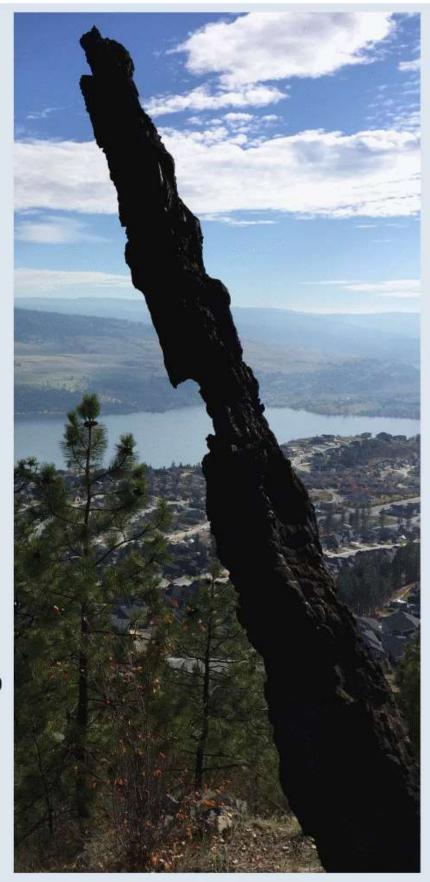
# Community Wildfire Protection Plan

### District of Lake Country

CWPP Update - January 2019



## District of Lake Country Community Wildfire Protection Plan

Prepared for:

Steve Windsor
Fire Chief and Director of Protective Services

Matt Vader
Manager, Strategic and Support Services

District of Lake Country 10150 Bottom Wood Lake Road Lake Country, BC V4V 2M1

Prepared by:
Davies Wildfire Management Inc.
11510 Upper Summit Drive
Coldstream, BC V1B 2B4

Andrew K. Low	RPF 4949
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#### **Executive Summary**

The Community Wildfire Protection Plan (CWPP) has been a foundational element of the Strategic Wildfire Prevention Initiative (SWPI), and now the Community Resiliency Investment (CRI) program and serves to paint the complete wildfire picture for communities in British Columbia. The District of Lake Country has long had a relationship with the surrounding environment, including wildland fire. Most recently during the 2017 fire season, the Okanagan Centre fire destroyed eight homes and displaced hundreds of residents. The cause of the fire was later determined to be arson. To reframe the wildfire issues faced by the community, and to position the municipality to access prevention funding under CRI, Lake Country retained Davies Wildfire Management Inc to undertake an update to its CWPP, which was first completed in 2010.

As a partial indicator of potential future wildfire activity, a fire history analysis has been completed. The occurrence rate of wildfires within the Lake Country area of interest (AOI) indicates a gradual increase in the occurrence of person-caused wildfires. Similarly, an analysis of three BC Wildfire Service fire weather stations in the surrounding region demonstrates a marked increase in the number of Fire Danger Class 4 and 5 days per year.

Geospatial analysis of provincial fuel type layers and the provincial strategic threat analysis (PSTA) outputs further characterize the wildfire impacts that Lake Country continues to face. Although parts of Lake Country are relatively well-protected by orchards or large fields dominated by agricultural crops, as well as Okanagan, Kalamalka, Wood and Ellison lakes, continued emphasis needs to be placed on the responsibilities of private property owners to manage their fuel hazards. This includes residential property owners and the steps they can take to manage their landscaping and structure characteristics to make their homes less prone to ignition during a wildfire.

Wildland urban interface wildfire threat assessments were completed on Crown and municipal land where geospatial analysis and fire behaviour modelling was classified as moderate or higher. Based on the threat assessments, five landscape fuel breaks and four interface fuel break have suggested, totalling 121.5 ha and 20.2 ha, respectively.

Lake Country will continue to face wildfire pressures, and these should be expected to increase in a changing climate. By maintaining a proactive focus on wildfire prevention and mitigation efforts, and through continued advocacy at the local and provincial levels, the community can continue to find ways to grow and thrive in an active wildfire environment.

#### **Summary of CWPP Recommendations**

- **Recommendation 1 (Public Engagement):** When developing wildfire-related communications for the public, consider including the ecological and cultural role that fire has played on the regional landscape.
- Recommendation 2 (Prevention and Preparedness): Consider approaching the BC Wildfire Service to explore the possibility of re-establishing a fire weather station on the Aberdeen Plateau to provide improved fire weather information related to important watershed values.
- Recommendation 3 (Prevention and Public Engagement): Maintain the link from the
  District of Lake Country website to the BC Wildfire Service Fire Danger Rating webpage to
  enable the public to maintain awareness of potential wildfire conditions. If possible,
  integrate an API into the Lake Country website that enables display of the current Fintry
  and West Kelowna Danger Class directly on the Lake Country website.
- Recommendation 4 (Preparedness and Governance): On an annual basis, consider
  preparing a Danger Class report for the Fintry, West Kelowna and Ida Bell 3 fire weather
  stations to help characterize fire danger trends year over year and assist decision makers
  in representing wildfire-related challenges faced by Lake Country.
- **Recommendation 5 (Prevention):** The application of prescribed fire in and around Lake Country should be supported as a proactive method of fuels management that can result in less smoke output than similar areas burning under wildfire conditions.
- Recommendation 6 (Prevention and Public Engagement): Wildland urban interface threat reduction should be promoted as a mutually beneficial strategy between private property owners and governments. Private property owners and governments alike need to take responsibility for the wildland fuel under their ownership.
- Recommendation 7 (Prevention and Governance): Maintain the Wildland Fire
  Development Permit Area requirements as drafted in the 2018 2038 District of Lake
  Country Official Community Plan. As various development permit requirements are
  amended from time to time, ensure that requirements and guidelines complement the
  Wildland Fire Development Permit Area requirements.
- Recommendation 8 (Prevention and Public Engagement): Lake Country should consider initiating FireSmart projects, as it is one of the best available options for generating public interest and action regarding hazard reduction on private property. Suggested neighbourhoods are listed in 5.2.3.

- Recommendation 9 (Prevention and Public Engagement): Establish a wildfire safety and
  hazard reduction page on the Lake Country Fire Department website to highlight the
  FireSmart program and simple actions that homeowners can take to reduce their homes'
  susceptibility to ignition during a wildfire. Engage in public education information sessions
  throughout Lake Country associated with wildfire management and/or FireSmart.
- Recommendation 10 (Prevention): Consider the landscape and interface fuel breaks referenced in Tables 17 and 18 for fuel mitigation treatments, followed by periodic maintenance.
- **Recommendation 11 (Operations):** As interagency partners in wildfire suppression operations, Lake Country Fire Department should consider pursuing seats in basic and intermediate wildfire training opportunities with the BC Wildfire Service.
- Recommendation 12 (Operations and Preparedness): Lake Country should consider acquiring a Type 2 Structure Protection Unit for the Lake Country Fire Department that can be used locally or deployed under cost recovery elsewhere in the province when conditions allow.

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#### 1. Introduction

The Community Wildfire Protection Plan (CWPP) program was initiated by the Province of British Columbia as a response to key recommendations contained in the Firestorm 2003 Provincial Review (Filmon, 2004). The CWPP program has been administered by the Union of BC Municipalities (UBCM) as a foundational component of the overarching Strategic Wildfire Prevention Initiative (SWPI) suite of funding programs since 2004 (Union of BC Municipalities, 2018). Recently, the provincial government announced that SWPI programs and funding would be rolled into the new Community Resiliency Investment (CRI) program (BC Government News, 2018). The CWPP program continues to be available to all local governments and First Nations in BC (Union of BC Municipalities, 2018).

#### 1.1 Purpose

A CWPP is intended to provide the basis for all future wildfire mitigation actions in a community. As such, the content of a CWPP provides a clear description of the wildfire environment, wildfire risks to the community, as well as strategic and operational recommendations to reduce risk and increase the community's resilience to wildfire threats.

A comprehensive awareness of the factors of the wildfire environment is the foundation upon which future hazard identification and mitigation efforts can proceed. In the intervening years since the adoption of the original CWPP, the regional and provincial wildfire picture has come into greater focus. Several high-profile wildland urban interface (WUI) fires have since impacted the community and surrounding area. Further afield, significant wildfire disasters have occurred in BC and other parts of Western Canada.

With these persistent factors in mind, the CWPP remains a cornerstone of wildfire mitigation planning for communities. The intended outcome of the CWPP planning process is to provide the community with a detailed framework to further efforts that will:

- Reduce the likelihood of a wildfire occurring the community;
- Reduce the impacts and/or losses to property and critical infrastructure;
- Reduce negative economic and social wildfire impacts to the community.

#### 1.2 CWPP Planning Process

Davies Wildfire Management Inc. (DWM) was retained as the consulting firm to conduct the CWPP update. Andrew Low, RPF, and John Davies, RPF, conducted the threat assessments, analysis and report compilation as forest professionals qualified in all aspects of wildland fire management.

#### 2. Local Area Description

The District of Lake Country was incorporated by Letters Patent issued on May 2, 1995. Upon incorporation, the rural areas of Carr's Landing, Winfield, Okanagan Centre and Oyama were

brought together into one municipal structure. The identities of these areas live on as wards within the municipal governance structure.

#### 2.1 CWPP Area of Interest

The area of interest (AOI), as used in CWPP terminology, essentially describes the study area. The UBCM guidance for defining the AOI is rather flexible, ranging from simply the extent of wildland urban interface (WUI) as the minimum, to taking a wider view consisting of the local government's legal boundary, with an added 2 km buffer beyond.

The AOI for Lake Country CWPP update was selected through consultation with the UBCM and Lake Country staff. As the funding body, the UBCM needs to ensure that work conducted on adjacent CWPPs would not be duplicated in the course of Lake Country CWPP update, given that adjacent local government CWPP AOIs abut the Lake Country municipal boundary. For this reason, the AOI for the 2019 CWPP update is slightly different than the 2010 CWPP AOI, which extended north and south 2 km into the cities of Vernon and Kelowna, respectively.

#### 2.2 Community Description

Lake Country is a diverse region in many respects. Ecologically, the AOI is mainly situated in the hot and dry Okanagan Valley, while the plateau area further east is generally cooler and moist. Given a diverse ecology, the region invites a range of land use, including agriculture and forestry, as well as a multitude of tourism and recreational pursuits.

#### 2.2.1 Governance and Administration

The District of Lake Country has gone through governance adjustments in the past few decades. The communities of Winfield, Oyama, Okanagan Centre and Carr's Landing were part of a rural electoral area governed by the Regional District of Central Okanagan (RDCO), formerly known as Electoral Area A before being incorporated as the District of Lake Country in 1995.

The District of Lake Country has a hybrid ward system of governance, which is unique in British Columbia. The four wards of Winfield, Oyama, Okanagan Centre and Carr's Landing each elect their own representative on Council. The Mayor and also two at-large councillors are elected to represent the entire community (2010 OCP).

The Okanagan Indian Band (OKIB) are the original inhabitants of the area and have a rich history and culture. The OKIB has an active government and administration, and now offers a variety of services and facilities to band members. Lake Country continues to develop a strong relationship with the OKIB, through community-to-community forums, protocol agreements, involvement of the OKIB on District committees, meaningful consultation, and shared projects and programming.

#### 2.2.2 Infrastructure and Services

Electricity is supplied to Lake Country via BC Hydro 60L205 transmission lines (69kV), from Vernon Terminal (iMapBC, 2018). Additionally, the District of Lake Country completed construction of the Lake Country Hydroelectric Generating Station in 2009. The facility has a generating capacity 1.1 megawatts and the average annual energy production is expected to be 3871 megawatt hours

(Mwh) (District of Lake Country, 2010). The generating station is located approximately 3 kilometers east of the community of Winfield (District of Lake Country, 2010).

The District of Lake Country is in the Okanagan health service area of the Interior Health Authority (IHA). Lake Country is situated between the Kelowna General Hospital to the south, and the Vernon Jubilee Hospital (VJH) to the north. KGH provides high-level, specialty medical care, including 24-hour emergency and trauma services, as well as specialized services, including cardiac surgery while VJH provides core medical and surgical specialty services, 24-hour emergency and trauma services, acute and obstetrical care. (Interior Health, 2018).

Table 1 Hospitals and health centres in Lake Country.

Hospitals and Health Services	Services Provided
Kelowna General Hospital	Tertiary referral hospital. High-level specialty medical care.
Vernon Jubilee Hospital	Regional hospital. Core medical and surgical specialty services to patients in the service area.
Public Health Satellite Office	Public health core programs.
Lake Country Lodge	Long-term care.
Blue Heron Villa	Assisted living.

#### 2.2.3 Economic Drivers

The 2016 Census employment data provide an indication of the economic drivers in the District of Lake Country. As illustrated in Figure 1, the top five sectors (construction; retail; healthcare; accommodation/food services and manufacturing) account for nearly half (48.77%) of the employed labour force in the District of lake Country (Government of Canada, 2016).

These top sectors can be particularly sensitive to the impacts of wildfire on the region. For example, evacuations and smoke impacts, whether they are affecting the community directly or the indirect effect of negative perception among potential visitors regarding fires elsewhere in the province can all lead to a decrease in visitation and tourist spending (Deacon, 2017). Wildfire smoke also contributes to increased health concerns among susceptible populations, resulting in increased strain on health care facilities (HealthLinkBC, 2017).

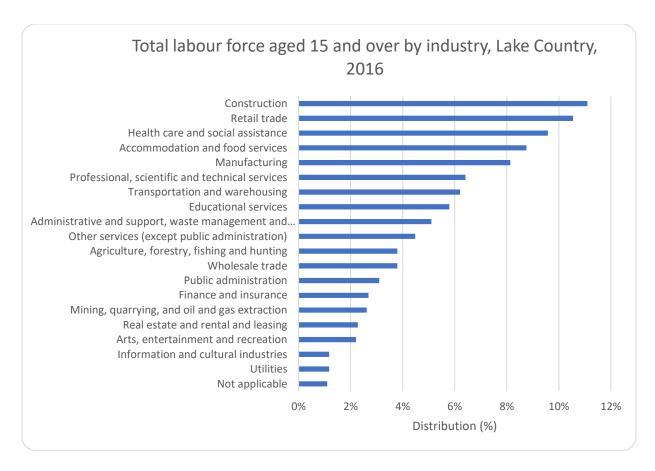


Figure 1 Employed labour force by industry in Lake Country, as per the 2016 census.

#### 2.2.4 Land Ownership

The AOI is comprised of 51% crown land with the bulk of the remainder consisting of private land (44%). Municipal ownership makes up a small proportion of land in the AOI (193 ha or 1%). Land ownership directly relates to the ability to carry out funded fuel management as CRI and FES funding is intended for mitigation activities on public land.

Table 2 Land ownership types within Lake Country AOI.

Туре	Area (ha)	%
Crown Provincial	11,904	51%
Private	10,231	44%
None	636	3%
Municipal	193	1%
First Nation	137	0.6%
Unknown	58	0.3%
Crown Agency	11	0.05%
Mixed Ownership	5.9	0.03%
Federal	1.2	0.01%
	23,178	100%

#### 2.2.5 Firefighting Jurisdiction

Fire protection for the District of Lake Country is provided by the Lake Country Fire Department (LCFD) – a fire department composed of both career and paid-on-call volunteers (District of Lake Country, 2018). An operational profile of LCFD is provided in Section 6.

#### 2.2.6 Existing Evacuation and Egress Routes

The 2016 District of Lake Country Emergency Evacuation plan provides policies and procedures for moving or dispersing persons from threatened or hazardous areas to areas of safe refuge during emergencies (District of Lake Country, 2016). The plan states that the best routes for evacuation from the threatened area are to be selected by the RCMP with input from the Incident Commander (IC) at the time of the incident (District of Lake Country, 2016).

The major egress routes out of Lake Country include Highway 97 northward to Vernon (approximately 28 kilometers) or southward to Kelowna (approximately 23 kilometers). Partial alternate egress routes include Commonage Road north toward the city of Vernon (via Okanagan Centre Road East and Carr's Landing Road, approximately 33 kilometers) and Glenmore Road south to Kelowna (via Okanagan Centre Road East, approximately 23 kilometers).

#### 2.3 Past Wildfires, Evacuations and Impacts

Wildfires have been a regular and natural disturbance agent in the Okanagan for millennia. In recent years, Lake Country has felt the effects of several wildfires (Table 3), ranging from small fast-moving fires that are contained relatively quickly, to prolonged periods of large fires burning in the surrounding area

Most concerning was the 2017 Okanagan Centre wildfire that ignited on the afternoon of July 15. Ultimately, eight homes were destroyed in the Nighthawk Road area as a result of the fire, which was mapped at a final size of 50.4 ha. On July 26, 2017 the RCMP announced that the cause of the wildfire was arson (RCMP, 2017). The following July, the RCMP announced that the 2017 Okanagan Centre arson fire was one of 28 other wildfires believed to have been deliberately set throughout the Okanagan over the past four years (RCMP, 2018).

Fortunately, and through a concerted response by multiple agencies and neighboring fire departments, no fatalities resulted from the Okanagan Centre fire. This fact is made more remarkable with the knowledge that the fire was set at one of the worst possible times and locations – the hottest and driest part of day, at the bottom of a steep slope with homes above. Ultimately, the insured losses for the Okanagan Centre fire reached \$13,000,000 (Lake Country Fire Department, 2018), but the outcome had the potential of being much worse.

Table 3 Past wildfires of significance in Lake Country.

Fire number	Cause	Geographic	Size (ha)	Date of discovery
K41118	Person	Okanagan Centre	50.4	July 15, 2017
K40046	Lightning	Ellison Ridge	1.2	May 4, 2016
K40571	Person	Beaver Lake Rd.	4.7	August 11, 2015
K40137	Person	Coral Beach	0.5	June 17, 2015
K40896	Person	Carr's Landing	1.4	March 17, 2014
N/A	Lightning	S of Beaver Lk Rd, E of Jim Bailey Rd.	5.0	July 25, 2013
K41040	Person	Barkley Rd.	1.0	July 24, 2008
K40196	Person	Lodge Rd.	4.0	June 28, 2006
K40344	Person	Oyama Middle Bench Rd.	30.0	September 18, 2001
K40136	Person	Okanagan Centre	1070	August 30, 1985
K50009	Person	Ellison Lake	28.3	April 21, 1982
K00210	Person	N of Spion Kop	559.5	July 7, 1960
K00512	Person	Woodsdale	39.7	July 14, 1958
129	Person	Ellison Lake	108.7	July 24, 1943
660	Person	Mill Creek	428.6	August 20, 1940

#### 2.4 Current Community Engagement

The Public Education Division of the District of Lake Country Fire Department developed the Safety, Awareness and Fire Education (SAFE) Program in Lake Country with the aim of protecting families in the event they experience a residential structure fire. It is a 4-hour program instructed over a period of 2 weeks in grade 3 classrooms with the emphasis on home escape planning. In addition, the District of Lake Country website has resources for homeowners on FireSmart, emergency evacuation procedures, burning regulations, campfire bans and links to past community wildfire protection plan information (District of Lake Country, 2018).

#### 2.5 Linkages to Other Plans and Policies

Several plans and policies exist at various levels of government that pertain to the response and recovery of WUI fires, as well as wildfire management in general. The following is a broad survey of the various plans and policies.

#### 2.5.1 Local Authority Emergency Plan

The District of Lake Country is party to the Regional District of Central Okanagan Emergency Plan, which is coordinated by the City of Kelowna on behalf of the regional district, the District of Lake Country, the District of Peachland, Westbank First Nation, Kelowna and West Kelowna (City of Kelowna, 2016). The emergency plan is intended to:

- assist emergency personnel to respond to disasters and major emergencies, such as floods, wildfires, major spills, plane crashes etc.;
- establish a centralized assessment and decision-making organization to share regional resources or request assistance from the provincial or federal governments;
- guide post-emergency recovery operations.

#### 2.5.2 Affiliated CWPPs

Lake Country's original CWPP was completed in 2010. Communities with adjacent CWPPs to Lake Country include:

- City of Kelowna (2016)
- Regional District of Central Kootenay (2006)
- Regional District of Central Okanagan (2008)
- Regional District of Kootenay-Boundary (2010)
- City of Vernon (2013)

#### 2.5.3 Local Government Plans and Policies

Wildfire planning and mitigation requirements are included in the Draft Official Community Plan 2018-2038 (District of Lake Country, 2018). Lake Country has established 11 development permit areas (DPAs), including the Wildland Fire Development Permit Area requirements. The wording of the wildland fire DPA guidelines remain largely unchanged from the previous 2010 OCP, with minor changes including the additional requirement for the preparation of a fire mitigation report

from a Registered Professional Forester<sup>1</sup> for development within the DPA not covered under an exemption.

Broadly, the wildland fire DPA guidelines intend to:

- minimize the risk to life and property from possible wildfires;
- ensure that development in potentially hazardous areas is conducted safely;
- require construction techniques and materials that are resistant to wildfire for buildings located within the Wildland Fire Development Permit Area, and;
- not further contribute to the existing risk of wildfire through the appropriate siting of vegetation and type of species planted for landscaping on lots at risk of wildfire (District of Lake Country, 2010).

Lake Country has in force the Burning Bylaw 612, 2007 (District of Lake Country, 2008). Specifically, the bylaw:

- restricts open burning permits to:
  - o residents that have properties >1 ha
  - o fire no larger than 2 m high and 3 m wide
  - o minimum separation of 30 m from fire and property boundaries, improvements
- Establishes the parameters within which open burning is permitted.
- Sets permit fees and describes offences and associated penalties.

#### 2.5.4 Higher Level Plans and Relevant Legislation

The Okanagan Shuswap Land and Resource Management Plan (LRMP) was completed in 2001 and relates to Crown land throughout the Okanagan Shuswap Natural Resource District (Province of British Columbia, 2001). The LRMP makes several references to wildfire management and hazard reduction (Table 4), none of which impinge on the ability of local governments to undertake mitigation work. Flowing from the LRMP are orders pertaining to the establishment of resource management zones and old growth management objectives (Province of British Columbia, 2007) and none of these orders impede Lake Country from pursuing strategic wildfire mitigation efforts.

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<sup>&</sup>lt;sup>1</sup> Registered Professional Foresters engaged to prepare fire hazard mitigation reports must also be qualified and competent to render assessments, prescriptions, opinion etc. related to wildland fire.

Table 4 Wildfire references in the Okanagan Shuswap Land and Resource Management Plan (Province of British Columbia, 2001).

Sec 7	Protect populated areas from forest fire hazards in the wildland — urban interface, and protect the provincial forest from fires originating on contiguous private land.
Sec 7.1	The Ministry of Forests is to coordinate fire hazard reduction in the Interface zone through consultation with the public, licensed tenure holders, affected resource agencies, First Nations, and local government.
Sec 7.2	Where practical, coordinate and implement fire hazard reduction activities with priority areas for prescribed burning for ecosystem enhancement purposes.
art 4 Ecosy	stem – Natural Disturbance Type 4 (page NDT4 4-9)
Sec 10.1	Where practical, return fire to the NDT4a at historical fire cycle intervals by developing and implementing a burn plan that includes restoration and maintenance burning.
Sec 10.3	Develop and implement a plan to modify suppression on naturally occurring wildfires that meet impact prescriptions.
Sec 11.9	Develop a fire management plan for the NDT4a and b.
Sec 11.11	Develop and implement a plan to modify suppression on naturally occurring wildfires that meet impact prescriptions.
art 4 Moun	tain Goat Habitat (page Wildlife_Goat 4-3)
Sec 2.1	Where other resource values are not threatened, enhance early seral foraging opportunities by implementing a "let burn" policy for high elevation wild fires in inoperable areas that are on, or adjacen to, goat winter ranges.
art 4 - Mule	Deer Winter Range (page Wildlife_Mdeer 4-12/)
Sec 3.4	Where practicable, utilize prescribed burns under specific conditions or mechanical treatments to enhance winter range forage values.

#### 2.5.5 Ministry Plans

The Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) has prepared fire management plans for each Natural Resource District in the province, as required by ministry policy. Fire management plans are intended to address all wildfire-related issues within the natural resource district, particularly the desired interaction between resource management concerns and fire suppression requirements. It is important to note that district fire management plans are currently not public documents. For the purposes of this CWPP update, the authors were afforded the opportunity to view the plan.

The current fire management plan for the Okanagan Shuswap Natural Resource District dates from 2015 and carries forward the 2014 wording with updates to spatial data only. The district fire management plan is a brief 15-page document that also includes high-level district mapping according to four broad "priority themes". The mapping themes are as follows:

- Theme 1 Human Life and Safety
  - WUI areas (high, moderate and low structure density)
  - Evacuation routes and marshalling points
- Theme 2 Critical Infrastructure and Property (that relates to maintaining Theme 1)
  - Energy generation and transmission, healthcare, first responder facilities, transportation, wildland structures etc.
- Theme 3 High Environmental Cultural
  - Water resources, species at risk, cultural values
- Theme 4 Resource Values
  - Ungulate winter range, old-growth management areas, timber, silviculture investments, range management, and visual quality areas

#### 3. Values at Risk

Values at risk (VAR) include human health and safety, facilities, services, cultural and natural resources etc. that may be negatively impacted by wildfire. This includes human life, property, critical infrastructure, high environmental and cultural values, and resource values.

#### 3.1 Human Life and Safety

The most recent census data from the Government of Canada indicates an enumerated population for Lake Country of 12,922 – up 10.4% from the 2011 census. The 2016 census also indicates 5,094 occupied private dwellings in Lake Country, an increase of 12.4% from 2011. With a land area of 122.19 square kilometers, the population density of Lake Country is 105.8 people per square kilometer (Government of Canada, 2016).

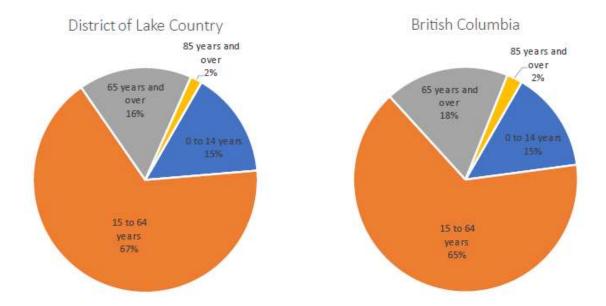


Figure 2 Age distribution in Lake Country and British Columbia, as determined by the 2016 census.

Compared to the provincial average, Lake Country has a similar proportion of people in both the 65 years and over and 85 and over age classes (Figure 2). With nearly one quarter of the population of Lake Country over the age of 65, extended periods of wildfire smoke will have an impact on a significant number of residents (as with many other parts of the province).

Among a host of other constituents, wildfire smoke contains particulate matter (PM) which is primarily composed of organic carbon and black carbon components (Naeher, et al., 2007). The size of PM that biomass burning produces is usually fine particles less than 2.5 micrometers ( $\mu$ m), referred to as PM<sub>2.5</sub> (Duran, 2014).

Although everyone responds to wildfire smoke exposure differently, the BC Centre for Disease Control (2018) identifies the following groups as being most at risk:

- people over 65;
- women who are pregnant;
- infants and small children;
- people with existing chronic respiratory conditions.

#### 3.2 Critical Infrastructure

The Lake Country water system serves over 4,350 residential, commercial, industrial, institutional, seasonal irrigation and agricultural connections, representing a total population served of approximately 13,000 people. Users consume approximately 9,622 mega liters of water annually (District of Lake Country, 2015).

The District of Lake Country receives water from four sources: Swalwell (Beaver) Lake, Okanagan Lake, Kalamalka Lake and Oyama Lake. In the case of Swalwell Lake and Oyama Lake the intakes are located within the downstream creeks of Vernon Creek and Oyama Creek (Urban Systems,

2012). Recent major water systems projects include a \$7 million Eldorado treated water reservoir and Glenmore booster station (Urban Systems, 2012).

As of 2009 the District of Lake Country liquid waste central collection system extended out toward Okanagan Centre and Chase Road, up to The Lakes development and the Davidson Road area. This collection system delivers raw sewage to the District of Lake Country's wastewater treatment plant located north of Beaver Lake Road. In addition to the central collection systems there are three smaller satellite systems within the District boundary; two systems in Carr's Landing and one in the Oyama area (AECOM, 2009).

#### 3.2.1 Electrical Power

Electricity is supplied to Lake Country via BC Hydro 60L205 transmission lines (69kV) from Vernon Terminal. The transmission line from Vernon runs south along the west side of Kalamalka lake, turns eastward at Oyama and south along Oyama road.

Additionally, the District of Lake Country completed construction of the Lake Country Hydroelectric Generating Station in 2009. The facility has a generating capacity 1.1 megawatts and the average annual energy production is expected to be 3871 megawatt hours (Mwh) (District of Lake Country, 2010). The generating station is located approximately 3 kilometers east of the community of Winfield (District of Lake Country, 2010).

#### 3.2.2 Communications, Pipelines and Municipal Buildings

The following infrastructure are noted:

- Lake Country has several Telus Mobility, Bell Mobility and Rogers Communications cellular towers serving the area (Nikkel, 2018).
- Transmission pipeline for natural gas, runs through Lake Country and south to Kelowna (FortisBC, 2009). FortisBC has a corporate emergency response plan for pipeline and electrical emergencies (FortisBC, 2016).

Key public buildings in Lake Country are summarized in Table 5.

Table 5 Key municipal buildings in Lake Country.

Facility	Address
Arena- Winfield	9830 Bottom Wood Lake Road
Community Centre- Beasley	3450 Woodsdale Road.
Community Hall- Okanagan Centre	11099 Maddock Avenue
Community Hall- Oyama	15710 Oyama Road
Community Hall- Winfield	10130 Bottom Wood Lake Road
Fire Hall 71 Winfield	10575 Okanagan Centre Road East
Fire Hall 81 Carr's Landing	16625 Commonage Road
Fire Hall 91 Oyama	15656 Oyama Road
Municipal Hall- District of Lake Country	10150 Bottom Wood Lake Road
Museum	11255 Okanagan Centre Road W
RCMP	3231 Berry Road
Seniors Activity Centre	9832 Bottom Wood Lake Road
Wastewater Treatment Facility	4062 Beaver Lake Road

#### 3.2.3 Water and Sewage

The District of Lake Country has four primary water systems serving most District users. These systems are fed by the following sources: Swalwel (Beaver) Lake (Crooked Lake chain flows into Beaver Lake), Oyama Lake (Damer Lake flows into Oyama Creek), Okanagan Lake and Kalamalka Lake (District of Lake Country, 2015). The Eldorado balancing reservoir was constructed downstream of the Vernon creek intake on the Swalwell (Beaver) Lake system in 2007 (Urban Systems, 2012).

Community watersheds that feed the various water systems are listed in section 3.3.1.

Sewage treatment for Lake Country is handled by the wastewater treatment plant located north of Beaver Lake Road which is operated by the District of Lake Country, as detailed in section 3.2.

The following water source areas are identified in Lake Country:

- Coral Beach Okanagan Lake
- Lake Pine Okanagan Lake
- Beaver (Swalwell) Lake
- Oyama Lake
- Kalamalka Lake
- Okanagan Lake

#### 3.3 High Environmental and Cultural Values

Parks, recreation and culture services are provided by Lake Country through the Infrastructure Services and Community Services departments. The Engineering and Environmental Services department is responsible for watershed protection, dam safety and infrastructure emergency preparedness.

#### 3.3.1 Drinking Water Supply Area and Community Watersheds

One community watershed is located within the District of Lake Country municipal boundary and two additional watersheds are located within the AOI. Portions of the Oyama Creek and Vernon Creek community watersheds lay within the AOI, feeding the Oyama and Swalwell (Beaver Lake) water systems, respectively. The Kelowna (Mill) Creek community watershed lies within the AOI but does not feed into the District of Lake Country System. The community watersheds pertaining to the District of Lake Country AOI are summarized in Table 6.

Table 6 Community Watersheds in Lake Country AOI.

Community watershed name	Source	Area within AOI (ha)
Vernon	Vernon Creek	1,234
Kelowna	Kelowna Creek	954
Oyama	Oyama Creek	419

#### 3.3.2 Cultural Values

Due to an extensive and uninterrupted First Nation presence throughout the Okanagan, wildfire and associated suppression operations have the potential to inadvertently seriously impact or destroy cultural heritage resources.

It can be challenging to navigate the requirements of the Heritage Conservation Act (HCA) during the critical initial attack phase of a wildfire response, but a basic awareness of what to look for can help to ensure that cultural heritage resources aren't impacted by suppression actions. For good reason, the exact locations of known resources are often privileged information, but through agreement and trust, general information regarding areas could be shared. From there, it is incumbent on personnel who are actively working in the field to be able to identify resources so that suppression actions can be planned or altered in such a way as to not to contravene the HCA.

#### 3.3.3 High Environmental Values

The BC Conservation Data Centre identifies Red, Blue, and Yellow listed vertebrate animals, plants and plant communities within Lake Country AOI, as summarized in Table 7 (BC Conservation Data Centre, 2018).

Table 7 Red and Blue listed species and plant communities within Lake Country AOI.

Common name	Scientific name	BC list status
Vertebrate animals		
American Badger	Taxidea taxus	Red
Gopher Snake, deserticola subspecies	Pituophis catenifer deserticola	Blue
Painted Turtle - Intermountain - Rocky Mountain Population	Chrysemys picta pop. 2	Blue
Western Rattlesnake	Crotalus oreganus	Blue
Ecological community		
Baltic Rush - Common Silverweed	Juncus balticus - Potentilla anserina	Red
Black Cottonwood - Douglas-fir / Common Snowberry Red-osier Dogwood	Populus trichocarpa - Pseudotsuga menziesii / Symphoricarpos albus - Cornus stolonifera	Red
Trembling Aspen / Common Snowberry / Kentucky Bluegrass	Populus tremuloides / Symphoricarpos albus / Poa pratensis	Red
Common Cattail Marsh	Typha latifolia Marsh	Blue
Hard-stemmed Bulrush Deep Marsh	Schoenoplectus acutus Deep Marsh	Blue
Vascular plants		
Near Navarretia	Navarretia propinqua	Red
Peach-leaf Willow	Salix amygdaloides	Blue

<sup>\*</sup> Red-listed: Any species or ecosystem that is at risk of being lost (extirpated, endangered or threatened)

#### 3.4 Other Resource Values

Lake Country, like many parts of the Okanagan, has a long agricultural history. Enjoying a mild, dry climate, tree fruits, grapes, ground crops and beef production are important contributors to the area. Wildfire can have significant direct and indirect impacts on agricultural sectors. For example, cattle can be displaced off their summer range or require evacuation. Food crops may be directly impacted by prolonged smoke-filled skies, while evacuation orders or simply worker displacement may limit the ability of producers to harvest crops in a timely manner.

#### 3.5 Hazardous Values and Solid Waste Management

Lake Country is not characterized by extensive heavy industry associated with potentially hazardous materials that could be impacted by wildfire. Household solid waste, recycling and yard waste collection is a regional function managed by the Regional District of Central Okanagan's Waste Reduction Office.

<sup>\*</sup> Blue-listed: Any species or ecosystem that is of special concern

#### 4. Wildfire Threat and Risk

The following is a summary of the factors that contribute to an understanding of the wildfire threat around a community. These factors include natural fire regime and ecology, Provincial Strategic Threat Analysis, and a local wildfire risk analysis. Risk assessment for wildfire and its impacts to communities considers both the likelihood of a wildfire and the potential consequence associated with that likelihood.

#### 4.1 Fire Regime, Fire Danger Days and Climate Change

Lake Country is an active fire environment where conditions often exist during the summer months where there is potential for losses to the public. When assessing the wildfire situation of the region, past conditions offer an indication of potential future conditions in the near term, and climate change scenarios must be incorporated when considering increasing future community resilience.

#### 4.1.1 Fire Regime

The ecology of Lake Country AOI has been shaped by the frequent occurrence of frequent low-intensity, stand-maintaining natural and historical anthropogenic fires. The entirety of the AOI is classified as Natural Disturbance Type 4 (NDT4), which describes ecosystems adapted to frequent stand-maintaining fire. The NDT classification (Table 8) of an area provides an illustration of the magnitude and frequency of natural disturbance (wildfires and windstorms, predominantly) across the land base.

Table 8 Natural disturbance type classification in British Columbia.

	Natural Disturbance Type (NDT)	Description
_	NDT1	Ecosystems with rare stand-initiating events
	NDT2	Ecosystems with infrequent stand-initiating events
	NDT3	Ecosystems with frequent stand-initiating events
	NDT4	Ecosystems with frequent stand-maintaining fire
	NDT5	Alpine Tundra and Subalpine Parkland ecosystems

In terms of natural disturbance, a distinction is drawn between stand-initiating and stand-maintaining events. Stand-initiating events typically terminate the existing forest and induce secondary succession to produce a new forest. Stand-maintaining events serve to keep successional processes stable (Province of British Columbia, 1995). In wildfire terms, high intensity fire behaviour, such as intermittent or continuous crown fire, would be considered a

stand-initiating event. Conversely, a low intensity fire surface fire consuming understory fuels while retaining a mature overstory is considered a stand-maintaining event.

These distinctions are important when assessing the wildfire history of an area. The absence of frequent stand-maintaining processes can result in a cascading series of ecological responses, including forest health, habitat and fuel loading issues. In the NDT4, low-intensity (i.e. surface fire) fire return intervals historically ranged from 4 to 50 years (Province of British Columbia, 1995). Forest protection policies centered around aggressive fire suppression have resulted in a drastically reduced frequency (or absence) of fire in ecosystems that are dependant (i.e. maintained) by frequent, low-intensity surface fires.

Stand-initiating fires (i.e. crown fires) in Ponderosa pine dominated stands were historically rare, with return intervals of at least 150 to 250+ years (Province of British Columbia, 1995). The longer a fire-maintained stand goes without fire maintenance, the greater the likelihood that a future fire occurrence will be a stand-initiating disturbance. From a firefighting standpoint this increasingly deteriorating condition can result in wildfires that require significantly more suppression effort and cost to control.

#### 4.1.2 Fire Weather Rating

Three BCWS fire weather stations were reviewed for Lake Country CWPP (Figure 3). The Fintry and West Kelowna fire weather stations (Figures 5 and 7) are the most representative to Lake Country (Table 9). The Ida Bell 3 fire weather station (Figure 6) was also analyzed to provide a high elevation perspective of fire weather consistent with the eastern portions of the AOI. Generally, the Lake Country area is well represented by the existing BCWS fire weather station locations, however the Aberdeen Plateau watershed area may benefit from re-establishing a fire weather station in the area.

Table 9 BC Wildfire service active fire weather stations in relation to Lake Country.

Station Name	e Latitude Longitude		Elevation	Install Date
Fintry	50.207	-119.480	670m	July 13, 1990
Ida Bell 3	49.767	-119.124	1300m	August 1, 2004
West Kelowna	49.883	-119.570	650m	November 1, 2016

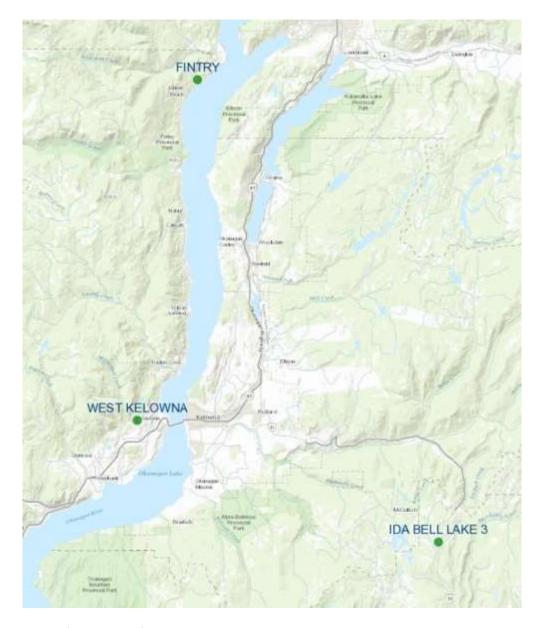


Figure 3 BC Wildfire Service fire weather stations in Lake Country region.

For the purposes of CWPPs in BC, fire weather conditions are described in terms of the *Fire Danger Class*. Fire Danger Class is defined in the Wildfire Regulation and is a rating derived from outputs of the Canadian Forest Fire Weather Index (FWI) System. Although the sole intent of the Fire Danger Class rating scheme is to restrict high risk activities (primarily industrial) occurring on or about forest and grassland areas, the use of Fire Danger Class has been extended to the CWPP realm as a straightforward means of characterizing fire weather conditions in an area represented by a weather station.

Fire Danger Class is determined by comparing the Buildup Index (BUI) to the Fire Weather Index (FWI) in one of three tables presented in the Wildfire Regulation. Each table is specific to one of three broad Danger Regions in BC; Lake Country is situated in Danger Region 3, along with the

Fintry, West Kelowna and Ida Bell 3 fire weather stations that were included in this analysis. The actual Fire Danger Classes are numerical ratings 1-5, in ascending order of severity. An illustration of the various inputs and components from which Fire Danger Class is derived is presented in Figure 4.

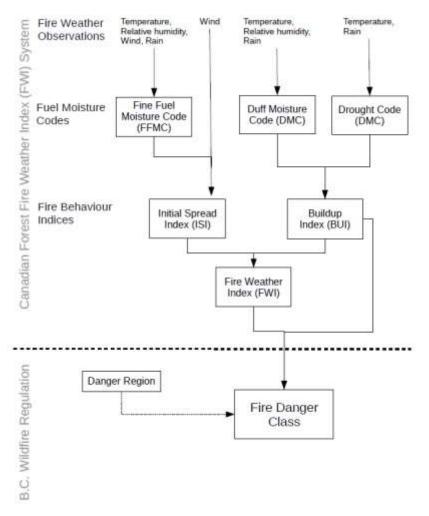


Figure 4 Fire Danger Class methodology.

A Fire Danger Class report for each of the three fire weather stations analysed has been prepared (see Figures 5-7). The Fire Danger Class reports illustrate the number of days per year when the Fire Danger Class was rated 4 or 5. The Lake Country AOI is situated in Danger Region 3, which has the following BUI and FWI ranges for Fire Danger Class 4 and 5:

BUI: 51 – 201+FWI: 17 – 47+

For each of the stations, the average number of Fire Danger Class 4 and 5 days in each dataset is presented, as well as the median, maximum and year of maximum (see Table 10). For all three of the fire weather stations analyzed, 2017 had the maximum number of Fire Danger Class 4 and 5 days.

The datasets for the three fire weather sations of interest date back to 1990 (Fintry), 2004 (Ida Bell 3) and 2016 (West Kelowna) and continue to be in service (see Table 9). Of interest is the increasing linear trend for Fire Danger Class 4 and 5 days for the Fintry and Ida Bell 3 stations (Figures 5 and 6). The West Kelowna station (Figure 7) lacks sufficient fire weather history to conduct any trend analyses. Although the Ida Bell 3 station is roughly 35 km away from Lake Country and approximately 800 m higher, the station is representative of the higher elevation fire potential in the region. For this reason, Ida Bell 3 can be used as an indicator of the potential for high-elevation timber fires to the east of Lake Country.

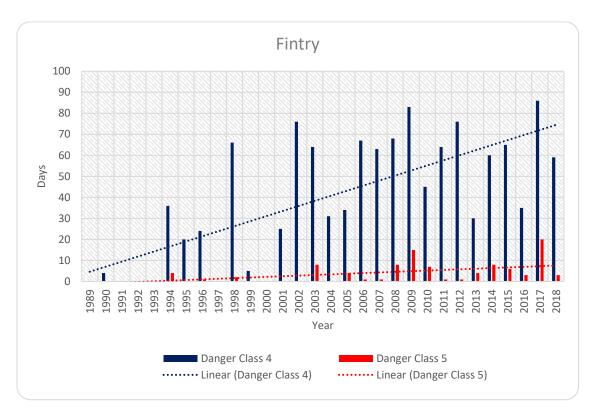


Figure 5 Fintry Danger Class 4 and 5 report.

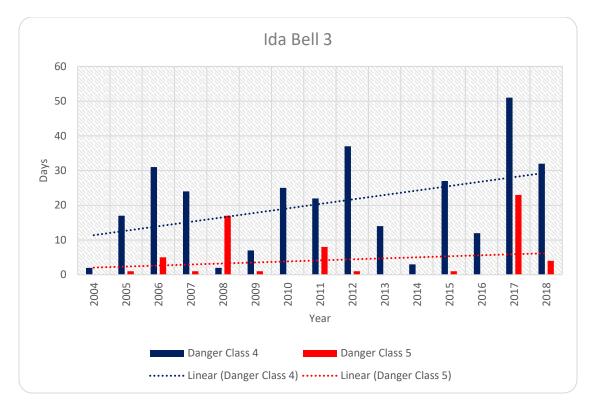


Figure 6 Ida Bell 3 Danger Class 4 and 5 report.

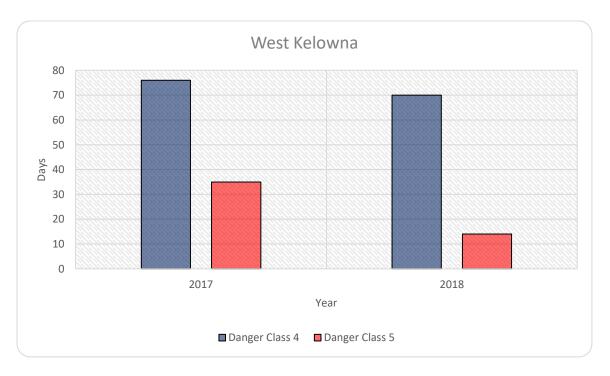


Figure 7 West Kelowna Fire Danger Class 4 and 5 report.

Table 10 Summary of Fire Danger Class 4 and 5 days for regional fire weather stations.

	Days				
Station Name	Danger Class	Average	Median	Maximum	Year of Maximum
Fintry	Danger Class 4	40	36	86	2017
	Danger Class 5	3	1	20	2017
	Combined	43	39	106	2017
Ida Bell 3	Danger Class 4	20	22	51	2017
	Danger Class 5	4	1	23	2017
	Combined	24	25	74	2017
West Kelowna*	Danger Class 4	73	73	76	2017
	Danger Class 5	24	24	35	2017
	Combined	97	97	111	2017

<sup>\*</sup> Two years of data

#### 4.1.3 Climate Change

The Pacific Climate Impacts Consortium (PCIC) is based at the University of Victoria and conducts quantitative studies on climate change and climate variability impacts for stakeholders in the Pacific and Yukon regions. Through analysis and interpretation of a variety of global climate models, PCIC serves to bridge the gap between climate research and practical application for a variety of end users. To do this, PCIC has several analysis tools available, including the Plan2Adapt toolkit, as well as the more detailed Regional Analysis Tool (Pacific Climate Impacts Consortium, 2013).

The future regional impacts of climate change are far from certain and projections are based on the best available models and information. For example, although the range of modelled future summer temperature increase is somewhat broad (Figure 8), the upward trend is conspicuous. Conversely, the range of modelled summer precipitation change (Figure 9) shows a more muddled range of projections. As with any set of models, as more data becomes available and emissions scenarios become more refined, future impacts will be brought into sharper focus.

The PCIC (2013) has drafted a set of potential climate impacts for the Central Okanagan in the 2050s, including:

- Increase in hot and dry conditions
- Increase in temperature
- Longer dry season
- High intensity precipitation
- Decrease in snowpack
- Possible changes in vegetation productivity

From a wildland fuel perspective, these impacts could result in a variety of ecological changes. Long term changes in moisture regimes can affect forest health and species distribution. Ecological communities may begin to migrate northwards or to higher elevations as site

suitability and disturbance patterns shift. Already dry ecological zones may become drier and more prevalent at higher elevations, making an already fire-prone landscape more extensive.

As some valley bottom areas and exposed slopes around Lake Country are already characterized by relatively light grass fuels, climate change induced upslope migration of treed areas may have little effect on the overall wildfire threats posed to the WUI. In fact, such a shift might actually confine high-intensity fire to higher elevations over the long term. However, in the wake of ecological migration, dead and downed fuel loading would most likely create a window of time of increased fuel hazard attributable to increased surface fuel loading, something akin to the recent effects of Western pine beetle on Ponderosa pine stands in the area.

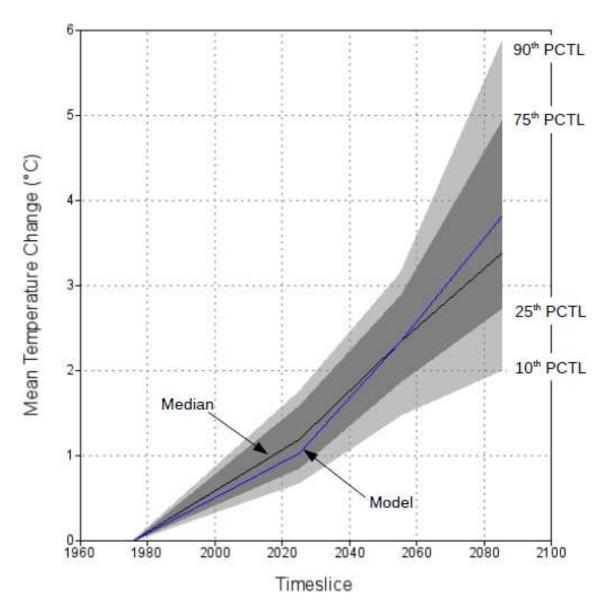


Figure 8 Range of projected summer (June, July, August) temperature change over three time periods (2020's, 2050's and 2080's) for the Central Okanagan. This figure is produced from a set of Global Climate Model (GCM) projections and represents the range of modelled outputs. The dark grey shading represents 50% of the projections used in the set, while the light grey shading

represents 80% of the projections used in the set. The black line labelled 'median' is the mid-point of projections in the set. The blue line labelled 'model' is the CGCM3 A2 run 4 model (Canadian Global Climate Model). A2 refers to one of several emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC).

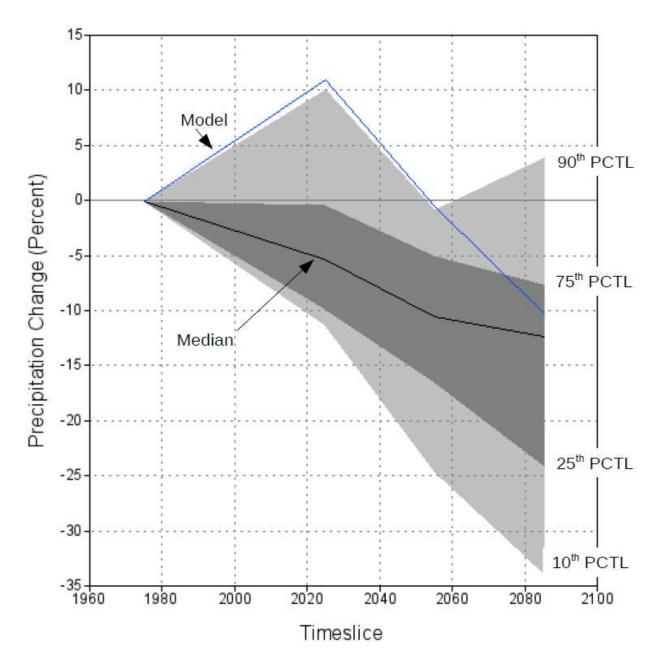


Figure 9 Range of projected summer (June, July, August) precipitation change (percent) over three time periods (2020's, 2050's and 2080's) for the Central Okanagan. This figure is produced from a set of Global Climate Model (GCM) projections and represents the range of modelled outputs. The dark grey shading represents 50% of the projections used in the set, while the light grey shading

represents 80% of the projections used in the set. The black line labelled 'median' is the mid-point of projections in the set. The blue line labelled 'model' is the CGCM3 A2 run 4 model (Canadian Global Climate Model). A2 refers to one of several emissions scenarios developed by the Intergovernmental Panel on Climate Change (IPCC).

# 4.2 Provincial Strategic Threat Analysis (PSTA)

The Provincial Strategic Threat Analysis (PSTA) is a provincial-scale analysis that attempts to characterize wildfire threat across BC. The analysis combines historical fire density, potential spotting impacts and predicted head fire intensity to produce a wildfire threat score. These scores are grouped into ten threat classes, ranging from 1 to 10, or Nil to Extreme. The PSTA layer is intended to serve as a starting point from which to design and conduct more detailed sampling to further characterize wildfire threat to communities.

The Lake Country PSTA ratings are illustrated on Maps 4a, 4b, 4c and 4d and are included as a separate attachment to the CWPP. Readers should be aware that private land is masked from publicly available PSTA data and products, as directed by UBCM and the BCWS.

## 4.2.1 PSTA Final Wildfire Threat Rating

To determine the overall PSTA Threat Rating, historical wildfire density, head fire intensity (HFI) and spotting impact are combined using a weighted averaging process. Weights are assigned as 30% fire density, 60% HFI (90th percentile fire weather index (FWI) values) and 10% spotting impact. These weighted values were added together to produce a final fire threat rating and assigned to 10 classes to produce a detailed map of fire threat rating throughout British Columbia.

The 10 threat classes represent increasing levels of overall fire threat (i.e. the higher the number, the higher the threat). PSTA Threat Class 7 is considered to be a threshold and the most severe overall threat classes are Class 7 and higher. Areas of the province that fall into these higher classes are most in need of mitigation.

Areas rated as Class 7 or higher are locations where the fire intensity, frequency and spotting can be severe enough to potentially cause catastrophic losses in any given wildfire season, where those ratings overlap with significant values at risk.

## 4.2.2 Spotting Impact

A common misconception amongst the public is that when homes are destroyed during a wildfire, that they are consumed by something akin to a wave of fire slamming up against neighbourhoods. This is often far from the case. Case studies from wildland urban interface fire disasters have shown that most homes aren't destroyed by direct flame impingement from extreme fire behaviour; they are more often ignited by smaller flames extending onto the house and by firebrands (embers) directly (Cohen, 2008).

## 4.2.3 Head Fire Intensity

Head fire intensity (HFI) is a representation of the energy release from a flaming front at the head, or leading edge of a wildfire as it proceeds in a given direction at a certain rate by

consuming available fuel. Head fire intensity is measured in kilowatts per meter (kW/m) of fire front and is a primary component of the Canadian Forest Fire Behaviour Prediction (FBP) System.

As a primary output of the FBP system, HFI is dependent on the type of fuel being burned under a given set of weather conditions and topographical characteristics. To calculate PSTA threat scores, 90<sup>th</sup> percentile weather data is used, adjusted to the existing topographical characteristics, and the prevailing fuel type. This analysis carries several assumptions (BC Wildfire Service, 2015), including:

- Applicability of the provincial fuel type layer;
- Wind and slope are aligned, which is a worst-case scenario; and
- Broad average environmental lapse rates to account for varying elevations.

Calculated HFI values are then classified into ten PSTA-HFI Classes (such as Table 11, as an example) to facilitate further calculation and analysis. The descriptors used in Table 11 will vary among fuel types and is provided simply as a generalization of potential fire behaviour.

Table 11 Head fire intensity classes and associated fire behaviour.

			1	T T
PSTA - HFI Class	Fire Intensity kW/m	Fire Intensity Class	Flame Length (meters)	Likely Fire Behaviour
1	0.01 – 1,000	2	< 1.8	Smouldering surface fire
2	1,000.01 - 2,000	3	1.8 to 2.5	Moderate vigour surface fire
3	2,000.01 - 4.000	4	2.5-3.5	vigorous surface fire
4	4,000.01 - 6,000	5	3.5 to 4.2	Vigorous surface fire with occasional torching
5	6,000.01 - 10,000	5	4.2 to 5.3	Vigorous surface fire with intermittent crowning
6	10,000.01 - 18,000	6	12.3 to 18.2	Highly vigorous surface fire with torching and/or continuous crown fire
7	18,000 .01 - 30,000	6	18.2 to 25.6	Extremely vigorous surface fire and continuous crown fire
8	30,000.01 - 60,000	6	>25.6	Extremely vigorous surface fire and continuous crown fire, and aggressive fire behaviour
9	60,000.01 - 100,000	6	>25.6	Blowup or conflagration, extreme and aggressive fire behaviour
10	≥ 100,000	6	>25.6	Blowup or conflagration, extreme and aggressive fire behaviour

## 4.2.4 Fire History

Fire history tells the story of the relationships between fire behaviour, landscape ecology, management policy (including fire suppression), human development and other land-use changes throughout the area. The Lake Country AOI has a persistent history of wildfire on the landscape. The BCWS maintains a database of wildfires dating back to the early 1900s. Fire history data for fires that occurred prior to 1950 are limited to larger perimeters only and does not include fires that may only have been spot-sized. These perimeters have been digitized from a

variety of sources, some dating back to linen maps. From 1950 onwards, the wildfire dataset becomes more complete, capturing fires of all size classes and provides a more accurate picture of fire occurrence trends.



Figure 10 Burned snag on the southern slope of Spion Kop. This snag is likely a remnant from the August 30, 1985 wildfire (K40136) that occurred in the area.

The fire history dataset is by no means perfect. Occasionally historical wildfires plot within lakes and there are sporadic discrepancies in information between point layers and perimeter layers for a given fire, but generally the dataset provides an adequate basis from which to conduct a historical fire analysis.

In the AOI between 1950 and 2018 a total of 385 wildfires<sup>2</sup> are recorded in the provincial fire history dataset. The majority of the these fires have been person-caused (68%), with the remainder (32%) being lightning-caused. On average, nearly two lightning fires and four person-caused fires occur each year in the Lake Country AOI. The most wildfires in the AOI in a one-year period occurred in 1975, with 17 total wildfires. The 1992 fire season saw the highest number of

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<sup>&</sup>lt;sup>2</sup> Nuisance fires, smoke chases and unknown incident types have been omitted from this analysis, as they are not technically wildfires.

lightning fires (nine), while the most person-caused wildfires (10) occurred in 1958, 1975, and 1995, respectively<sup>3</sup>. See Table 12 for the Lake Country AOI breakdown of wildfire occurrence from 1950 to 2018.

Table 12 Summary of total, average and annual maximum wildfires by cause in the Lake Country AOI since 1950.

	Distri	ct of Lake Country	AOI
Cause	Lightning	Person	All
Total wildfires	124	261	385
Annual average	1.8	3.8	5.7
Percentage of cause	32%	68%	100%
Annual maximum	9	10	17
Year of maximum	1992	1995, 1975, 1958	1975

When wildfire occurrence since 1950 is graphed for the AOI we see that the occurrence of lightning and person-caused wildfires each display a slightly divergent linear trend (Figure 11). The annual occurrence of person-caused wildfires has increased slightly over the period, while the annual occurrence of lightning-caused fires indicates a slightly decreasing trend. While these two occurrence trends over the past 68 years may not appear significant, the rate of person-caused wildfires indicates that further prevention efforts are warranted.

The provincial fire history dataset reveals that wildfires have occurred in the AOI in all months except November, January and February (Figure 12). The occurrence of lightning-caused fires occupies a slightly narrower window, spanning March to October, with July and August as the core period for most lightning fires to start.

When pre-1950 perimeter data is included in an annual area burned analysis of the AOI (Figure 13), we see several years where the area burned exceeded 100 ha (1940, 1943, 1960 and 1985).

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<sup>&</sup>lt;sup>3</sup> Discrepancies are noted between fire history findings in the 2010 Lake Country CWPP and the 2019 CWPP update. We have attempted to replicate the findings of the 2010 CWPP for the 1950 -2008 period using the 2010 AOI (which is slightly different than the 2019 AOI). It appears that nuisance and smoke chase responses were included in the 2010 analysis. As nuisance fires and smoke chases do not meet the definition of a wildfire (and have only been tracked since 1999), we have excluded them from the fire history analysis for the 2019 CWPP update. Additionally, the 2010 CWPP indicates that the most wildfires to occur in a one-year period occurred in 2003 (24 fires) – we were only able to account for 12 wildfires for 2003 in the provincial dataset when the 2010 AOI was used to clip the historical fire dataset.

The largest wildfire to date in the AOI occurred on August 30, 1985 and was designated K40136 for that year. The provincial fire history datasets show a discrepancy in fire size for K40136: the attributes for the point data indicate a size of 1,670 ha, while the perimeter (polygon) information lists the size as 1,070 ha. The polygon attributes describe the source of the perimeter data as simply a buffered point as opposed to a more exact method, such as a digitized perimeter from a hard copy map source. This discrepancy in fire size appears to be limited to the one 1985 fire and is inconsequential at this point. The current practice of the BCWS is to utilize GPS tracks as a minimum for populating fire perimeter datasets, so it is unlikely that buffered points would be used in contemporary dataset versions.

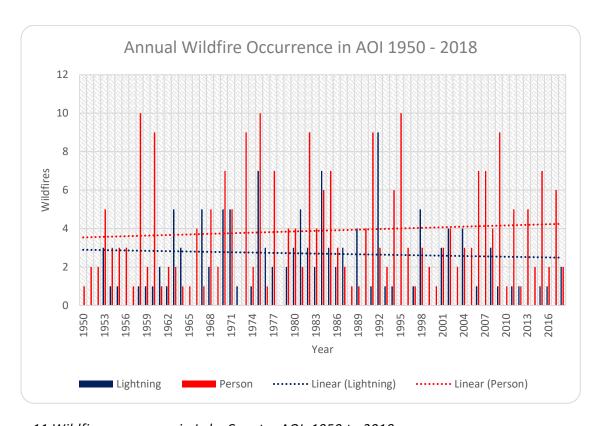


Figure 11 Wildfire occurrence in Lake Country AOI, 1950 to 2018.

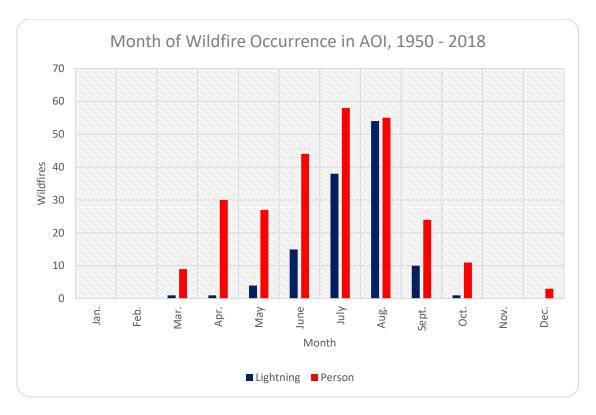


Figure 12 Month of Wildfire Occurrence in AOI (1950-2018)

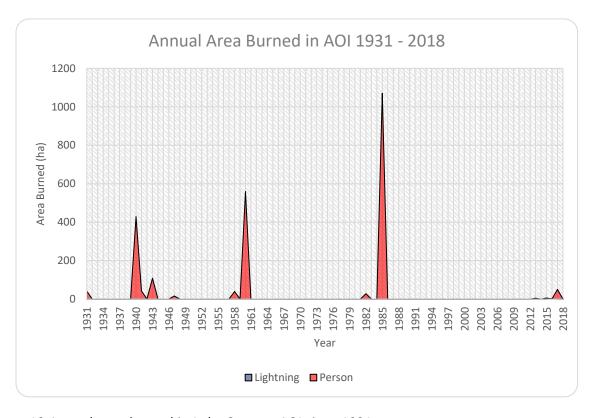


Figure 13 Annual area burned in Lake Country AOI since 1931.

For interest's sake, the entire fire history dataset for British Columbia has been summarized to help provide additional context to current wildfire issues (Figures 14 and 15). Across the province, the occurrence of person-caused wildfires has displayed a steady decline since the 1970s. Curiously though, lightning fires show a nearly opposite increasing trend. Provincially, this highlights both good and bad news: humans are starting fewer unwanted wildfires, but lightning fires seem to be increasing. The former trend can be encouraged through targeted prevention campaigns and land use practices, while the latter is completely outside our control.

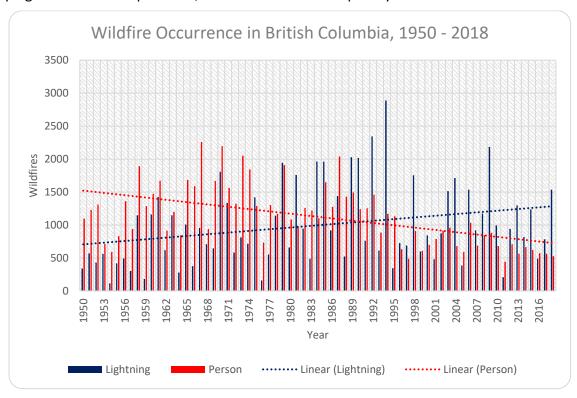


Figure 14 Wildfire occurrence in BC, 1950-2018

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<sup>&</sup>lt;sup>4</sup> Nuisance fires, smoke chases and unknown incident types were omitted from our analysis of the provincial data, as they are not technically wildfires.

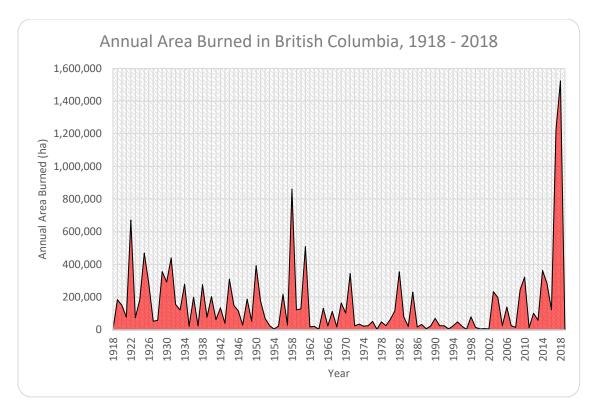


Figure 15 Annual area burned in BC, 1918-2018

# 4.3 Local Wildfire Threat Assessment

The process to assess wildfire threat for the Lake Country 2019 CWPP update followed the 2012 WUI Wildfire Threat Assessment guide methodology developed by Morrow et al. (2013). Normally, plot locations are selected through GIS analysis and fire behaviour modeling of the provincial fuel type layer. Specifically, the methodology (as detailed in Appendix 5) seeks municipal or crown land polygons with a modelled fire behaviour rating of Moderate or higher that are within 100-m of a structure in the WUI. This methodology serves to identify the highest priority areas for field assessment.

## 4.3.1 Fuel Type Verification

The issue of fuel type is somewhat more complicated in BC compared to other parts of Canada, owing to the diversity and breadth of ecosystems in this province. Fuel types are a primary input to the Canadian Forest Fire Behaviour Prediction (FBP) System and form the basis for predicting rate of spread, type of fire and fire intensity class (i.e. the primary components of the FBP system). Although FBP fuel types are intended to be viewed qualitatively and not quantitatively, many forest types in BC simply don't represent good fits with the established national FBP fuel types.

The FBP system is an adequate tool for wildfire pre-suppression (i.e. preparedness) and suppression operations. Systems such as FBP are "intended to assist firefighters and officers in estimating potential fire behaviour in constant conditions..." (Taylor & Alexander, 2016). The utility of FBP in quantifying wildfire threat or risk or assessing forest types for the purposes of

prescribing long-term fuel management treatments is not well documented or reviewed. An ecological approach to describing wildland fuels provides greater opportunity to describe characteristics related to stand structure and biomass, as it relates to wildland fire behaviour.

The ecology of Lake Country AOI is predominantly characterized by the Interior Douglas-fir and Ponderosa Pine biogeoclimatic zones, as summarized in Table 13.

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Table 13 Biogeoclimatic classification of the Lake Country AOI.

		Area in	
Biogeoclin	natic subzones/variant	AOI (ha)	% of AOI
IDFxh1	Interior Douglas-fir - Okanagan Very Dry Hot	10,752	46%
PPxh1	Ponderosa Pine - Okanagan Very Dry Hot	7,001	30%
IDFdm1	Interior Douglas-fir - Kettle Dry Mild	2,327	10%
MSdm1	Montane Spruce - Okanagan Dry Mild	1,819	8%
IDFmw1	Interior Douglas-fir - Shuswap Moist Warm	957	4%
ICHmk1	Interior Cedar Hemlock - Kootenay Moist Cool	323	1%
		23,180	100%

The natural disturbance patterns of the IDFxh1, PPxh1 and IDFdm1 have been characterized by historically frequent stand maintaining fires (i.e. fires in the NDT4, as discussed in 4.2) prior to the fire-return interval being interrupted by contemporary forest management and fire suppression policies. Stand maintaining fires are typically low intensity surface burns that consume understory fuels while retaining a healthy green overstory. These frequent fires kept ladder fuels to a minimum and typically resulted in an open, park-like stand structure.

In the absence of periodic low intensity fire in the area, small trees that would have typically been fire-killed have become established, forming thickets and creating ladder fuels and resulting in relatively higher tree densities. Fine fuels, such as dead Ponderosa pine needles, often accumulate at the base of mature trees, resulting in higher fine fuel loading that could produce fire intensity great enough to result in lethal scorching of trees whose thick bark would have otherwise protected the vital phloem and cambial tissues.

The FBP fuel types for most interface areas in Lake Country are classified as either Grass or Ponderosa Pine Douglas-fir; termed the O1 and C7 fuel types, respectively (Table 14). The C7 fuel type lends itself well to manual fuel treatments that target the small diameter understory conifers and retains the larger diameter overstory layer. However, a C7 fuel type that undergoes this type of treatment (often referred to as "thinning from below"), ultimately remains a C7 fuel type since the FBP system has limited options for modifying C7 predictions.

At higher elevations, in the MS and ICH zones and certain IDF subzones, C-3 and M-1/2 fuel types are more or less the best (but far from perfect) fit. These areas are more typical of a stand replacement fire regime, whereby high-severity fire results in a relatively higher proportion of tree mortality. Wet belt ecosystems, such as the ICH are notoriously challenging to classify according to fuel type. Often the best option is the M-2 or C-5 fuel types, though these are nowhere near a perfect match. The ICH zone is often typical of a mixed-severity fire regime,

whereby examples of both relatively low-intensity and stand-replacing fires can be found on the landscape.

The FBP fuel type distribution for the AOI is presented in Table 14 and a generalized classification of all FBP fuel types, according to spotting potential, is provided in Table 15.

Table 14 Distribution of CFFDRS fuel types in Lake Country AOI.

FBP Fuel Type	Area (ha)	%
Non-fuel (water, urban, cultivation etc.)	8,668	37%
C-7 Ponderosa Pine/Douglas-fir	8,257	36%
O-1a Matted/Cut Grass	4.660	200/
O-1b Standing Grass	4,669	20%
C-3 Mature Jack or Lodgepole Pine	868	4%
M-1 Boreal Mixedwood - Leafless	317	1%
M-2 Boreal Mixedwood - Green	317	170
S-1 Jack or Lodgepole Pine Slash	305	0.3%
D-1 Leafless Aspen	66	0.20/
D-2 Green Aspen	00	0.3%
C-4 Immature Jack or Lodgepole Pine Stands	20	0.09%
C-5 Red and White Pine	6.0	0.03%
C-2 Boreal Spruce	2.8	0.01%
	23,180	100.0%

Table 15 Fuel type categories and crown fire spotting potential.

Fuel Type Categories	Fuel Type - Crown Fire/ Spot Potential
1: C1, C2, C4, M3-M4 (>50% C/DF)	High
2: C3, C7, M3-M4 (<50% C/DF) M1-M2 >50% Conifer	Moderate
3: C5, C6, O1a/b, S1- S3 <sup>1</sup> M1-M2 (26-49% Conifer)	Low
4: D1, D2, M1-M2 (<26% Conifer)	Very Low

## 4.3.2 Proximity of Fuel to the Community

Wildland fuels closest to built-up areas usually represent the highest hazard to communities. The common recommended approach (i.e. SWPI, CRI, FireSmart and others) is to reduce fuel hazards from the value or structure outward, ensuring mitigation continuity. Untreated areas adjacent to the value or structure may allow a wildfire to build in intensity and rate of spread, which can increase the risk to the value. To capture the importance of fuel proximity in the local wildfire threat assessment, the WUI is weighted more heavily from the value or structure outwards. Fuels adjacent to the values and/or structures at risk receive the highest rating followed by progressively lower ratings moving out.

The local wildfire threat assessment process subdivides the WUI into three areas – the first 100 meters (WUI 100), 101 to 500 meters (the WUI 500), and 501 to 2000 meters (the WUI 2000). These zones provide guidance for classifying threat levels and subsequent priorities of treatments (Table 16).

Table 16 Proximity to the Interface.

Proximity to the Interface	Descriptor	Explanation
WUI 100	(0-100 m)	This Zone is always located adjacent to the value at risk. Treatment would modify the wildfire behaviour near or adjacent to the value. Treatment effectiveness would be increased when the value is FireSmart.
WUI 500	(101-500m)	Treatment would affect wildfire behaviour approaching a value, as well as the wildfire's ability to impact the value with short- to medium-range spotting; should also provide suppression opportunities near a value.
WUI 2000	(501-2000 m)	Treatment would be effective in limiting long - range spotting but short- range spotting may fall short of the value and cause a new ignition that could affect a value.
	>2 000 m	This should form part of a landscape assessment and is generally not part of the zoning process. Treatment is relatively ineffective for threat mitigation to a value, unless used to form a part of a larger fuel break / treatment.

Where fuel treatments are intended to reduce the risk to values in the built environment, the generally accepted practice is to begin treatments at the values and progress outwards. This strategy most often straddles the boundaries between private and public land and requires a coordinated effort to have any meaningful result. When gaps of untreated fuel are left, regardless of land status, the overall effectiveness of adjacent fuel treatments can become reduced or completely negated.

## 4.3.3 Fire Spread Patterns

The BCWS has prepared *ISI roses* for each of its fire weather stations across the province, with the expectation that they be included in community wildfire protection planning. Similar to a

wind rose, the ISI rose uses the direction and magnitude of ISI, which is a numeric rating of expected rate of fire spread that combines the effect of wind and the fine fuel moisture code (FFMC). The ISI roses for Fintry and Ida Bell 3 are provided in Figures 16 and 17, though extreme caution is needed when interpreting the plots for anywhere but the immediate station area. No ISI rose for the West Kelowna fire weather station is available from the BCWS at present.

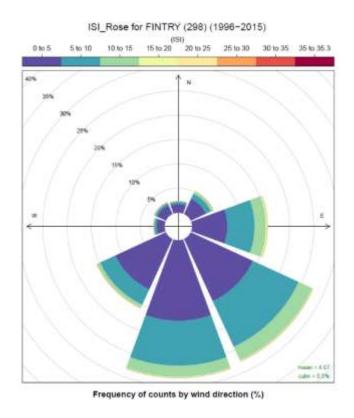


Figure 16 ISI rose for the Fintry fire weather station, 1996-2015. Provided by BCWS.

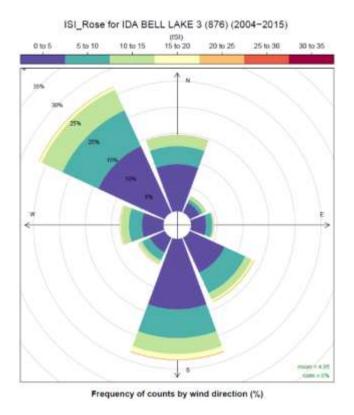


Figure 17 ISI rose for the Ida Bell 3 fire weather station, 2004 – 2015. Provided by BCWS.

## 4.3.4 Topography

In the context of the fire environment, topography refers to the shape and features of the landscape. Of primary importance for an understanding of fire behaviour is slope. When all other factors are equal, a fire will spread faster up a slope than it would across flat ground. When a fire burns on a slope, the upslope fuel particles are closer to the flame compared to the downslope fuels. As well, hot air rising along the slope tilts the flame uphill, further increasing the ease of ignition of upslope fuels. A pre-heating effect on upslope fuels also contributes to faster upslope fire spread.

Topography influences fire behavior principally by the steepness of the slope. However, the configuration of the terrain such as narrow draws, saddles and so forth can also influence fire spread and intensity. Slope aspect (i.e. the cardinal direction that a slope faces) determines the amount and quality of solar radiation that a slope will receive, which in turn influences plant growing conditions and drying rates.

The 2012 Wildfire Threat Assessment Guide (used for this CWPP) classifies slope slightly differently than the 2017 Wildfire Risk Classification process, but the intended outcome is similar – to characterize slope steepness in terms of how a wildfire will spread and behave on a given slope. The classifications ultimately attempt to reflect the role of slope as a primary input of the Canadian Forest Fire Behaviour Prediction System (FBP), which underpins much of the threat characterization and mitigation work in BC and elsewhere.

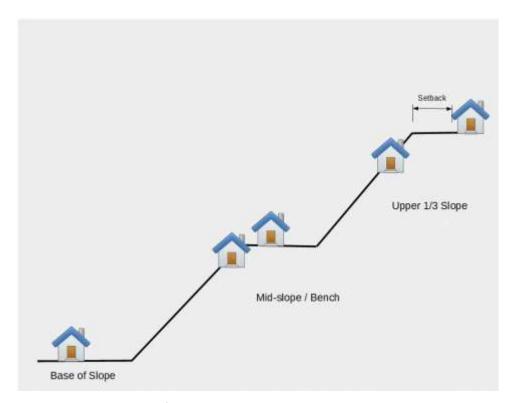


Figure 18 Relative slope position of values.

When structures (i.e. values) are situated on or near a slope, the position of the value in relation to the slope corresponds to the relative WUI threat rating. Where a slope is characterized by continuous and available fuel, values situated at the base of the slope are at less risk than values situated on the mid or upper slope (Figure 18). The risk to values that are situated on slope benches is dependant on the degree to which the value is "set back" from the crest of the slope. Adequate setback is where the value is far enough back from the crest of the slope, such that the value is not subjected to the full effects of upslope fire spread coming up from below. FireSmart Canada broadly defines adequate set back as 10 m for a single-story building, with set back increased proportionally for multi-story buildings (Partners in Protection, 2003). Set back is further illustrated in Figure 19.



Figure 19 Structure set back in relation to the steep slope below Nighthawk Road.

# 4.4 Summary of Section 4 Recommendations

- Recommendation 1 (Public Engagement): When developing wildfire-related communications for the public, consider including the ecological and cultural role that fire has played on the regional landscape.
- Recommendation 2 (Prevention and Preparedness): Consider approaching the BC Wildfire Service to explore the possibility of re-establishing a fire weather station on the Aberdeen Plateau to provide improved fire weather information related to important watershed values.
- Recommendation 3 (Prevention and Public Engagement): Maintain the link from the
  District of Lake Country website to the BC Wildfire Service Fire Danger Rating webpage to
  enable the public to maintain awareness of potential wildfire conditions. If possible,
  integrate an API into the Lake Country website that enables display of the current Fintry
  and West Kelowna Danger Class directly on the Lake Country website.
- Recommendation 4 (Preparedness and Governance): On an annual basis, consider preparing a Danger Class report for the Fintry, West Kelowna and Ida Bell 3 fire weather stations to help characterize fire danger trends year over year and assist decision makers in representing wildfire-related challenges faced by Lake Country.

# 5. Risk Management and Mitigation Factors

When considering the risk of wildland urban interface fires the issue can be viewed in terms of the probable frequency of a fire occurring, and the probable magnitude of the resulting losses. Wildfire occurrence directly relates to fire cause and is the focus of fire prevention planning and education, which is a fundamental element of wildfire management. As discussed in 4.2.4 fire cause in the AOI is attributed predominantly towards people. This fact illustrates the importance of an all-encompassing approach to managing wildland urban interface fire threats: although prevention programs can reduce the occurrence of person-caused fires, we will never be able to completely eliminate the probability of a wildfire occurring, so we also need to attempt to reduce the magnitude of each occurrence and it's associated probable future losses.

# 5.1 Fuel Management

Managing wildland fuels is one aspect of reducing the risk to communities in the wildland urban interface. In the drier portions of the AOI, as previously discussed, the predominant fuel type in the interface is C7 Ponderosa Pine Douglas-fir. This fuel type, exemplified in the Interior Douglas-fir and Ponderosa Pine biogeoclimatic zones, is particularly well-suited to certain fuel management treatments, owing to its typical fire-maintained structure of well-spaced and pruned fire adapted conifer overstory (Figure 20).

A variety of treatment methods are available for this particular fuel type, depending on treatment intensity, treatment timing, site sensitivity and public support, among other factors. Treatments in the C7 have traditionally been carried out by hand crews, whereby thinning and pruning have been undertaken with a variety of tools and techniques, including power saws, brush saws, pole-pruners etc. Debris disposal is typically carried out either through pile and burn, chipping or hauling off-site. These types of hand treatments can be labour intensive, depending on stand density, surface fuel loading and terrain limitations. Hand treatments are well suited to sites with thin and sensitive soils that would be otherwise degraded through ground-based equipment.

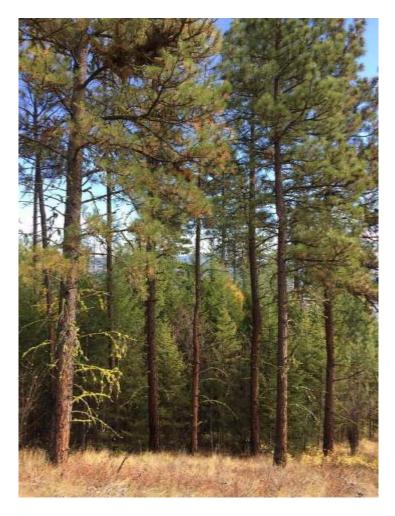


Figure 20 This photo from Spion Kop is typical of the post-1985 fire stand conditions in the area. Dense stands of juvenile Ponderosa pine have established in the understory, increasing the vertical fuel continuity (i.e. ladder fuels) within the stand.

Fuel treatments can also be carried out with mechanized equipment, such as feller bunchers and various types of mulchers. Conventional timber harvesting is also a viable form of fuel management in certain timber types, with the added benefit of at least partial recovery of costs through log utilization. The use of machinery enables the land manager to realize higher production rates compared to hand crew treatments alone. Site sensitivities are a significant factor when considering the use of mechanized methods – thin soils, common to lower elevation hot/dry sites can be significantly degraded if treatments aren't designed and carried out professionally.

Regardless of the method for reducing fuel loading on any particular forested site, surface fuels must be considered and attended to. During hand falling/bucking or mechanical harvesting, processing and yarding, surface fine fuel loading can increase with disturbance. In many cases, particularly in Ponderosa pine and interior Douglas-fir stands, the use of low-intensity prescribed fire can be an effective means of both reducing surface fine fuel loads and realizing beneficial ecological fire effects.

Fuel management treatments, particularly on NDT4 sites, should not be viewed as one-time actions. Rather, fuel treatments require periodic maintenance entries to maintain the integrity and purpose of the treatment area. In the absence of maintenance, or periodic low-intensity fire, treated NDT4 sites will trend back towards pre-treatment structure and conditions.

Fuel breaks on Crown Land immediately adjacent to private land and in close proximity to the wildland urban interface and/or intermix areas, are termed *interface fuel breaks*. Interface fuel breaks are designed to modify fire behaviour, create fire suppression options and a safe place from which to anchor crews and tactics, and improve suppression outcomes. The dimensions of interface fuel breaks are dependant on the forest/fuel type and associated fire behaviour, but generally this type of fuel break will occupy, at minimum, the WUI 100 zone. The design of an interface fuel break should incorporate existing natural features, where they exist, that offer a similar modification or impediment to fire behaviour. These can be areas of low fuel loading, no fuel loading or a fuel type with less potential fire behaviour.

Fuel breaks created through stand modification are not intended to be impenetrable barriers to fire spread; rather they are intended to modify and decrease fire behaviour. Similarly, the presence of an interface fuel break alone does not ensure the survivability of adjacent structures, especially if those properties are not FireSmart. The combination of a well designed and maintained interface fuel break *and* adjacent private property and structures that are FireSmart, is a proven method of achieving real risk reduction.

Fuel breaks located beyond interface fuel breaks (i.e. beyond the WUI 100 zone) are termed *primary fuel breaks*. The location of primary fuel breaks is contingent on land ownership (Crown vs. private), existing natural and man-made features, fuel types, and prevailing wind patterns. As with interface fuel breaks, primary fuel breaks are intended to modify fire behaviour and create fire suppression options that reduce the risk of high intensity wildfire reaching a community or other built-up areas.

Primary fuel breaks may be located to completely surround a community or be strategically placed upwind of communities and perpendicular to fire season winds. Primary fuel breaks need to have sufficient width and fuel modification to minimize horizontal and vertical fuel continuity to effectively reduce the head fire intensity as a wildfire enters into the fuel break.

As with interface fuel breaks, primary fuel breaks should not be viewed as impenetrable barriers to fire spread. The potential for ember transport and spot fires on the community side of any fuel break is a very real concern and may negate the effectiveness of any fuel break if not designed and treated in a manner that attempts to reduce this risk.

Five broad potential primary fuel break areas have been identified and are summarized in Table 18, representing 121.5 ha in total. Within the WUI four possible interface fuel breaks have been identified through GIS analysis (detailed in Appendix 5) followed by site assessments using the 2012 WUI Wildfire Threat Assessment process (Morrow, et al., 2013). These proposed interface fuel breaks are summarized in Table 17 and total 20.2 ha.

Table 17 Interface Fuel Breaks

Poly	Reference Plot	Wildfire Behav. Threat Class	WUI Threat Class	Geographic Area	Area (ha)	Feature Type	Priority Rank
1	LC_099	EXTREME	EXTREME	Nighthawk Rd	4.6	Interface Fuel Break	Priority 1
2	LC_003	HIGH	EXTREME	Spion Kop Peak	8.6	Interface Fuel Break	Priority 2
7	LC_098	HIGH	EXTREME	Nighthawk Rd 2	0.9	Interface Fuel Break	Priority 7
9	LC_012	HIGH	High	Jack Seaton Park 1	6.1	Interface Fuel Break	Priority 9
					20.2		

Table 18 Primary Landscape Level Fuel Breaks

Poly		Wildfire Behav. Threat	WUI Threat				Priority
Pc	Reference Plot	Class	Class	Geographic Area	Area (ha)	Feature Type	Rank
3	LC_002	EXTREME	MOD	Spion Kop 2	29.5	Landscape Fuel Break	Priority 3
4	LC_005	EXTREME	HIGH	Spion Kop 3	23.1	Landscape Fuel Break	Priority 4
5	LC_010	EXTREME	MOD	Oyama Lake FSR	31.5	Landscape Fuel Break	Priority 5
6	LC_001	EXTREME	HIGH	Spion Kop Apex Trailhead	26.0	Landscape Fuel Break	Priority 6
8	LC_006	HIGH	HIGH	Spion Kop 4	11.4	Landscape Fuel Break	Priority 8

121.5

# 5.2 FireSmart Planning and Activities

The FireSmart Canada program is administered by Partners in Protection, a national non-profit association comprised of national, provincial and local government agencies with fire protection mandates. Modelled after the FireWise Communities USA program in the United States, FireSmart Canada has developed a comprehensive planning and assessment process to mitigate wildfire hazards to existing communities, as well as guide new development. Although the FireSmart program is primarily focused towards residential homes, the principles have been adapted for application in mixed-use areas, industrial activities and elsewhere. For this reason,

although home or house are the terms most often used when describing FireSmart principles, structure or building are equally appropriate and more broadly applicable.

## **5.2.1** FireSmart Goals and Objectives

The FireSmart program seeks to strike a reasonable balance between the aesthetic values of living in WUI areas with the need to make communities more resilient to the effects of wildfire. At the core of the FireSmart program is the relationship between a home and the surrounding natural areas and whether this relationship can result in the transfer of fire between the two. Hazards are assessed and mitigated by giving priority to the structure and immediate surroundings and then working progressively outwards. This is accomplished through the establishment of three zones around a structure:

- Priority Zone 1a: The area within 1.5m of a building
- Priority Zone 1: The area within 10 m of a building
- Priority Zone 2: The area 10-30 m from a building
- Priority Zone 3: The area 30-100 m from a building

On sites with relatively higher building densities, multiple sets of priority zones invariably overlap. One building's Zone 2 may be an adjacent building's Zone 1 and so forth. This characteristic is common in all but the most rural of WUI settings and speaks to the shared nature of wildfire hazard and collective resilience.

The general goal of FireSmart is to encourage private land owners to adopt and conduct FireSmart practices to reduce the fuel hazard and implement other measure to minimize damages to assets on their property from wildfire. These include:

- Reduce the potential for an active crown fire to move through private land.
- Reduce the potential for ember transport through private land and structures.
- Create landscape conditions around properties where fire suppression efforts can be effective and safe for responders and resources.
- Treat fuels adjacent and nearby to structures to reduce the probability of ignition from radiant heat, direct flame contact, and/or ember transport.
- Implement measures to structures and assets that reduce the probability of ignition and loss.

Research and post-fire reviews have shown that when values have been constructed, retrofitted or treated in accordance with FireSmart principles, they stand a greater chance of survival compared to those that haven't (Westhaver, 2017; Partners in Protection, 2003). The spatial scale that determines home ignitions corresponds more to the specific site and characteristics of homes and property than to landscape scale wildfire management and fuel modification strategies (Cohen, 2000). In order to truly reduce the threat of homes and other values being destroyed in wildland urban interface fire disasters, homeowners and governments alike must take deliberate and concerted steps to properly assess and mitigate hazards. An excellent example of private property fuel reduction was observed in the Nighthawk Road area (Figure 21).



Figure 21 This photo illustrates good fuel management practices employed by some homeowners in the Nighthawk Road area. These private property efforts should be complemented by fuel management treatment on adjacent municipal lands.

## 5.2.2 Key Aspects of FireSmart for Local Governments

The FireSmart program is wholly dependent on interest and participation from residents who live in fire prone environments. Obviously, while local governments can't force residents to take an active interest in any particular cause or issue, they can conduct public education and awareness campaigns and support FireSmart projects, with the goal of building a critical mass of motivated residents who are committed to reducing the ignitability of their homes.

The challenge that local governments continue to face is how to deal with private landowners who are either unable or unwilling to mitigate fuel hazards on their property. Publicly funded programs such as FireSmart are not permitted to be used directly for work on private property, and there is little recourse for local governments to compel private landowners to undertake mitigation actions. Even if most homes in a residential area undertake meaningful FireSmart actions, when unmitigated private properties are interspersed among them, the overall threat to mitigated property remains, due to the threat of structure to structure ignition and propagation. Suggested FireSmart activities that have been successful with other local governments are presented in Table 19.

Table 19 FireSmart practices and activities.

FireSmart Theme	Suggested Activities
Communication, Education & Partnerships	<ul> <li>Host a FireSmart day</li> <li>Use local government newsletters and social media</li> <li>Undertake FireSmart Local Representative or Community Champion training</li> <li>Continue to pursue CRI funding for FireSmart projects</li> <li>Form a community-wide FireSmart committee</li> <li>Encourage homeowners and/or neighborhoods to undertake FireSmart site assessments and area assessments</li> </ul>
Vegetation management	<ul> <li>Develop FireSmart demonstration areas in public spaces, such as parks and municipal facilities</li> <li>Strengthen landscaping requirements in zoning and development permits to require fire resistive landscaping and replacement of legacy high-flammability plants.</li> <li>Facilitate treatment debris disposal for landowners</li> </ul>
Planning & Development	<ul> <li>Strengthen policies and practices for FireSmart construction and maintenance of public buildings</li> <li>Maintain the Development Permit Areas for Wildfire Interface in order to require FireSmart exterior finishing, landscaping and professional assessments and recommendations</li> </ul>

## 5.2.3 Priority Areas within the Area of Interest for FireSmart

Lake Country could benefit from a program of FireSmart projects, with the goal of achieving FireSmart Canada Community Recognition for a number of neighbourhoods. Based on assessments of Lake Country, the following neighbourhood areas are suggested for FireSmart Community Recognition projects:

- Nighthawk Road;
- Jack Seaton Park area;
- Apex Drive area;
- Lakehill Drive area;
- Forest Hills;
- Juniper Cove;
- Oyama Lake Road.

# **5.3 Community Communication and Education**

The following community engagement strategies would be of benefit to Lake Country and its residents in furthering wildland urban interface fire awareness and education:

- Establish a community wildfire safety page on Lake Country webpage, that includes:
  - the current CWPP;
  - completed FireSmart Community Assessment Reports;
  - information for residents on how to conduct their own FireSmart Structure and Site Hazard Assessment Forms, and steps they can take to lower their hazard scores;
- Host wildfire or FireSmart public education workshops or information sessions prior to and during fire season

# **5.4 Summary of Section 5 Recommendations**

- **Recommendation 5 (Prevention):** The application of prescribed fire in and around Lake Country should be supported as a proactive method of fuels management that can result in less smoke output than similar areas burning under wildfire conditions.
- Recommendation 6 (Prevention and Public Engagement): Wildland urban interface
  threat reduction should be promoted as a mutually beneficial strategy between private
  property owners and governments. Private property owners and governments alike need
  to take responsibility for the wildland fuel under their ownership.
- Recommendation 7 (Prevention and Governance): Maintain the Wildland Fire
  Development Permit Area requirements as drafted in the 2018 2038 District of Lake
  Country Official Community Plan. As various development permit requirements are
  amended from time to time, ensure that requirements and guidelines complement the
  Wildland Fire Development Permit Area requirements.
- Recommendation 8 (Prevention and Public Engagement): Lake Country should consider initiating FireSmart projects, as it is one of the best available options for generating public interest and action regarding hazard reduction on private property. Suggested neighbourhoods are listed in 5.2.3.
- Recommendation 9 (Prevention and Public Engagement): Establish a wildfire safety and
  hazard reduction page on the Lake Country Fire Department website to highlight the
  FireSmart program and simple actions that homeowners can take to reduce their homes'
  susceptibility to ignition during a wildfire. Engage in public education information sessions
  throughout Lake Country associated with wildfire management and/or FireSmart.
- Recommendation 10 (Prevention): Consider the landscape and interface fuel breaks referenced in Tables 17 and 18 for fuel mitigation treatments, followed by periodic maintenance.

# 6. Wildfire Response Resources

The BC Wildfire Service, as a branch of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), has responsibility to respond to wildfires outside local fire protection areas and to provide assistance to local fire departments on wildfires within their fire protection area, when requested. Fire departments are responsible for their own costs incurred while responding to wildfires within their jurisdiction. Costs incurred by the BCWS to undertake firefighting assistance within a fire department protection area are borne by the Province. In situations where the BCWS requests a fire department to respond to a wildfire outside their fire protection area, the fire department is compensated according to the Inter-Agency Operational Procedures and Reimbursement Rates agreement (The Office of the Fire Commissioner, The Fire Chiefs Association of BC, BC Wildfire Service, 2017).

# **6.1 Local Government Firefighting Resources**

When the District of Lake Country was incorporated in 1995, the Winfield, Carr's Landing and Oyama volunteer fire departments were amalgamated to form the Lake Country Fire Department. The department provides emergency medical, firefighting and rescue services to the community and is party to the Regional District of Central Okanagan mutual aid agreement. Regionally, the department participates in extrication, rope and marine rescue.

## 6.1.1 Fire Department and Equipment

The Lake Country Fire Department has a complement of seven career staff and 54 paid-on-call firefighters. The department is situated in three fire stations: Station 91 (Oyama); Station 81 (Carr's Landing); and Station 71 (Winfield), which is also headquarters for the Fire Chief, Deputy Fire Chief, Emergency Services Clerk and the Fire Inspector. The department's complement of apparatus is listed in Table 20.

During the 2018 municipal elections a referendum question was posed to voters regarding the replacement of Station 71. The referendum passed and will enable Lake Country to borrow up to \$6.6 million to fund the replacement of Station 71.

Table 20 Lake Country Fire Department apparatus.

Station	Designator	Туре	Description
	Engine 71	Engine	2013 Freightliner
	Mini 71	Mini Pumper	2000 Ford F550
	Ladder 71	Ladder truck	2011 Smeal
Station 71 - Winfield	Pumper 71	Pumper	2004 Spartan
	Tender 71	Water Tender	1998 International
	Rescue 71	Rescue truck	2018 Freightliner
	Mule 71	UTV & Wagon	2007 Kawasaki
Station 81 - Carr's Landing	Engine 81	Engine	2013 Freightliner
Station of - Carr's Landing	Pumper 81	Pumper	1998 International
	Engine 91	Engine	2007 Freightliner
Station 01 Ovama	Pumper 91	Pumper	1990 Pierce
Station 91 - Oyama	Bush 91	Bush truck	2015 Ford F450
	Marine Rescue 91	Regional rescue boat	2014 Kanter Marine

# 6.1.2 Water Availability for Wildfire Suppression

Water for fire suppression in the District of Lake Country is referenced variously in Bylaw 985, 2016, which draws upon the Fire Underwriters Survey (FUS) guidelines on water supply for public fire protection (Fire Underwriters Survey, 1999).

## 6.1.3 Access and Evacuation

The District of Lake Country Bylaw 985, 2016, Section G references road classifications and specifications for hillside collector, local, public/private lanes and cul-de-sacs, including widths and geometry (District of Lake Country, 2016). All road specifications are within the guidelines recommended by FireSmart Canada for road widths and radii.

Lake Country has a comprehensive emergency evacuation plan that delineates 39 evacuation zones throughout the district (District of Lake Country, 2016).

## 6.1.4 Training

In addition to the S-100 basic wildfire training, a number of additional wildland firefighting course exist within the BCWS training catalogue that have been difficult for non-BCWS fire personnel to access. Owing to the frequency of wildland and wildland urban interface firefighting that Lake Country departments undertake, there should also be increased opportunities for local fire services personnel to undertake wildfire agency training normally reserved for BCWS employees. Possible training includes:

- Basic and Intermediate Wildland Fire Behaviour (S-290 and S-390, respectively);
- Wildfire Scene Preservation for First Responders (FI-110);
- Aviation safety and awareness training;
- Ignition operations and prescribed burn training;

## **6.2 Structure Protection**

There are recent examples of wildland urban interface fires in the Okanagan (e.g. Glenrosa 2009, Seclusion Bay 2010, Trepanier Creek 2012, Okanagan Centre 2017 etc.) where the deployment of structure protection sprinkler systems was not possible or practical during the initial attack. In some cases, structures were impacted so quickly after a wildfire started that it would have been unlikely to achieve successful deployment of an SPU. While engaged in the critical initial attack phase of suppression, finite resources are often exclusively dedicated to life safety (i.e. rescues and evacuation) and fire control assignments. The ability to undertake structure assessments, plan and deploy structure protection sprinklers is often not possible during the emergent stages of a developing WUI fire. Structure protection units and SPU crews and specialists are most often deployed to fires that either already or have the potential to become longer duration project fires where extensive areas require SPU capability. In these cases, Type 1 SPU trailers are often deployed.

Homeowners should not rely on whether SPU capabilities can be installed on their home in time to save it. Rather, an active and concerted effort needs to be taken by residents to assess and mitigate hazards that affect the ignitability of their homes *before* a wildland urban interface fire disaster unfolds. It will never be possible to dedicate sprinklers and firefighters to protect every home in BC from wildfire – homeowners need to take action themselves ahead of time.

There are, however, scenarios when a local SPU that can be deployed in a timely manner can offer a tactical advantage to the local fire service. One such scenario is a small inaccessible wildfire that is forecasted to exhibit substantial growth due to a pending wind event but suppression options are limited (e.g. darkness precluding air operations etc.). Another possible scenario is a large persistent project fire burning beyond the Lake Country fire protection area and Lake Country wants to prepare structure protection ahead of a wind event (e.g. cold front passage).

Some fire departments in BC have procured their own SPUs to complement their suppression capabilities. In many cases, it has proven to be a useful tool for local suppression needs. Additionally, it can also prove to be a significant source of income during the fire season when provided to the BCWS. Such income can help subsidize the fire department and reduce the budgetary needs or burden on the Local Government.

# 6.3 Summary of Section 6 Recommendations

- Recommendation 11 (Operations): As interagency partners in wildfire suppression operations, Lake Country Fire Department should consider pursuing seats in basic and intermediate wildfire training opportunities with the BC Wildfire Service.
- Recommendation 12 (Operations and Preparedness): Lake Country should consider acquiring a Type 2 Structure Protection Unit for the Lake Country Fire Department that can be used locally or deployed under cost recovery elsewhere in the province when conditions allow.

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# APPENDIX 1: Wildfire Threat Assessment – FBP Fuel Type Change Rationale

No fuel type changes are recommended.

# **APPENDIX 2: Wildfire Threat Assessment Worksheets and Photos**

Table 21 Summary of WUI wildfire threat assessment worksheets.

WUI_Threat_Class	Extreme	Extreme	Moderate	High	Moderate	High	Extreme	High	High	High	High	Moderate	Moderate	Low
Wildfire_Behaviour_Threat_Class	Extreme	High	Extreme	Extreme	Extreme	Extreme	High	High	High	High	High	High	High	Moderate
Total_Wildfire_Threat_Score	201	199	198	198	191	187	172	156	150	150	148	146	142	88
WUI_Wildfire_Threat_Score	05	55	25	35	21	35	20	27	27	33	38	18	25	0
Structural_20	30	30	10	20	1	20	30	12	12	20	25	10	12	0
Structural_19	5 9	10	3	m	00	8	2	3	3	3	3	m	8 (	0
Structural_18	15	15	3 12	3 12	12	12	15	9 12	3 12	7 10	0 10	3 5	10	0
Wildfire_Behaviour_Threat_Score	151	144	173	163	170	152	122	129	123	117	110	128	117	88
Topography_Sub_Tota	47	39	39	44	44	40	55	39	32	23	26	20	29	16
Topograpgy_17	15	15	10	15	15	10	15	10	10	5	10	5	15	2
Topograpgy_16	10	٤ ع	4 (	2 0	7 (	5 (	10	7	5 5	9 1	5 1	5 5	٤١	
Topograpgy_15	2 10	2 5	2 10	2 10	2 10	2 10	5 15	2 10	2 5	2 1	1 0	2 5	1 0	0 1
Topograpgy_14	0 12	12	12	0 12	12	15	15	0 12	12	12	01 0		10	0 10
Weather_Sub_Total	15 30	15 30	15 30	15 30	15 30	15 30	15 30	15 30	15 30	15 30	15 30	15 30	15 30	15 30
Weather_13	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1	15 1
Weather_12	74 1	75 1	104 1	89 1	96 1	82 1	37 1	60 1	61 1	64 1	54	78 1	58 1	1 1
Fuel_Sub_Total	2 1						2		10	2 6	01		10	5
Fuel_11	10	10 10	5 10	20 10	30 10	10 10	0	5 10	5 10	2	5 10	5 10	5 10	0
Fuel_10	2 1	5 1	30	2 2	2 3	10 1	2	2	2	2	2	10	2	2
Fuel_9	10	10	15 3	10	15	10 1	7	7	2	10	- 5	5 1	2	7
Fuel_8	3 1	5 1	5 1	5 1	5 1	5 1	0	2	2	5 1	2	2	2	0
Fuel_7	10	10	15	91	15	2	2	2	10	10	2	15	2	5
Fuel 5	10	7	2	01	2	10	2	7	2	2	2	7	2	2
Fuel 4	10	7	10	10	2	10	7	7	7	10	5	7	7	10
Fuel 3	4	3	4	4	4	4	4	4	4	4	4	4	4	4
Fuel 2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Fuel_1	2	3	3	m	т.	3	3	3	3	3	3	2	3	m
Elevation_m	442	985	683	109	927	637	482	580	576	553	579	811	584	295
Northing	5545765	5550926	5550324	5550607	5553465	5550260	5545682	5550411	5550623	5545734	5550287	5550838	5550500	5545743
Easting	324911	326608	326887	325774	333408	326980	325049	327561	327682	325450	327336	326725	327672	325525
UTM_Zone	110	110	110	110	110	110	110	110	110	110	110	110	110	110
Geographic	Nighthawk Road	Spion Kop Peak	Spion Kop	Raven Ridge Trailhead	Start of Oyama Lake FSR	Spion Kop Apex Drive Trailhead	Nighthawk Road	Lower East Spion Kop	Lower East Spion Kop	Jack Seaton Park	Lower East Spion Kop	Spion Kop Upper East	Lower East Spion Kop	Jack Seaton Park
Plot ID	660 71	E00 71	1C_002	500 71	LC_010	LC_001	860 71	800 <sup>-</sup> 21	900 77	LC_012	600 77	LC_004	700_3J	LC_011

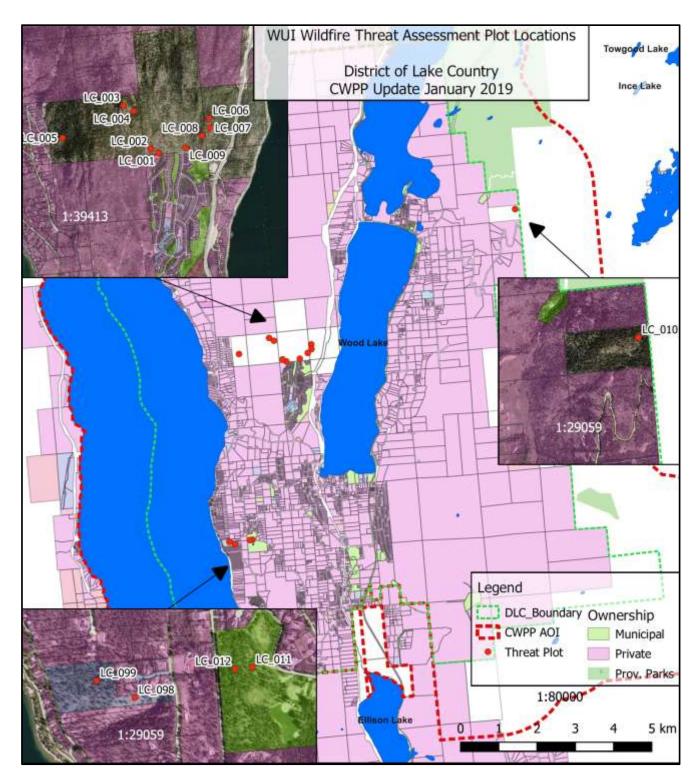


Figure 22 Map of WUI wildfire threat assessment plot locations.

Fact: LC-00/ Annum A, LOW  Tary, O.L. 18, 2  Paton T. 18, 2  COMPONENT Glabourgement  Fuel  Duffection  Status Angles (in)  1 Suffer	0/8 pens	DIATOR DEVELO	Locke Co	0 19, 418	LEAD Spir 337°W 6
Tarry O LL 18 2  Packed (**) 8 4 4/  COMPONENT (Subcomponent  Foot  Duffsch and slacker Approximat  Subcom (Approximat  The component  Subcom (Approximat  Subcom (Approximat  Subcom (Approximat  Subcom (Approximat  Subcomponent  Subcomponen	A	50.0794	C Street Barrier Street Barrier Barrie	0 19, 418	
Tarry O LL 18 2  Packed (**) 8 4 4/  COMPONENT (Subcomponent  Foot  Duffsch and slacker Approximat  Subcom (Approximat  The component  Subcom (Approximat  Subcom (Approximat  Subcom (Approximat  Subcom (Approximat  Subcomponent  Subcomponen	A (1-c2) 20 Mary, Serbi, terapted Copy, Line	LEVELS  J-cs Dy-land/Net	C 5-12 By 2-14 Met 3 5 5 3	D (5-19) Bey Corall Mei	
Foote (T) 8 et 4/ COMPONENT (Subcamponent Faul  Difficult and Subcharkfuller (cell Subchark	A (1-c2) 20 Mary, Serbi, terapted Copy, Line	LEVELS  #  J-c3 Dy Janual Wel	C 5-12 By 2-14 Met 3 5 5 3	D (5-19) Bey Corall Mei	
Contraction of Fund  Fund  Dut System of States (System of States (System of System of	725 0 Mars, Sirks, insigned Cops Jose	J-c3 Dis Land Wet	5-<18 Bry Zenal Mei Si & J	10-19 Dry Zeral Mel	
Plant Dut Sych and Sales have Regime (see) Sales have Regime (see) Sales Constrainty (the control Sychothan Sale Constraints A Direct Woods Debts	725 0 Mars, Sirks, insigned Cops Jose	3-c3 Diploma Wet	5-<18 Bry Zenal Mei Si & J	10-19 Dry Zeral Mel	
Standard Regime (red)  1. Surface (See Constantly (See Cons	1 23 0 Mars, Sirks, (expired Cops) Jose	Distand Wet	Bry Zonal Mei	Bity Denait Mel.	
Parts Contractly (This count)  1. Superintial field (despiration)  4. One Woods Debris	Mary, Kirth, (engined (top), Jose	2.4	45-46	12 8 4	3rg 200 3rg 2mal Wes 13 16 8
A Fine Winely Debra	(graphed Copt. Jow		3	41-40 4	(10)
+ Time Microly Debut		Steritorias Strado	Lighen, Cardyr Stealin	Presport. Amper	Septimolia Batchigger), Aportopy Brain, Suprob Becom
Continuity (c. v. June) (% conset)	47.00000	Suitatel, «18 sancage 1	(8-25-manage	*25 counting < 30 counting 18	>25 cnessys, > 10 cm deep 15.
Early Real Division Continuity (2-fast) (November 1)	12 mode	Suttent, and coverage a	19-25 coverage	> 15 cwetope. out-closeded ?	>2 coupp. paragraphics III
5 Steer and Steed Combronia Street Despire (M)	9	70-0	61-40 16	63-40	-80 10
Der Dei silwart Gewei Deaver (%)	145 × 140% (140° 000 1000 1000	81-00 2	#1-0) 1	36-HI #	(4)
I Dec and Dead Comfor Essee Short-Imple (m)	Se of < 20% conflet (controllation)	1-1 1	2-c1	(19)	11
9 (we and Seed Suppressed and their deep (see Ann. (stamustra)	1400	303-3005	100-300	2001-4000 23	>400 ld
13 Award Houlth the of destroyed and or-destroyed street	Standing Dood and Party Sown < 1 or < 20 demolf o	Handing Erect and Fartle Ocien 3-25	Sarding Dead and Rattle Bowe 525-00	Hinning Deut and Parth Fowe >50 - 72	Hanting Dust and Early Down >75 10
1) Contracyclynet/Stationer	6.0	21-46	41.48	61.00	540
WEDLAND DE		1	1.	Sub Tetal	82/155*
Weather		0	c	D	04
12 dispreferateZee	Af, begains	Charle CEE Min Dry Zeroel Wes	Era SBN, FSSF Era Tomal Wet 10 7 1	(35 MA, 5895, (Net-to:) & 642, 8W(E), SW(E), Bry Zonal Wei 75 10 E	##.16E
11 Assertal William Scaleman Str. WMS For Zone)	01, E1, E2, 66, 95, E1, VE. 15, E1, HE, 97	E1, G1, R1, R4, V4, G1, G1, W6	GT, CS, GA, CA, 97, CL, No	41, 65, 61, 72, 73, 91, 86, 96, 87, 80. 10	W, M, Q, M
				Sub Tetal	30/9
Tegography		377.5			
14 Agent (1-11% steel)	No.	Saf	< 1876 olique all'augustis.	G.	1 Sinck
13 Marr (Ni	1	50-25 and coarcount for North shapes 5	(0)	45-54 12	915 14
14 Seeds	Har I	Killing 1	Slight trruit; baset free relief states	Comprise dops, Completes or shallow polices of	Einstated slope, electropides
17 Janks spiri Resuprophic Landstewn in Western Served	< 5 by righted feed fami I	Hurth and/or cost argents dominate, whilles special vectoched from boots and/or West	Maintenna rettii, krisee topopujis, egikii aant ard filos cheeps, mileje notation to white speak large nater holies	Bollow toxain, million water bodes, resemble specificated stops of separate and stops of serges, contact neglections to wideline spread	Epistresial, remissore, hiproprophy No restriction to well the special 15
FUEL WEATHER AND TOPO	GRAPHY		WILDERS	NAB Total BEHANDOOR THREAT SCORE	40 M
Structural				D	46/ /44
M Rodun et Machel Commelty in Slige	No Structures Nation within 2 km	Setting of dept, miley better.	Mon-High tremball, elevated acting, < 70% days (0)	#64-doperationes. ×15%-stage 12	Egyer 15 of Slope 15
TI Type of Novinground	No Manager Makes within 2 km 0	Privestro letertuci.	Perceptor Intertors, with Inchesions	Interval > 1 stracture/ful 8	Internal of declaration introductions
23 Acction of Assument Area Solution to Nations	No Stratum Silan with 1 km	100 200 100 (200 m)	100 205-500 < 200 m 1 12 25	Hst/Rolling +100-200-190 <200 m 1 12 25	S00 200 500 4200 m 1 15 M
and to finite of corporation of the					35 m 187188
	Cheer Despet PN  Core Shallment Cover Shallment Cover Shallment  Cover Sha	Control Disease (N)  1	Concentration   Contentration   Contentratio	Committee Project   Committee   Committe	Core Discharge   2

Figure 23 Plot LC\_001 threat assessment worksheet.

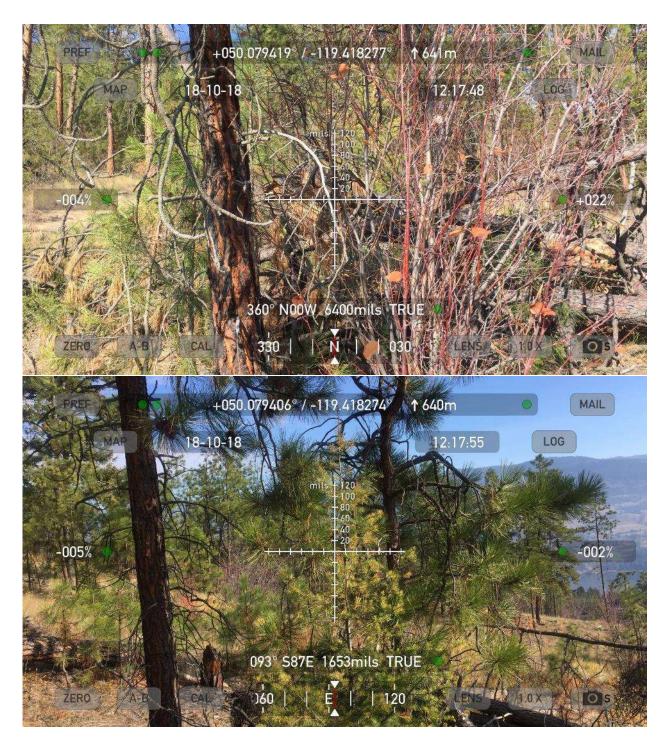


Figure 24 Plot LC\_001 photos from plot centre.

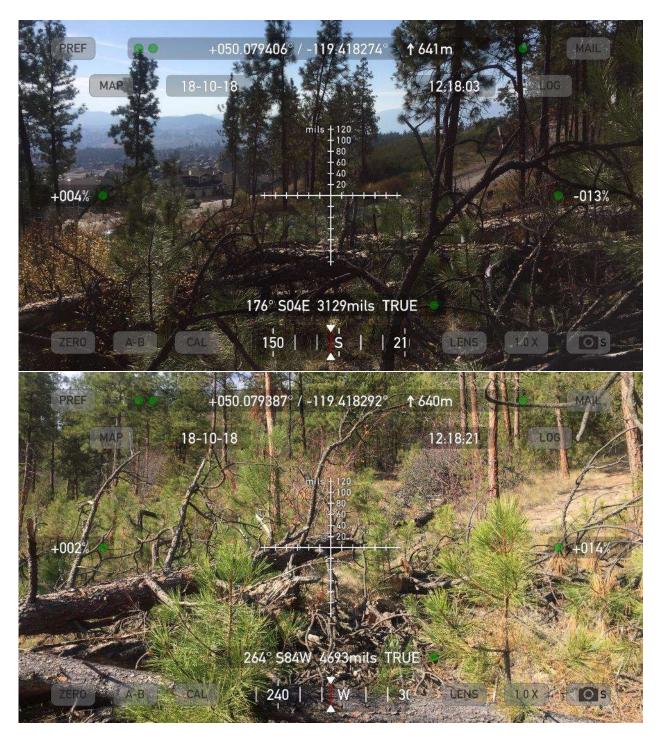


Figure 25 Figure 24 Plot LC\_001 photos from plot centre.



Figure 26 Plot LC\_001 canopy closure.

WILDLAND URBAN INT	ERFACE WILDFIR	RE THREAT ASSESS	SMENT WORKSHEE	T of two	манис Деленам			
M126-002	(unnursty)	Dist. 0	of Lake	Country	/			
Amor A. LOW	Simple philip	months 5	PION KO	P				
10x Oct. 18, 20	078 CON	50.079	951°N, -	118.419	662°W			
has (1) 8 (4) (c)	print (a) a la len consensuit Microso Flance Fire operational							
COMPONENT		LEVELS						
Fuel	A		c	D	· ·			
Part Registrant Montain Registe (cm)	(7)	Dry Jimar Wei	3-c19 By Zonal Met 16 d Z	By Josef Well 12 8 4	Dry Zonal War 11 10 0			
7 Section Not Continuely (% cont)	120	A11-40	3.	11-40	1			
1 Vigeratina find Composition	More, Births, Emgand Crops, Low Rightmaphility Weeds	Herbs, Oscolania Shrain 2	Cariffer Vendos	Property lamper	Cappbrish, Sandrotes, Arbitop Brish, Scott Moore			
4 For Wordy Delant Contractly (c.m./tol) (N.cone)	+1 crease	Signified, 4.19 coverage 3	10-35 cownage	Siftmone citimbre 19	> 25 covelage, > 10 covelage			
3 Large Woods Britis (Landworld (1-Aut) (No sere)	41 useup	Signed clkuomaje	18-25 cowrage	>-75 coverage, not repeated:	>25 coverage, gustially desired to			
8 Gerrand Boad Cardiona. Cover Doser (N)	-20	20-40	(1-10) 10	(1-10)	>40			
3 Line for abuses Comm Change (NO	146 or C 10% (militates (100%) (fiction ()	41-48 2	Kinds 1	35-10	(30)			
8 Ger and Boad Lambs Green Bear maple (N)	Sear 42% code constraint	11	3-41	V-<2 18	*1			
The and Erad Suppressed and Medicatory Conden: Edwarding	0.69E	505,000	1007-2001 10	20(1-4000 38	>600			
10 Given Health ("Not demonstrated and or almost strong"	Standing Dood and Partie Sown < 1 or < 20 domestic II	Stroding Sout and Rordle Soun 3-23	Handing Desit and Rattle Bown >25-92 18	Standing Dead and Parts Sown. > 60 - 75 38	Steeding Snort and Forth Drives >/1 In			
11 Gentleman Format Mail Green within Jhan MU	6.78	21-46	41-40	11-80 7	(10)			
	10		11-17-2	Sub Tetal	147			
Weather 11 Segralaction	A. A. Symples	(NILOEMS Dry Soot Wet	EXPLOSAL VALVE Day Aread Med	D 13: W1, 18h, (W1 at 4-a), EW1, (W5 – By food We	M.W.			
1. Account Walking An account the Walk For Account	05, 81, 82, 64, VI. RX. VI. VI., RS. RV. W.	STARTER WALLAN	61,03,64,14. ¥1,01,98	91, 10, 11, 12, 13, 91, 90, 81, 92, 93, 95, 96, 82, 82, 82	W.M. C. AT			
		50.		Sub Total	30%			
Topography	i.A		E	D	E			
THE AMERICA CONTRACT	Runtin S	Set 1	c little deper all aspects.	West 12	South 'S			
S. Sandki.	<38	16-27 and year score for North-Score	(B.H g	45-54 13	>6			
16 Seen	Hal	Rating	Situat teruin, princi les relef dues	Consistent stope, days drawn or shallow golff or	Sansislant slage. (Into galleto			
17 Sanda sport Managagha Distribution to Milatine Spread	< 5 ha instated farest	Herth and/or root aspects distribute, wildfar spread restricted from Spath and the Med.	Mountaineur torque, belien lipings sphe, regular spiend and slape sharepes, maltiple recristions to whether spread large met trades:	Author became, more water bedies, retroited aspest and disperchanges, news retrocking to willbus served 18	Emilmana, contention topography No section for weather sproad 15			
FUEL WEATHER AND TOPO			WILEPTER BEHAVIOUR THREAT SCHOOL 7					
Structural	A to the street	B Asian status	E State Stat	D med about a second	E Save Markins			
18 Proteon of Mouranny Constraintly on Stage	Makes works 2 to 1	Bottom of slope valley feature	With Disperbase Olderd, wherested earling, in 2006, slauge Till	Statistical contraction of the c	Sport 1/5 of Store			
15 Approximent	No Veurices. Nation within J lime	Persentitivefue, na indexest	Personatur Interface, with trickyopes 3	Informia y 1 emounteria 8	Interna cl. dmitanha Internation 10			
26 Profiles of Recognited Area Yellother to Value:	No New York Time Tables within 7 km 3	>500(20)-500(-20) m 1 10 30	5400 800-500 < 200 m 3 12 35	3 880 200-580 -/ 200 m 1 12 25	5.500 250-900 < 750 m; 1 15 30			
**Frequent only of Fuel task total south. ** Proceed to Street and companyor calls if this broad and some is a 10 for announced only if			TOTAL	CE WILDFIRE THREAT SCORE				
Wildfire Behaviour Threat Clas Lew 1-0   Wildrate 41-75   Egg. 96-141	• laborit applicable shoot		Wildland Urban II- tim II- Mideure II- Ng: 27	14	(deit soplicable (Ln.))			

Figure 27 Plot LC\_002 threat assessment worksheet.

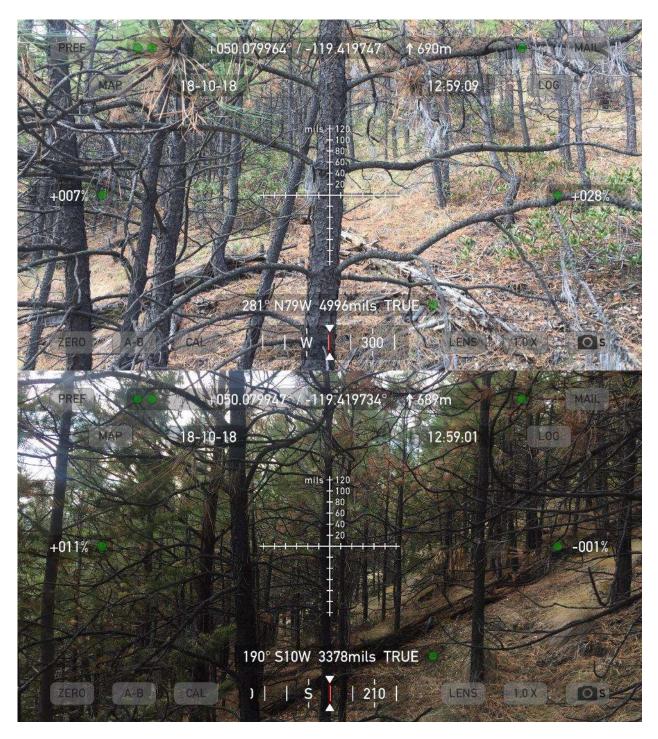


Figure 28 Plot LC\_002 photos from plot centre.



Figure 29 Plot LC\_002 photos from plot centre.



Figure 30 Plot LC\_002 canopy closure.

	nez Cop3	Limmonty	Dist	Laker	alex			
APPENDIX	Name pl. 1 and	Engaphi )	out on South Rame	Lake Country				
4	De 12/19/19	postw		22211	- 1-60 K	V 865 m		
4	Policy C. R. R.	-	eg Mines Tee	eie III. Ineij	****	383801		
	COMPONENT		LEVELS					
	/Subcomponent		1000		_		11 0326608	
	Fool 1 DAY Jugations	A 1+c2	2-1	5-01	D 10-21	20	5550926	
	Miccon Replace Cont	_(ata)	Seg Zond Wei	Dry Zonal Wal Sili di 3	Sing Consul West 12 8 8	Dry Janii Wei 15 Nr. S	200726	
	2 Service Services (Normally (Normal)	*(B	30-40	10-10	A1-MI			
	3 Styrtelius And Geographics	Mosa, Horto, Drigated Crors, Low Reviscolide Movels	Reduces Steaks	Contro Strain	(solan	Sapetrosis, Banchyaros, detelape Broom, Sintal Resem		
	Fore Woody Setting     Genderally (in a Participant)	«Tonetige	Statistical, or 10 conscious	18-25 centraps	IH25 coverage, < 10 coveres 10	0-25 overage, > 30 cm diveg		
	3 General Week Select Generally (3-70s) (No. aved	+1 persup	Scattered, <78 coverage	18-15-corrupt 3	> 25 coverage, not described	>25 coverage, partially elevated		
	4. Cove and Dread Conflorate Coven Classer (N)	400	20-10	41-88 10	91-8E 18	>88 16		
	1 Over Scrattering Green Groups (No)	180 e 1806. Carrieros presidêntes	41-90	17-10	3(-4) 4	QF )		
	B Live and Dead Sector Comm Size Aught (III)	3+ iz +(25% izmfer izmet planets	I-t	2-Q	(1)	***		
	3 Cive and Bond Taggrees and objections Carefully Carefully Carefully Consultated	198	( W.W.)	1081-3601 18	201-lank 20	>400 16		
	16 Favor Neath 1% or democrat and or democrat sints)	Standing Evolvand Partitions + 3 or + 30 standing	Tomby Dead and for tip Dead 3-15	Standing Excit and Farth Roses >25-16 18	Stanting Boat and Furtly Down 1901–15 JO	Standing Stadené Fathy Bown 1-15 18		
	If Gentlema Forest Med Error within Jone File:	9.39	21-48 	41-4E	61-80 7	248 11		
	-				Seb Tirtal	75 /118		
	Weather 12 Engrotinate See	A. Ergerri	PROLEDE MAI	10 Las, corr by four Res	DE MI, 925, CWI 60 & 60, 8955, SA9 - Bry Josef Wei 55 - 10 - 5	(PD)		
	15 Pictorical Wildford Ocuments day	65, 61, 62, 66, 65, 61, VI, VI, 65, 88, 67	EX. (03. 83. 94. 96. (03. 61. 38	50 7 1 67,75,64,18, WLC1,96	55 - 10 - 6 61, 81, 81, 62, 63, 85, 84, 87, 82	N. M. ET. TI		
	WEST for June.		1000		Sell Tistal	30/#		
	Topography	A		c	0	- 6		
	14. dayes ci-tifli stand	Bert	1at	< 16% dige all agents W	West 17	South		
	15 Skpr/%/	<16	16-29 and man score the fineth dispers	31-44	85-34	>45		
		- 1	1	it .	11	15		
	W Jenus	the 1	Rydding 1	Moged terrain, miner loss relief dispen	Clesiativit digys, drec disses or pludies quilles y	deep guilles		
	11 Landscape/ Appapagille Landscape de Midiline Spitest	e 3 ha holated forest lant 1	Both and or exception demands which sports community which sports and the sports which will be set to a set to	Meeriumies terrain, Sessee topography virgitar exect and slage changes, mathale excretions to writting grand large water bodies	Refling stroom, militer warps bodies, relicious sepect and slape changes, militar restautions to will fire spread	Continents, constitue Improprie No reduction to writte spread TI		
	FUEL, WEATHER AND TOPO	GRAPHY	i.	1000000	Sub Tical BEHAVIOUR THREAT SCORE	194 /2000		
1	Structural	Α		c	D	ŧ		
	W Freihar of Shurgare Community on Steps	Restriction Reservettos Jan 6	Sutram of dispe, nathry hothers	Mid-dops benchland, alreaded calling, < 16% sliger 10	Mol-dype continuous, >19% shipe 12	Hope US of Mope		
	19 (per/Climitament	Resident Annual Com-	Potomatic bitorials, es locipalers.	Preside Interture, with mularises	(Mensis > ! croduleilis 8	Jerymno - C microsetilu Microsoteri 10		
	21 Poster of Accommod Ave. Relative to Salvan	No Structure Nature and two 2 wer	450W >180,250-180 < 200 m 1 10 20	>906,280-903 c,250 m	Hat Malting =180 505-180 - 280 m 1 12 25	590x# >500x780-500 = 200 = 1 15 30		
100	Noved selp II had not total in 29 moset to Stratunik comprised only 1995 flavour Supera - 65 to unburger polycy	after Denast		WILDLAND URBAN OKTOWA	CL WILDFIRE THREAT SCHOOL L WILDFIRE THREAT SCHOOL	55 m 199 ms		
	Aldfire Behaviour Threat Class			Widland Urban	Interface Threat Class	heit applicable dassi		

Figure 31 Plot LC\_003 threat assessment worksheet.

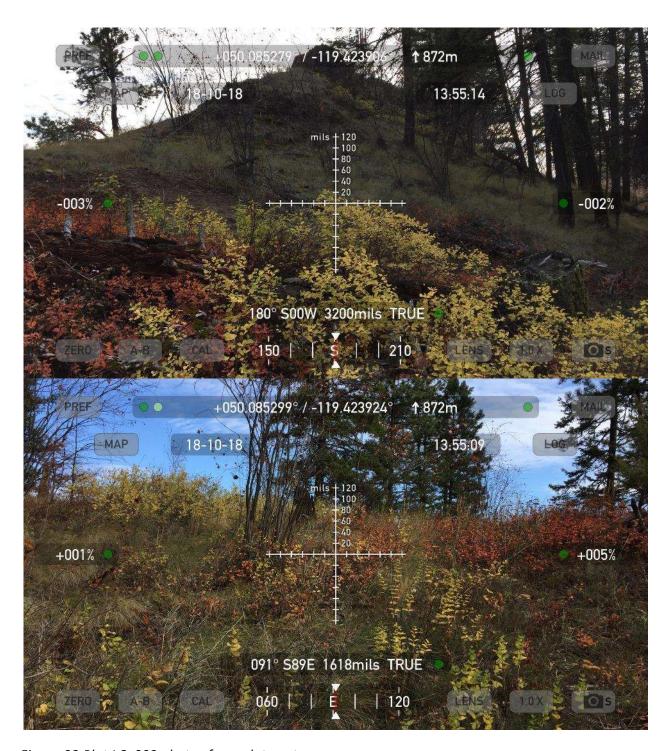


Figure 32 Plot LC\_003 photos from plot centre.

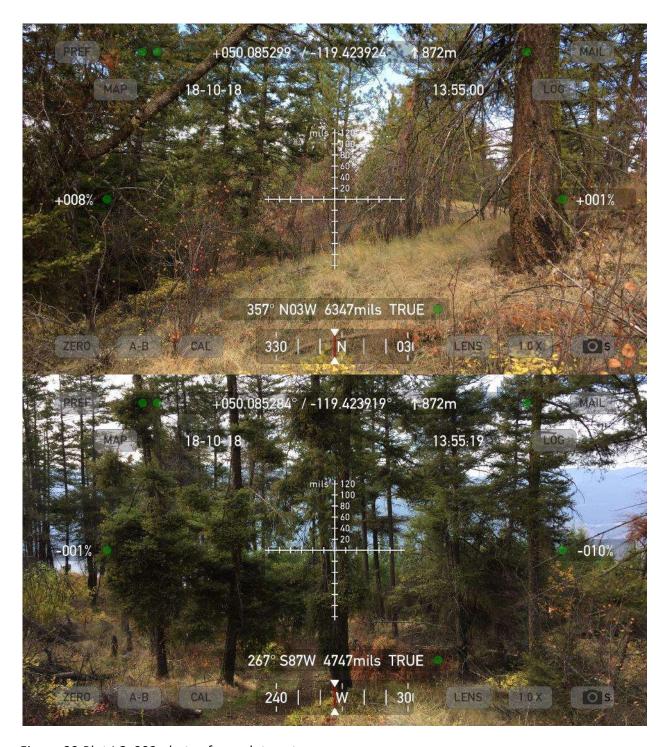


Figure 33 Plot LC\_003 photos from plot centre.



Figure 34 Plot LC\_003 canopy closure.

9 4.40:004	Connecti	Dist of	16-						
B A. LOW		continuous S		water.	er = 1				
			TEPN -	Po Upp	21400				
A -00.10,A	00:10, w10 20.001210 1, 117. 122170 W								
COMPONENT		LEVELS							
/Subunipanent Fuel				D	-				
1 Soft Styllt and Maintain Regime (1917	Hd.	Sept Ber	(hydrogal Mari	19-21 Decimal Mer	Strafford Str				
3 Surface Facil Community (14 sees)	+20	20-41	61-00	(1-81 6	(31)				
5 1 special for 1 separate	Mos, Feder, Imagest Crass, Low Flammability Works	Section State	Labor. Carefor Evelor	100	Supplication of the Control of the C				
4 The Ward Debts Debteds Co-Net (Normal	d down	National, 118 company	(Halipere)	> 25 com sign. = 10 cm drop	>00 commun. > 70 cm demy				
The Black Delice     Dethicity (**	-therein	[cattered] =18-remage	19-03 (mm)pr	of mellid	T-(E contage, garante etropoli- do				
6 Ver and Supl Continue (Seen Street Vel	1	25-48	41-00 10	TOE	10 0				
/ Debelloon Contribution (N/	sections steer dear	***	8-0	31-31	(1)				
S Terrard Dead Sentin Cover Sear Registrary	oun-door.		Port.	11,4	10.				
<ul> <li>Tion and dread Supermond and Strainstery Specifics, Joseph</li> </ul>	6 0 100 No. 3	Services	1007,7006	700-400 H	1409				
TO Promit Health (To all demonstral phall on determined alterna)	Reporting Seast and Earth Street of or 1,30 days of the	Harding Sociard Halfy Soon	Transfirst Dead and Public State WIS-100 VIII	Harding Deal and Participants (AB-71)	Standing Standard Surfly Street Artis St.				
11 (artistical familiar) (and desirable familiar)	130	20 W	ejet:	0,00	(#)				
				Sub Tetal	1.0				
Weether  11 Expedience See	A Millionet	THE DEAN TO DEAN	W. P. 100 COAP Dr. P. Transil West 18 7 8	0 99, 60, 1091, 1099 o. 1.5 o.), 8991, 109 - 5ry Seryi Mri	(1)				
11 Protein of Wildline Disabletion by Wildline	55, 67, 70, 66, 70, 80, 26, 51, 41, 82, 87	S1.16.76.76. 26.16.46.88	V.O.M.M. R.D.M.	F. K. G. C. C. B. K. H. AT U	N. St. ST. HI				
				Set Setal	30.00				
Topography	A		£	B	1				
14. Approfit 2-1219 aligner	(LIFE	Set :	crist-iner all aparts	17	1021				
75 344170	×0	Not and the side	3-11	0 H	+B -11				
th. Seaso	Re:	Milling	regret terrace and travelled produ-	Construct star.	Consider State. State grades				
17 Androam Tengraph Santation is Mater Spend	n il ha riskateli famed. Sand I	Next and a red agents democrat withher period trained from both and a feet	Numbers (error, bridge Openpages, replace open and depropages, military recording wild for open on a growth below.	Authory terrain, move exper- to-dier, reconsultable of profitions sharings, move reported to white spinel	Continuous, Americant Interpretally the restriction of middle great 1).				
FUEL WEATHER AND TO	POGRAPHY		WILDER	Suk Teta BEHANDON TIRREAT SCORE	20 m 128 mm				
Structural	A			D	1				
18 - Machine of Standard Community of Standard	Retentary Select selfor 2000	(Interview	Management of control of the control	Mil-slige coltracion; >15% slige 72	Steet 3/1 of Stock 13				
(6 Sanat Seeingelein)	Marinisteri Marinisteri A	Kinstichtries	Provincianos est options	borns > 7 margarite	Intrem c) unuturibe intrementare 18				
30 Assistant of Museumann Alexa Kelatree to Kalaze	fin (Auctories Values wifers: ) (19) - E	Vite 301-108-050 m	500,000 500 < 100 er 1 11 35	(M/hd+) >00206 (80 -200 m)	3 15 30 3 15 30 10 10 10 10 10 10 10 10 10 10 10 10 10				
"Proceed only if having that is not in the found by Doorhaal component only in debyong: form in VET for orbitated or	E William Theory	9		CE WILDFIRE THREAT SCORE A WILDFIRE THREAT SCHOOL	11000				
			Whiteest Orlian Interface Threat Class (2007 applical) should						

Figure 35 Plot LC\_004 threat assessment worksheet.

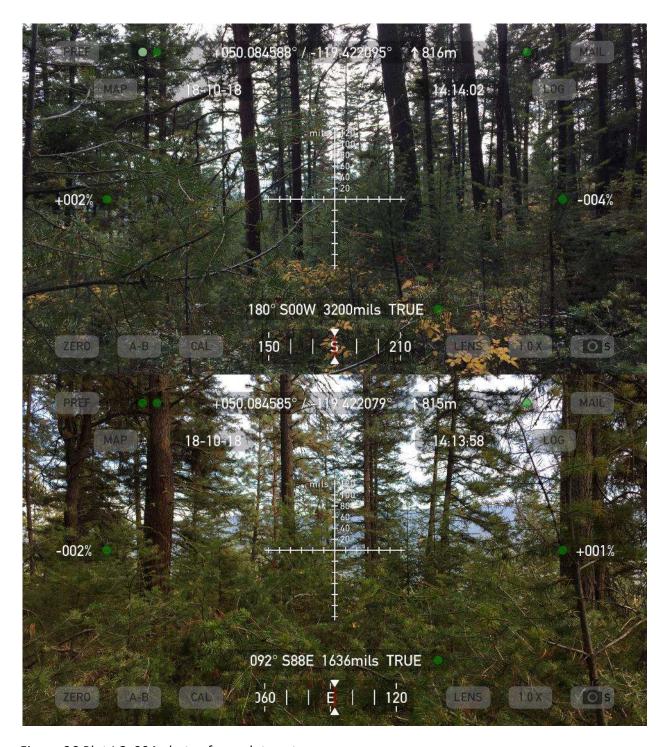


Figure 36 Plot LC\_004 photos from plot centre.

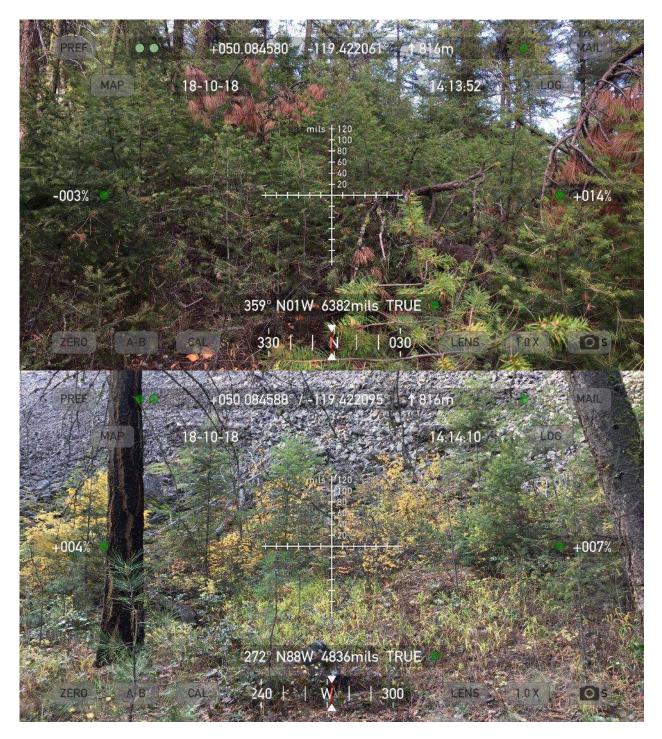


Figure 37 Plot LC\_004 photos from plot centre.



Figure 38 Plot LC\_004 canopy closure.

=	MILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET									
APPENDIX	MILZC_005		-							
P	- A. Low		menoran R	170°N - 119. 435322°W 3						
A A	= Och 5,201		50.08 2	170 N.		15322 W 3	16			
	THE (1) 1 1 4	100.3000	Contracting Vision   16. description							
	COMPONENT Subsemplement		TEALER							
	Foot	1		•						
	Software (a)	(3)	by marker	Dry Josef Bot	Stry Total Serv Stry Total Serv Str Str St	314 (and Williams St.				
1325774	Surface Avels Community (No. 1980)	1.	77	# H	11.40	0				
5550407	1 Aproximator	Many, harby, broughted began large fluoreschilding Meetin	Providence of the other	Control (male)	todgen. Imper	Suprimum A Browninger of Anderspe Mouse, Suprimum Bellemin				
Solm	F . Ger West) Delay Santoning in Alley (Accept	1) speciels.	Extent. - Standard	16-15 chandle	(Transp.)	5-(5 coverage — 30 cm ands — 1)				
	1 July Rud Ohn Usbach (1795 (Kuba)	-tigmp	hoteed. - Hoseskip: - 1	(5-th compr	> Districts of dealers	prody-want)				
	E Van end Peaul Conditioner Count Discour (NJ	T	25-41	(E)	61-m 10	7.00				
	T Ger Bestete Front Bester (Nr	responsive species	11.00	41-421	747	0				
	f . Let an file a familie from Box Pegil (e).	The first contract of the cont	4	500		1/2				
	† Jerynd Intel Septembel and Jackmology Contine Attentional	(10)	381-1808	101.200	Services	1-000 St.				
	13 New York (% of demonstrated or demonstrated)	North Sen - 5 er clitteralls	Harding Two East Hardin Seem 5-23	Harring Seat and Harris Science 1-71-58 19	Autotion All-71	Standing Destroys Starting Comments				
	11 Technical Sect Such Dep action Mat (No.)	77	27-81	0.00	da	(-R)				
	Weather			c c	Tab larat D	89				
	ii kunimbibe	d) trust	Des Domi Sufferilled	Electrical State of the Control of t	201.001.1001.01.02 8005, Vel - Dy Jan/Wei	(9.11				
	12 Noterial Wildher Science No Wild Fre Zand	25, 31, 87, 54, 31, 61, 50, 62, 62, 66, 87	ILW ICH NOT BER	17-02-04-11) 17-02-04-11	9, 6, 6, 0, 0, 10 9, 6, 6, 0, 0	(FAGE)				
					Tab Selat	30 m				
	Topography	A		c	83					
	IA April (-Triviale)	Rett	ALIE T	chinaline allaques.	West )	South 31				
	Sun No.	-4	No.25 and treatment. He fair to chapter		#5-19 13	10				
	it Seal	- Out	Notice of	Stored Stream most fee (Albel Street)	Santon Sign.	innumeridan (n) giller (i)				
	17 Indian Syspenia Indian a Market Speed	5. No makes i ferrit Sent 	National and appellance of the second	Bacifiane (a female, finale) framiliating (1-222) (221) and flage framph, endigite (n) 1224/6 (n) heldful sarted lings seeks (n) mg	fulfug lesses, more water leader, mortal appell and characteristics, moral vicinitation to wild or group 18	Communication of the Communica				
	FUEL WEATHER AND TOPO	GRAPHY			Sub Street Transport Scores	/63 /24e**				
	Structured  18 Audion of Station' (companies or blain	Selection. Management	Notice of date.	Moderate territoria. Moderate territoria.	Alle days continued, a little days	Stoper Charl Stope				
	19 Specimensor	Astronomia Microsophia Leik	Alexandri Martani Farida (Martani	Hamel Harles	Names I estable	Improve of destination				
	20 Action of Assessment Anna. Submers below	No literature Marie artists I was	- 102 (10 - 100 -	100 700 100 100 m	Section   100 mm	1500 100 100 100 100 100 100 100 100 100				
	"Mayord subject for subject on the Art Theorem is the control of t	Elite Sirel	1.16/	HILDLAND SINGS FRIDING						
	Whitles Reharing Threat Clas	e (de 2 april dile de ci			Orterface Threat Close	(temphate dut.				

Figure 39 Plot LC\_005 threat assessment worksheet.

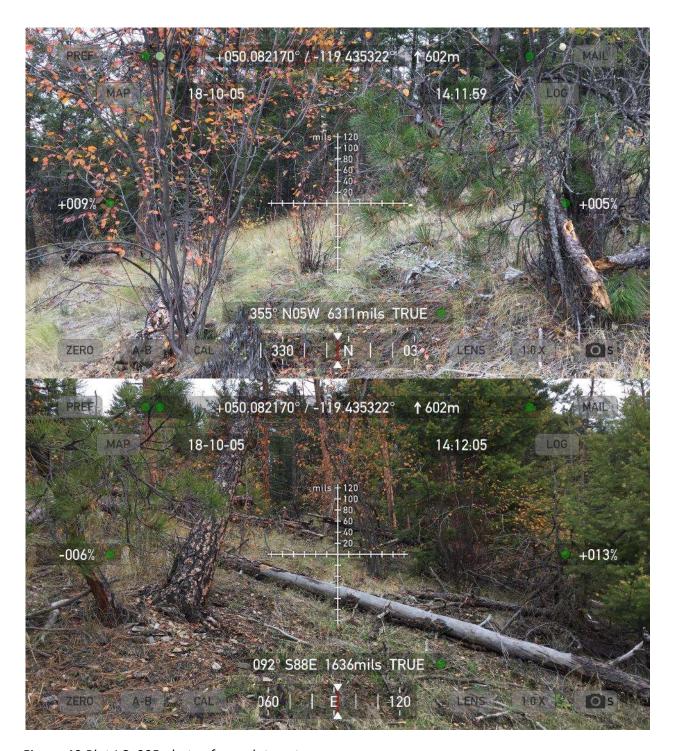


Figure 40 Plot LC\_005 photos from plot centre.

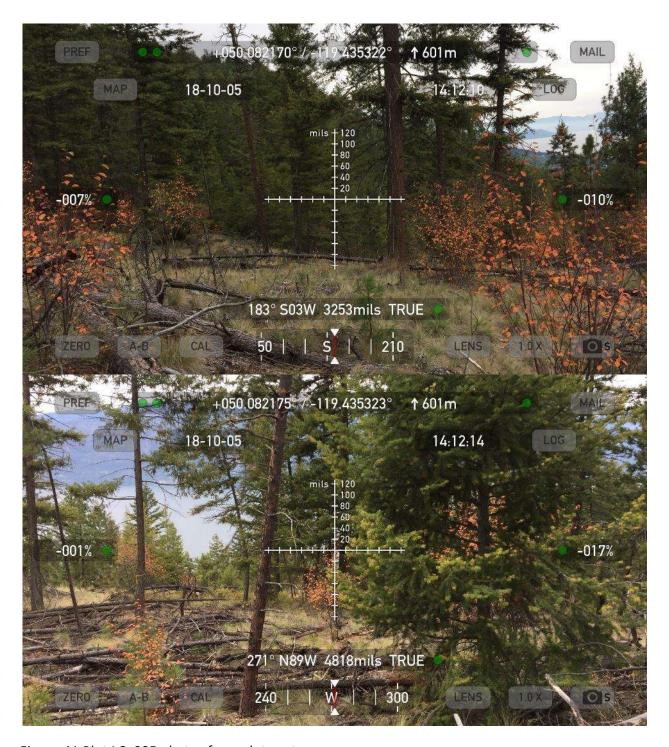


Figure 41 Plot LC\_005 photos from plot centre.

Z	no 11-006	Corenardy	Dist 0	Lake Co	water	
APPENDIX	mm P. LOW	Geographi (i	ratio/liverhane	ower F	Spien K	ap
i i	on Oct. 19/1	g wome	50.0828	62"N, -1	19.40869	10°PW
	Box (Y) X K &	Self-December	ie Nove I for	uta III. Sthirtig	proligi	
	COMPONENT /Subcomponent		FEAST			
	Fuel			e	D	1
	1 Bull Depth and Minister Regime (cm)	(1-4)	Dry Devel Wet	2-416 Drg Janual West 30 6 2	Ry Josef Wet 13 H 4	3-20 Dry 2) med Wes 15 No 5
82	1 Turber Rath Contactly (Notice)	< 20	20-80	61-60 Y	67-88 4	(37)
23	1 September (and Composition	Most, Reds, Impatel Cops, Lear Name (Ely Words)	Sections Sents	Lines. Centry Steals	Assign. Assign	Supriment, Banchiposs, Anning Bress, Supri Bresse
	8 Are Woody Debris Continuity (1 - And; (% cleen)	- ct coneage	Scattered, «Ybsperrage	(Signage)	>25 coverage. < 10 cm along	e∂romigs, > Bandag
	1 Large Rively Selvis Cardinary (in-law) (Novemb)	<1 company	futters, <10 (wrap)	(15-25 immap)	> 25 sweeps, out-clevated	>25 owners partially desired
	6 Lee and Bred Conflorate Drewn Glorate (NG)	4	11-10	(1)-60 10	61-80 N	=40 10
	F. Alter Desidence Down Glouve PNI	2-80 or + 80% unaferous crosses discuss 0	\$1-40.	61-60 7	20-40 4	(7)
	8 Live and Elevi Combin Sanan Base Hought (m)	5+ or < 19% unified sopen doorn	(1)	1-0	1-61	17
	T Live and Dead Suppressed and Shapestony Greaters (Sentendra)	0.00	101-300	3001-2010 10	3001-4000 30	2-8000 30
	18 Fives Fheelth (Novi document and or-document store)	Standing Brist and Facily Down < 3 or CX statuchs	Standing Dead and Sartly Scene 1-25	Standing Brod and Facility Ocean In 20-10 10	Standing Dood and Furthy Down 190 - 75	Standing Brast and Forth Down >25 87
	11 Earthway Arent Sind Green within Jun PRI	8-78	21-46	41-68	61.80	(38)
	***************************************				Sub Setal	61 nss.
	Weather	A			0	E
	() Biggedinals See	At Arrysted	Day Social Wet	RIN, SES, EVAL One Serval Wet 10 J J	ES, MI, SSPS, (Wir ed & ed), EWES, SWE – Dry Zonal Wet 15 10 5	( it
	13 Abancual Walfiller December Sty WMS For Zenity	(5, 81, 82, 66, 95, 81, 91, 91, 85, 86, 91	67, 69, 83, 34, 10, 43, 46, 58	67, 63, 64, 04, 93, 61, 44	61, 85, 80, (2, 13, 85, 86, 84, 62, 82) 10	(0,11,0,11
					Sub Social	3014
	Topography	A	8	c	0	E
	14 Aspects to Otherwood	Note:	Last 5	< 10% stopp all suports	( West	Sauth 15
	11 Scienti	<8 1	14-28 and max sure for Wattr Aligns	35-44	45-54	)B 19
	is Desire	Had L	10mg	lisper irosas, occur fee milef Styles	Districted display, these districts or shallow guilless	Consideration, dec) galles
	12 Landscape Topsprophe Limitation to Michine Sproof	e 5 ha nalazor forest land 1	Burth unaken nest expects downsele, whitner spread reducted from South unaken West	Bustlatine teran, beine tanggapte reputer ment and days crampes, walkale reposed targe water bodies	full inj letter, mino with bullet, moved appd: and dope charges, enter restriction to widths usual	Cantinuous, compraging topography topography topography and after upsaid 15
	FUEL, WEATHER AND TOPO	COACON		we other	Sub Total REMANDOR THREAT SCORE	32/55
	Structural	GRAPHY A		C	D D	23/249**
	19 Protect Consum' Commonly or Bigs	Victoriales Values without less if	Bottom of depo- edity bettom	With slope brainfland, elevated safety, < 10% slope 10	- Mid-dispercent/money	Nave 1/3 of Slepe 18
	19 Days of Development	No Structures Values within 7 km	Resource Streeture, eo indesions	Parameter (Imperiors) with dedictionsy	Internal > 1 strecture/kg	Setermia of situature/ Sefermictors 16
	II Porton of Accounted Ann Relation to Relate	No Structurer Values within I law in	#36mi > 900 300-100 <140-14 1 30 30	984418 +504285-500+206+ 1   12   24	Flat Rolling >990 300-100 < 200 m 1 12 35	3-515 200-500 -(201- 1 15 18
	"Proceed only if five last total act 25: " Proceed to Sent and component code (196)	the Door			CE WILDFORE THREAT SCORE L WILDFORE THREAT SCORE	

Figure 42 Plot LC\_006 threat assessment worksheet.

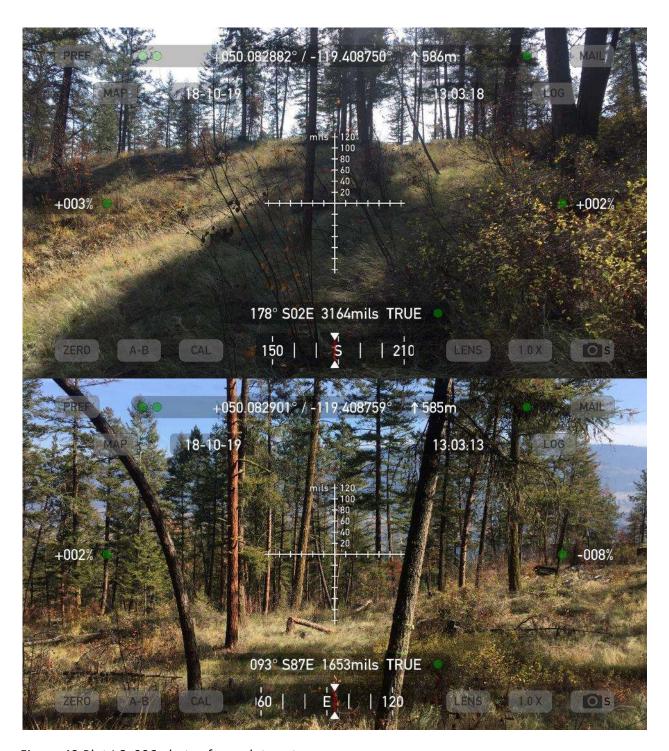


Figure 43 Plot LC\_006 photos from plot centre.

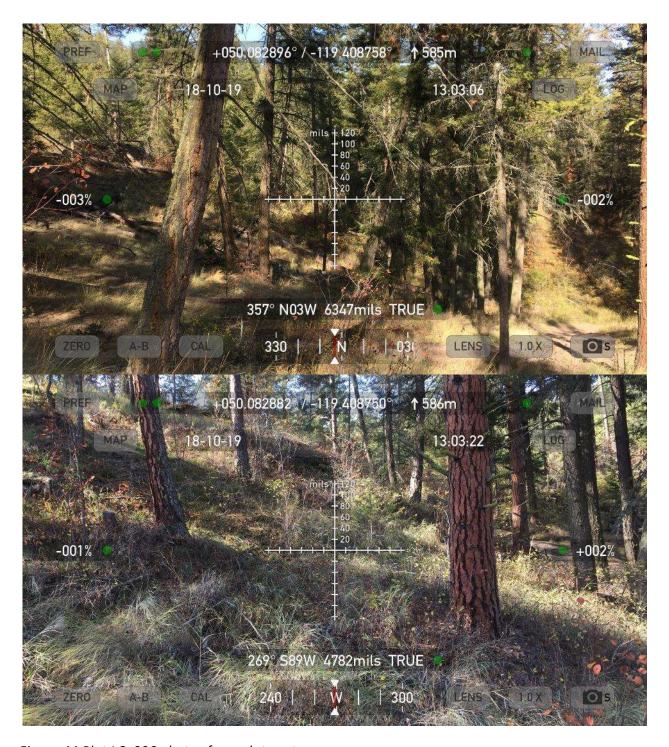


Figure 44 Plot LC\_006 photos from plot centre.



Figure 45 Plot LC\_006 canopy closure.

2	WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET									
W No.	125-007	Simulty:	Distrio	of Lat	ke Count	Y				
-	7717		usualine tune	OWEL E	of F Spin	408781				
	Day 177	Sollmont Sollmont	00-081	#56 N		708181				
_	COMPONENT LEVELS									
	Subcomponent Fuel	A	II II	c	0					
. 1	Balliforn and	F	3+ch Dry Strait Wet	5-410 By Japal Wet	TO-JIX Day Janul Wel	2-2X Styrional West				
1	Meatine Righter (146) Surface	-OH	7-4	10 N Z	12 1 4 61-80	19 11 3				
	Each Coctowity (Ni cree)	,								
72	Reprinted Facilities (Congress Face)	More, Sirchs, triggated Crops, Low Harmanistry Weeds	Broken Street	Sides, Souther Street,	Su)	Supplement, Bunchstann, Antologe Buck, Suitab Staten.				
10/	Time Moudy Cedics Contractly (+ = 7cm) (Nuclear)	<1 owner	Scattered, <16 usersqu 8	(adtown)	+ Bowings < Web drop 10	AlSommuje, > Trombep 11				
1	Logir Rough School Continuity (5-7m) (% count	<1 (peraps	Surrent, «Moneoge 1	M25 (seeigh	> 21 contegs, red deated y	5-15 corrupt, partidly desired 10				
4	(in and Deal Cookings) (seen Octoor (N.)	407	(20)	61-40 E	61-8E	588 18				
- 1	(selferbare) (mee Coner (%)	180 oc 48% spollocal clean distant	61AE	1)-40	35-86	(3)				
	Lise and Dead Eurober Crosses State (Insplicity)	5+ or +205 confer coverchain 3	10	(Fig.)	1-2 11	11				
- 1	The and Dead Suppressed and Bioderstony Conden: Community	(100)	981-1080 1	1001-1900	.091-400 JI	>4000 10				
100	Forest Regille (North demonstrated or - demonstrated	Stonewy Orest and Pacity Stone + 1 or + 28 personne	Steading Sent and Fortly Dawn 5-25	Standing Social and Furth Down >75/48	Mareting Dead and Facts Science (10 - 2)	Standing Doad and Facility Bown (-7) (8)				
7.00	Centioner French Stech Great within Jun (R)	3.20	2140	11-42.	61,80	(4)				
_					Sub Total	58 /88*				
-	Weather	A			0					
14	fayed setcles	Al Symptotic	Sty Torod West	39 /sniFfer 39 /sniFfer	ET, AK, 1891, TSH-1811 A-02 SWID, 1905 - Bry Zonal Wet 15 - 10 - 8	PE BL				
19	Hydronial BERTim (Assertings (Ag of MS Time Zone)	UC.81. RO. SA, VI. PI. VI. VI. ES, ML. EF	63, GE, 85, ML, ML, GT, GE, VE	67,15,64,14, VLC1,16	83, 81, 63, 63, 63, 63, 85, 86, 84, 87, 82 11	(1,40,0)				
_		-			Sub fintel	30m				
	Topography April (>196 sipe)	A With	- B (at	(100 steps of agents	D No.	Serie				
		1	1	11-41	T) 45-54	76				
. 15	Ster 50	(7)	for North Hopes	1	11	78.				
16	Scrinia	rius T	Nav.	Signal house, native flow relief during	Compation stops, drop drows or shellow gallies	Gesates tops desputies				
19	Vanishinger Tupuppers Validation in Welfur Sprend	<ul> <li>S ha subject forest</li> <li>Rend</li> <li>1</li> </ul>	Plant handon and aspects dominate, wild the spread wat stand from Smith and/or Med	Museum as proving business transpraches regular agent and dependency on malitative spread forge water backet	Spling songs, renor either before sommel aspect and stige changes, more neinclose to widding speed	Emilianis, Lambsell Impography No replication to widths great				
	EL WEATHER AND TOPO	GRAPHY		WARRE	NA TION BEHAVIOUR INSEAS SCORE	117 (240**				
	Structural	A		•	0	€				
16	Produce of Standard Geometry on Stope	No Nourbert Nation within 2 into	Better of Aspe.	Mat-tope ben-black allowed willing - 1976, dops 10	Mid-disperior/transco. > 19% stope	Saper VI of Stops 13				
	See of Down general	No Student Retery will in Jone	Principles bifurface so reclassive	Primate Intertain with mulation	Totalenta > 1 Vitalent/No A	Memie 47 drefue/for Whatsures St				
38	Andrew of Assessment Area Modern in Wilson	No Moudann Nature and the 2 law II	1 10 51	>50 NO -525 - 260 m	FLA/Bulling >508,250-100 +200 m 1 12 25	-906 280 500 < 200 H. 1 15 16				
** Frank	cody Final salt testino 29. In Section Companies ofly FWI or Sone is 25th to unimated polys			WILDLAND URBAN INTERFA TOTA	CE WILDFIRE THREAT SCORE L WILDFIRE THREAT SCORE	25 m				
Wiles to a	ice Behaviour Threat Class	Climb quitrativales)		Wildland Urban I ion 9- Materia 14		(deck pyllicible dard)				

Figure 46 Plot LC\_007 threat assessment worksheet.



Figure 47 Plot LC\_007 photos from plot centre.

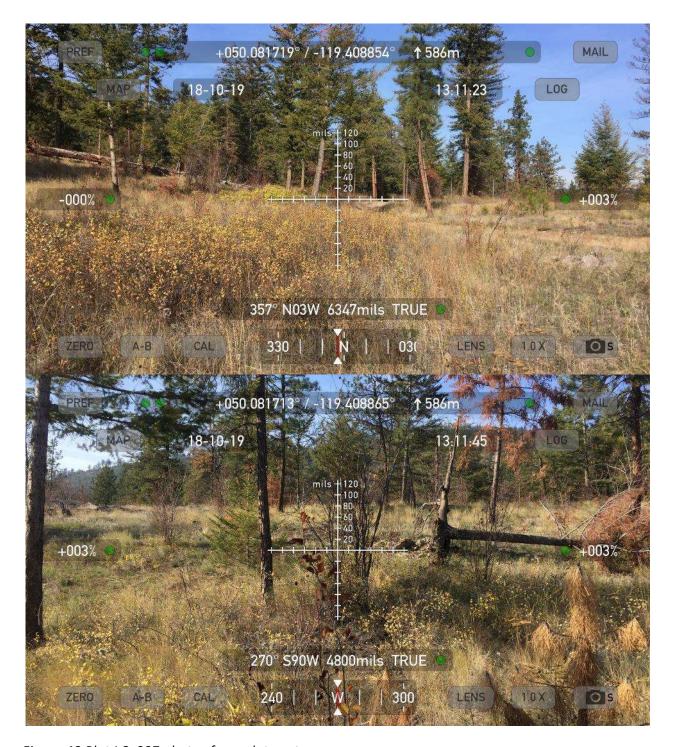


Figure 48 Plot LC\_007 photos from plot centre.



Figure 49 Plot LC\_007 canopy closure.

×	WILDLAND URBAN INTERFACE WILDFIRE THREAT ASSESSMENT WORKSHEET   Pre-Instruct										
APPENDIX	HAR LC-008	Consumbly,	DISTRI	66 p. f.	HURE C	PUNKTY					
8	Meint A. LOW	- 2	C.O. O.O.	1000 E.	Spion /	000000					
A	on Oct. 191	/ S DISHIM	es UL ment	17.71	OZOI PV						
	COMPONENT (Subcomponent		LEVELS								
	Fuel	A		•	D						
	Dell Septe and Member Report (cm)	(4)	Bry (coal flat	5 = < 10) Dry Jimul Wel 50 6 2	25 / 20 al Wei 22 / 3 d	Styling/Wei					
	2 Sonface Famil Continuity (No. const)	*23	1 I	41-42	41-40	(*)					
27561	1 Stephenson Fuel Teleposition	More, Kiede, Imigated Crops, Low Hammuniday Mores	Brothiles Shruki J	Archier, Taeder Versits 3	( d	Lagithmoh, Rundigisen, Antologo Brasik, Surtick Basen					
550411 80m	Fine Woody Debris     Tomittaday (+ Tom) Fill (1997)	-Concept	Sudienel, 4.50 unerope 5	#21 gerage	n 25 coverage, < 10 cov aboy 10	o 25 overliga; > 16 citrobusp 15					
80m	1 Lange Woody Debins Controlly (1-7-ms; (% comp)	chowings .	Scattered, «10 covered» 3	10-25-coverage 5	25 compt. not strated	in 25 coverage, particular direction. 34					
	1 Der and Brack Condenses Cross Chronic (H)	*)#	(10)	41-48 11	41-80 11	140 11					
	Diver December (R)	180 yr < 676 combrons cown thems	61-8) 2	61-66 3.	71-47	(1)					
	Dies and Bread Condin Grown     Bead Reight (In)	Se ur < 20% sander imme classer	3.4	(191)	1-12	ñ					
	f - For and Brait Suppressed and Stedentury Online (spress/ful)	(1)	191-1900	1001-2000	307.408	14698 18					
	10 Tivest Realth (third dominant and in-dominant street)	Speaking Dead and Facility Ower + 1 w=<20 strengths 8	Standing Strail and Fastly Down (-27)	Pareding Evail and Farth Goves >25-30 18	Manding Braid and Parity Does 1450 - 15 20	Standing Exad and Fartly Bown >-75 -38					
	<ol> <li>Earlytainer Formst Starth Court within Jim (N)</li> </ol>	1.8	1148	45-40 5	61-80	700					
					Sub-Total	60 /188*					
	Weather			c	D						
	12 Superfloats See	AC, Teliptorii	Dy Tour Net	IDL SIG FOR Dry / mid Wes TO 7 1	BY MS, SBPL CWY 411 A-92, BWTS, SMB – Dry Zhool Wet 15 57 S	75					
	To Rate-year Widdler Drawstern De WMM For Joseph	(5, 61, 87, 50, 91, 101, 1/6, 91, 85, 88, 87	AL DE DE AS CLEON SET	67,15,64,64, V1,53,66	81, 81, 81, 12, 13, 91, 66, 84, 67, 82 10	NT, NA, 47, N1 15					
					Sub Total	30/9					
	Topography	A		¢		E					
	TE Ayerts (>15% slight)	Refti 2	iat	COR due al agenta	Wed 1	Swells 15					
	15 Mapr (NJ	<b< td=""><td>16-28 and maxicom for North Stepen</td><td>N-H</td><td>40-34 12</td><td>&gt;39 15</td></b<>	16-28 and maxicom for North Stepen	N-H	40-34 12	>39 15					
	16 Jeogra	THE STATE OF	Siding	Napel teroir, mine for rolet depen	Consistent single, deep insues or skalines spillers	Geodet days, dreg galleo					
	17 dandraper Resignation dashermen in Mathee Speed	+ 5 har solated fasest Sand 1	Nurth and/a not appets (invest), will fire lighted with the fram half and/a Nur.	Migrature sa tença, booker hopography, mysler essent and disperimentary in midrate restrictions in wildfine spread large water booker T	bulling serger, tribus water bodys, me manufacture, and object the type, mean registration to wild the special to	Embrace, considered transpraying the restriction to writely spenal 15					
	FUEL WEATHER AND TOPO	GRAPHY		WILDPIES	Sub Total REMANDOUR THREAT SCORE	129 1380-					
	Structural	Α	- 10	C .	D	E					
	18 Analyse of Diseases' Community on Vego	No Structurer Malacs within 2 Arts	Batture of dops, robo Settom	Mid-days brockland, identification, <15% days 10	Mid-dispercutioneus, > 10% dispe	Opport 1/3 of Maga 15					
	19 Japan Development	Schooler Spiercethe Zim	Francisco books,	Province Startage, with inclusions	Interes > 1 etrictum/fis a	Marrie s. I discountly Infrationism					
	23 Fortunal Assessment Ann Mildher in Values	No Structure: Nation within 7 km	Above >100,200,000 -200,00 1 10 20	354-08 -500,001-509-200-m		> 900 200 - 100 < 200 m 1 15 30					
	*Proceed only If Follow's total in S2K. ** Proceed to Structural component only If Williams in Section 10 Sec	Mr Sma		WILDLAND TREAM INTERFA		27.55					
	Wildfire Behaviour Threat Class Low (-4) Motors (5-4) Sup (6-10)	k (Terk applicable class)		Wildland Urban (on G Malerdo 14 (op) 27	* 🖳	site ik applicable dood					

Figure 50 Plot LC\_008 threat assessment worksheet.

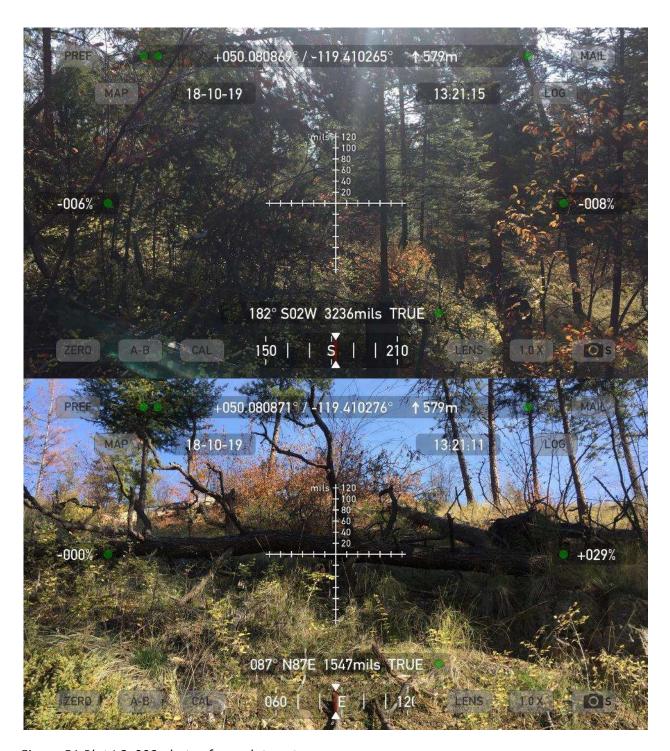


Figure 51 Plot LC\_008 photos from plot centre.

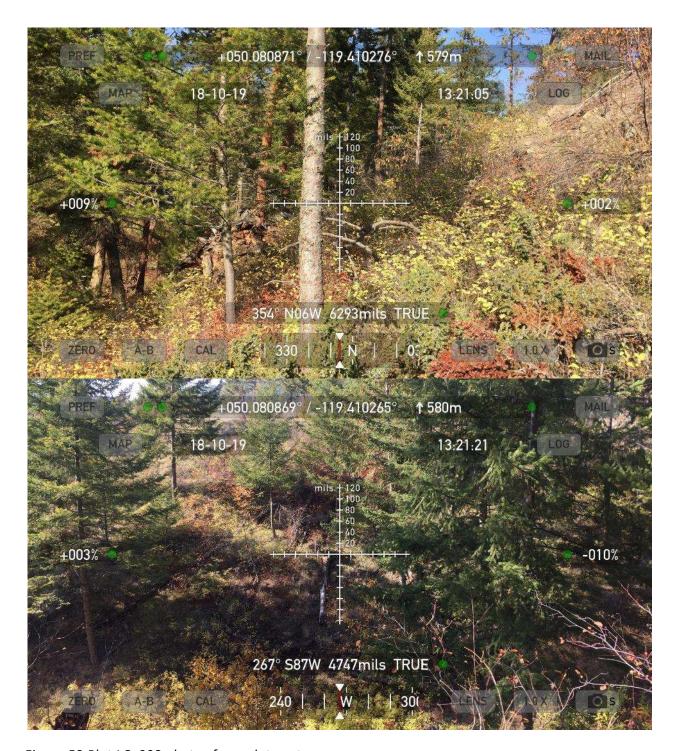


Figure 52 Plot LC\_008 photos from plot centre.



Figure 53 Plot LC\_008 canopy closure.

WILDLAND URE  WI	2/18 un	December (a) (mee )	97446)	T. 119.	413366°W								
COMPONENT (Subcomponent Fuel but had a set	9/13 una e 5 lani	tembr (fine )	74401	1,-119,	4/33K6°W								
COMPONENT (Subcomponent Fuel but had a set	e 5 land	December (a) (mee )	rests 18 20cci	11111									
COMPONENT (Subcomponent Fuel (but had and				(mile)									
Subcomponent Fuel													
1 Dath back and		501075	-										
Minister Region Sci	(+4)	J-ci	6-c16	D 19-20	>20								
		Dry Jesus We.	Bry Conal Wet	Day (cond West 13 8 4 43—30	Dry Zraud Wel 15 40 5								
3 Notice full Continuity (% const.)	GE C	30-49	1	-	(3")								
87	Mays, Hirthe Imagined Creys, Discreasing W	Torre Distributes Strates	Cerific Tests	Seeper Seeper	Laprimet, Bandyster, Anistope Buck, Sural Books								
4 File World China Community (c. n. htm)	(Normal) 1 renting	Micheel, (Transpi	W-25 emitys 7	>35 corecipe. < 10 cm deep 18	A.D. contrage. In Thirmshop 11								
1 Jarge Mondy Debris Santrauty ( - April )	Numer 1		18-25-comoge 5	> 25 consupe, and constant	>25 cretage, particle desired III								
6 Core and Dept Create Create Groups (NC)	- 4	(10)	#1-40 to	815-465 15	540 N								
J (inclinational Control Character (NC)	1-00 or s-009 Application (10-09)	N 61-60 disare	A1-40	20-80	(3)								
I (ive and break back Som finglet (w)	rGreen. Since COState constitute		1-a	1-12	4.1								
1 Live and Dead Sugar Wedenstropy Coulers		101.000	1005-2000	201-406 28	>400E 30								
10 Finest Hoselli y'll of Bondon's and un-dealered deep!	SyntepDod	3 Partle Sows	Standing Dead and Pathy Down > 25-91 10	Handing Deal and Partly Roses >10 - 71 28	Standing Dead and Facility Deam - 21 all								
11 Gantiburea Kirenti (1) within Jillic (19)		31-40	41.60 1	81.90 7	(10)								
-				Sub fetal	54000								
Weather			6	D									
1 Superchinete Sine	A', Impre	Dry Zonal Wet	Bry Smith, Codi Bry Smith Wet 18 J 1	ISAN, VEPS, (Minish & es.), ISAN, SWE - Bry Joseph Wet 26 10 1	1 1								
1 Homerod Walfer Organisation Will Fee Zond	61, 91, 82, 66, W VS, 81, 91, 98,	Wingstein	67,15,64,14. 91,17,54	#E. RE, RE, RE, RE, RE 10	W. H. D. SH								
				Sub Total	The state of the s								
Tapugraphy	E North	1	< 1906 Singer of August)	0	- E								
4 April D 188 dis	1	tat.	-	West 12	Sadf - 16								
15 30(4)(4)	(1)	N-25 and may some fair foots slopes	19-44	45-54	235								
16. Annen	The T	School	Significant, executive relations	Consistent stope, Berg Blanc or stalling golden	Considered sileges,								
11 candingen/Tulegree Unitediate is Wolfd Spread	ptur < 5 tu huriano d' servi.	Service and in contrasper dominate, widdler sons and scheller Most and/or Most		Bulling totals, rainer worth basies, moramal aspect and days changes, mean morascum to writte around	Continuous, consistent topopuspine Na restriction to resisten spread 25								
FUEL, WEATHER A	но торобавлиу		WILLIAM	Seb Tota BEHAVIOUR THREAT SCORE	Z= /SI								
Structural	A		c	D D	110 240								
9 Profession of Education Community on Mag-		Sitter of days. Time offsy bettern	Mid-clair See Mand, Reseted railes, < 11% digs	Med-slage confinences, >15% slage 13	Hagner V/A of Steam 18								
3 Aye of Bookymon	Ny Section Nation with a	ference insulan.	Promote Intellier, with inclusions	Reports - 7 Manuface/hill	langeria <7 praeturalta lahatnunum 10								
(2) Profiler of Associate Relative to Values	et Anne No Structure Values within 2	7 Above > 100 (200 + 020) or 1 1 20	540005 5100300-109-130-m	Hut Rolling > 500 200-100 < 200 m 1 12 25	5-flow = 100 /85-101 < 100 m								
*hoosel why ETvel out total ** Record to Shouland compress Scharces Sone II 20 for ext	so 25. et unby PWART to House		WILDLAND ERREIN (NTLAN)	NE WELDTINE THREAT SCOR	35 m								
Wildfire Rehaviour Th	reat Class (there applicable d	insi		Interface Threat Class	icheck applicable dans								

Figure 54 Plot LC\_009 threat assessment worksheet.

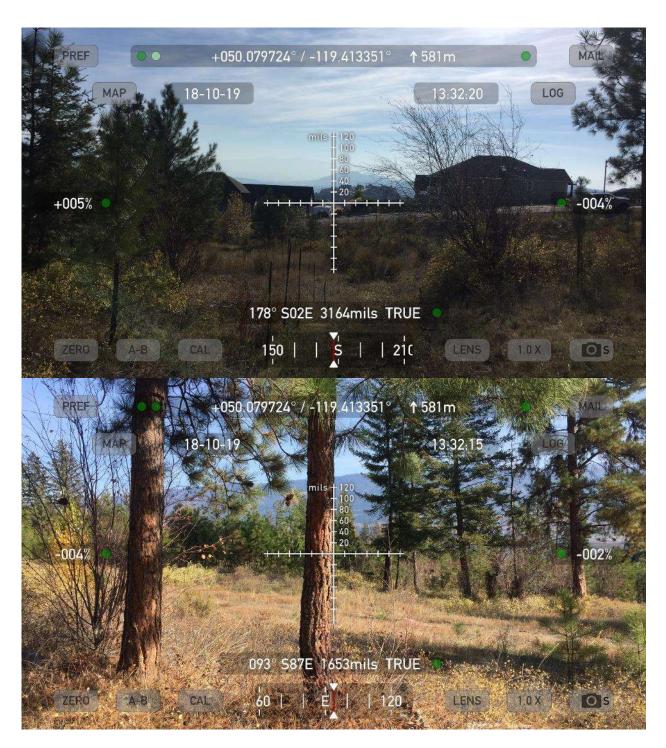


Figure 55 Plot LC\_009 photos from plot centre.

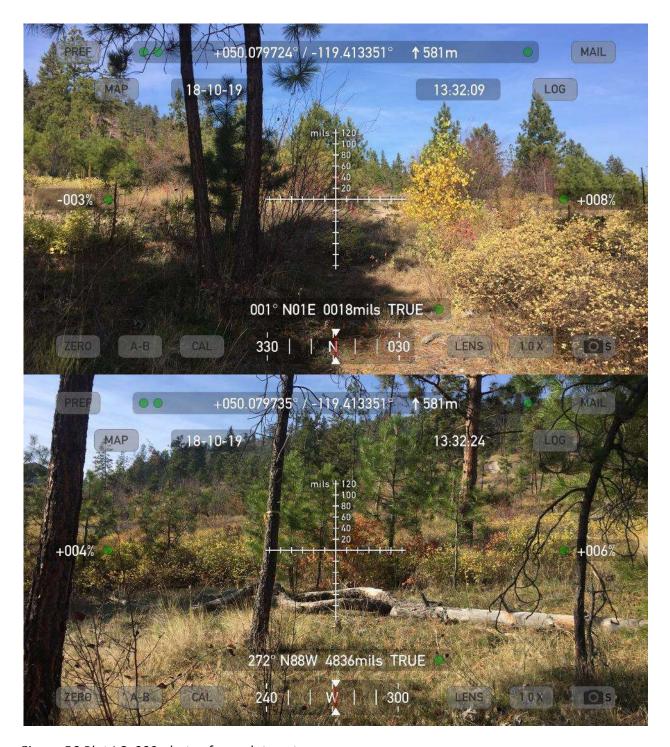


Figure 56 Plot LC\_009 photos from plot centre.



Figure 57 Plot LC\_009 canopy closure.

=	LC-010		District	MENT WORKSHE	ke Cou	and summer		
<u> </u>	- 1.LOW	Ampapa ta	renovember 3	not of	OVAMAA			
d.	001-22/1	g area :	50.1100	41°N -	112.329		927m	
⋖ .	m(3) = = 5		+ Win In	at the state of			12000	
-	COMPONENT		LEVELS					
	Subcomponent Park		B					
333408	Daff Unit have	trial	led .	Solite	10.00	- 48		
	Medica Repression:	-0	100	No Feed No.	Styling the Styling Styling Styling	Step Seed Wer		
	th costs	,	3.	1		0		
927m	Topotopie Suid Tompse Bon	Most rees. Impress opt. Dwo Hardwards Sweds	Service Seas.	Liste, Liste Deals	(Index)	Rowthplass Acetige Sturic Scotch Wilson		
3.77	Face Mesop Solves Continuely (1-7/10) (76 source)	- cramps	(Street,	The Street age	off temps, of the state	- Di contrajo 13 condens 16		
	Sept Mode (Adm) Sept Mode (Adm)	30.000000	(Strong)	10-25 iomige 3	125 mmage no desire	-23 immage, pertully electric		
74	London Control	10	7	47-87 10	(100)	10		
	Contractors Contractors	1-81-0 + 81% (a-1-10) ( (-41-1) ( (-41-1)	57	11-40	30-40	0		
3-71	Line and Bright (artife (1) and Then simple (4)	In a captured control of the captured control of the captured capt	3-1	2-1	N-12 W	(1)		
	the set had beyond set that any been properly	(10)	100,000	1801-2408	7971-4690. (II	14000 W		
	West Statis /by of Statistics and or distributed (Statis)	Supplied to the supplied of the supplied to th	Number Deal and Audit State 1-21	Standing Stead quer Forth Scient + 25-18 - 78	Sanding State and Sandy Green 1981–75 20	Turky Lucia or Turky Lucia or 100 Miles		
	(Individual Excellibration) with the /N/	131	796	9-9	4141	(1)		
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Figure 58 Plot LC\_010 threat assessment worksheet.

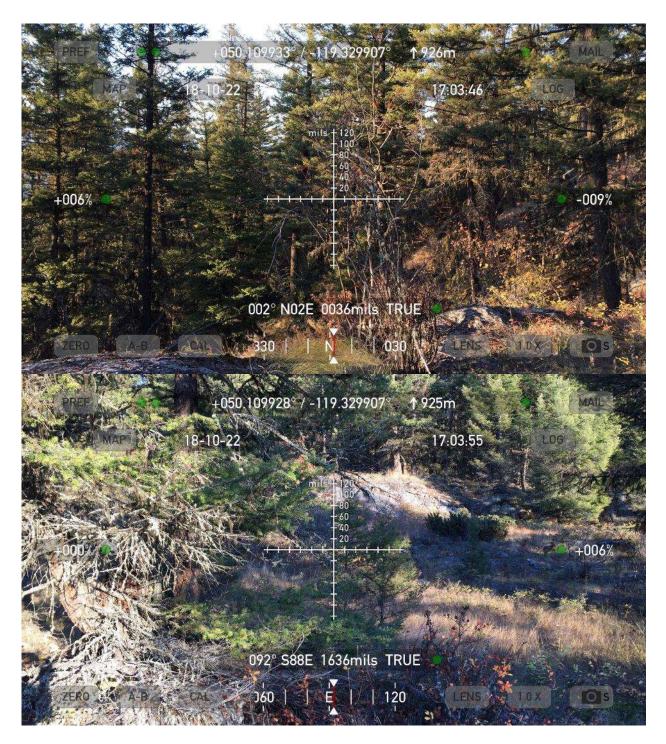


Figure 59 Plot LC\_010 photos from plot centre.

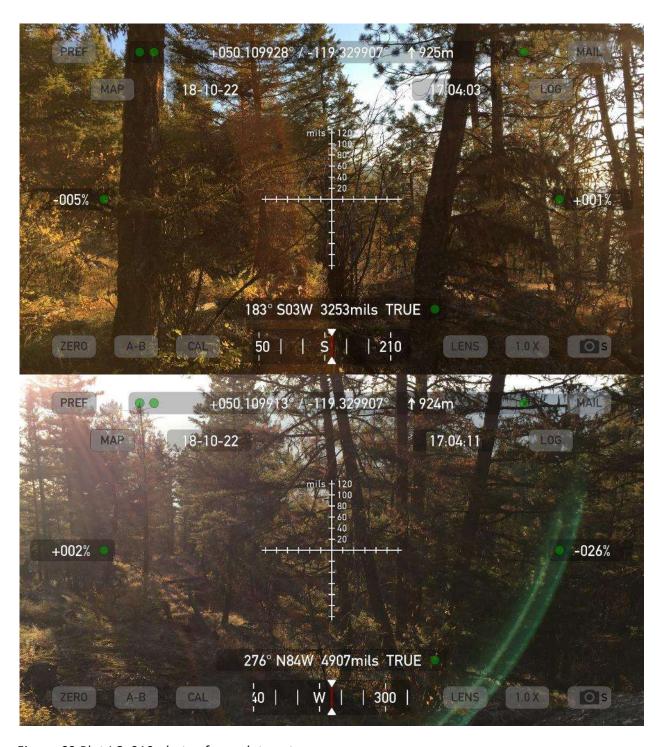


Figure 60 Plot LC\_010 photos from plot centre.



Figure 61 Plot LC\_010 canopy closure.

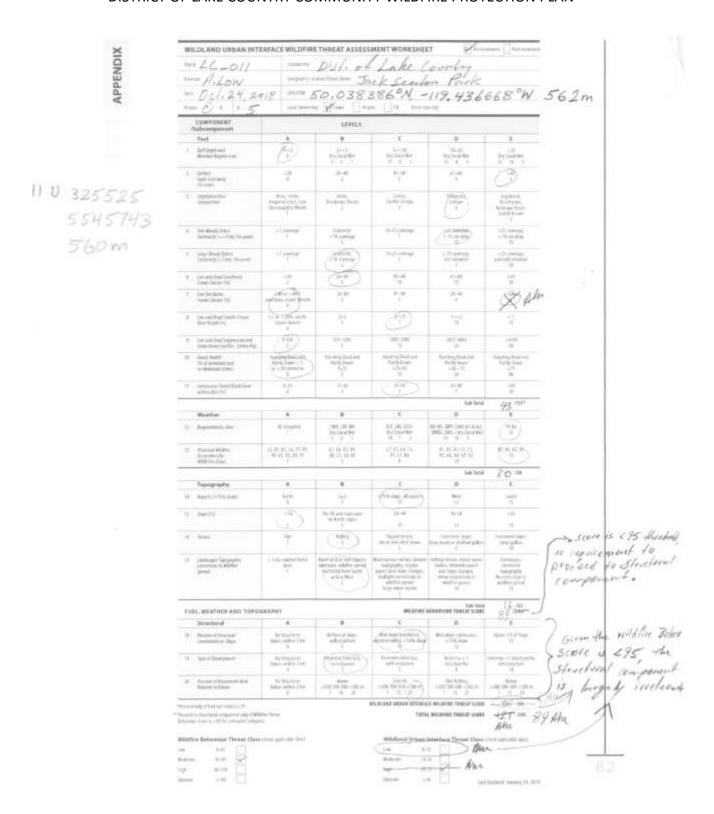


Figure 62 Plot LC\_011 threat assessment worksheet.

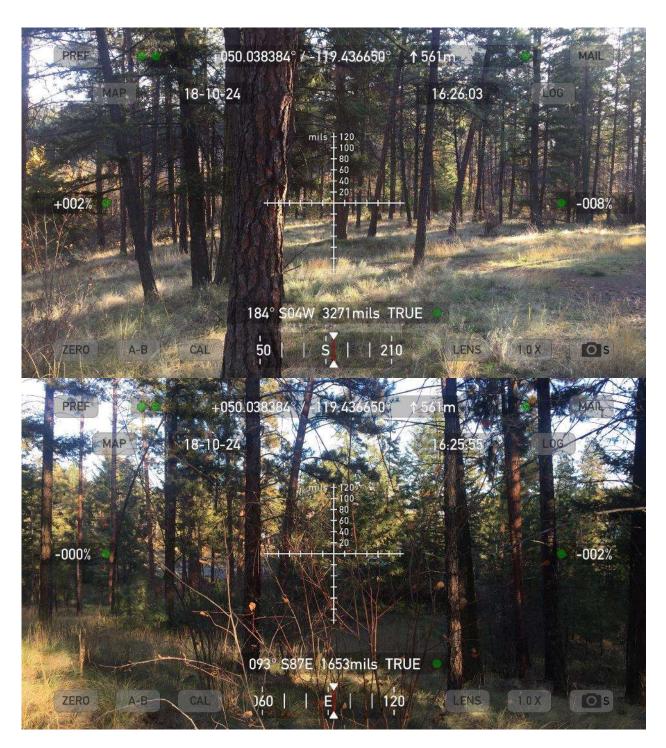


Figure 63 Plot LC\_011 photos from plot centre.



Figure 64 Plot LC\_011 photos from plot centre.



Figure 65 Plot LC\_011 canopy closure.

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Figure 66 Plot LC\_012 threat assessment worksheet.

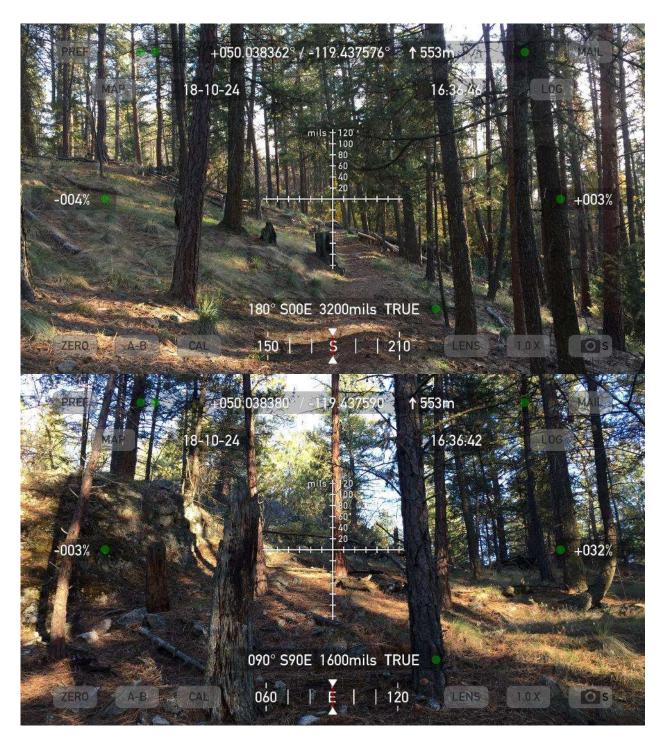


Figure 67 Plot LC\_012 photos from plot centre.

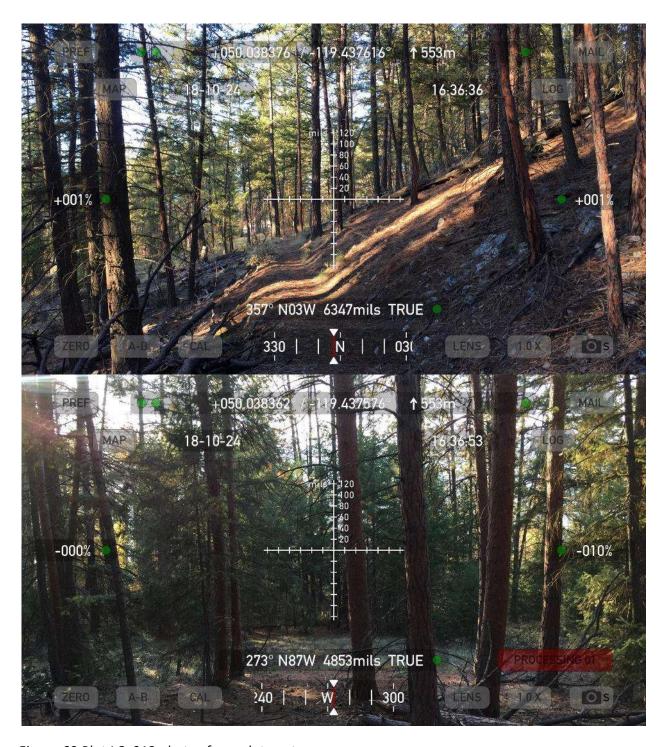


Figure 68 Plot LC\_012 photos from plot centre.



Figure 69 Plot LC\_012 canopy closure.

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Figure 70 Plot LC\_098 threat assessment worksheet.

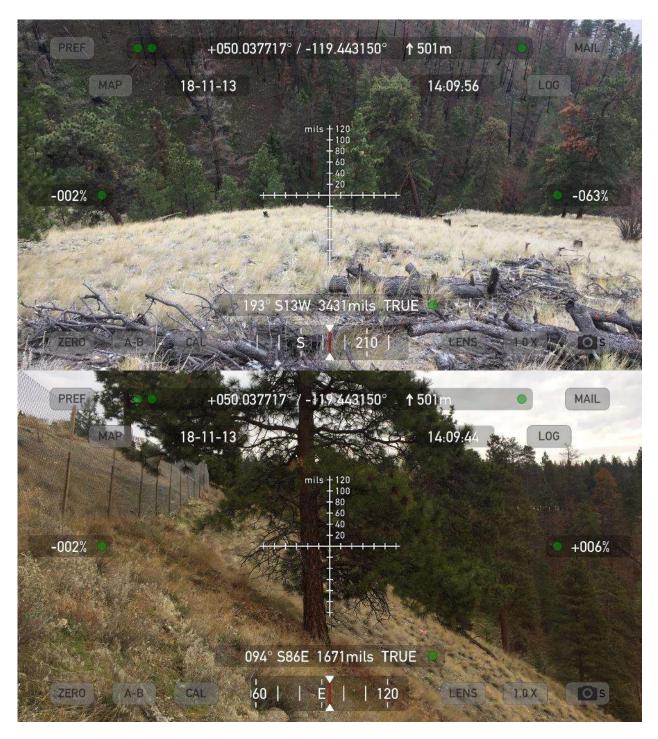


Figure 71 Plot LC\_098 photos from plot centre.



Figure 72 Plot LC\_098 photos from plot centre.

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Figure 73 Plot LC\_099 threat assessment worksheet.

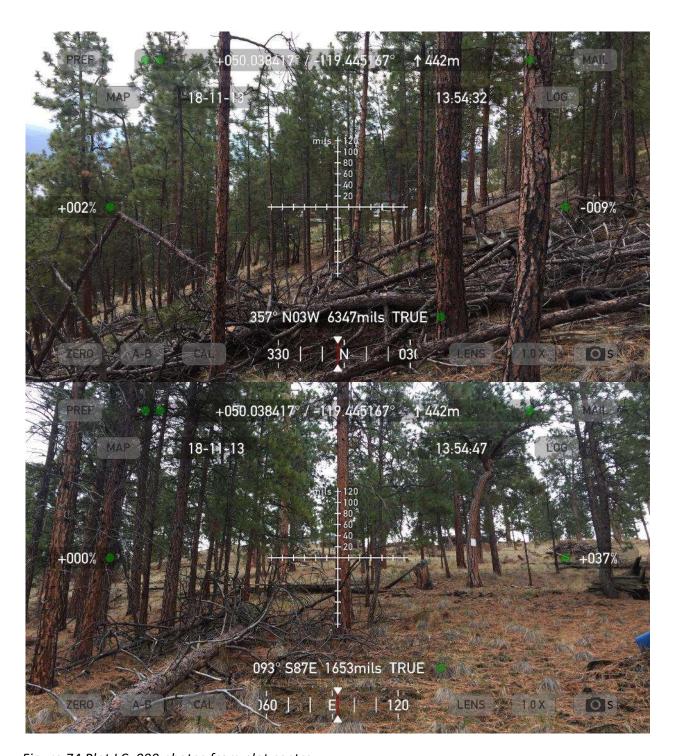


Figure 74 Plot LC\_099 photos from plot centre.

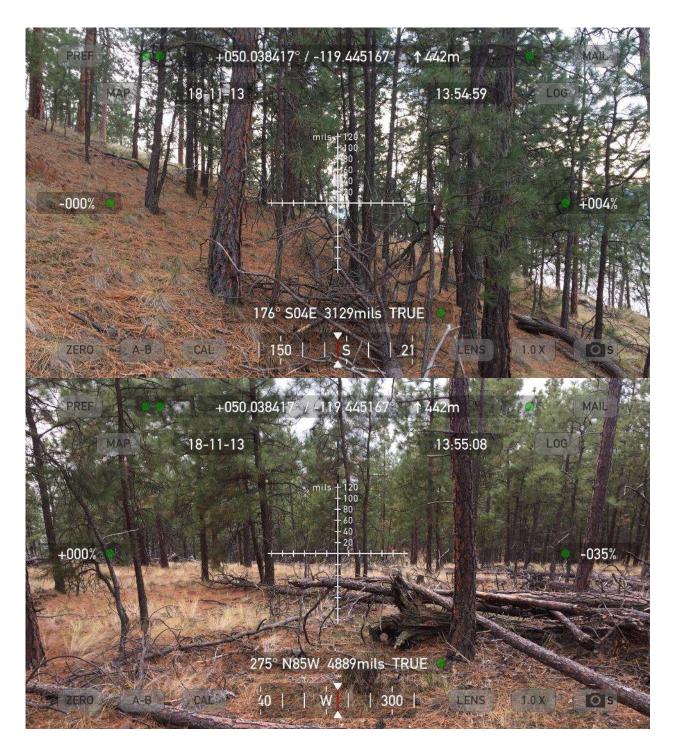


Figure 75 Plot LC\_099 photos from plot centre.



Figure 76 Plot LC\_099 canopy closure.

# **APPENDIX 3: Maps**

Included as a separate document due to file size and dimensions.

## **APPENDIX 4: GIS Methodology**

The Wildfire Risk Analysis (WRA) is a GIS-based model that spatially quantifies and analyzes the relationships that exist between the critical factors affecting wildfire risk. The intent of the analysis is to provide planners with a decision making tool to spatially identify the risk at the landscape level. This information allows planners to analyze and explore the implications of different management activities in relation to wildfire risk.

The overall rating spatially expresses wildfire risk by incorporating four key components, with specific weightings, as follows:

- Fire behaviour characteristics (40% of the weighting);
- Risk of ignition (10% of the weighting);
- Threat to structures, natural features and cultural features of significance (25% of the weighting);
- Suppression constraints (25% of the weighting).

These four components are in turn calculated from contributing factors, or sub components, each of which is represented by a layer in GIS. The layers representing these four components are subsequently overlain to produce the final wildfire risk rating.

## Component #1 - Fire Behaviour

The fire behaviour component of the WRA measures how wildfire will behave under extreme weather conditions. The Canadian Fire Behaviour Prediction System (FPB) provides quantitative outputs of selected fire behaviour characteristics for the major Canadian fuel types.

#### Fuel Types

Sixteen national benchmark fuel types, which are divided into five categories, are used by the Canadian Fire Behaviour Prediction System to forecast how wildfire will react. These fuel types were defined using the forest inventory and guidelines developed by the Ministry of Forests, Lands and Natural Resource Operations. Six fuel types were identified in the study area. It is important to note that these fuel types represent a type of behaviour pattern and their names are generic and do not accurately describe the type of stand itself.

#### Weather

Weather conditions used to calculate fire behaviour were derived from historic government records for two weather stations within the area.

This weather data was compiled and statistically analyzed to determine the average 80th percentile fire weather indices for the months of May to September.

#### Topography

Topographical attributes required to predict fire behaviour include slope and aspect. The study area was delineated into polygons based on slope breaks of 10% intervals and aspects of 45 degrees. The cardinal wind direction was calculated from the aspect so that it was blowing upslope and the elapsed time was set at 24 hours.

All of the data pertaining to fuel types, topographical attributes, and fire weather was compiled for the entire study area. This information was then run through the modeling software (Remsoft FPB97) to create the three output fire behaviour layers: fire intensity, rate of spread and crown fraction burned.

#### Fire Intensity

This layer is a measure of the rate of heat energy released per unit time per unit length of fire front and is based on the rate of spread and the predicted fuel consumption. The units for this layer are kilowatts per meter.

#### Rate of Spread

This layer is a measure of the speed at which a fire extends its horizontal dimensions. It is based on the hourly Initial Spread Index (ISI) value and is adjusted for the steepness of slope, the interactions between slope and wind direction and increasing fuel availability as accounted for through the Build Up Index (BUI). The units for this layer are meters per minute.

#### Crown Fraction Burned

This layer is a measure of the proportion of tree crowns involved in the fire. It is based on the rate of spread, the crown base height and the foliar moisture content and is expressed as a percentage value.

The weightings of the fire behaviour layers were designated as follows with a total maximum value of 40 and categorized into risk categories as follows: 6-19 = Low; 20-29 = Medium; 30-40 = High.

Table 5 Fire behaviour units and applied weighting.

Layer	Units	Unit Value	Weight
		>0-500	4 – Very Low
	Kilowatts per meter (kW/m)	501-1000	8 – Low
		1001-2000	10 - Low
Fire Intensity		2001-4000	12 – Medium
		4001-10000	16 – Medium
		10001-30000	18 – High
		>30000	20 – Very High
Rate of Spread	Meters per minute (m/min)	>0-5	2 – Very Low
		6-10	4 – Low
		11-20	6 – Medium
		21-40	8 – High
		>40	10 – Very high
	Percent of canopy crown burned (%)	0	0 – None
		1-9	3 – Low
Crown Fraction Burned		10-49	6 – Medium
The state of the s		50-89	8 – High
		90-100	10 – Very high

# Component #2 - Risk of Ignition

Fires are ignited by either humans or lightning. The most common source of human caused ignition includes the use of motorized machinery, discarded cigarettes and matches, fires started in houses,

campfires lit within natural areas, sparks from railways and trees falling and striking hydro distribution and transmission lines. These causes are accounted for by buffering all areas where these causes are most likely to occur. A 30-meter buffer has been established around all roads, structures, hydro lines and railways. Where these areas run through fuel types that are likely to sustain a fire ignition, the area has been assigned a high-risk ranking.

It is difficult to predict the risk of lighting striking across a landscape. Therefore, all fuel types that are likely to sustain a fire ignition due to a lighting strike have been identified and assigned a moderate risk ranking. All deciduous fuel types have been assigned a low ranking and non-fuels have been assigned a weighting of 0.

The weightings of the risk of ignition were designated as follows with a total maximum value of 10 and categorized into risk categories as follows: 1 = Low; 5 = Medium; 10 = High.

Table 6 Risk of ignition units and applied weighting.

Layer	Units	Weight
Risk of Human Caused Ignition	Areas within 30 meters of Structures Roads Trails/Camping areas Hydro Transmission lines Railways	10
Risk of Lightning	All fuel types except deciduous or non-fuels (C2, C3, C4, C7, M2)	5
Caused Ignition	All Deciduous fuels (D1/D2)	1
	All non-fuels (W, I, U, N)	0

## Component #3 - Values at Risk - Structures

The structural values at risk component of the model identifies human structures which are at risk of being damaged or destroyed by wildfire. All structures within the wildland interface were identified using orthophotos and buffers of 30 m, 100 m and 2 km were then created around these structures. Weightings were assigned to these buffers as per the table below.

The weightings of the structures and natural features at risk were designated as follows with a total maximum value of 25 and categorized into risk categories as follows: 5 = Low; 10-25 = High.

Table 7 Values at risk units and applied weighting.

Layer	Units	Weight
Structures and facilities at risk	Areas within 30 meters of any structures	25
	Areas within 100 meters of any structures	20
	Areas within 2km of any structures	5

## Component #4 – Suppression Constraints

The ability to suppress a wildfire depends on a number of factors including terrain characteristics, accessibility and the availability of suppression resources. Four factors were used to determine the overall rating for suppression capability: proximity to roads, proximity to water sources, initial attack time and steepness of terrain.

#### Proximity to Roads – Access

This layer accounts for the accessibility of suppression resources to fight a wildfire by creating 100 m, 500 m and 1000 m buffers along all roads in and adjacent to the study area. These buffers were assigned threat weightings that decreased with their proximity to roads.

#### **Proximity to Water Sources**

This layer is a measure of the availability of water sources for fire suppression. It was derived by creating 100 m buffers around all fire hydrants and perennial rivers, creeks and lakes. Fire hydrants were

designated the lowest weighting of 2, perennial water sources (ponds, reservoirs, lakes, rivers) were designated a weighting of 6 and all other areas were designated a weighting of 10.

#### Steepness of Terrain

Steepness of terrain influences the timely ability of ground crews to access the fire and construct fire lines Areas were weighted based on their average slope class. Designated weights increase relative to the steepness of the slope.

Weightings of the suppression constraints were designated as follows with a total maximum value of 25 and categorized into risk categories as follows: 0-9 = Low; 10-19 = Medium; 20-25 = High.

Table 8 Suppression constraints units and applied weighting.

Layer	Units	Unit Value	Weight
	Distance from roads in meters	0-100 from roads	1
Proximity to		101-500 from roads	3
Roads		501-1000 from roads	6
		>1000 from roads	10
	water sources	< 100m from perennial water sources	5
Proximity to		(ponds, reservoirs, lakes, rivers)	
Water sources		>100 meters from perennial water sources	10
		(ponds, reservoirs, lakes, rivers)	
	% Slope	0-20	1
Steepness of		21-40	2
terrain	, suppe	41-60	3
		60-100	4

- 1			
- 1			_
- 1		>100	5
- 1		- 100	2
- 1			
- 1			
- 1			

<sup>\*</sup>The entire area was weighted based on distance from roads. The risk was reduced by three if the area was accessible by a trail.

# Final Wildfire Risk Rating

The final wildfire risk rating has been calculated by adding together the ratings of the four primary components to produce a final weighting out of 100. The final weightings have been categorized as follows:

Table 9 Final wildfire risk weighting and risk class.

Final Weight	Wildfire Risk
0-39	Low
40-59	Moderate
60-79	High
>80	Very high