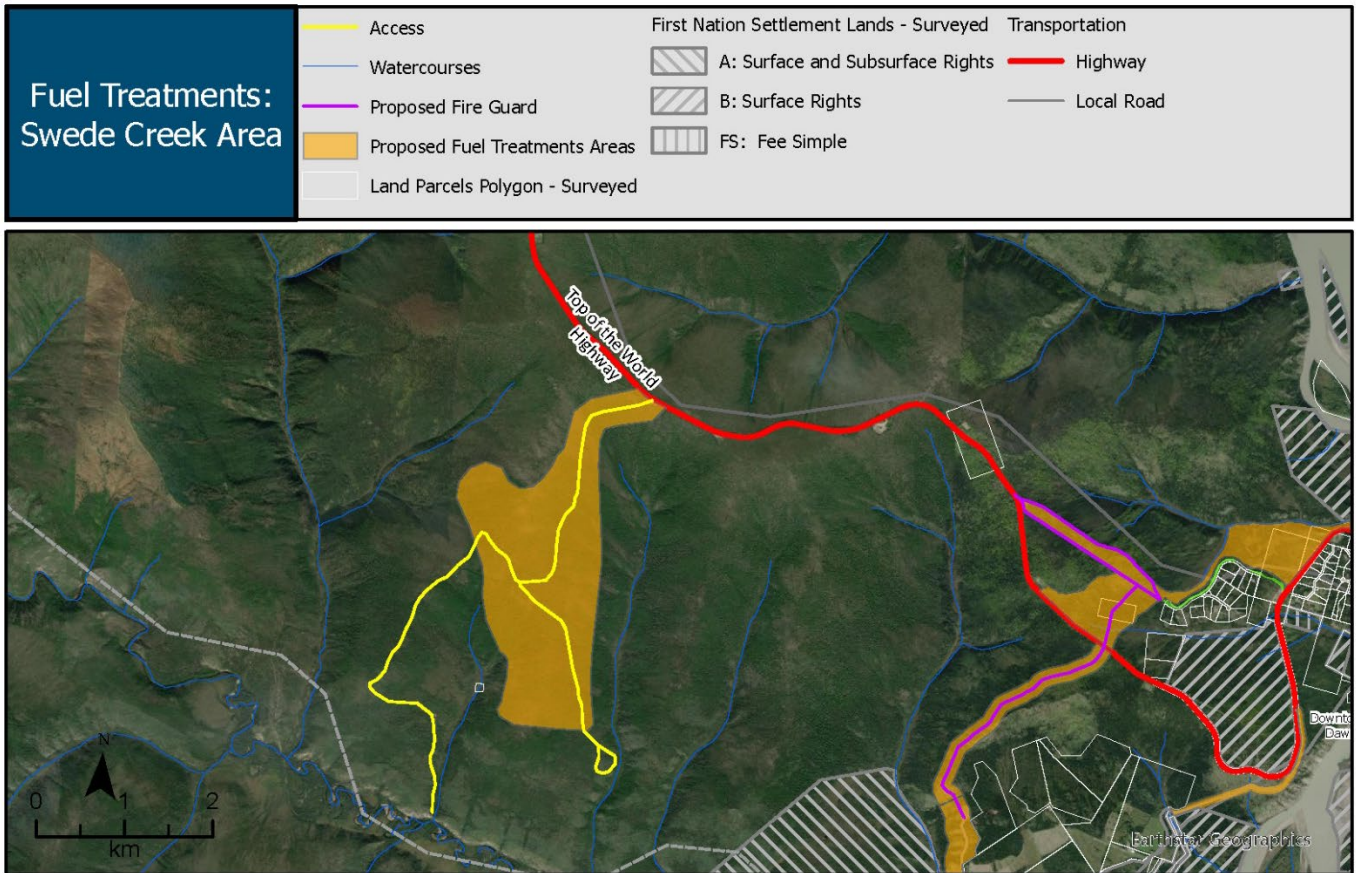


Figure 16. Fuel Treatments in Swede Creek Area.

There is an extensive history of fire ignition in the Swede Creek valley that is of concern when coupled with extensive, intact spruce forest. Forest fuel treatments in Figure 16: Fuel Treatments in Swede Creek Area is scoped in as a strategic location to construct a fuel break due to its existing access and potential utility to suppress a wildfire before it approaches the subdivisions.

5.2 Moosehide

Wildfire Risk and Key Vulnerabilities: Moosehide contains the small village site located 5 kilometres north of Dawson City, along the Yukon River. A traditional village site, Moosehide was inhabited by the Tr'öndëk Hwëch'in after their displacement from Tr'ochëk. Most residents moved to Dawson in the 1950s. However, the site is used seasonally by several families. Moosehide is an important village for gatherings, special events and cultural activities. The village contains over 20 cabins and other significant structures and is part of the Tr'öndëk-Klondike UNESCO World Heritage Site.

Biannually, the site hosts Moosehide Gathering across multiple days in July. If an evacuation were required, it would require a large number of boats and/or aviation resources to evacuate the 500-2000 visitors that may be present.

To the north and northeast of Moosehide is largely open deciduous, grassy hills. Beyond these areas are old burns that may be less susceptible to being burned again in subsequent years. Moosehide may be more vulnerable to fire in early spring prior to green-up.

The village can be accessed by overland hiking trails or via boat on the Yukon River; therefore, there is no year-round vehicle access. This limits emergency egress (escape) and suppression efforts. There are no formal firefighting services available to Moosehide. A need has been recognized for an increase in firefighting training and resources in the Tr'ondëk Hwëch'in's 2016 Community Plan.

There are several pieces of infrastructure in place that have reduced Moosehide's vulnerability to wildfire. In 1999, a cat guard was constructed 9 kilometres east of Moosehide and then widened along a 5-kilometre stretch during a 2015 fire. FireSmart projects have also been ongoing over the years in the area directly adjacent to Moosehide.

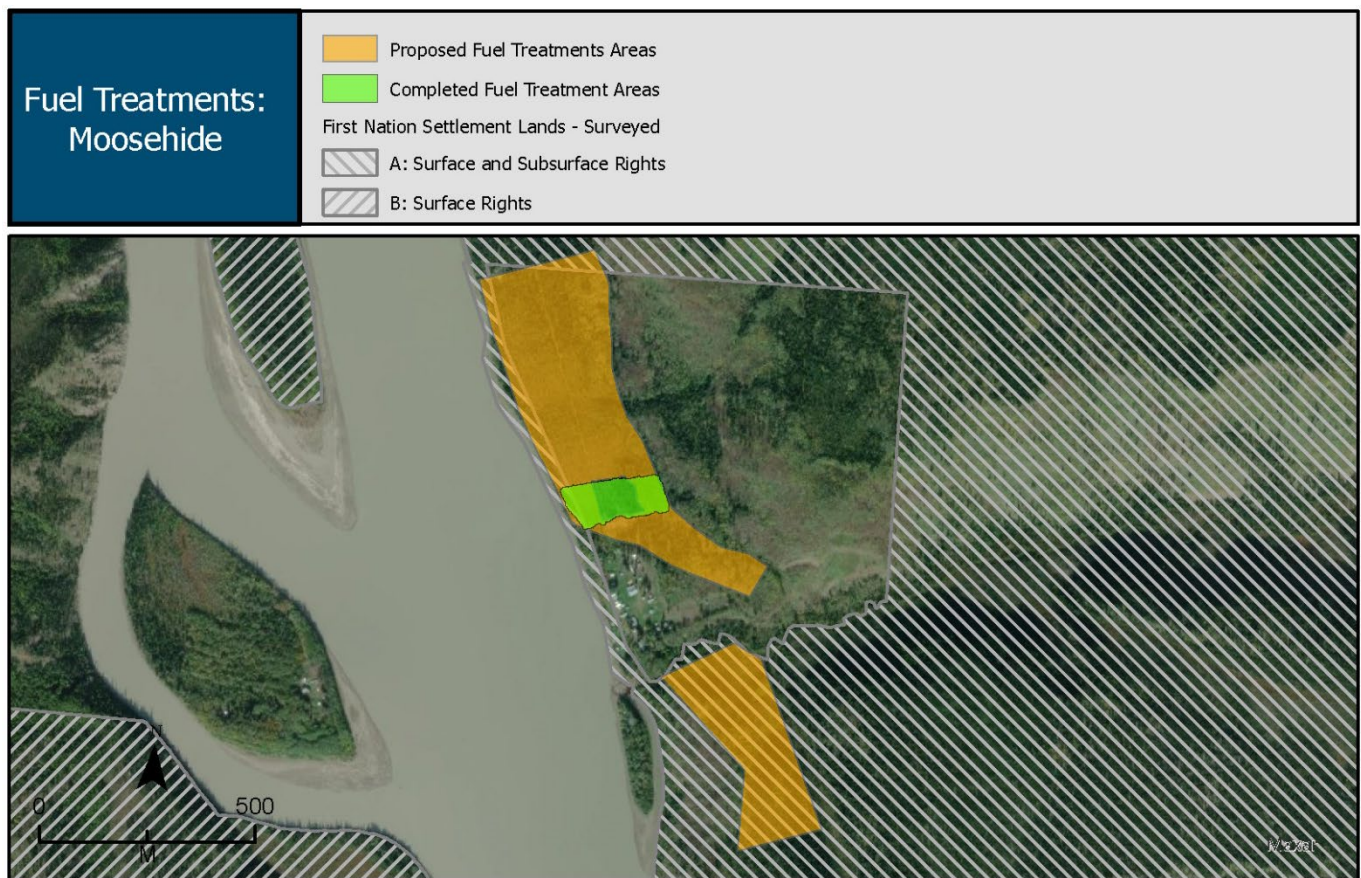


Figure 17. Fuel Treatments in Moosehide Area of Interest.

Proposed Fuel Treatments: Proposed fuel treatments in Moosehide are likely to be a less intrusive FireSmart or shelterwood treatment. This will likely be conducted using non-mechanized techniques (i.e., hand falling) due to the difficulties in bringing equipment into the site. The thinned forest will reduce chances of embers igniting and, in the correct conditions, reduce a crown fire to a less intense surface fire. It also creates defensible space and increases time for wildland firefighters to protect structures at this site.

5.3 City Grouping

Wildfire Risk and Key Vulnerabilities: This grouping consists of all areas within Dawson City’s municipal boundaries, which includes the historic downtown area as well as the newer subdivisions southeast of downtown along the Klondike Highway, including Trondëk (Steve Taylor) and Dome subdivisions, and the Dome Road area.

While much of the City Grouping is largely protected from wildfire due to rivers on the west and south flanks, there is also an extensive tract of mixedwood forest directly north and east of the City Grouping that poses a threat to the town.

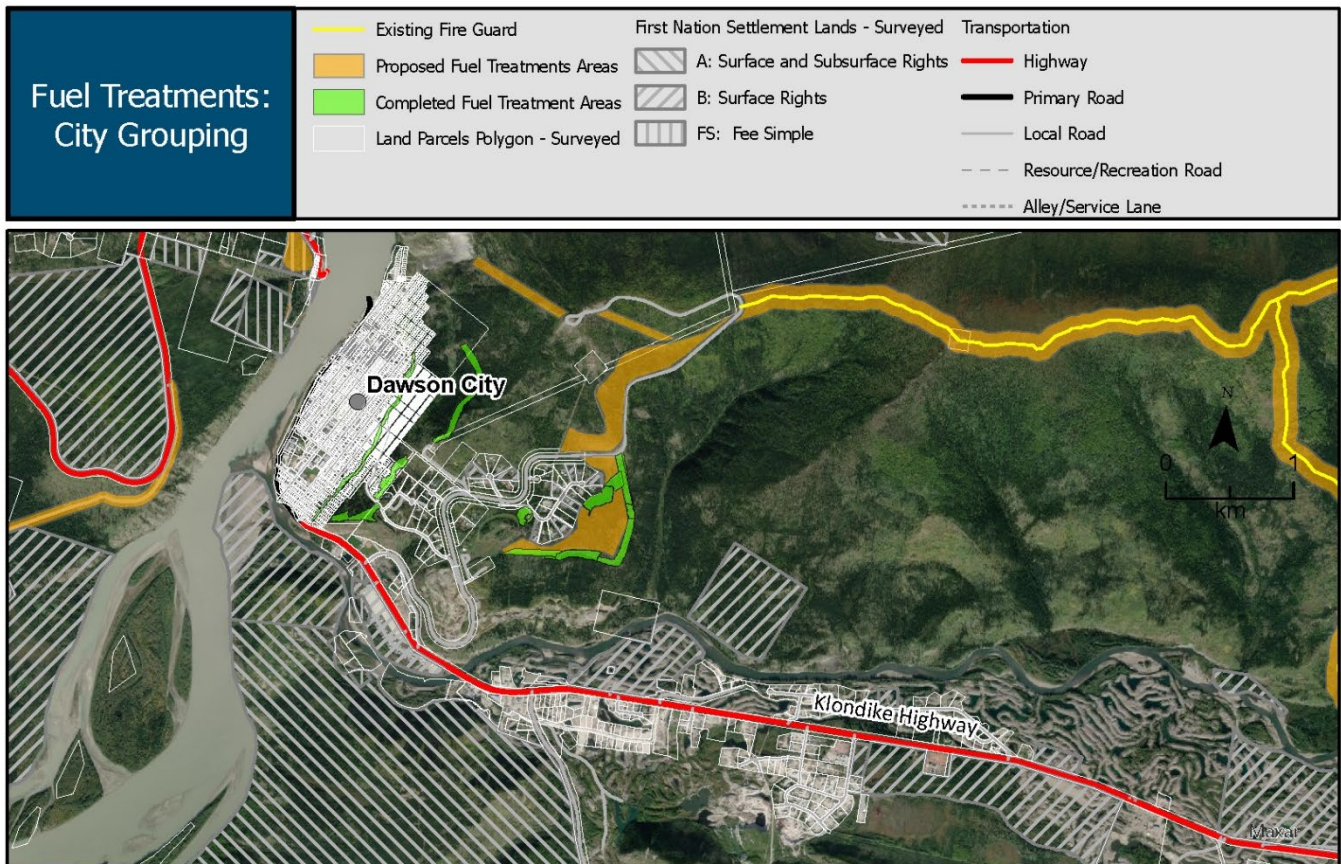


Figure 18: Fuel Treatments in City Grouping: Dawson City, Dome and Callison/Dredge Pond subdivisions.

The City Grouping boasts all functional amenities: emergency services, grocery, hardware and necessity stores, a school, hospitality services, etc. If a wildfire were to impact the City Grouping and major amenities were damaged or destroyed, the town and surrounding area would suffer.

Most of the buildings located in the downtown area of the City Grouping are densely spaced and many are important heritage buildings. The Dawson Historical Complex is a National Historic Site made up of 17 buildings that are irreplaceable. These are generally constructed out of aged wood surrounded by wooden boardwalks that are highly flammable. There is a strong desire to preserve the buildings of downtown Dawson but also the

essence and nature of this historical place; therefore, many of these structures are limited in their construction by several municipal, territorial, and federal plans, acts and regulations.

The Dawson City Fire Department provides fire response services to the area located within the Dawson City municipal boundary. This unit is under the direction of one paid Fire Chief who organizes about 30 volunteer firefighters and several engines.

The Dome Road subdivision consists of over 50 lots with ample distance between homes. The space between these homes is largely filled with forest comprised of predominately spruce. The spruce leading forest within, and adjacent to, the area could pose a threat to the neighbourhood for localized ignitions, travelling embers and oncoming wildfire.

The Callison and Dredge Pond neighbourhoods are fairly well-protected from wildfire as the lots are large, cleared of vegetation and built amongst tailing piles that are unlikely to burn. Due to the dredge ponds and the flanking Klondike River, there is ample water for fire suppression operations.

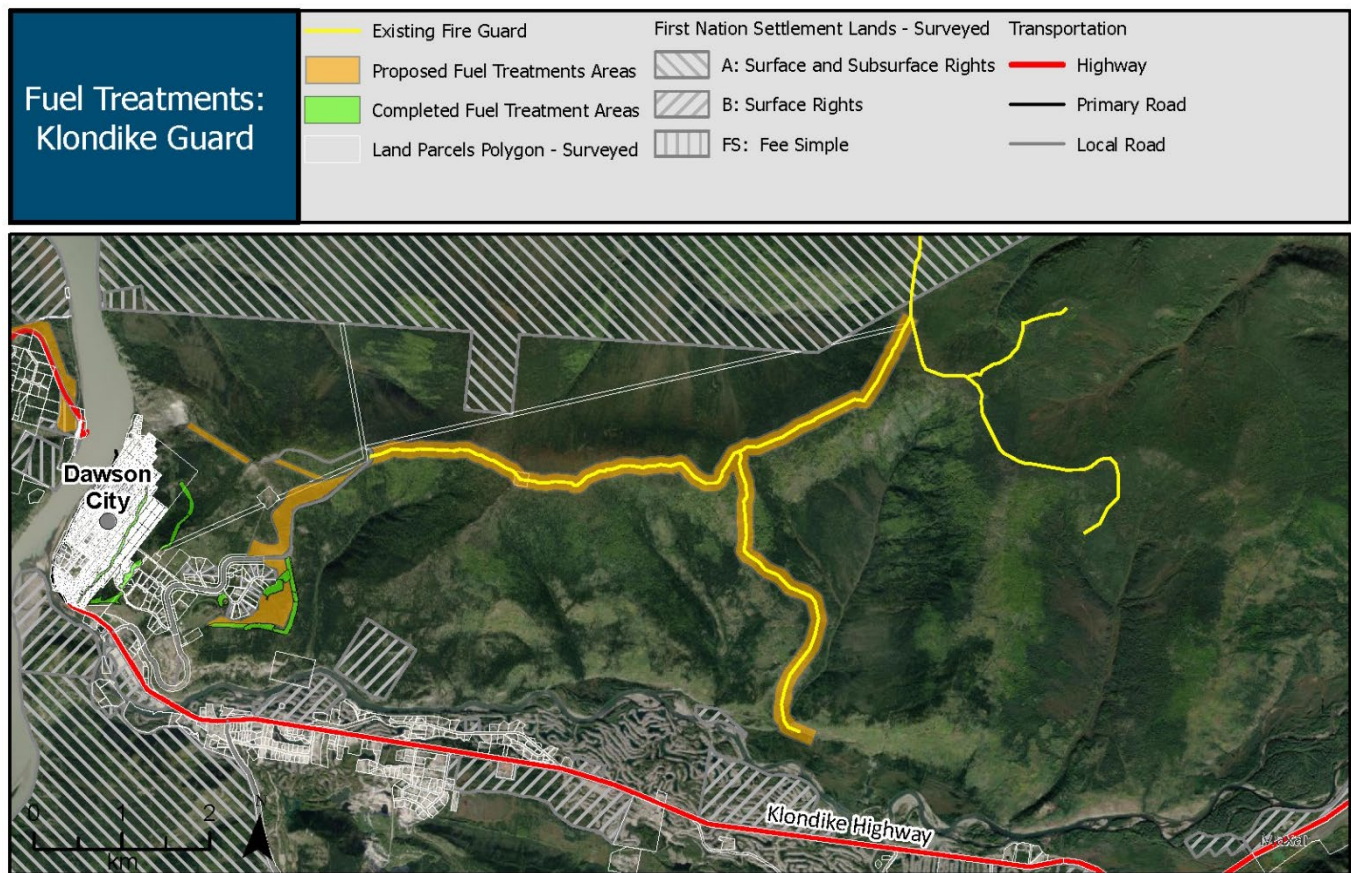


Figure 19: Fuel Treatments: Klondike Guard.

Proposed Fuel Treatments: To protect the City Grouping from a potential wildfire in the intact spruce forest to the north and northwest, it is recommended to extend existing FireSmart and other thinning work along the Dome Road and subdivisions. A variable retention (clearcut) is proposed for the two linear features extending from the Dome Lookout to create access for fire suppression and a break in forest fuels. Wildland Fire

Management recognizes the importance of the trail system on the Dome Road and will work with stakeholders to protect and buffer these recreational resources from fuel abatement operations.

The existing fire guard may be upgraded for ease of access. Forest fuels adjacent to the fire guard may be brushed, thinned or cleared to create a wider break that protects the entire City Grouping as well as the North Klondike Highway as an egress route in the event of an evacuation order. This will also be a strategic location for fire suppression activities.

5.4 East Grouping

Wildfire Risk and Key Vulnerabilities: This grouping includes the inhabited areas along the Klondike Highway, east of the City of Dawson’s municipal boundary and includes Bear Creek, Dawson Airport, Rock Creek and Henderson Subdivision. The Klondike Valley Fire Department has jurisdiction over structural fires in this grouping.

This expansive area is variable in forest types from mature, pure spruce forest in the Rock Creek area, to grasslands in the Henderson Corner area, and mixedwood forest and swamps dominated by willow and black spruce throughout. The Klondike River lies to the north of the grouping but is not as wide as the Yukon River. Thus, it offers less protection from extreme wildfire behaviour and ember travel.

The Bear Creek Subdivision was created in the 1980s and many properties exemplify the pre-FireSmart vintage: dry wood building materials, outbuildings located close to the main building and little to no clearing of vegetation within the home ignition zone. Some areas are cleared of vegetation due to old mining operations and consist of tailing piles flanked by early seral species such as trembling aspen, balsam poplar and willow, which is representative of resiliency to fire. Other areas of the subdivision contain thick coverage of mature spruce adjacent to buildings, which is less resilient. The main cluster of homes and infrastructure are all located along a body of water that would provide ample water for fire suppression activities.

The Dawson City Airport is located about 18 kilometres from Dawson City. The expansive cleared area of the airport offers an existing fuel break from wildfire. While there is little direct threat due to the extensive clearing in and around the airport, directly across the Klondike Highway to the northeast is a roughly 100-hectare parcel of dense mature spruce, which could be volatile in the event of a wildfire. Smoke could limit the ability to travel in and out via the airport and North Klondike Highway. It could also impact important flights such as medical evacuations.

The Rock Creek area consists of two different components: the main subdivision between the Klondike River and the Klondike Highway, and a large agricultural area to the north of the Klondike River. The subdivision is a newer development than Bear Creek and contains larger lot sizes that are less densely spaced. While house-to-house ignition would be less probable, the concern is the large amount of mature spruce that surrounds homes.

Across the Klondike River are several isolated agricultural parcels that are only accessible by boat. These appear to be less at-risk due to the sparser nature of vegetation on the south-facing slopes, though they may also be threatened by black spruce, scrub birch and willow vegetation in the surrounding area. If the surface fuels and conditions are dry enough to ignite, wildfire can spread rapidly through these fuels. Emergency access, egress and means of communication are limiting factors for wildfire resiliency for this population.

Lot sizes in Henderson Corner vary but many are over 1 hectare in size and contain areas cleared of standing timber. These spaces offer protection from wildfire if grasses are kept green and/or short. The area surrounding the south side of the subdivision consists of low-lying black spruce, scrub birch and willow ecosystems with some thick pockets of mature spruce.

Grassy fuels are relatively widespread in the Henderson Corner area. Wildfire can spread rapidly through dead cured grasses during the spring and summer. Residents of Henderson Corner are strongly encouraged to maintain their properties by keeping grasses short and following FireSmart principles for keeping a fire resilient property.

Proposed Fuel Treatments:

FireSmart work will continue within the Klondike River Campground and Rock Creek Subdivision. The Klondike Guard is intended to offer some protection to the East Grouping from a fire approaching from the north. Further timber harvesting on the Dome Road Timber Harvest Plan could increase fragmentation of hazardous forest fuels on the landscape to lower the risk of fire. Residents in Henderson Corner, Rock Creek and Bear Creek are encouraged to carry out FireSmart actions to reduce the vulnerability of their structures.

Wildland Fire Management will explore options for fuel abatement in Henderson Corner whether it is proposed fuel treatments on the ridge south of Henderson Corner, on the bottom of the slope south of Henderson Corner, or options for prescribed burning of grasses. Placement of fuel treatments in this area will depend on wet and permafrost conditions being conducive to land clearing.

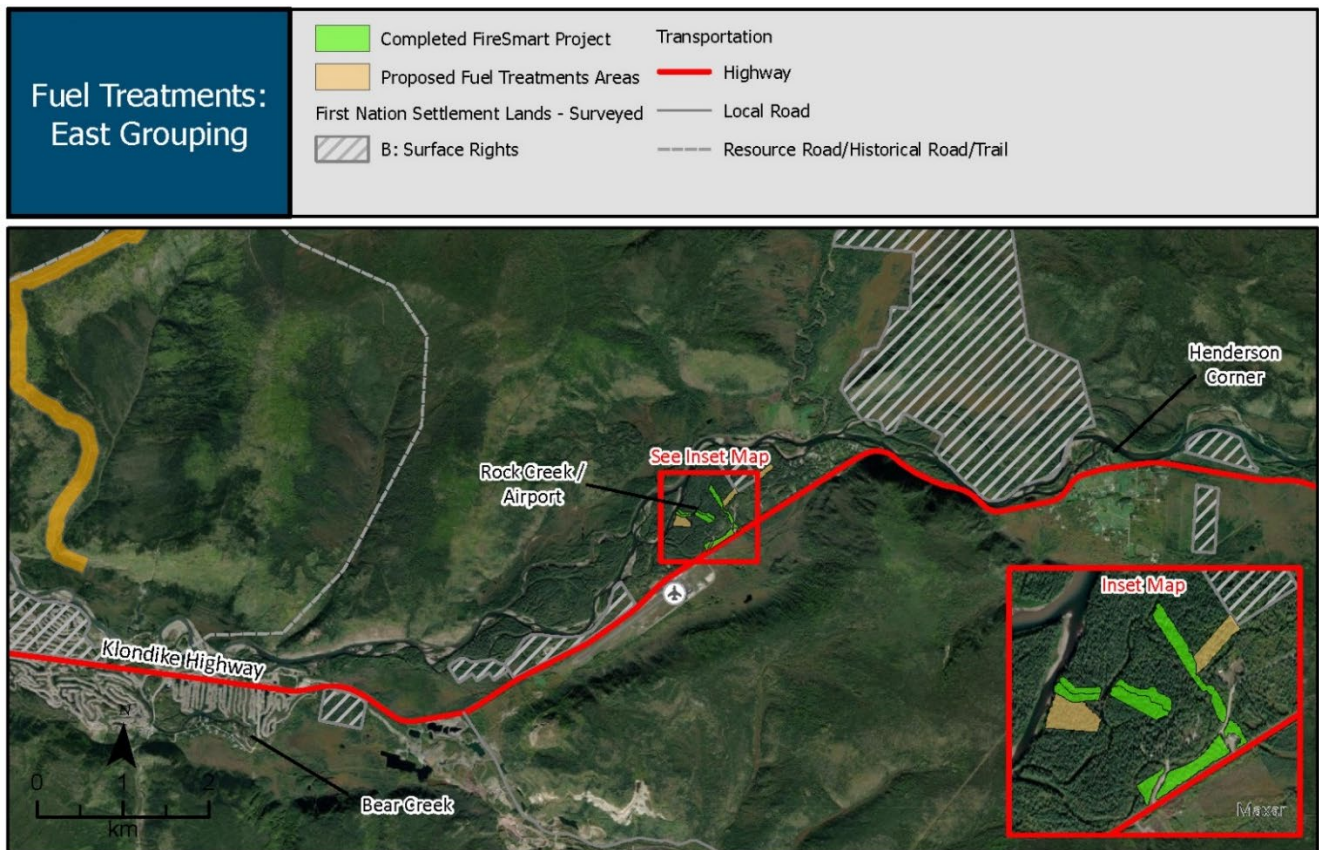


Figure 20. Fuel Treatments in East Grouping: Bear Creek, Rock Creek / Airport and Henderson Corner subdivisions.

5.3 Other Risk Management Tools

5.3.1 Bylaw and Zoning

Communities can have a significant impact on reducing fire risk by considering a suite of options available through regulations such as zoning and/or bylaws. New infrastructure, such as future subdivisions should consider fire hazards prior to development. Established infrastructure should consider fire risk whenever upgrades are required. The Canadian Standards Association has developed a new National Standard of Canada for Fire Resilient Planning for Northern Communities S504:19. This standard helps guide community developments and building standards with considerations for communities living in fire prone boreal ecosystems such as those in Yukon.

5.3.2 Management Plans

Appendix 2 identified key local management plans for the planning area. These existing plans include information that guides the contents of the Community Wildfire Protection Plan and may include policies and recommendations that touch on reducing risk of oncoming wildfire for the community. Additionally, future management plans or amendments to existing plans should consider the contents of the community wildfire protection plan and incorporate the content to consider increasing fire resiliency.

For example, upgrading the Klondike Guard will create better access to the Dome Road Timber Harvest Plan (See Figure 21). The Dome Road Timber Harvest Plan has been a relatively inactive approved harvesting area. Allowing permits for personal and commercial timber harvesting, within the specifications outlined in the Dome Road Timber Harvest Plan, will create further fragmentation in forest fuels that reduce risk.

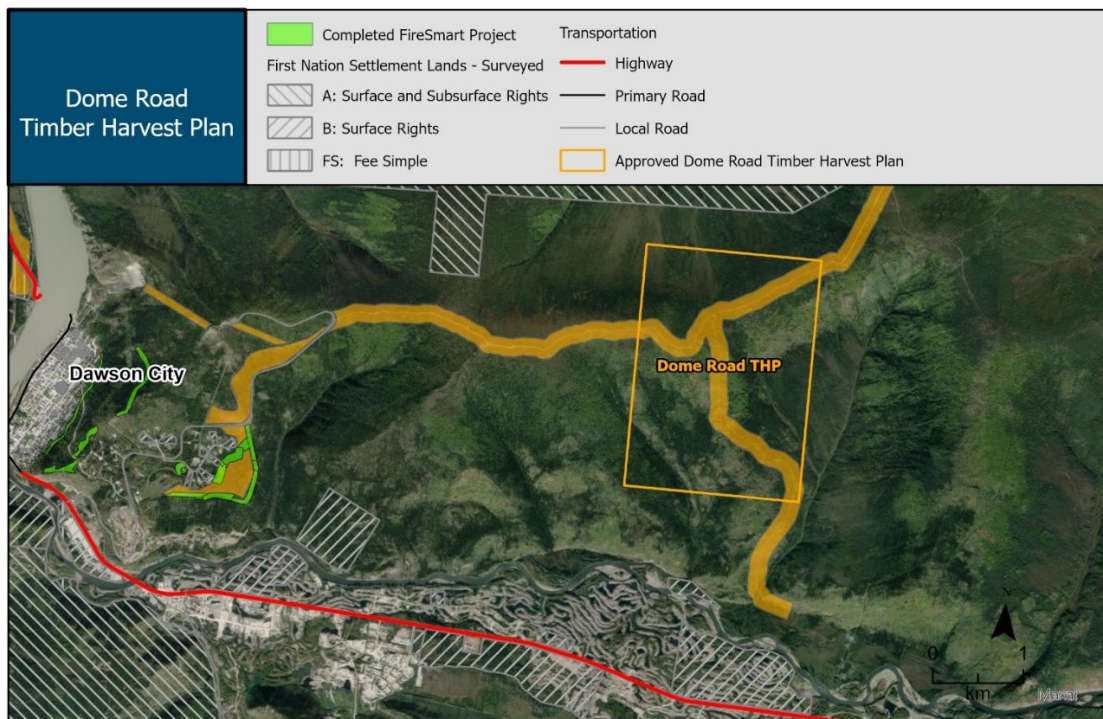


Figure 21. Location of the Klondike Guard and Dome Road Timber Harvest Plan that could contribute to create fragmentation in the landscape.

Additionally, the Top of the World Timber Harvest Plan, located approximately 3 kilometres west of Dawson City in the West Dawson/Sunnydale area, has been actively harvested for green timber since its approval in 2014. Active harvesting has resulted in fragmenting and creating breaks in forest fuels, contributing to fire risk-reduction.

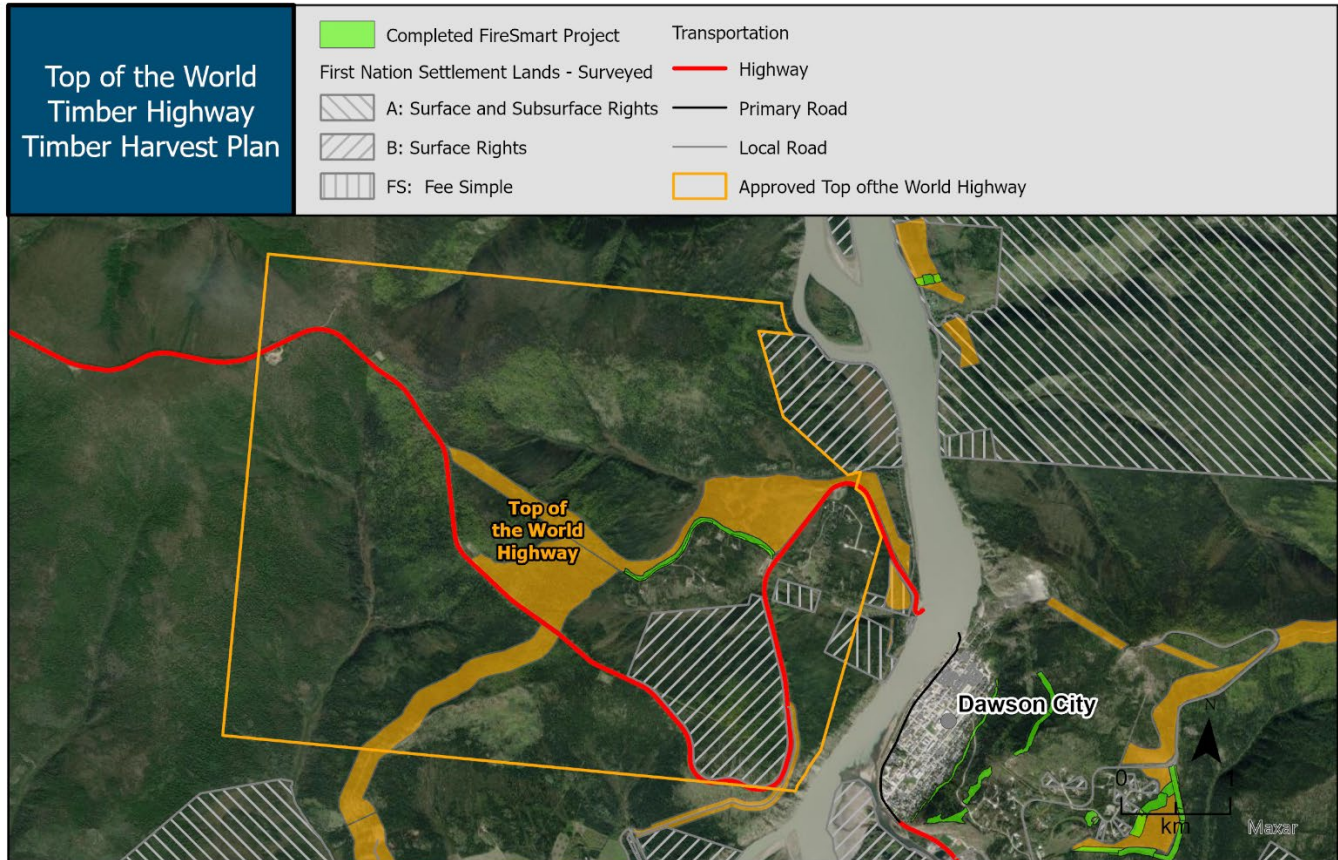


Figure 22. Location of the Top of the World Highway Timber Harvest Plan that could contribute to creating fragmentation in the landscape.

5.3.3 Community Education and Engagement

The Community Wildfire Protection Plan is only successful if community members and stakeholders are engaged in taking action to reduce wildfire risk. Education and engagement tools can be organized into these categories:

- **Community Endorsement:** During the draft stages, the CWPP is presented and available to the public to understand, comment and ask questions. Approval of the management tools presented in the plan is crucial to its success.
- **Promoting FireSmart Principles:** Relevant parties will work with community associations and other local groups to coordinate FireSmart projects. Additionally, Wildland Fire Management, along with other stakeholders will seek to educate the community on FireSmart principles, such as organizing community school visits to inform students about fire resiliency and FireSmart practices.
- **Private Property Hazard Reduction Strategies:** In addition to supporting FireSmart and fuel abatement activities on public land, implementation of the CWPP includes educating community members on reducing wildfire hazards on their own properties. Resources can be found at <https://firesmartcanada.ca/resources/>.

5.3.4 Tactical Exercises and Emergency Planning

Completing an evacuation plan and practicing evacuations ahead of time can significantly improve efficiency during an emergency and increase the likelihood of a positive outcome. The following are some options for tactical exercises and evacuation planning:

- Public events that explicitly address evacuation routes, challenges and preparedness measures.
- Increased communication of existing and future evacuation planning efforts to the public, including identification of:
 - A range of possible scenarios and how evacuation might proceed in each.
 - Primary routes (including new routes developed under this plan), their quality and strategies for improvement (if necessary).
 - Areas for residents to shelter in place in the event their evacuation route is compromised.
- Tactical exercises to practice evacuations and identify vulnerabilities such as:
 - “Tabletop Exercises” to address larger-scale issues and scenarios.
 - Neighbourhood-level mock evacuations to address local considerations.
 - Neighbourhoods identified as being most exposed would represent the best pilots and priorities for these exercises and provide opportunities for local feedback.

6. Final Recommendations

This section outlines a summary of recommendations based on the risks, values and key vulnerabilities presented in this plan. Next steps are for stakeholders, with Government of Yukon, Wildland Fire Management as the lead, to identify the next steps and responsible agencies to complete each recommendation.

Table 8: Recommendations for creating a wildfire resilient community.

Theme	Action / Recommendation	Status/Next Steps	Lead
Fuel Abatement	Develop an accurate FBP fuel type layer for the planning area to assist in planning for fuel treatments in the proposed areas.		
	Develop a site plan for fuel treatments in the proposed areas.		
	Execute fuel treatments in the proposed areas as per the site plan.		
FireSmart	Undertake FireSmart assessments for heritage buildings throughout the community.		
	Continue to support FireSmart fuel treatments projects with respect to creating access, defensible space and link fuel discontinuities.		
	Property owners should review FireSmart principles and apply them to their homes and properties.		
	New residential subdivisions should be designed with consideration of surrounding risks and ways for reducing wildfire risk, including applying FireSmart principles.		
Wildfire Response	Provide cross-training of volunteer firefighters with wildland firefighters.		

Theme	Action / Recommendation	Status/Next Steps	Lead
	Pursue training for residents of Sunnydale and West Dawson.		
	Increase resources and facilities for structural firefighting capacity in Sunnydale and West Dawson.		
	Conduct tabletop exercises and live neighborhood-level mock evacuations.		
Communications and Engagement	Complete an evacuation plan for the planning area and residents.		
	Host public events and expand communication of evacuation considerations to residents and visitors.		

7. Monitoring and Reporting

An annual meeting shall be established with stakeholders to update progress from the previous year and on current and future projects. This meeting will allow engagement and input into these projects. The Community Wildfire Protection Plan is a living document that is developed using the best understanding of fire hazards, behaviour and wildfire community protection at the time of writing. The knowledge base is anticipated to evolve, as will the community of Dawson’s requirements for protection and risk reduction against wildfire. The CWPP will have a review cycle of 5 years.

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Appendix 1: Supplemental Data

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Appendix 1: Supplemental Data

Fire Behavior Prediction System Values: Dawson weather station calculates Fire Behaviour Prediction system values. The following charts (Figure 10 and Figure 11), display Fire Weather Index (FWI) and Fire Daily Severity Rating (DSR) values for the weather records available. The FWI is a rating of potential fire intensity. It uses weather observations to calculate the dryness of the fuel and expected fire behaviour should an ignition start on that day. It does not consider fuel type or terrain. The DSR is based on the FWI, but adds additional detail to consider the difficulty of controlling a wildfire.

Figures 10 and 11 demonstrate that high FWI and DSR conditions occur most frequently in the spring and gradually ease off in summer, the timing of which depends on the individual season.

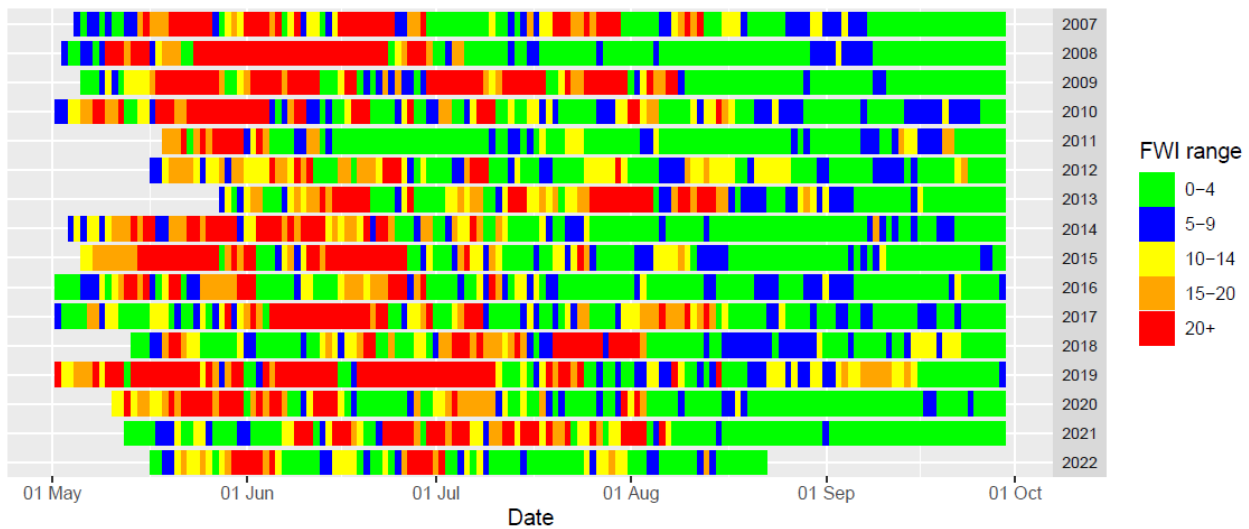


Figure 1. Fire Weather Index (FWI) historical values for Dawson weather station.

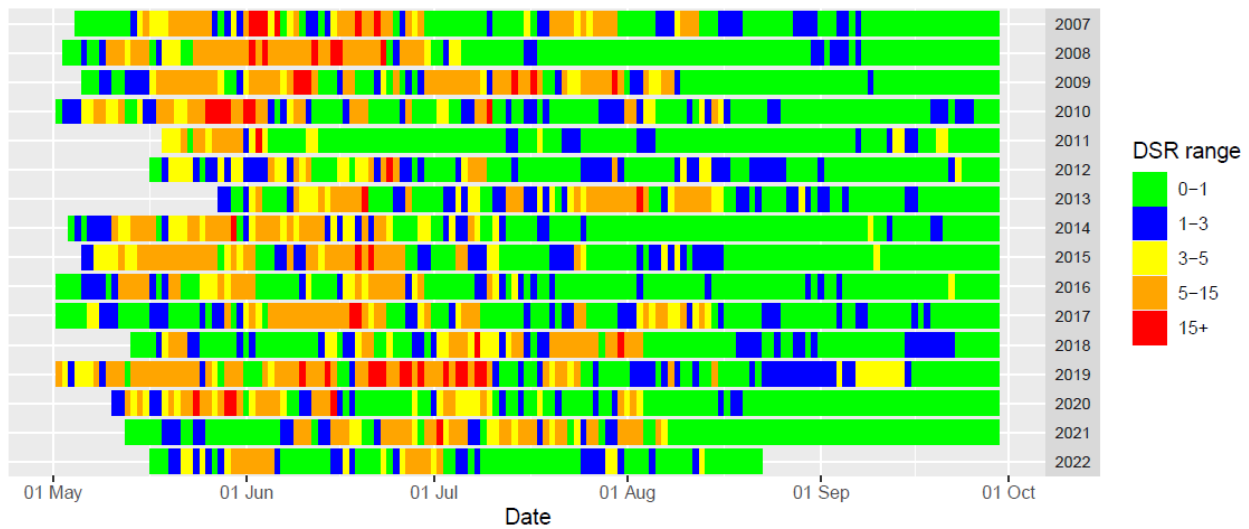


Figure 2. Fire Daily Severity Rating (DSR) for Dawson weather station historical records.

Applying FWI data to wind rose charts enables an overview of whether high FWI values were recorded under any particular wind direction. Figure 8 demonstrates that for Dawson, high FWI days can occur under any wind direction, but are more likely from southeast and northeast wind conditions as these occur more frequently.

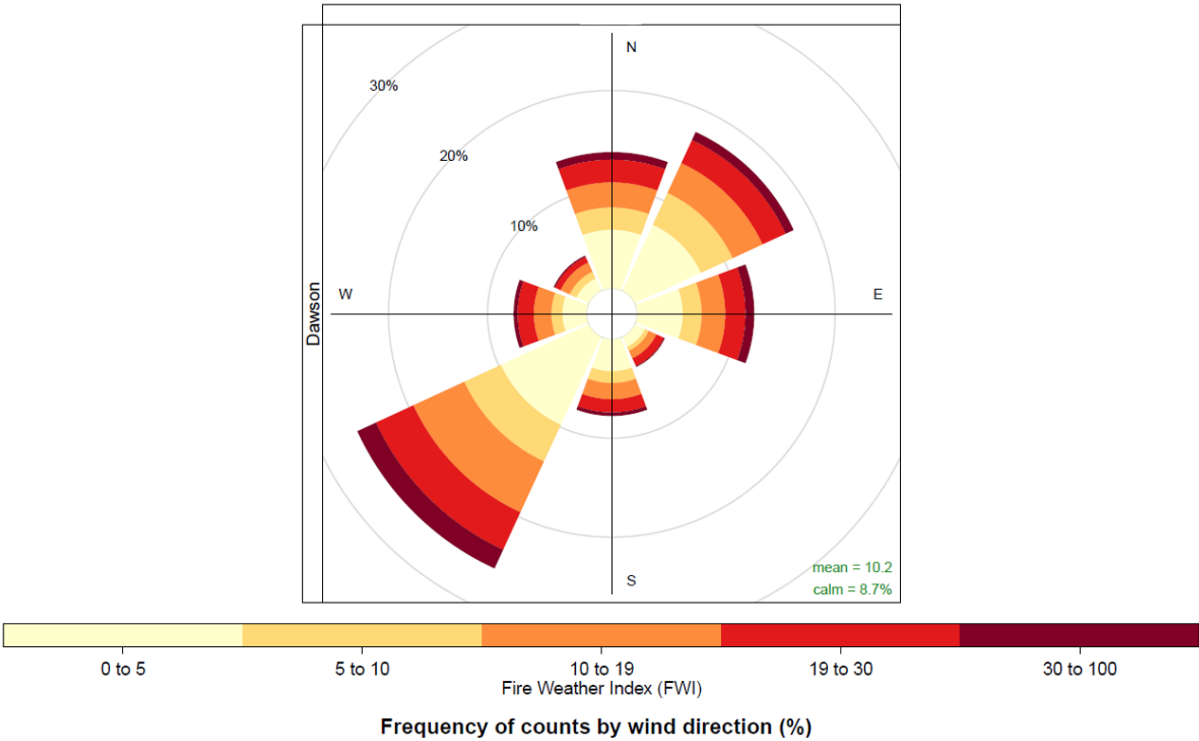


Figure 3. Wind rose showing frequency of FWI values for wind directions.

Appendix 2: Key Local Management Plans

Wildfire can affect many aspects of a community and there are several existing planning documents that relate to this CWPP. While this CWPP will inform subsequent community planning, existing community plans will inform the development of this CWPP by providing helpful information that guides overall plan development. The tables below outline existing plans and their relationship to this CWPP. In the digital version of this CWPP, plan titles are hyperlinks to access documents.

Key Local Plans and Relationship to CWPP			
Plan Title	Description	Relationship to CWPP	Additional Information
City of Dawson Official Community Plan (2018)	<ul style="list-style-type: none"> The main policy document for the City of Dawson, which outlines goals and policies that are used to guide decision-making on planning and land use management. The <i>Zoning Bylaw</i> is the main tool for implementing the OCP and provides specific Land Use Designations for each parcel within the Municipal boundary. Identifies housing as a critical issue for Dawson. Identifies heritage and culture (Klondike Gold rush history and Tr'ondëk Hwëch'in) as key priorities to manage. 	<ul style="list-style-type: none"> Sets forth governance policies that will ultimately support and facilitate wildfire hazard planning and mitigation projects. Recommends all subdivisions, buildings and structures have defensible spaces as laid out in FireSmart standards. 	<ul style="list-style-type: none"> Does not include all CWPP AOI in Municipal boundaries. Recognizes housing needs in the community are not being met. Dawson's economy is rooted in public services, mining, the accommodation and food service sector, and arts, entertainment, and recreation.
After the Gold Rush: The Integrated Community Sustainability Plan (2006)	<ul style="list-style-type: none"> A long-term, comprehensive plan that provides direction for the community to realize sustainable objectives. Identifies a community vision, community value statements and sustainable principles. Approved and adopted by both City of Dawson and Tr'ondëk Hwëch'in governments. Applies only to Tr'ondëk Hwëch'in traditional territory and City of Dawson Municipal boundaries. 	<ul style="list-style-type: none"> "Greening" of community as a key priority—planting more trees in the downtown core as an action item. Also includes a recommendation to require native planting around all developments—these objectives could conflict with wildfire hazard reduction goals. 	
Dawson City Heritage Management Plan (2008)	<ul style="list-style-type: none"> Provides recommendations for heritage management in order to preserve and strengthen the visual character and design intent of the historically important and significant cultural landscape. Divides the Dawson area into three Heritage Management Areas. Further divides these management units into eight Character Areas, 	<ul style="list-style-type: none"> Sets forth recommendations that may conflict with wildfire hazard reduction goals. "Dawson Townsite" is comprised of 2 Heritage Management Areas (Downtown and Residential), which are broken into five Character Areas—these 5 units are 	<ul style="list-style-type: none"> Indicates that conservation of historic buildings in the Dawson Townsite Heritage Management Areas will follow the existing <i>Design Guidelines for Historic Dawson</i>.

Key Local Plans and Relationship to CWPP			
Plan Title	Description	Relationship to CWPP	Additional Information
	<p>each with specific management recommendations for both preservation of historical features and the design of new features.</p> <ul style="list-style-type: none"> Establishes two new bylaws -<i>Heritage Bylaw</i> and <i>Heritage Fund Bylaw</i>. 	<p>encompassed by the CWPP's "Dawson" AOI shape.</p> <ul style="list-style-type: none"> "Klondike Valley Character Area" encompasses the CWPP's "C4" and "Callison/Dredge Pond Subdivision" AOI shapes. 	
Design Guidelines for Historic Dawson	<ul style="list-style-type: none"> A Parks Canada document outlining general guidelines meant to aid in the re-creation of the historic atmosphere of early Dawson. 	<ul style="list-style-type: none"> Sets forth recommendations that may conflict with wildfire hazard reduction goals. The <i>Dawson City Heritage Management Plan (2008)</i> indicates that conservation of historic buildings in the Dawson Townsite Heritage Management Areas will follow these guidelines. 	<ul style="list-style-type: none"> Unknown date on this document. Possibly as old as late 1970s.
City of Dawson Parks & Recreation Master Plan (2020)	<ul style="list-style-type: none"> 10-year strategic plan that sets high-level direction for how Dawson delivers parks and recreation programs and infrastructure. 	<ul style="list-style-type: none"> Wildfire Management Branch has been working with recreational planning teams to incorporate recreation areas with fuel abatement. 	
The City of Dawson Downtown Revitalization Plan (2013)	<ul style="list-style-type: none"> A plan that sets out steps to encourage and guide development and infrastructure investments in the downtown core. 	<ul style="list-style-type: none"> Informs on the key values of the area as recognized by both locals and visitors—some of these may conflict with wildfire mitigation strategies. 	
Dawson City North End Plan (2018)	<ul style="list-style-type: none"> A plan that facilitates the development of the North End of the Historic Townsite area of Dawson City (across from and north of the ferry terminal). Provides the concept for 28 new residential lots, a micro-housing project, a green space and the reconfiguring of some existing privately titled lots in the area. 	<ul style="list-style-type: none"> Informs on the planned development in the area. Residents value the "wild," natural character of the North End—the vegetated, natural character of the area emerged as a key value. Any fuel management treatments associated with the area will consider these values. 	<ul style="list-style-type: none"> North End is considered a Heritage Character Area in the <i>Dawson City Heritage Management Plan (2008)</i>.
Dome Road Subdivision Master Plan (2021)	<ul style="list-style-type: none"> Provides for four separate development areas in the Dome Road area—south of the historic townsite and east of TH's C-4 Tr'ondëk Subdivision. 	<ul style="list-style-type: none"> Informs on planned development of the area. 	

Key Local Plans and Relationship to CWPP

Plan Title	Description	Relationship to CWPP	Additional Information
Dredge Pond Subdivision Phase II Master Plan	<ul style="list-style-type: none"> • City of Dawson and Government of Yukon are embarking on a Master Plan for the Dredge Pond II Subdivision. • Envisioned as a 142 ha residential development between the Klondike River and the Klondike Highway southeast of historic downtown. 	<ul style="list-style-type: none"> • Currently outside of CWPP AOI. • Future iterations of CWPP should include all areas of Subdivision if development goes ahead as planned. 	
West Dawson and Sunnyside Local Area Plan (2013)	<ul style="list-style-type: none"> • Provides goals and objectives to guide the planning process for the area • Outlines land use designations and policies intended to guide future land use in the area. • Provides community values via engagement. • Provides some local constraints information. 	<ul style="list-style-type: none"> • Encompasses areas of CWPP known as West Dawson, Upper West Dawson and Sunnyside. • Recognizes the need for a FireSmart program, a fire protection facility, and road upgrades to facilitate easy emergency access and egress (currently one way in/out). 	<ul style="list-style-type: none"> • Permafrost degradation—can happen when surface vegetation is removed.
West Dawson and Sunnyside Area Development Regulations (in progress)	<ul style="list-style-type: none"> • Government of Yukon is working with community members and Tr'ondëk Hwëch'in to develop zoning for the area. 	<ul style="list-style-type: none"> • Could set forth zoning recommendations that conflict with wildfire hazard reduction goals. 	<ul style="list-style-type: none"> • Work was being done in 2019—unsure of current status of project.
Dawson Trail Management Plan (2016-2025)	<ul style="list-style-type: none"> • Provides a framework for the ongoing management, maintenance and development of trails. • Provides an inventory of the current trail network in the Dawson area (not including Tr'ondëk Hwëch'in lands). • Aligns with the Official Community Plan. 	<ul style="list-style-type: none"> • Wildfire objectives may override trail objectives, but trail representatives should partake in discussions regarding fuel management activities to see if synergies can be made. 	<ul style="list-style-type: none"> • Parks and Recreation Office is responsible party.
Municipal Civil Emergency Plan (2013)	<ul style="list-style-type: none"> • Outlines a coordinated response to an emergency situation under the direction of the Civil Emergency Measures Commission (CEMC). • Outlines procedures for coordinated preparation for, response to, and recovery from emergencies and disasters, including wildfire events and urban interface fires. 	<ul style="list-style-type: none"> • Fire is listed second on the list of hazards. 	<ul style="list-style-type: none"> • Outlines group responsibilities of CEMC as well as individual responsibilities. • Outlines the Municipal Support Group, which is comprised of municipal and/or other non-governmental officials who may be required to advise and assist the Mayor and CEMC during an emergency.

Key Local Plans and Relationship to CWPP

Plan Title	Description	Relationship to CWPP	Additional Information
Dawson Climate Change Adaptation Plan (2011)	<ul style="list-style-type: none"> Provides 52 consequences of climate change, with priority rankings and recommended adaptations for Dawson area. Plan intended as a resource for community use to support other planning and decision-making processes in the area. 	<ul style="list-style-type: none"> Lists “wildfires” as a climate-induced vulnerability and outlines the climate-change consequences of wildfire. 	<ul style="list-style-type: none"> Most of the bullets included on the “list of community consequences of forest fires” were given a “low” priority rating. Was recommended that this plan be updated by 2020 to reflect the current status of global carbon emissions.
Dawson Forest Resources Management Plan (2013)	<ul style="list-style-type: none"> Provides a framework for the sustainable management of a forest-based economy in the Dawson forest planning area. Intended to meet the criteria established in the Tr’ondëk Hwëch’in Final Agreement as well as the Yukon Forest Resources Act. Planning region includes public and First Nation settlement land, but does not include the municipality of the City of Dawson. Developed with a 20-year planning horizon. 	<ul style="list-style-type: none"> Ultimately sets the resource and ecological goals of the forested lands outside the City of Dawson— influences how wildfire mitigation strategies are implemented. 	<ul style="list-style-type: none"> Non-timber forest products are identified—birch syrup, mushrooms, berries and wildlife. Lists a number of Timber Harvest Plans for the Dawson area that are not included in this table. See https://yukon.ca/en/find-timber-harvest-plan-dawson-city for full list.
Top of the World Timber Harvest Plan (2014)	<ul style="list-style-type: none"> Outlines management objectives for a 146.9 ha parcel 3 km west of Dawson in the West Dawson and Sunnysdale area along the Top of the World Highway. 	<ul style="list-style-type: none"> Active operating unit for commercial harvesting has resulted in thinning and clearing of the forests in this area. These areas should be tied into additional fuel abatement work under the CWPP. West Dawson and Sunnysdale Local Area Plan (WDSLAP) has identified risk of wildfire a concern—fuel abatement activities as part of CWPP should align with objectives set in this plan and tie in to increase effectiveness at a landscape level. 	<ul style="list-style-type: none"> Two rare plants mentioned as per WDSLAP (<i>Cypripedium guttatum</i> and <i>Minuartia yukonensis</i>).
Dome Road Timber Harvest Plan	<ul style="list-style-type: none"> Plan identifies one operating unit of 48 ha for sawlog potential, 8 km east of Dawson City. 	<ul style="list-style-type: none"> Active operating unit for commercial harvesting, however no harvesting has occurred in this area due to slope constraints. 	<ul style="list-style-type: none"> ATV trails / switchbacks in area.

Key Local Plans and Relationship to CWPP

Plan Title	Description	Relationship to CWPP	Additional Information
Summary of Land Management Authorities within Yukon Municipalities (2012)	<ul style="list-style-type: none"> Identifies the four jurisdictions (Government of Canada, YTG, First Nation Governments and municipal governments) that plan, manage and authorize activities on land in Yukon. Outlines the roles and responsibilities that fall to the above jurisdictions. 	<ul style="list-style-type: none"> Provides direction to the development of policy and law governing forest resources. 	
Dawson Region Land Use Plan TH Final Agreement Chapter 11 Land use Planning	<ul style="list-style-type: none"> A regional land use planning process was started by the Yukon Land Use Planning Council (YLUPC) for the Dawson area. The Dawson Planning Commission has officially handed over the Recommended Plan to the Governing parties (Yukon Premier, Tr’ondëk Hwëch’in Chief, Na-Cho Nyäk Dun Deputy Chief) for consultation with stakeholders and public. Draft Plan set to be released publicly for consultation in Fall 2023. 	<ul style="list-style-type: none"> Future iterations of CWPP should consider Land Use Plan if complete at this time. 	<ul style="list-style-type: none"> Yukon Land Use Planning Council Relates to TH Final Agreement Chapter 11 Land Use Planning.
Tr’ondëk Hwëch’in Final Agreement (1998) Tr’ondëk Hwëch’in Self-Government Agreement (1998)	<ul style="list-style-type: none"> Agreement between Tr’ondëk Hwëch’in, the Government of Canada and the Government of Yukon asserting aboriginal rights, titles and interests with respect to its Traditional Territory as well as Settlement Land. Granted Tr’ondëk Hwëch’in lands and the authority to manage those lands in a similar manner to those of a provincial government. 	<ul style="list-style-type: none"> Must consider and consult with Tr’ondëk Hwëch’in First Nation on all activities occurring on Traditional Territories. 	
Moosehide Community Plan (2016)	<ul style="list-style-type: none"> Identifies a community vision, a series of community values, and highlights goals and objectives to be attained. Creates a framework for future development. Provides two proposed housing zones for future development of the area. 	<ul style="list-style-type: none"> Provides a number of goals and objectives around the topic of emergency response and wildfire hazard reduction. CWPP is coordinated to reduce redundancies. 	<ul style="list-style-type: none"> Not an IR or part of Tr’ondëk Hwëch’in Settlement Lands—Federal Government has a special fiduciary responsibility for Moosehide lands (may mean that in the event of a natural disaster, Canada would have to take special measures to mitigate impacts).
Moosehide Cultural Resources Management Plan (2016)	<ul style="list-style-type: none"> Guides residents, the community and government in the care and management of the village’s resources and values. Balances historic cultural value with active residential living. 	<ul style="list-style-type: none"> Informs on the key values of the area, which ultimately may hinder or facilitate wildfire mitigation. 	

Appendix 3: Mitigation Methods to Reduce Wildfire Risks to Values

See Section 3.4 of the Dawson City Community Wildfire Protection Plan for a definition of wildfire risk and the following risk components/factors. This worksheet is designed for stakeholders and wildfire professionals to address mitigation methods for the above risk factors in the planning area. Residents are encouraged to use a similar matrix to assess mitigation to address wildfire risk on their own property.

Value	Wildfire Hazard	Description	Mitigation method to address risk factor			
			Likelihood	Severity	Exposure	Vulnerability
Homes	Direct flame contact, radiant heat and ember exposure.	Homes are constructed within the Wildland Urban Interface. Homes are near continuous forests, except for Dawson City itself, which can support elevated fire behaviour and risk house loss (and possibly loss of life).				
Evacuation routes	Inability to evacuate from a wildfire.	Sunnydale subdivision has limited access/egress routes towards Highway 9. West Dawson Subdivision Road has one way in/out. Other subdivisions have multiple roads towards Highway 9.				
Access for firefighting resources	Difficulty accessing a property during a wildfire.	It is important to know any specific access challenges before a fire and report to property owners, for example: long driveways and small turnaround points that are difficult for a fire engine.				
Drinking water supply	Infiltration of fire by-products, sedimentation, changes in soil properties, runoff and firefighting chemicals infiltrating water supply.	There are 11 public supply or private water supply wells around Dawson. Rock Creek / Airport has 6. All are within the wildland urban interface and near continuous forest fuels. Bear Creek has 1. There are several that are well-protected within Dawson City and 2 supplying the campground in West Dawson.				

Value	Wildfire Hazard	Description	Mitigation method to address risk factor			
			Likelihood	Severity	Exposure	Vulnerability
		Water supply wells can be impacted by wildfire through several processes. First, contamination from particles after a wildfire seeping into wells (as a result of the fire or from fire retardant). Secondly, well infrastructure can be impacted, depending on well design.				
Firefighting water supply	Access to water is from Yukon or Klondike Rivers.	Water sources for firefighting appliances may limit efficiency of firefighting—if wells cannot be accessed and there is no hydrant system, firefighting appliances will have to leave the fire to refill elsewhere, such as the Yukon or Klondike Rivers.				
Health facilities	Direct fire hazard and supply chain issues from blocked roads.	If the Community Hospital were to be directly impacted by fire, or if Dawson were to be temporarily disconnected from supplies/staff, the community might not be able to access health care. The Yukon healthcare facility nearest to Dawson is in Mayo (2hr 45min drive).				
School facilities	Direct fire hazard and resources.	If the school were to be directly impacted by fire, or if Dawson were to be temporarily disconnected from staff, the community might not be able to access school and facilities. The Yukon school nearest to Dawson is in Mayo (2hr 45min drive).				

			Mitigation method to address risk factor			
Value	Wildfire Hazard	Description	Likelihood	Severity	Exposure	Vulnerability
Economic: tourism, forest products	Direct fire impact and smoke.	Loss of environment assets and increased smoke in the area can reduce tourism. Loss of forest harvest opportunities will impact jobs within Dawson. Loss of historic buildings, including those in Dawson and in Moosehide, will also significantly impact tourism.				
Infrastructure	Loss of soil integrity as a product of fire.	Chemical changes such as increased acidity from fire product runoff can impact biological treatment of sewage.				
	Ember attack and radiant heat threats.	Historic wooden structures in Dawson and Moosehide are particularly vulnerable.				
Environmental Values	Loss of habitat from direct fire impacts, degradation of water quality from runoff.	Forests and river inlets around the AOI provide regional biodiversity values and support provincially listed species at risk. Loss of habitat can occur not only when forests are burned at too high a severity or too frequently, but also when soil properties are altered, and chemicals and sediments infiltrate nearby rivers.				

Appendix 4: References

- AECOM. 2021. *Modeling Future Wildfire Risk in Yukon*. Report for Yukon Government.
- Beaver A. 2015. *Wildland Fire Risk Management and Decision Making*. Conference proceedings: 13th International Wildland Fire Safety Summit and 4th Human Dimensions of Wildland Fire Conference. April 20-24, Boise, Idaho.
- City of Dawson, 2021, Office Consolidation of Official Community Plan Bylaw 2018-18. Available: <https://www.cityofdawson.ca/Home/DownloadDocument?docId=88edd405-5708-487d-994f-e59d28b93e83>
- Cruz MG, Alexander ME and Fernandes, P. 2022. *Evidence for lack of a fuel effect on forest and shrubland fire rates of spread under elevated fire danger conditions: implications for modelling and management*. International Journal of Wildland Fire. Doi:10.1071/WF21171
- Dawson Forest Management Planning Team. 2013. *Dawson Forest Resources Management Plan*. Available: <https://yukon.ca/sites/yukon.ca/files/emr/emr-dawson-forest-resources-management-plan.pdf>
- Ember Research Services Ltd., Applied Ecosystem Management Ltd & TransNorthern Management Consulting. 2000. *Yukon Community Wildfire Risk and Reduction Assessment - Final Report*. Report for Government of Yukon and Indian and Northern Affairs Canada Fire Management Program, Yukon.
- Ember Research Services Ltd. 2016. *Coffee Gold Project Appendix 16-E Wildfire Burn Probability Analysis*. p19. Available: https://emrlibrary.gov.yk.ca/minerals/MajorMines/coffee/project-proposal/appendices/16-E_Coffee_20170331_Wildfire_Burn_Probability.pdf
- Ember Research Services Ltd. 2017. *Yukon Communities: Wildland Fire Risk Assessment Methodology Project*. Report for Yukon Wildland Fire Management.
- Flannigan MD, Logan KA, Amiro BD, Skinner WR & Stocks BJ. 2005. *Future Area Burned in Canada*. Climatic Change 72: 1-16.
- Forest Management Branch. n.d. *Budworm*. Energy Mines and Resources, Government of Yukon. Available: https://emrlibrary.gov.yk.ca/forestry/forest_health/forest-insect-and-disease-pamphlets/6-budworm.pdf
- Forest Management Branch. n.d. *Aspen Serpentine Leafminer*. Energy Mines and Resources, Government of Yukon. Available: https://emrlibrary.gov.yk.ca/forestry/forest_health/forest-insect-and-disease-pamphlets/1-aspen-serpentine-leafminer.pdf
- Forest Management Branch. n.d. *Large Aspen Tortrix*. Energy Mines and Resources, Government of Yukon. Available: https://emrlibrary.gov.yk.ca/forestry/forest_health/forest-insect-and-disease-pamphlets/11-large-aspen-tortrix.pdf
- Forest Management Branch. n.d. *Northern Spruce Engraver Beetle*. Energy Mines and Resources, Government of Yukon. Available: https://emrlibrary.gov.yk.ca/forestry/forest_health/forest-insect-and-disease-pamphlets/14-northern-spruce-engraver-beetle.pdf
- Forest Management Branch. n.d. *Pine Needle Cast*. Energy Mines and Resources, Government of Yukon. Available: https://emrlibrary.gov.yk.ca/forestry/forest_health/forest-insect-and-disease-pamphlets/17-pine-needle-cast.pdf
- Forest Management Branch. n.d. *Spruce Bark Beetle*. Energy Mines and Resources, Government of Yukon. Available: https://emrlibrary.gov.yk.ca/forestry/forest_health/forest-insect-and-disease-pamphlets/19-spruce-bark-beetle.pdf
- Government of Yukon. 2002. *Municipal Act: Revised Statues of the Yukon*. Accessible: <https://laws.yukon.ca/cms/images/LEGISLATION/acts/municipal.pdf>

Government of Yukon. 2013. West Dawson and Sunnydale Local Area Plan. Accessible: <https://yukon.ca/sites/yukon.ca/files/emr/emr-west-dawson-sunnydale-local-area-plan.pdf>

Government of Yukon. 2018. Yukon Forest Health Report. Whitehorse. Accessible: https://yukon.ca/sites/yukon.ca/files/emr/emr-2018-forest-health-report_2.pdf

Government of Yukon. 2020. Yukon Forest Health Report. Whitehorse. Accessible: <https://yukon.ca/sites/yukon.ca/files/emr-2020-yukon-forest-health-report.pdf>

Government of Yukon, 2022, Community Statistics: Dawson. Available: <https://community-statistics.service.yukon.ca/pages/dawson>

Government of Yukon, Tr'ondëk Hwëch'in and Inukshuk Planning & Development. 2013. West Dawson and Sunnydale Local Area Plan. Available: <https://yukon.ca/sites/yukon.ca/files/emr/emr-west-dawson-sunnydale-local-area-plan.pdf>

Hicke JA, Johnson MC, Hayes JL, Preisler HK, 2012. *Effects of bark beetle-caused tree mortality on wildfire*. Forest Ecology Management. 271, 81–90.

NASA Earth Observatory. n.d. Biomes: Desert. Accessible: <https://earthobservatory.nasa.gov/biome/biodesert.php>

Perrakis DBD & Eade G. 2015 *British Columbia Wildfire Fuel Typing and Fuel Type Layer Description*. Report for BC Wildfire Service. Victoria, British Columbia.

Stocks BJ, Wotton BM, Flannigan MD, Fosbert MA, Cahoon DR, & Goldammer, JG. 2001. *Boreal forest fire regimes and climate change*. Pages 233-246 in M. Beniston and M.M. Verstraete, editors. *Remote sensing and climate modeling: synergies and limitations*. Kluwer Academic, Dordrecht, The Netherlands.

Singer JA, Turnbull R, Foster M, Bettigole C, Frey BR, Downey MC, Covey KR, Ashton MS. 2019. *Sudden Aspen Decline: A Review of Pattern and Process in a Changing Climate*. *Forests*. 10(8):671. <https://doi.org/10.3390/f10080671>

Smith, CAS., Meikle, JC, and Roots, CF. (editors), 2004. *Ecoregions of the Yukon Territory: Biophysical properties of Yukon landscapes*. Agriculture and Agri-Food Canada, PARC Technical Bulletin No. 04-01, Summerland, British Columbia, 313 p. Accessible: <https://yukon.ca/sites/yukon.ca/files/env/env-ecoregions-yukon-territory.pdf>

Statistics Canada, 2021. *Census Profile 2021 Census: Dawson Town*. Available: <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Dawson&DGUIDlist=2021A00056001029&GENDERlist=1,2,3&STATISTICALlist=1&HEADERlist=0>

Tr'ondëk Hwëch'in. 2016. *Moosehide Community Plan*. Available: <https://www.trondek.ca/moosehide-community-plan>

University of California. 2022. *Preparing Your Home. Wildfire Preparation*. Available: <https://ucanr.edu/sites/fire/Prepare/Building/>

Wotton M, Flannigan M & Nock CA. 2010. *Forest fire occurrence and climate change in Canada*. *International Journal of Wildland Fire*. 19. 253-271. 10.1071/WF09002.

Wotton, M, Flannigan, M & Marshall, G. 2017. *Potential climate change impacts on fire intensity and key wildfire suppression thresholds in Canada*. *Environmental Research Letters*. 12. 095003. 10.1088/1748-9326/aa7e6e.