



Community Wildfire Protection Plan (CWPP)

Town of Lake Cowichan & Cowichan Lake Fire Protection Service Area

Document 1 (CWPP Report)
(Document 2 contains CWPP Maps)

Strategic Wildfire Prevention Initiative

2017



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Town of Lake Cowichan

Community Vision (OCP 2011)

*Our vision is to create
a vibrant, healthy, sustainable community
that exists in harmony with the natural environment,
enjoys a balanced economy,
supports all generations and
provides the opportunities to satisfy diverse social needs.*



Lake Days 2017

Acknowledgments

This Community Wildfire Protection Plan for the Town of Lake Cowichan and Cowichan Lake Fire Protection Service Area was a collaborative project between the Town of Lake Cowichan, Lake Cowichan Fire Department, Madrone Environmental, and Strathcona Forestry Consulting. Support for the project from Mayor Ross Forrest and Town Council was greatly appreciated.

Project oversight was provided by Doug Knott, Lake Cowichan Fire Chief, Steve Vatcher, Risk Management Officer, LCFD, and Margaret Symon RPF, Strathcona Forestry Consulting.

Mapping and Geographical Information System deliverables were capably prepared by Madrone Environmental Services Ltd.



Executive Summary

In 2017 the Town of Lake Cowichan undertook preparation of a Community Wildfire Protection Plan for the Cowichan Lake Fire Protection Service Area, an expansive area stretching from McLean Road off Highway 18 in the east, to Bald Mountain and Marble Bay Road in the west, and including the Lake Cowichan First Nation, in addition to portions of Electoral Areas F and I. The perimeter of the Fire Protection Area measures 71 km. The area within the Fire Protection Service Area is 8592 ha. The Area of Interest (AOI) encompassing the entire Fire Protection Service Area plus a two kilometre Wildland Urban Interface (WUI) buffer beyond structures, is approximately 13,200 ha.

The updated Provincial Strategic Threat Analysis prepared as part of this CWPP determined that the Town core generally has a moderate threat rating. The surrounding hinterland, which contains and/or is next to extensive forest land, and accounts for approximately 73% of the CWPP area, generally has a high threat rating, although there are areas with steeper slopes/higher fuel levels/warm aspects that are rated extreme. Local Fire Risk was evaluated as High at the town core; this is where most of the area's critical infrastructure is located. Outside of the town core, the risk is also high. Four simultaneous callouts would effectively tax the response limits of Lake Cowichan Fire Department. The Fire Department is increasingly concerned about the fire threat in the summer. A significant portion of the community is forested. Extensive forest lands surround the area. In July and August, when the Fire Danger Rating often reaches Extreme, the local population swells with thousands of summer visitors.

An updated Fuel Type map prepared in conjunction with the CWPP indicates that the dominant Fuel Type in the area is C-5 (mature coniferous forest). A broad range of Fuel Types are represented. A number of difficulties were encountered when trying to classify local fuel types into generic categories. Many of the lands in the study area have been previously disturbed by historical logging and more recent landclearing, resulting in a mix of fragmented fuels. No Fuel Type data was available for the significant proportion of Private Managed Forest Lands in the Wildland Urban Interface (WUI) zone of the study area.

The study identified seven high priority locations for fuel management, which will require detailed assessment of approximately 556 ha. Prevailing winds are southwest. Highest priority fuel management is in the southwest. However, fuel treatment is also a priority east of town, where there is difficult evacuation, coupled with vast fuel complexes. The Town of Lake Cowichan is encouraged to apply for funding under SWPI to assess priority areas and prepare Fuel Management Prescriptions in order to build resilience to mitigate the potential impacts of wildfire. Ongoing fuel management throughout the AOI is recommended to reduce the risk of wildfire.

A FireSmart program initiated at Lake Cowichan in 2017 was very successful, with six communities, including Lake Cowichan First Nation, achieving FireSmart Canada Recognition. The program will be expanded in 2018 to augment current initiatives and incorporate additional communities at risk.

Recommendations arising from the CWPP are broadly summarized in the table overleaf. One of the major challenges facing the Town is to engage with surrounding private forest land owners to reduce the risk of fires in the extensive forested interface zone surrounding the boundary of the Fire Protection Service Area.

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View looking north from Centennial Park. August 2017.

SECTION 1: Introduction

1.1 Purpose

The purpose of this Community Wildfire Protection Plan is to identify the wildfire risks within and surrounding the Town of Lake Cowichan community, to describe the potential consequences if a wildfire was to impact the community, and to examine possible ways to reduce the wildfire risk. The goal is to define the threat to human life, property and critical infrastructure from wildfires at the community of Lake Cowichan, identify measures necessary to mitigate those threats, and outline a plan of action to implement the measures.

This CWPP is a component of the Strategic Wildfire Prevention Initiative (SWPI), a suite of funding programs administered by UBCM and managed through the Strategic Wildfire Prevention Working Group. Since 2004, the initiative has supported communities to mitigate risk from wildfire in the wildland urban interface. The CWPP program was launched as a result of recommendations of the Filmon report “Firestorm 2004 Provincial Review” following devastating interface wildfires in BC’s interior in 2003. That report recommended that the province take a lead role to improve fire prevention in the interface.

The CWPP planning process provides the community with a detailed framework to inform the implementation of specific actions that will result in:

1. Reduced likelihood of a wildfire entering the community
2. Reduced impacts and losses to property and critical infrastructure
3. Reduced negative economic and social impacts to the community

1.2 CWPP Planning Process

The Town of Lake Cowichan was part of a CWPP completed for the entire Cowichan Valley Regional District in 2006. An updated CWPP for the CVRD was completed in 2012. Fuel and community characteristics change over time. The CVRD CWPP was useful in identifying broad scale wildfire risk. In order to effectively plan for wildfire mitigation at the Lake Cowichan Fire Protection Area, preparation of a separate Community Wildfire Protection Plan was deemed essential.

(Note: In 2017 the Cowichan Valley Regional District embarked on a new CVRD-west CWPP. Coordination and consultation with the CVRD are vital to ensure Areas of Interest are appropriate and not overlapping.) The Town of Lake Cowichan is working with the CVRD at joint planning meetings aimed at mitigating the wildfire risk in areas joined by mutual boundaries.)

The CWPP planning process at the Town of Lake Cowichan involved four phases in developing the CWPP:

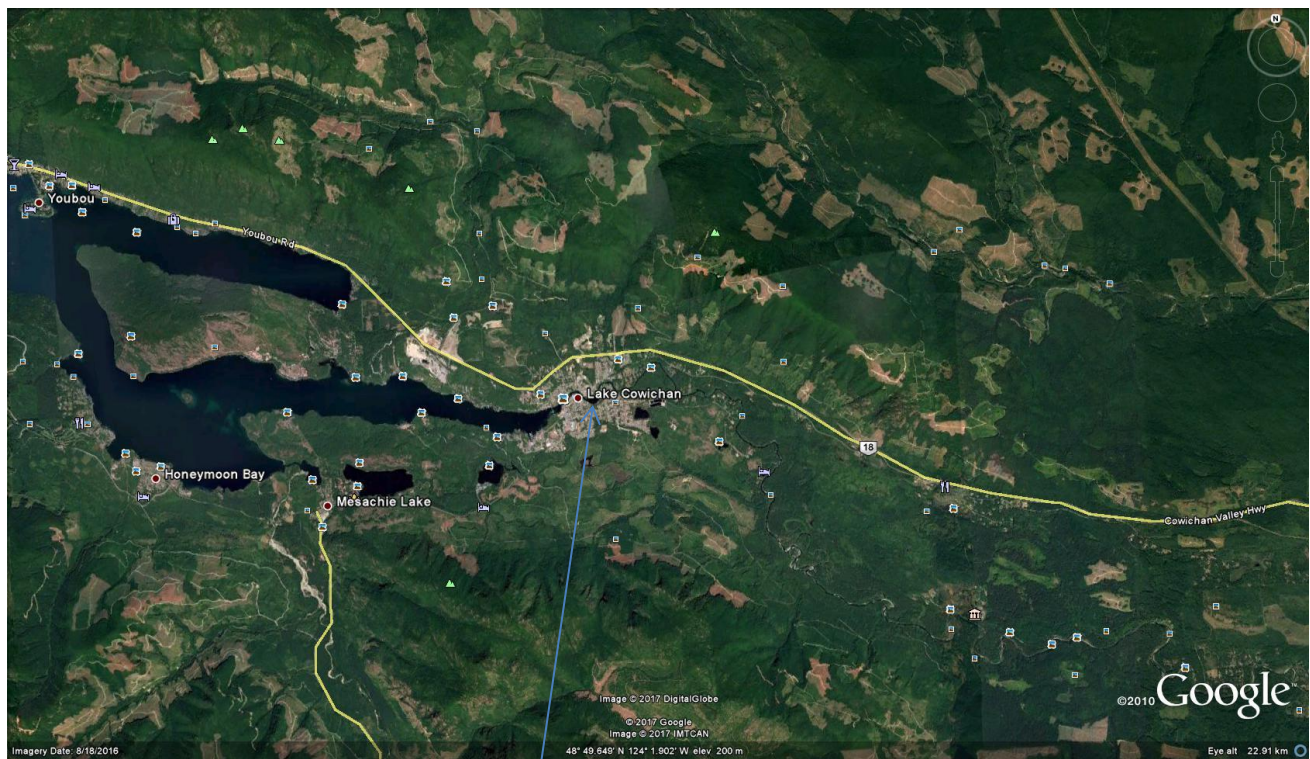
1. Building the team. In December 2016, a core planning team was assembled, including representatives of the local government, local fire services representatives (with structural protection knowledge) and a registered professional forester with advanced understanding of wildfire. BCWS representatives from the local Fire Zone (with fire behaviour knowledge) and Fire Centre (Fuel Management Specialist) provided valuable support. The core planning team identified key stakeholders and their roles with the CWPP plan development.

2. During the spring and summer of 2017, the core team identified values at risk, and assessed the local wildfire threat.
The wildfire threat was assessed through a combination of several approaches, including: Natural Fire Regime and Ecology, the Provincial Strategic Threat Analysis, and Local Wildfire Threat Analysis.

If the fuel (the hazard) ignites and the fire spreads towards the community, the wildfire can become a threat to life and property, with an associated risk of loss (probability x consequence).

3. A risk mitigation strategy was developed, including prioritized fuel treatments, FireSmart activities, and local wildfire response recommendations to reduce the wildfire threat.
4. Community engagement and education was implemented through presentations to the Town, Mayor and Council, and at public presentations. Additionally, individual community members and First Nation members were engaged in specific activities ensuring successful implementation of the CWPP.

SECTION 2: Local Area Description



Google Earth view of the Town of Lake Cowichan and surrounding area.

2.1 CWPP Area of Interest (See Document 2, Map 1: Area of Interest)

The Area of Interest (AOI) defined by this CWPP includes the entire Cowichan Lake Fire Protection Service Area, plus a 2 km Wildland Urban Interface (WUI) boundary beyond structures. The WUI is any area where combustible wildland fuels (vegetation) are found adjacent to homes, farm structures, other outbuildings or infrastructure. This may occur in the interface where development and fuels meet at a well-defined boundary or in the intermix, where development and fuels intermingle and have no clearly defined boundary¹. In B.C. the WUI is the area within 2 kilometers of a community with a minimum density of 6 structures per square kilometer.

This AOI includes the Town of Lake Cowichan, portions of CVRD Area I (Youbou/Meade Creek) and Area F (Cowichan Lake South/Skutz Falls). The AOI also includes the traditional territory of the Lake Cowichan First Nation, including the Indian Reserve that is their community core located on approximately 40 ha between the Youbou Highway and North Shore Road.

The Cowichan Lake Fire Protection Service Area (FSA) has an area of approximately 8600 ha. The entire area encompassed by the FSA and a 2 km WUI buffer is approximately 13,200 ha.

The AOI extends in the east from LePage Road for over 25 km to the western end of Marble Bay Road, and has a variable 4 to 8 kilometre north-south boundary.

Land Ownership

Almost all of the land surrounding Cowichan Lake is privately owned. There are numerous private residences located along the lakeshore. Surrounding the community are extensive forest lands. The majority of these forest lands are privately managed forest lands owned by major forest companies.

Land Ownership in the AOI:

Crown	44.6 ha
Municipal	488.5 ha
Private	7,404.3 ha
Unknown	125.5 ha

2.2 Community Description

The Town of Lake Cowichan is located approximately 25 km west of Duncan at the eastern end of Cowichan Lake on Vancouver Island, British Columbia. Cowichan Lake is one of the largest fresh-water lakes on Vancouver Island. The Cowichan River, a BC Heritage River and Canadian Heritage river, flows from the lake through the town, and meets the Salish Sea east of Duncan at Cowichan Bay.

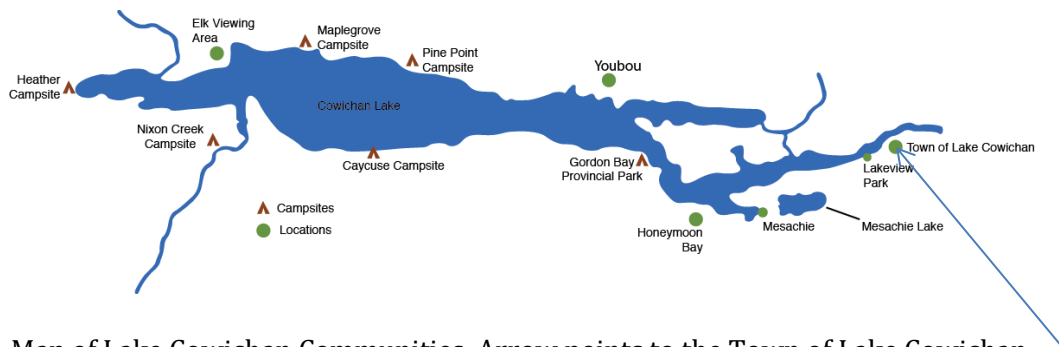
In 2016, the date of the most recent census, the Town of Lake Cowichan had a population of 3,015. The Lake Cowichan First Nation has approximately 20 people residing on its reserve. Excluding the

¹ Partners in Protection. 2003. Firesmart: Protecting Your Community from Wildfire. Second edition. Partners in Protection. Edmonton, AB.

First Nation, census data indicate an aging population at the AOI, with 40% of residents over 50 years. The population of Lake Cowichan more than doubles in the summer time with an influx of tourists and summer-only residents.

The AOI is located in the Cowichan Valley Regional District. The Town of Lake Cowichan was incorporated as a municipality in 1944. A mayor and four councillors are elected every four years. They oversee the planning, maintenance and upkeep of the town's roads, services and buildings.

Other communities at Cowichan Lake are Honeymoon Bay, Mesachie Lake, Caycuse and Youbou. Secondary roadways provide access to Port Renfrew, Nitinat and Bamfield.



Map of Lake Cowichan Communities. Arrow points to the Town of Lake Cowichan.

History: For hundreds of years before Euro-Canadians settled in the Cowichan valley in the 1800's, native people lived around the shores of Cowichan Lake. The Lake Cowichan people used a wide range of resources throughout their traditional territory. <https://fnbc.info/org/lake-cowichan-first-nation>

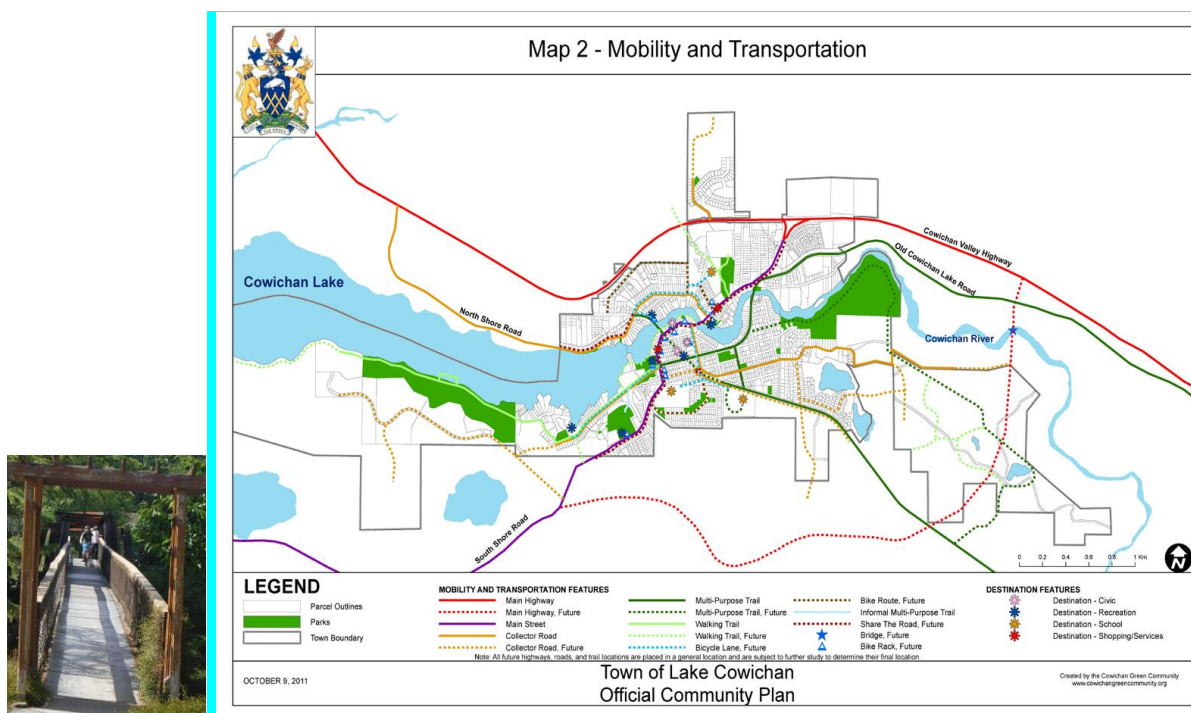
Historical Economic Drivers: Historically the Town's industrial base was founded in the logging, timber and related railway industry. Large timber processing mills established in Lake Cowichan and surrounding area operated for almost one hundred years. For well over the first part of the twentieth century, the forest industry was served by two railways, boosting the development of the Town. Since 2000, however, changes in provincial policy removing a requirement for dependence on local mills have reduced the importance of forestry as a mainstay in the economy. Over time, the Town's industrial base has decreased significantly to the point where former industrial sites are being redeveloped for residential use.

Current Economic Drivers: In recent years, tourism has become a significant component of the economy. As noted in the OCP (2011), retail trade now comprises the largest sector of the labour force at 14.9%, "eclipsing the still sizable, but declining, logging and forest products sector at 14.6%," with the service industry in close contention at 13.5%. Additionally, an increasing number of workers are commuting to Duncan and as far as Victoria. In some respects, Lake Cowichan is becoming a "bedroom community."

Residents and tourists alike are attracted to the area's attractive location and mild climate. The Town and most of the Lake Cowichan community enjoy warm, dry summers and mild, wet winters, with an average annual snowfall around 14 cm. The long growing season supports prime forest growth, which continues to support timber harvesting in the area. Forestlands surrounding the Town of Lake Cowichan are also greatly valued by residents and tourists for recreational and aesthetic values. Forestlands are also integral to the quality and viability of the vast Cowichan Lake watershed.

Emergency Services: Key critical infrastructure –fire department, police station, and ambulance station – is located in close proximity on the north side of the river. The Lake Cowichan Fire Department and BC Ambulance Lake Cowichan Station are located on North Shore Road, while the RCMP detachment, which services the entire Lake Cowichan area, is located at Stanley Road, south of Cowichan Lake Road. The Lake Cowichan Fire Department assists the Cowichan Valley Regional District with fire protection services in the electoral areas adjacent to the Town through a mutual aid agreement. The Lake Cowichan ambulance station is a “single car” station with a large response area encompassing all the communities around Cowichan Lake and as far west as Nitinat.

Transportation: Main transportation routes connecting the Town with other areas are Cowichan Highway 18 (connecting Lake Cowichan with Duncan), the Youbou Road (runs along north side of Cowichan Lake), and South Shore (travels along the south side to Cowichan Lake to Mesachie Lake, Honeymoon Bay, and accesses the Marine Circle Route Highway to Port Renfrew). As noted in the OCP, the transportation network in the area comprises major roads, collector roads, local roads, public and private logging roads, sidewalks, trails, and transit services. There are no train routes and no airports in the Cowichan Lake area. Meetings are taking place between the Town, the Lake Cowichan Fire Department, and the CVRD to review evacuation routes and procedures.



OCP Map: Mobility and transportation at the Town of Lake Cowichan includes several footbridges.

2.3 Past Wildfires, Evacuations and Impacts

The MoFLNRORD fire reporting system was used to compile a database of fire back to 1950 in the plan area. (Refer to Document 2: Map 5 – Fire History).

There is no requirement for fire departments to maintain fire history records. Historical fire records at Lake Cowichan Fire Department are unavailable. Fortunately, current Fire Chief Doug

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Knott, who has served with the department for many years, was able to provide a brief account of interface fires in the area since 1998:

1998 – Fire at Lake Cowichan First Nation- across highway (north side highway). Sprinklers were used. The Town water structure was compromised.

2003/2005 – two fires in logging land behind logging on south side of highway

2004. April. Campers started a fire near the satellite facility

2005. Summer. The Slopes. A burn pile was re-kindled. Water bombers were activated. Fire just about made it to Neva Road. TW property.

2006 – August. Wildfire off Neva Road. Water bombers activated. Air and equipment required. Cause: arson in logging.

2011/2012 – about 4-5 yrs. ago, arson south of, downslope of Lexie's property.

~2013 – bush fire by river – Skutz

2014 – 3 yrs. ago – TCT Johel Road – smoking. Went into aircraft – taken over by Forestry.

2015 – July 28. Skutz/Hwy 18. Fire started in active logging TW block. At boundaries of FPA.

2015 – major wildfire at Lizard Lake. Campers started the fire.



Mars water bomber at Neva Road wildfire, 2006.

2.4 Current Community Engagement

As a small close-knit community, the Town of Lake Cowichan benefits with a strong level of support with regards to wildfire risk mitigation. This is evident in the key role of the local fire department in all aspects of fire prevention. In addition to emergency response services, the Lake Cowichan Fire Department is very active in the community promoting fire prevention and suppression programs.

In the summer of 2017, three members from LCFD were deployed to Elephant Hill Fire (Cache Creek-Loon Lake-Clinton area) as part of a Structural Protection Team with LCFD Tender #2 working with Burnaby, & Duncan Fire Departments.

Early in 2017, on behalf of the Town, the LCFD applied to SWPI for a FireSmart grant. The grant was awarded to the Town in early spring of 2017, at which time the Lake Cowichan Fire Department had two members certified as FireSmart Representatives (LFRs). The LFR's, in liaison with a Registered Professional Forester with experience in WUI work, made a presentation to the Town Council and residents about the FireSmart program and how it could help the town and its residents be better prepared for a wildland urban interface fire. Presentations were also made to

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the Town Council, Advisory Planning Commission, and Cowichan Lake Community Forest Co-operative.

Social media was used to deliver information to the public. Additionally, the local newspaper featured an article on local FireSmart efforts.

On National FireSmart Day, May 6, 2017, the Lake Cowichan Fire Department and the FireSmart Planning Team held a public information/education event at the fire hall. This event provided an excellent opportunity to talk with local residents keen to be involved in the FireSmart program. Fourteen residents were identified who sought to become FireSmart Community Champions. As a result, the FireSmart Planning Team was able to work with six communities in the Lake Cowichan Fire Protection Area towards making the communities FireSmart. Participants of the training learned that post-fire investigations at Fort McMurray showed that FireSmart structures survived overwhelmingly, with 81% of the surviving structures having been FireSmart. If structures on the perimeter of the town – at the interface with the forest – had been FireSmart, much of the fire spread from one building to another that led to the vast majority of structure loss in Fort McMurray could have been prevented.

The FireSmart campaign continued at Lake Cowichan's annual community event "Lake Days" in June 2017. In July, a FireSmart Community Champions Workshop was held at the Lake Cowichan Fire Hall to train volunteer Community Champions how to assist and lead their communities. Individual and community FireSmart assessments continued throughout the summer and fall of 2017. In late October, a chipper day was organized for FireSmart communities.

In November 2017 a presentation was made to Town Council, updating them as to the progress of the FireSmart planning activities throughout the year. Also in November, a presentation was made to the public at a Town Hall meeting. Approximately sixty people were in attendance.

In December, the FireSmart planning team gave a presentation to the South Island Fire Management Organization at its fall meeting in Duncan, BC. Representatives from the Wildfire Branch, local government, and local private forest companies were in attendance.

The FireSmart planning team assisted the six FireSmart Communities in submitting application to FireSmart Canada to receive Community Recognition. Planning continues for ongoing FireSmart community education.

This FireSmart Community program is now being spearheaded by the residents themselves, taking priority actions on simple steps to reduce the wildfire hazard on their homes and in their yards, with assistance from a fire professional and local FireSmart representatives who can recommend specific actions to get them started.

Through newsletters, walk-arounds, emails, and informal meetings, residents in six Lake Cowichan neighbourhoods are now tackling wildfire risk by raising awareness in their local communities. Newsletters, walk-arounds, emails, informal meetings.

The following fuel management treatments were conducted in the AOI and surrounding area:

- Cowichan Valley Trail – fuel treatment conducted by CVRD Parks Department 2010
- Bald Mountain Trail Park – fuel treatment conducted by CVRD Parks Department 2010

- Bald Mountain 911 Repeater –fuel treatments were conducted by CVRD Emergency Preparedness – 2011 (30 trees felled), 2013 (50 trees felled), 2015 (30 Tons of natural fuel removed)

2.5 Linkages to Other Plans and Policies

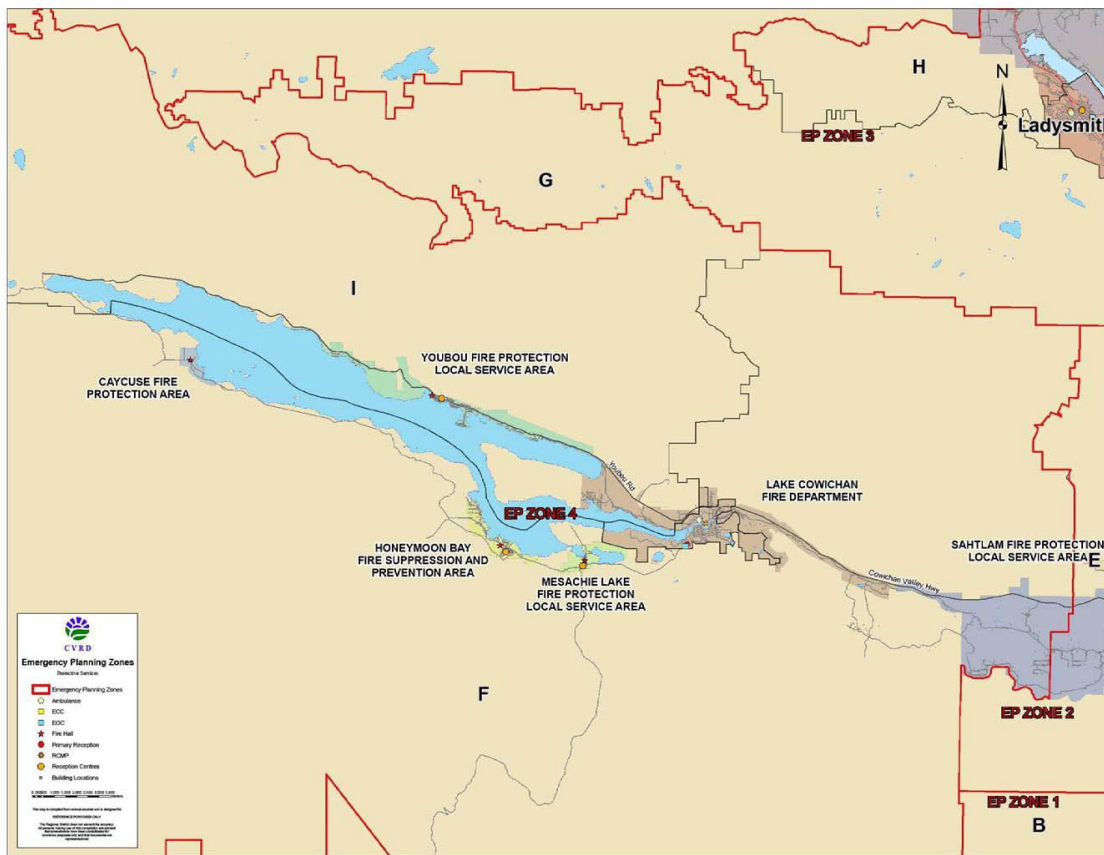
2.5.1 Local Authority Emergency Plan

Under the Emergency Program Act, local governments must prepare local emergency plans that include preparation for, response to, and recovery from, emergencies and disasters. The plan must cover all potential emergencies and disasters that could affect all or any part of the local government, (including wildfire), and may contain essential information for the CWPP.

The CVRD Emergency Preparedness Plan <https://www.cvrld.bc.ca/DocumentCentre/view/890> (CVRD Emergency Preparedness Handbook) contains the following information relevant to interface wildfires:

- response maps
- general information about evacuation procedures
- primary reception centres
- critical infrastructure reviews
- frequencies of local radio stations advising when / if a Reception Centre has opened

At several meetings with the Town and public in 2017 at Lake Cowichan, many residents asked about emergency evacuation routes. While the CVRD Emergency Preparedness Plan is an excellent document, specific evacuation routes are not described. In November 2017 the Town of Lake Cowichan held two meetings with emergency response agencies and the public to examine evacuation routes and procedures in the community.



CVRD Emergency Planning Zone 4 (Cowichan Lake)

2.5.2 Affiliated CWPPs

As noted in the introduction, a CWPP initially conducted for the CVRD in 2006, and updated in 2012, provided a broad review of wildfire prevention activities in the region as a whole, but was not specific to Lake Cowichan. The CVRD is currently undertaking a CVRD-west CWPP. Since late 2017, meetings have taken place between the Town of Lake Cowichan / Lake Cowichan Fire Department and the CVRD Emergency Preparedness Department to review CWPP recommendations and coordinate planning for wildfire prevention in the overlap area of CVRD-west.

2.5.3 Local Government and First Nation Plans and Policies

Plans and policies relating to wildfire at the Town of Lake Cowichan and Lake Cowichan First Nation are currently limited to the Official Community Plan and its associated bylaws.

Section 875 of the Local Government Act provides that a local government “may have a community plan prepared or revised and such plans shall be expressed in writing and may include plans, maps, tables or other graphic material and shall include statements and map designations for the area covered by the plan.” The most recent Official Community Plan for the Town of Lake Cowichan was completed on 25 October 2011 <http://www-townlakecowichan.bc.ca>

There are several bylaws currently in place that relate to interface wildfires:

- Building 987-2017 Building Regulations Bylaw
- 727 Unsightly Premises
- 807 Fireworks Bylaw
- 878 Outdoor Burning Regulation

Section 919 of the Local Government Act provides that the Town of Lake Cowichan may designate Development Permit Areas for specified areas or conditions, such as the protection of the natural environment, or protection of development from hazardous conditions. The Local Government Act requires that the Community Plan must describe the special conditions or objectives that justify the designation, and specify guidelines respecting the manner by which the special conditions or objectives will be met. The Act provides that specified activities may be exempt from a requirement to obtain a Development Permit.

Development Permit Areas established by the OCP do not include Wildfire. The Town of Lake Cowichan is currently engaged in a process to update its OCP, and is encouraged to establish Development Permit Areas for Wildfire in the new Plan.

2.5.4 Higher Level Plans and Relevant Legislation

The MFLNRORD stated there are no Higher Level Plans in place relevant to the CWPP. The VILUP (Vancouver Island Land Use Plan) may be relevant, as the Town is settlement area (VILUP 4.4.1).

In British Columbia, the Wildfire Act and Wildfire Regulation define the legal responsibilities and obligations to which everyone in the province is subject. When the BC Wildfire Service places bans or restrictions in an area, the Wildfire Act and Regulation makes them enforceable. (The Lake Cowichan Fire Protection Area complies with these bans.) As such, everyone in B.C. is expected to understand and abide by the Wildfire Act and Regulation. Its key goal is to specify responsibilities and obligations on:

- Fire use
- Wildfire prevention
- Wildfire control
- Rehabilitation

On April 1, 2016, increased fines for a variety of wildfire-related violation tickets came into force. [A summary of these fines is available here.](#)

The *Wildfire Act and Regulation* may be followed at:

- [Wildfire Act](#)
- [Wildfire Regulation](#)

2.5.5 Ministry or Industry Plans

Integration of existing planning initiatives is critical to ensuring efficient and effective wildfire risk mitigation activities.

Within a municipality or Regional District, the local authority can enact its own bylaws around wildfire, however in BC local government often defers to the province, and follow the bans/restrictions etc. implemented by the province. This type of agreement enhances fire prevention cooperation between different levels of government.

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From a context of wildfire management in British Columbia, fire management plans are documents completed by a land manager (i.e., Natural Resource District Manager or Provincial Park Manager) identifying values on the landscape, and guiding fire management and response planning and operations. District fire management plans are not a statutory requirement, although they are required through Ministry policy.

During the preparation of this CWPP, the South Island Natural Resource District advised there is no publicly available fire management plan for the district. The British Columbia Wildfire Service likewise stated there are no BCWS Fire Prevention Plans in effect for the Lake Cowichan area. However, BCWS newly advised there is a FMP for the West Coast Region, an area which encompasses the AOI. BCWS said the document is not public, but is relevant to this section of the CWPP document.

BC Provincial Parks said that there are no plans in place for the area. BC Provincial Parks noted several concerns with respect to wildfire risk and emergency response at Cowichan River Provincial Park:

- poor cell phone reception
- some areas have rugged terrain challenging emergency extraction
- notable defiance of campfire ban
- car fires are not uncommon
- illegal campfires are common
- illegal use of ATVs in the park

The Cowichan Valley Regional District (CVRD) Parks Department manages several areas of parkland in the Lake Cowichan area. When contacted, the Manager of the CVRD Parks Department said “staff are not unaware of any fire-related problems in CVRD’s parks, nor have any fire-related issues been reported that we parks staff is aware of (sic).”

In 2010, the CVRD Parks Department undertook fuel management treatment at the Cowichan Valley Trail and Baldy Mountain Trail (see Document 2, Map 3). Regarding fuel treatment maintenance, the CVRD Parks Department stated, “a further assessment would be required of CVRD’s parks to determine any change conditions from the assessment/prescription work done in 2010. Undertaking a further assessment is currently dependent upon availability of grant funding programs as was available back in 2009/10.”

Private forest companies operate throughout Lake Cowichan; forest harvesting occurs throughout much of the Cowichan Lake watershed. The majority of forest activity takes place on privately owned lands, and is governed by the Private Managed Forest Land Act. Managed forest land is a BC Assessment property classification established in 1988 to encourage private landowners in British Columbia to manage their lands for long-term forest production. All managed forest land must be used in accordance with the Private Managed Forest Land Act. Private forest land outside of the Managed Forest Program is not subject to the same regulations.

The provincial Wildfire Act and Regulation (and associated bans and restrictions) apply to all Crown and private lands (including Managed Forest Lands) that are outside a local government jurisdiction. The Wildfire Act and Regulation cover wildfire management and issues such as fuel management, prescribed burning, and other prevention-related issues. Local governments may impose bylaws above and beyond provincial legislation. The Town of Lake Cowichan has a burning bylaw that applies to the Fire Service Protection Area.

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Managed Forest Land owners do benefit from a Wildfire Response Agreement for fire fighting with the province. The cost sharing agreement provides fire response by the Wildfire Service that would normally be the responsibility of the landowner.

Private Managed Forest Land owners are required to have Fire Management Plans, but these are generally unavailable to the public. Similarly, harvest schedules are usually not accessible by the public. TimberWest notes on its website, “As is TimberWest’s practice, we will continue to share our harvesting plans with the community in advance of harvesting activities.” The Town of Lake Cowichan has made a request to TimberWest for regularly scheduled meetings to preview upcoming logging blocks and slashburning activities planned in the Town’s WUI hinterland. Discussions have also been initiated with other Private Managed Forest Landowners in the area to mitigate fuel hazards in the WUI zone around the Town of Lake Cowichan. At the same time, local governments and landowners should be striving to meet provincial carbon pollution reduction targets.

In 2012, the Forest Practices Board of BC completed a special investigation into fire management planning, from which several recommendations were made, including involving local government and the public in the planning process, where appropriate. The Town of Lake Cowichan should encourage the provincial government to include the Town’s interests in fire management planning processes at the Forest District and Provincial Park levels.

SECTION 3: Values at Risk

(Refer to Document 2, Map 3: Values at Risk)

Values at risk (VAR) are the human or natural resources that may be impacted by wildfire. This includes human life, property, critical infrastructure, high environmental and cultural values, and resource values.

Updating VAR data is critical for effective mitigation planning.

Risk is a product of probability and consequence. Wildfire risk is rated high throughout much of the AOI. If wildfire struck the town core, which contains key emergency response personnel, equipment, and facilities, it would be impossible to respond to outlying areas. If the Lake Cowichan Fire Department (located in the town core) was called to four fires simultaneously, they would not be able to respond to any more fires. Four fires would tax their response to the limit. According to the LCFD, approximately 12 years ago, the fire department was dispatched to four fires in disparate parts of the FSA; manpower and equipment was “stretched very thin.”



Values at risk: clockwise from top left: Kaatza Museum; Town Office; Cowichan Lake District Visitor Centre; Lake Days; Bald Mt repeater; totem at Forest Workers' Memorial Park; Forest Workers' Memorial Park.

3.1 Human Life and Safety

In the event of a wildfire approaching a community, the first priority is human life and safety, including the evacuation of at-risk areas. Wildfire can move quickly and unpredictably. It takes time for people to evacuate an area and safe egress can be blocked by the fire itself or by vehicle congestion or accidents.

Cowichan Lake is a very popular recreational area. From May to September population of the Town of Lake Cowichan swells with tourists attracted to the area's natural resources and community events (i.e., Lake Days, Sunfest). There are numerous summer cabins, mainly along the north eastern shoreline of the lake. Within the Lake Cowichan Fire Protection WUI area there are several designated campgrounds, including Lakeview Municipal Campground on the north shore, west of the Town of Lake Cowichan; Beaver Lake Resort on Beaver Lake. In addition, tourists travelling to campsites maintained by TimberWest and the BC Forest Service at the western part of Cowichan Lake travel through the Town of Lake Cowichan. The Cowichan Lake Education Center, a full service conference and education facility, is located on the shores of Cowichan Lake west of the Town of Lake Cowichan.

“Lake Cowichan is essentially a 1-way-in/1-way-out community.”
LCFD

Evacuation from the Town and outlying areas AOI would be challenging. Many access and egress locations in the Lake Cowichan Fire Protection Service Area are limited to 1-way- in / 1-way-out. Evacuations needing to head east during an emergency or WUI event would be a challenge. As an example, Highway 18, the main artery in and out of the Cowichan Lake area runs along the bottom slope of the south-facing ridge that forms the northern part of the Cowichan Valley. Emergency closures of Highway 18 re-route traffic on the Old Lake Cowichan Highway, a winding, older secondary route below it, which travels through thickly wooded areas. Routes west travel along South Shore and North Shore Roads along the lake, connecting with logging roads on the North out of Youbou, and the Pacific Marine Route in Mesachie Lake in the South. Further travel west through Honeymoon Bay leads to a network of logging roads.

Evacuation from many areas would be hindered by long, 1-way-in/1-way-out roads (i.e., Hudgrove) and steep winding (often 1-way-in) narrow roads (River Road at LambsHill; Lakeview estates; Woodland Cottages; Sunny Beach Estates).

The circumstances and areas of the WUI event would dictate how emergency responders would effectively try to direct and control the safe and timely evacuation of local area residents, in addition to the high numbers of tourists who visit Lake Cowichan during the fire season.

At public meetings held in the Town of Lake Cowichan in 2016 and 2017, questions were raised about emergency evacuation during peak summer periods. Many questions were raised about the effectiveness of emergency preparedness at SunFest.

At a recent meeting hosted by the CVRD for stakeholders working on a CWPP for CVRD West, the Lake Cowichan Fire Department sent two representatives and contributed to the conversation of such challenges during evacuations. The Lake Cowichan Fire Protection Service Area includes some areas in the CVRD. The hope is that during this work by both parties an effective and safe solution regarding evacuation routes can be established and put into place.

Structure locations and key attribute locations, including new development (i.e., SunFest and new residential subdivisions, including The Slopes, Woodland Shores, Sunny Beach Estates), were verified during the preparation of the CWPP. The Lake Cowichan First Nation is currently developing areas at both the north and south shores of Cowichan Lake.

Fire Department Response. On September 1, 2012 the LCFD was paged out to three Incidents of Fire during the same time. One fire was reported on the roof of the middle school Stanley Gordon, there was a brush fire on the side of Highway 18 at the entrance to Town, and another brush fire was on the side of the road on Cowichan Lake Road just east of the town. Although these fires were all minor in nature and the LCFD was able to deal with them relatively quickly, fire department resources were taxed. Mesachie Lake Fire Department was requested to respond via Mutual Aid to the Lake Cowichan Fire Department Hall to handle any other calls while the LCFD was dealing with the incidents.

Eight minimum tasks are required at every Structure Fire, and need to be performed concurrently: First Engine, Second Engine, Pump Operator, Ventilation Team, Search & Rescue, Water Supply, RIT Team and Incident command. These eight tasks require a total of sixteen Fire Fighters (combination of FF's, Company Officers & Chief Officer) for an effective, efficient & safe fire attack just for the eight tasks listed for a simple non-complex structure. The Lake Cowichan Fire Department usually has between 28-32 active members who may or may not be in Lake Cowichan and able to respond.

This information, together with the experience from these events and the training provided during the FireSmart Local Representative Workshop, has shown that if a large scale WUI fire was to enter the Lake Cowichan Fire Department Protection Service Area and ignite homes and structures, etc., the Lake Cowichan Fire Department would be strained to deal with any more than two structure fires simultaneously. Mutual Aid agreements are in place with neighbouring Fire Departments; their resources could be called on unless they were engaged working on incidents themselves.

In recognition of this challenge and the high risk it creates for the area during the fire season, the Lake Cowichan Fire Department has purchased and equipped a Structure Protection Unit (SPU) trailer that would help provide proactive protection to about sixty homes. The most recent Water Tender has foam capability that can pump and roll to wet down areas as well as make fire breaks. The LCFD also started Community FireSmart training with the public to help mitigate the risk and loss in the event of a WUI fire.

3.2 Critical Infrastructure

Critical infrastructure within the WUI is identified in order to effectively determine the wildfire risk and identify mitigation activities. Critical infrastructure assets— or CI —are those physical resources, service and information technology facilities, networks and assets which, if disrupted or destroyed, would have a serious impact on the operation of an organization, sector, region or government. As noted, most of the CI is located in/near the town core.

Critical infrastructure identified in the area encompassed by the CWPP and 2 km WUI includes:

Town infrastructure / Water:

- Town Office, South Shore Road
- Town Works Yard, Grosskleg Way

Emergency Response:

- Lake Cowichan Fire Department, North Shore Road
- BC Ambulance Stn 119, North Shore Road
- RCMP, Stanley Road

Emergency Reception Centre:

- Lake Cowichan Sports Arena, South Shore Road

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Communications:

- Bald Mt. 911 Repeater
- Satellite Teleglobe facility

Power/ BC Hydro:

- substation (across from high school):

Schools:

- Lake Cowichan High School
- Palsson Elementary

Marina:

- Point Ideal (emergency evacuation route by water)

Grocery store:

- Country Grocer (only large grocery store in town)

Banks: (no other banking facilities anywhere at Lake Cowichan)

- RBC
- Island Savings

Hotels/motels/Bed and Breakfasts: (in an emergency, these facilities provide short-term lodgings)

- Cowichan Lake Lodge
- Greendale Riverside Cabins
- etc.

Seniors Residences / Seniors Centre: (vulnerable citizens, many of whom are elderly and in frail health, would need to be evacuated in an emergency)

- Two apartment buildings on King George
- Seniors Centre, South Shore Road

Wooden bridges:

- 3

Gas stations:

- Coop on Cowichan Highway, Tiptons on North Shore Road

Sawmills:

- (3) Carlite, Eldon Shake Mill – Youbou Highway, small mill on Hudgrove

Water Districts:

- (3): Woodlands Shores, Bayview Villages and Cottages, Meade Ck Road/Sunset Road (24 homes west end of Meade Ck Road)

Forest Research: (while not classified as Critical Infrastructure, wildfire at this facility would jeopardize personnel, equipment, seedling trials, and structures, and would result in potential loss of highly valuable long-term forestry research)

Recreation:

- Cowichan Valley Trail, TransCanada Trail (accessible by 4-W-D for emergency access/egress) and numerous other trails

Post Office:

- South Shore Road

Medical Clinics / Health Unit:

- Medical Clinics (2): Brookside Medical Clinic, Stanley Road; Lakeside Medical Clinic, South Shore Road.

3.2.1 Electrical Power

- substation (across from high school):

A spokesperson for BC Hydro stated there are 3 circuits coming out of LCW (Lake Cowichan Substation). They all operate at 25 kv phase to phase voltage. The substation is across from the high school.

There is also a 69 kv sub transmission circuit feeding Lake Cowichan from the Prevost substation. From Prevost, these lines come in and join at Highway 18 and the Connector, then come into Lake Cowichan down Cowichan Lake Road, crossing the river in town, and then down Sahtlam Avenue to the substation that is the twinned supply. Both are 69 kv transmission lines.

3.2.2 Communications, Pipelines and Municipal Buildings

- Bald Mt. 911 Repeater
- Satellite Teleglobe facility

- Town Office, South Shore Road
- Town Works Yard, Grosskleg Way

The Town of Lake Cowichan does not have any gas lines, airports, or pipelines.

The Chief Administrative Officer (CAO) for the Town of Lake Cowichan works at the Town Hall municipal building on South Shore Road. The CAO directly supervises the positions of Superintendent, Public Works and Engineering Services, Director of Finance and Manager of the Cowichan Lake Education Centre, and is both the officer responsible for corporate administration of the municipality and the officer responsible for financial administration. The CAO reports directly to the Mayor and Council.

The CAO is also the Emergency Operation Centre Director for Zone 4 of the Cowichan Valley Regional District. The Emergency Planning Committee plans and conducts exercises for such events as wild fires and earthquakes. The Committee assumed the lead role in developing an evacuation plan for the high school which now serves as a model for all schools in the Cowichan Valley School District. Zone 4 comprises all of Electoral Areas F and I of the District and the Town of Lake Cowichan, reaching all the way to the west coast of Vancouver Island. The communities of Caycuse, Honeymoon Bay, Lake Cowichan, Mesachie Lake, Nitinat and Youbou are all within Zone 4.

The CAO also manages the areas of Economic Development, the Building Permit and Bylaw Enforcement and Fire Departments.

Two communications facilities are located in the Lake Cowichan study area. The first, a Teleglobe satellite facility on Indian Road, has been in existence for several years, but the current operating status is unknown.

The second facility is the Bald Mountain 911 repeater. The CVRD (FireComm) Bald Mtn radio site is one of six mountain-top radio repeaters within the overall radio network. Like the other sites in the CVRD network, this site provides continuous lifeline support communication for all fire service operations within the Lake Cowichan area, which includes the:

- Lake Cowichan VFD
- Mesachie Lake VFD
- Honeymoon Bay VFD
- Youbou VFD
- Caycuse VFD

Bald Mtn is linked to the CVRD (FireComm) head-end radio site at Mt. Sicker via a VHF radio link. Nanaimo FireComm dispatch is (in turn) linked to Mt. Sicker via a 900 MHz radio system. Fire Dispatch signals travel from Nanaimo through Mt. Sicker and beyond to Bald Mtn.

Bald Mtn is a solar powered radio site with a large broadband battery storage facility within the comshell, which houses the site electronics. In 2018, Bald Mtn will become part of the CVRD remote site monitoring (RSM) radio network via a 900 MHz radio link to Mt. Tuam on Saltspring Island. Given the only access to Bald Mtn is via helicopter, the RSM project will provide a virtual window into Bald Mtn for site diagnostics, which will include direct monitoring of the solar energy charging system.

Like all other sites in the CVRD (FireComm) radio network, Bald Mtn is a feature rich site that directly supports local VFD operations. Loss of the site due fire or vandalism would cripple local fire operations and force local department to rely on cell phone linkages with Fire Dispatch in Nanaimo.

3.2.3 Water and Sewage

- Town Water Treatment Facility, Hudgrove Road
- Town Water Reservoir (covered), Indian Road
- Cowichan Lake weir and locks

The Town of Lake Cowichan draws water directly from Cowichan Lake through a triplex pump station located on North Shore Road. Disinfection occurs at the pump station. Water is pumped directly to a storage reservoir on Indian Road, which contains an active volume of 5,400 m³ (approx. 1.5 million US gal). From the reservoir, water is distributed to the Town under static head. Three pump stations boost the pressure to above 50 psi in three pressure zones at higher elevation.

The existing system's hydraulic model completed in 2011 showed an average available fire flow of 78.48 L/s, calculated under MDD + FF.

Further upgrades to the water system are on-ongoing or completed, to construct a 6 million dollar water treatment plant on Indian Road and 1.3 million dollar upsize or twin certain water mains.

These projects are aimed to improving the water quality and the flows and pressures predetermined by the computer model.

3.3 High Environmental and Cultural Values

High environmental and cultural values located within the WUI need to be clearly identified in order to effectively determine wildfire risk and identify mitigation activities.

As noted in the OCP (op. cit.), the Town of Lake Cowichan and surrounding area is a diverse natural environment that includes lakes, rivers, streams and wetlands, rocky bluffs, diverse lakeshores, and mountainous steep slope areas. These areas provide critical habitat for a wide variety of fish, birds, other wildlife, and plant species, and provide the basis for the high quality of life for its residents. The rich resource of land base is also characterized by competing land uses, including residential, commercial, light industrial, institutional, and recreational uses.

For thousands of years, the Hul'qumi'num Coast Salish people, comprised of six First Nations: Cowichan, Chemainus, Penelakut, Lyackson, Halalt and Lake Cowichan lived in, travelled and fished the waterways of southeastern Vancouver Island, including the Cowichan watershed. The Hul'qumi'num society has a sophisticated understanding of hwulmuhw (Indigenous) relationships, s'aalh tumuhw (land) and resource and extraction rights, as well as a world view that reflects a spiritual relationship with the environment. The ways in which the ancestors used and occupied the territory continues to be important to the Hul'qumi'num people.

www.hulquminum.bc.ca/hulquminum_people

3.3.1 Drinking Water Supply Area and Community Watersheds

Communities dependent on surface water from a specific watershed should be aware that wildfire has the potential to cause significant damage to soils, high rates of sedimentation and/or landslides that can degrade water quality for many years. In worst-case scenarios, the water supply may have to be abandoned (temporarily or permanently) or new water treatment infrastructure may need to be built, which can take several years and substantial funding.

Many communities in the Cowichan valley, including the Town of Lake Cowichan, are dependent on Cowichan Lake and Cowichan River for their water supply. The Cowichan River originates at the easterly end of the community of Lake Cowichan. Cowichan Lake, the source of the river, is fifty kilometres long and surrounded by forested mountains up to 2000m.

A Ministry of Environment report in 2011 stated that monitoring results for Cowichan Lake indicated the water quality is excellent (Water Quality Assessment and Objectives for Cowichan Lake. Overview Report. Ministry of Environment. June 2011). The water chemistry is typical of coastal lakes with low mineral content, ample dissolved oxygen, and very clear waters, which is indicative of high quality raw drinking water. Cowichan Lake is relatively unproductive biologically and is classified as oligotrophic (low nutrient content). However, there is a diverse and normal plankton community. These types of lakes often support many fish species, like rainbow trout, which prefer cool, well-oxygenated waters.

The MoE report states that turbidity values in both the lake and tributaries, and TSS concentrations in the tributaries, are generally low, however, it appears that occasional moderate values can occur. It's likely that precipitation events caused the short-term increased turbidity values.

Concentrations of microbiological indicators were primarily below detection limits (<1 CFU/100ml). The marina at the head of the south arm had the highest concentration of fecal coliforms in a single sample at

2,300 CFU/100 mL. However, the drinking water guideline for raw water receiving disinfection only was exceeded in 6 of the 60 sample sets (five samples in 30 days) for fecal coliforms and in only 1 of the sample sets for *E. coli*. Seasonal campgrounds, boat and human traffic on the lake, and wildlife could be contributing to the bacterial levels. These exceedances demonstrate the need to treat water for human consumption to prevent potential health risks.

Cowichan Lake is not a designated community watershed (under the *Forest and Range Practices Act*). The Ministry of Environment uses other tools, such as water quality objectives, and legislation, such as the *Private Managed Forest Land Act* and the *Drinking Water Protection Act*, to ensure that all watersheds and /or water supplies are managed in a consistent manner and to protect water quality within these watershed

3.3.2 Cultural Values

Cultural heritage values in the Cowichan Lake area consist of Hul'qumi'num use areas, which include meeting places, hunting and gathering areas, and places of spiritual significance, such as bathing pools. Heritage sites are areas that carry a deep cultural significance for the Hul'qumi'num people. They include both tangible, archaeological sites – ancient monuments and cemeteries built by the ancestors, and intangible cultural landscapes that, according to Hul'qumi'num legends and oral history, have symbolic and sacred significance for Hul'qumi'num people.

Wildfire prevention strategies will aim to preserve First Nation cultural heritage values within the scope of the CWPP. The main priority is prevention of catastrophic damage due to wildfire.

Any treatments carried out for mitigating wildfire risk must respect areas which are deemed culturally sensitive. When managing Crown land, it is a legal requirement to consider the archeological potential of the area by appropriate referral of maps and data. When sensitive areas are indicated, assessments are completed to determine the existence and extent of artifacts. A similar high level of care is recommended on private and municipal land when completing fire mitigation treatments.

3.3.3 High Environmental Values

The Cowichan River watershed, which includes Cowichan Lake, is one of three rivers in BC designated a Canadian Heritage River based on its outstanding natural, cultural, and recreational values. Cowichan Lake is the second largest lake on Vancouver Island and supplies drinking water to the Town of Lake Cowichan and the Cowichan Valley Regional District. The Cowichan watershed supports an abundance and diversity of both anadromous and resident salmonids that is unrivalled on Vancouver Island. Anthropogenic land uses within the watershed include timber harvesting, residential and recreation. These activities, as well natural erosion, wildlife, and wildfire risk, all potentially affect water quality in the Cowichan Lake watershed.

3.4 Other Resource Values

Local Institutions: Various institutions located in the “downtown” area provide services to the wellbeing of the community:

- Royal Canadian Legion Lake Cowichan Branch
- Vancouver Island Library Lake Cowichan Branch

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These institutions provide essential networking and social services to a broad sector of local citizens. The Legion can also access emergency services for members and non-members in need.

Parks and Trails: The Lake Cowichan area contains numerous parks and a network of popular trails.

Provincial Parks:

Cowichan River Provincial Park is a 750-hectare area stretching almost 20 kilometres, from the town of Lake Cowichan to Glenora, just south of Duncan. This provincial park protects significant stretches of the Cowichan River, a designated Canadian Heritage River. The park contains the historic 20 km long Cowichan River Footpath and the TransCanada Trail, which travels across the restored 66-Mile and Holt Creek wooden Trestles.

CVRD Parks:

The CVRD Parks Department manages a number of Community Parks in the Cowichan Lake South/Skutz Falls and Meade Creek area. In 2010 the CVRD Parks Department undertook fuel management at Bald Mountain Trail to reduce the risk of wildfire along the park's western boundary with a new subdivision.

The CVRD Parks Department also manages the Cowichan Valley Trail, a Regional Park that is part of the Great Trail (TransCanada Trail) on southern Vancouver Island. The western terminus of the trail is at the Town of Lake Cowichan. Numerous rural acreages are scattered along the Cowichan Valley Trail. In 2010 the CVRD Parks Department undertook fuel management work at specific areas along the entire length of the Cowichan Valley Trail where an elevated wildfire risk was identified.

Town Parks:

The Town of Lake Cowichan manages a number of local parks. Some parks, such as Central Park, Riverside Park, Forest Workers Park, and Saywell Park, are well maintained with low grass and scattered trees and shrubs, and have minimal fuel loading.

Other parks, such as Stoker Park, at Woodland Shores, are not as well maintained, and have been encroached by broom, tall grass, and other invasive brush species. Concerned local residents have taken the initiative to regularly remove broom from the park in order to reduce the wildfire risk in the area. Stoker Park and Winter Park, at the Slopes, would be suitable candidates for fuel management to reduce the threat of wildfire at the adjoining residential subdivisions.

Friendship Park

Friendship Park Fisheries Trail is a wooded trail that is located next to the Country Grocer store on South Shore Road. The path winds along a small creek through mature mixed forest beside Palsson Elementary School.

Due to its central location in the heart of the town, next to an elementary school, Friendship Park is a suitable choice for a Demonstration Forest to promote FireSmart fuel management strategies. Current fuel loading at the park constitutes a moderately high wildfire threat to the adjacent school, Cowichan Highway, nearby homes, and adjoining shopping plaza. Several trails running through the park could be "FireSmarted" to reduce the risk of wildfire.

Timber (including Private Forest Managed Lands within the Cowichan Lake WUI), water and high-value wildlife habitat present within the AOI may constrain fuel treatment opportunities.

Wildfire mitigation activities will likely affect a small amount of the local Timber Harvesting Land Base. Some of the area proposed for fuel management includes previously treated parkland (Cowichan Valley Trail, Bald Mountain Park trail) recommended for re-assessment. The majority of the proposed areas for fuel management are outside the Timber Harvesting Land Base. Areas proposed for fuel management encompass provincial parklands, municipal lands, First Nation lands, road rights of way, and residential lands (i.e., subdivisions).

Fuel management will ensure forest cover is resilient to wildfire, thus protecting human life and property, and ecological values.

3.5 Hazardous Values

Hazardous values within the Lake Cowichan Fire Response Area that pose a safety hazard to emergency responders include:

- BC Hydro substation (across from Lake Cowichan High School)
- Lake Cowichan Sports Arena (ammonia leak potential at ice rink)
- Sawmills (Karlite, SDN Contracting)
- Two old schools

In addition, two old schools pose a safety hazard to emergency responders. A number of schools around Lake Cowichan have been closed and now lie vacant: J. H. Boyd Elementary and A.B. Greenwell Elementary. The J.H. Boyd site was sold to a private party amidst considerable controversy as the site was originally donated by one of the Town's former mill owners. The A.B. Greenwell Elementary school building was closed due to mould infestation.

The Lake Cowichan Fire Department has responded to several arson fires at the J.H. Boyd site. The derelict building, which contains asbestos, is boarded up, but continues to attract vagrants. The grounds of the old school have been encroached by broom and tall grass. The old building and vacant grounds are located next door to the Slopes subdivision, a residential development for seniors and those with disabilities.

A.B. Greenwell School, located in the midst of the “100 Houses” neighbourhood, is surrounded by mixed forest.

Ignition risk is a constant at both of these old school facilities is high. The consequence of a fire would be high due to the proximity of neighbouring residential development.



*Left: Derelict school (ex-J.H. Boyd Elementary) and grounds adjacent to Brookside Village
Right: A.B. Greenwell School (no longer used as a school) is located near the “Hundred Homes”*

SECTION 4: Wildfire Threat and Risk

4.1 Fire Regime, Fire Danger Days and Climate Change (see Document 2, Map 3: Fire Regime, Ecology, and Fire Threat)

4.1.1 Fire Regime

In British Columbia, the Biogeoclimatic Ecosystem Classification (BEC) system is used for identifying and categorizing ecosystems throughout the province. It combines climate, vegetation and site characteristics (soils, elevation, slope position, geology) to classify ecosystems. The majority of the Lake Cowichan Fire Protection Area is classified in the Coastal Western Hemlock very dry (CWHxm) Biogeoclimatic subzone <https://www.for.gov.bc.ca/hfd/pubs/docs/lmh/lmh28/lmh28-01.pdf>. The CWHxm occurs at lower elevations along the eastside of Vancouver Island, and also extends inland along major valleys, including the Cowichan Valley. The CWHxm is characterized by warm, dry summers, and moist, mild winters with relatively little snowfall. Growing seasons are long, and feature water deficits on zonal sites. Small areas of well-drained, south-facing slopes in the eastern portion of the AOI are classified in the Coastal Douglas-fir (CDF) Biogeoclimatic Subzone variant, the biogeoclimatic unit with the mildest climate in Canada.

Forests on zonal sites are dominated by Douglas-fir, accompanied by western hemlock and minor amounts of western redcedar. Major understorey species include salal, dull Oregon-grape, red huckleberry, and mosses (*Hylocomium splendens*, and *Kindbergia oregana*). Less common species include vanilla-leaf, sword fern, twinflower, and bracken.

British Columbia has tremendous ecological variation. For biodiversity objectives, five natural disturbance types (NDTs) are recognized as occurring in the province. Disturbance types characterize areas with different natural disturbance regimes. Stand-initiating disturbances are those processes that largely terminate the existing forest stand and initiate secondary succession in order to produce a new stand. The disturbance agents are mostly wildfires, windstorms and, to a lesser extent, insects and landslides. The stand-maintaining disturbances serve to keep successional processes stable.

The AOI is classified as Natural Disturbance Type 2 (NDT2) – Ecosystems with infrequent stand-initiating events. Historically, these forest ecosystems were usually even-aged, but extended post-fire regeneration periods produced stands with uneven-aged tendencies <https://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/biodiv/chap2.htm>.

At low to moderate elevations along the southeast coast of Vancouver Island, including the eastern end of Cowichan Lake, all areas designated as NDT2, historical wildfires were often of moderate size (20 to 1000 ha), with unburned areas resulting from sheltering terrain features, higher site moisture or chance. Many larger fires occurred after periods of extended drought, but the landscape was dominated by extensive areas of mature forest surrounding patches of younger forest. As a result of major fires that occurred in this disturbance type, the landscape would have consisted of

extensive areas of even-aged stands with snags and veteran trees that had survived previous fires. Small areas were missed by the burns.

The mean return interval for these disturbances is about 200 years for the CDF and CWH biogeoclimatic zones.

The pattern and timing of forest harvesting are the dominant factors that determine the size and spatial distribution of similarly aged forest patches in managed landscapes. When planning coarse filter fuel management, the objective in this disturbance type is to maintain a range of small to medium-sized (up to 250 ha) similarly aged forest patches on the landscape. The forest patch size distribution applies to both harvest unit and the leave area between harvest units.

Clearcutting with wildlife tree patches and some small clearcuts can be used to simulate the small-scale disturbances that naturally occurred in this disturbance type. However, complete reliance on small, dispersed clearcuts and small leave areas would lead to excessive forest fragmentation. Therefore, some larger patches should be cut to form larger openings; others should be identified as leave areas.

Harvest units and the remaining mature forest stands of various sizes within the operable forest should be distributed across the landscape.

Areas in the AOI have seen significant disturbance in the last 150 years since European settlers came to the area. Historical logging (including railroad logging), land clearing, and mining initially altered the natural landscape. Fires started as a result of these activities burned many forests in the area (i.e., sections of Bald Mountain). In recent years, land development has resulted in loss and/or change of natural forest cover. For example, the south-facing slopes of Bald Mountain were cleared by a developer approximately 10-15 years ago. A mix of fragmented coniferous stands intermixed with brush (including invasive broom) extends across the slopes. The Lake Town Ranch property, venue for SunFest and other outdoor concerts, was selectively logged by previous owners; now some areas of the site are vegetated with thick stands of conifer regeneration.

4.1.2 Fire Weather Rating

Wildfire threat exposure to the community will vary throughout the fire season based on the fuels present, the moisture content of fuels, and fire weather conditions. Consequences of a threat may be realized when an ignition occurs during high or extreme wildfire conditions, as represented by Fire Danger Rating. A general indication of the likelihood of high fire threat to the community can be assessed by reviewing the level and frequency of high and extreme fire danger ratings typically experienced in the local area during the fire season.



LCFD Fire Danger Sign, Highway 18. Early July, 2017

The nearest climate station to the study area for which climate normal data are available is the Cowichan Lake Forestry station (elevation 176.8 m) (Environment Canada Climate Station 1012040) at Mesachie Lake. Average daily temperatures over an almost thirty year period (1971-2000) in August were 17.9°C. Average total annual precipitation is 2,170 mm, with only 112 mm (water equivalent) (6%) of this falling as snow. Most precipitation (1749 mm, or 81%) falls between October and March. Snowpack reaches a maximum in April and May, and snowmelt contributes to spring freshet and summer flows.

Recent long-term Fire Weather data from the Mesachie weather station (2006-2016) summarized in the table below show that the summer months have the highest average danger rating, with August showing the highest average Daily Severity Rating (DSR) at 14.5. This means that 14.5 days in August are in Extreme Fire Danger Rating. There were, on average, almost 29 “extreme fire” danger days each year. In the same decade, there was an average of 34 “high fire” danger days each year. Summer temperatures are warmer than those of the coastal areas, with average temperatures around 25 degrees Celsius or higher. The area can be subject to severe wind storms.



Fire Weather System Danger History in the Forest

Year	Danger Class	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total days
2 MESACHIE 2														
Average	Extreme	0.00	0.00	0.00	0.00	0.00	2.00	6.75	14.50	4.67	0.67	0.00	0.00	28.58
Average	High	0.00	0.00	0.00	0.00	2.75	5.42	12.58	8.83	4.42	0.33	0.00	0.00	34.33
Average	Moderate	0.00	0.00	0.00	0.67	8.42	9.67	8.17	5.00	5.67	2.25	0.00	0.00	39.83
Average	Low	0.00	0.08	1.08	8.83	11.08	9.50	2.92	1.92	8.67	7.92	1.00	0.75	53.75
Average	Very Low	5.17	4.67	7.92	15.92	8.50	3.42	0.58	0.75	6.58	19.42	24.33	10.67	107.92

Ten-year Fire Weather data (2006-2016), Mesachie Lk weather station (BCWS).

4.1.3 Climate Change

Climate change is not a recent issue. Global atmospheric CO₂ has risen from the historical average of 240 ppm to the current 400 ppm (https://climate.nasa.gov/climate_resources/24/). Its effects can be observed worldwide with ocean acidification, rising sea levels, melting permafrost, etc. British Columbia's mean annual average temperature has also been on the rise and it could be shifting the boundaries of the Biogeoclimatic Ecosystem Classification (BEC) zones as the warmer climate could potentially favor relatively warmer climate BEC zones over colder climate BEC zones, like the Coastal Western Hemlock (CWHxm1) subzone and Coastal Douglas-fir (CDFmm) subzone variant (biogeoclimatic units at AOI). (<https://viurrspace.ca/handle/10613/5880>)

The Intergovernmental Panel on Climate Change (IPCC) estimates that average global surface temperature will increase by 1.8 to 4.0°C (best estimate) over this century relative to the period 1980-1999 (range of 1.1° to 6.4°C), a substantial increase over the rate of warming (0.6°C), recorded for the last century (IPCC 2007). The upper end of the projected warming rate is unprecedented in the last 50 million years and is about 50 times faster than warming following ice ages in the last million years (http://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-6-2.html).

Climate change affects the probability of fires starting and spreading. The length of the fire season is expected to increase from 30 to 52 days across BC; fire season is already starting earlier (https://www2.gov.bc.ca/assets/gov/.../natural.../2c_va_disturbance-aug30-final.pdf). Seasonal drought indices and hence fire risk is projected to increase.

The correlation between area burned and drought indices varies with forest type². Projected changes in fire regime vary by region. Deficits occur where monthly precipitation is less than monthly evaporative demand (reflecting solar radiation, air temperature and humidity, and wind). Dry periods during the summer will likely become more intense, particularly in southern BC, which is expected to become warmer and drier and hence to experience more frequent, severe and extensive fires, leading to more area burned³
https://www.for.gov.bc.ca/hfd/library/fia/2006/FSP_Y062233.pdf

In the US, the most comprehensive study of climate science since 2013 concludes, based on extensive evidence, that it is extremely likely that human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century (Climate Science Special Report <https://science2017.globalchange.gov/>).“For the warming over the last century,” the report concludes, “there is no convincing alternative explanation supported by the extent of the observational evidence.” (TC timescolonoist.com Saturday November 4.) Climate study released despite White House stance).

The recent release of this massive US report concludes the evidence of global warming is stronger than ever. Since 1990, the Earth has warmed by 1.0 degree Celsius, and seas have risen by 20 centimetres. Heat waves, downpours, and wildfires have become more frequent. Scientists have concluded that it's “extremely likely” – meaning with 95 to 100% certainty – that global warming is man-made, mostly from the release of carbon dioxide into the atmosphere from the burning of coal, oil and natural gas. Study co-author states, “This period is now the warmest in the history of

² Haughian S.R., P.J. Burton, S. W. Taylor, & C. L. Curry. 2012. Expected effects of climate change on forest disturbance regimes in British Columbia. BC Journal of Ecosystems and Management 13(1):1–24.

³ Spittlehouse, D.L. 2008. Climate Change, impacts, and adaptation scenarios: climate change and forest and range management in British Columbia. B.C. Min. For. Range, Res. Br., Victoria, B.C. Tech. Rep. 045.<http://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr045.htm>

modern civilization.” The report documented how different climate change-caused events can interact in a complex way to challenge life on Earth, as evidenced by Superstorm Sandy five years ago, and more recently by devastating wildfires in California.

Recent climate change studies indicate that drier coastal ecosystems (i.e., CWHxm at AOI) may be susceptible to impacts of climatic change. Projections of future drought and drier summers in coastal ecosystems could result in growth declines in Douglas-fir forests, particularly on drier site types. www.unbc.ca/assets/bc_protected_area_research.../griesbauer_dendro_poster.pdf

Subsequent to the passage of Bill 27 (Green Communities Act), Section 877 of the Local Government Act requires Official Community Plans to include community-wide targets, policies and actions for the reduction of greenhouse gas emissions in the area covered by the plan. Corporate targets addressing municipal operations are voluntary.

Bill 44 identified province-wide targets as follows:

(a) by 2020 and for each subsequent calendar year, BC greenhouse gas emissions will be at least 33% less than the level of those emissions in 2007;

(b) by 2050 and for each subsequent calendar year, BC greenhouse gas emissions will be at least 80% less than the level of those emissions in 2007.

The Town of Lake Cowichan is a signatory of the BC Climate Action Charter, which commits the Town to monitor and report on corporate (local government operations) and community emissions, and to be carbon neutral by 2012. When the CWPP was presented to Lake Cowichan Mayor and Council and staff in the fall of 2017, the Town acknowledged that further work needs to be done in the realm of climate change in the community.

In 2017 the province announced a comprehensive climate-action strategy that provides a pathway for B.C. to prosper economically while meeting carbon pollution reduction targets, including setting a new legislated 2030 reduction target and establishing separate sectoral reduction targets and plans. Joint planning is underway between the LCFD, First Nations, and local Private Managed Forest Landowners on a fibre recovery project that would accomplish hazard abatement, significantly reduce carbon emissions, and provide a steady economic return.

4.2 Provincial Strategic Threat Analysis (PSTA)

The Provincial Strategic Threat Analysis (PSTA) Wildfire Threat Analysis represents a digital mapping layer that combines three key fire behavior inputs: fire density; spotting impact; and head fire intensity. These inputs are combined to produce an overall fire threat analysis layer that integrates many different aspects of fire hazard and risk.

Local governments, First Nations, natural resource management agencies and resource-based industries use the datasets to prioritize community wildfire protection planning, and to guide mitigation of wildfire in areas identified to be at risk. The mapping layers include vegetation types, historical wildfire data, forest fuel classification, fire behaviour patterns, geography and other factors.

4.2.1 PSTA Final Wildfire Threat Rating (see Document 2, Map 4A: PSTA Threat Rating)

To determine the overall PSTA Threat Rating, fire density, head fire intensity (HFI) and spotting impact were combined using a weighted averaging process. Weights were assigned as 30% fire

density, 60% HFI (90th percentile) 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 Wildfire Threat Rating at the AOI was assessed as High for much of the area, with localized areas of Extreme Threat Ratings in areas with steeper slopes, warmer aspects, extensive fuel complexes (i.e., slopes of Bald Mtn). Small areas rated Moderate include localized areas with minimal/no fuels (i.e., parking lots in the Town Core; wetlands and lakes: Kwassin Lake, Grant Lake, Mayo Lake, Beaver Lake). Cowichan Lake serves as a natural buffer to wildfire, but also creates localized weather systems that can exacerbate fire behaviour.

4.2.2 Spotting Impact *(see Document 2, Map 4B: PSTA Spotting Impact)*

Spotting impact represents the ability of embers from a burning biomass fuel (such as a group of trees) to be sent aloft for some distance over the landscape and start new fires.

Research shows that a high percentage of structure losses are from embers being transported to and igniting structures and subsequent structure-to-structure ignitions⁴. The Spotting Impact Layer estimates the threat of embers impacting a given point on the landscape from the fuel types surrounding it.

Map 4B (Document 2) produced by the province indicates the spotting impact at the Fire Protection Area is low. Contrary to this, if there was a fire start during the fire season, onshore westerly winds would have the capacity to carry embers long distances east. Spotting impact would be high. Due to the topography of the area, it is not unforeseen that embers would carry uphill along the hilly topography rimming the northeast portion of the lake, a wide area with vulnerable development, including Woodland Shores and Marble Bay Area, the Lake Cowichan First Nation, Lambs Hill neighbourhood, the Slopes, Brookside, etc. Spotting from fires in the western portion of the area would also have potential to fly east and land in the town core.

4.2.3 Head Fire Intensity *(see Document 2, Map 4C: PSTA Fire Head Intensity)*

Head Fire Intensity (HFI) represents the intensity (energy output) of the flaming front of a wildfire, measured in kilowatts per metre (kW/m). It is related to suppression effort and impacts to values. 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. It has been previously correlated with fire suppression difficulty.

If a fire start in the western portion of the fire protection area was fanned by westerly winds, and spread into stands of Fuel Type C5 (mature conifer – widely present in the area) and lesser amounts of other Fuel Types (modified C2 and C3), it would have potential to reach HFI ranks 6-8. During 90th percentile fire weather, Fire Intensity Classes could reach “5” (vigorous surface fire with occasional torching). Suppression would be challenged by extremely vigorous surface and ground fires growing into continuous crown fires. Steep slopes with no access in the western portion of the AOI would exacerbate suppression difficulties.

⁴ Partners in Protection. 2003. Firesmart: Protecting Your Community from Wildfire. Second edition. Partners in Protection. Edmonton, AB.

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Aerial view of Lake Cowichan looking east, from Marble Bay area in the west.



The following table relates the HFI and intensity classes to flame length, and likely fire behaviour.

Table 2: Head Fire Intensity Classes and Associated Fire Behaviour

PSTA - HFI Class	Fire Intensity kW/m	Fire Intensity Class ⁵	Flame Length (meters) ⁶	Likely Fire Behaviour ⁷
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 ⁸	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

⁵ Head fire intensity should be classified by intensity class not fire rank. Fire rank is a visual description of conifer fires for air operations.

⁶ For calculating Flame Length, Bryam (1959) was used for surface fire (<10 000 kW/m) and Thomas (1963) was used for crown fire situations (>10 000 kW/m).

⁷ These characteristic will be different in open and closed forest fuel.

⁸ With HFI over 30 000 kW/m the function of the equation are stretched beyond the expectation of the equation, fire is under the influence too many other factors.

				fire behaviour
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NB: The descriptions in this table will vary by fuel type and should only be used as guidance for expected fire behaviour.

4.2.4 Fire History (see Document 2, Map 5: PSTA Fire History)

Fire density represents the ignition and fire spread potential based on historic fire occurrence patterns.

The province’s fire history database dates back to 1950. This provides a relatively long timespan from a management perspective, but a short one in terms of disturbance ecology and human activity. Fire history tells the story of the relationship between fire behaviour, landscape ecology, management policy (including fire suppression), human development and other land-use changes throughout the province.

The BC Wildfire Service tracks fire history by looking at fire perimeters for larger fires, and fire start density. An understanding of the historical causes of fire, fuel types, and weather trends will aid in the development of fuel breaks, and in prioritizing fuel treatments or other management activities.

Although the location of future ignitions is difficult to predict with accuracy, a review of historic fire ignitions and spread can reveal patterns that have a greater likelihood of occurring in the future.

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 potential for very large, destructive and landscape-altering fires is related to the historical fire and fire response patterns within a given planning unit. The PSTA fire density layer was analyzed using fires with final sizes greater than 4.0 hectares. These were given a weight of one (1) in the analysis, while large fires (> 500 ha) were given a weight of 5, in order to reflect the much greater cost and damage usually associated with larger fires. The complete set of BCWS fire perimeters are also included on the fire history layers.

The primary wildfire threat in the Cowichan Lake Fire Protection Service Area is from active logging in the WUI. Private forestry lands surround the entire community. A pattern of recent logged areas and forest stands of different ages extends from all perimeters. The Lake Cowichan Fire Department is often called to attack fires on forestry lands. Another major wildfire threat comes from areas of public usage, particularly the lakefront area. Recreational use of the area has greatly increased in recent years. At the same time, there has been increased encroachment from residential development in the WUI (i.e., The Slopes and Woodland Shores subdivisions).

A wildfire anywhere on the perimeter would threaten multiples values, including access routes. A fire that started in an active logging block on a steep, south-facing slope in the Skutz area in 2015 resulted in partial closures of Highway 18, the primary route connecting Lake Cowichan with the rest of the Cowichan valley. Variable wind patterns at the time, during the height of summer, raised concerns about the fire spreading in several directions.

The Lake Cowichan Fire Department has responded to fire starts at locations throughout the Response area. A combination of factors: interface structural density, continuum of fuels; challenging access; response distance; concentration of logging areas along the interface boundary; summer droughts; and influx of summer visitors throughout the CWPP area create a challenge to wildfire prevention in the WUI zone.

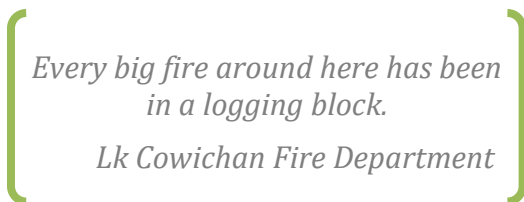
4.3 Local Wildfire Threat Assessment

The intent of this sub-section is to provide a detailed assessment of the local wildfire threat, including field reviewed fuel characteristics, proximity of fuel to the community, local fire spread patterns, topographical considerations and local factors.

Assessment of the local wildfire threat involved a process that considered weighted local wildfire threat factors. The WUI area was then stratified based on relative wildfire threat and risk. Priority areas were subsequently identified for field assessment. The following key steps were used to complete the local wildfire threat assessment:

1. Develop local fuel type map.
2. Consider the proximity of fuel to the community.
3. Consider fire spread patterns (i.e. ISI Roses).
4. Consider topography.
5. Stratify the WUI based on relative wildfire threat.
6. Consider other local factors.
7. Identify priority wildfire risk areas for field assessment.

Wildfire threat is directly related to the likelihood of hazardous fuel igniting and fire spreading into the community either directly or through ember transport. The PSTA provides information to help evaluate the 3 conditions necessary for a wildfire to threaten a community:

- | | | |
|--|---|---|
| <ol style="list-style-type: none">1. an ignition occurs2. the resulting fire intensity (Head rapidly, and3. the fire spreads embers into the Impact) |  <p><i>Every big fire around here has been in a logging block.</i>
<i>Lk Cowichan Fire Department</i></p> | <p>(Fire History) generates sufficient Fire Intensity) and spreads into and/or transports community (Spotting</p> |
|--|---|---|

4.3.1 Fuel Type Verification (See Document 2, Map 6: Updated Fuel Types)

Fuel (structure, loading, and availability of biomass) is one of the three elements of the “fire behaviour triangle.” Fuel is the only fire behaviour driver that can be modified by people, and is a critical input of the PSTA Fire Threat Analysis.

Fuel is live and dead forest vegetation and organic material, viewed from the standpoint of how it affects fire behaviour. The burning of fuel generates energy and contributes to the intensity of a fire.

Fuel is any biomass – in the soil, on the forest floor, or elevated in the air – that has the potential to ignite and burn. Fire modelling systems such as the Canadian Forest Fire Danger Rating System define categorical fuel types, which are designed to reflect the typical structure and arrangement of fuels in commonly encountered vegetation types.

The Fire Behaviour Prediction (FBP) System of the CFFDRS categorizes fuel into 17 distinct types (Appendix 2).

The provincial FBP Fuel Type Layer data provides information on forest fuel types and associated fire behaviour prediction models. Identification of fuel types is necessary for any type of fire behaviour prediction modelling or analysis.

The fuel layer data is based primarily on forest inventory data from the provincial Vegetation Resources Inventory (VRI) Layer polygons (minimum 1 hectare); and their respective land cover attributes. The provincial surface area of ~95 million hectares is represented by approximately four million VRI polygons, which are then classified into FBP fuel types (plus ‘non-fuel’ or ‘water’). There are still gaps in the inventory data, most notably from areas of private forest land on Vancouver Island. VRI polygon data are not available, so fuel type data derived by satellite image classification is used instead. Recent examinations have suggested that the areas covered by the national grid were less reliable than the VRI-based classification, likely due to unique vegetation assemblages in BC that are not found in other regions of Canada. The error was deemed too significant for the Private Managed Forest Land areas, and therefore these areas were designated as “no data” for fuel types; no further analysis was performed on the WTA.

Ground-truthing of fuel structure characteristics specific to fire behaviour prediction was undertaken. This involved assessing attributes that have been found to be particularly significant in affecting fire behaviour and may or may not be part of general forest stand characteristics: fuel loading (fine and coarse woody debris, litter and duff depth, and crown fuel load), crown base height, canopy bulk density (difficult to measure directly), and tree height. Crown attributes (especially crown base height and canopy bulk density) can also be assessed by combining measured stand attributes with modeled crown fuel characteristics.

Various tables and calculators can be used for such purposes⁹; predictions based on these studies would also benefit from field validation, although these efforts often consist of significant research projects (e.g. destructive sampling and measurement of entire tree crowns) rather than simple field measurements. These characteristics can be used to inform the selection of the best fit FBP fuel type; however, it is not always obvious how to do so. For example, surface fuel loading or canopy bulk density are not described quantitatively for FBP fuel types in the technical system description¹⁰.

Ground-truthing of FBP fuel types, however, is more problematic. Assigning a FBP fuel type to a particular stand or vegetation polygon is a complex, somewhat subjective process, often described as a blend of ‘art’ and science. Evaluating FBP fuel types in the field requires specialized training and experience in a particular vegetation type.

⁹ Cruz et al. 2003a. Assessing canopy fuel stratum characteristics in crown fire prone fuel types of western North America. *International Journal of Wildland Fire* 12(1), 39-50. AND Alexander and Cruz. 2014. The general nature of crown fires. *Fire Management Today* 73(4):8-11.

¹⁰ Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System. Forestry Canada Fire Danger Group. Information Report ST-X-3.

The following table shows the fire behaviour potential of the FBP fuel types grouped into 4 categories based on their relevance to a wildfire threat assessment.

Table 3: Fuel Type Categories and Crown Fire Spot 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 ¹ M1-M2 (26-49% Conifer)	Low
4: D1, D2, M1-M2 (<26% Conifer)	Very Low

Analysis of the Fuel Types in the AOI revealed a wide range of Fuel Types, with C5 predominant. Mixed Forest Fuel Types (with coniferous and deciduous trees) tended to have >50% coniferous content, increasing the Crown Fire/Spot Potential. Due to the generic nature of Fuel Types, the high degree of human disturbance factors in the study area, the amount of invasive broom, brush, and fragmented conifer stands on warm, south-facing slopes above Marble Bay in the western portion of the study area, and the potential for ignitions from the influx of summer visitors, the Crown Fire / Spot Potential is generally considered Moderate to High. Higher ratings are associated with the warm, south-facing slopes of Bald Mountain, where a mix of fragmented coniferous stands extends with invasive broom and brush across steeper hillsides above Marble Bay, where new residential subdivisions are being built.

As part of the CWPP planning process the BCWS fuel type layer was verified using current data sources including imagery, new treatments, new developments or updated disturbance data. All changes were documented during the Fuel Type mapping, with rationales provided.

Generic Fuel Types in the AOI (see Appendix 2 for links to descriptions of Fuel Types):

Generic Fuel Type	Ha
C-1	49.2
C-2	0
C-3	0
C-4	0
*C-5	5960.4
C-6	0
C-7	0
D-1/2	3211.5
S-1	0
S-2	0
S-3	2.5
O-1a/b	307.8
M-1/2	771.8
M3	0
Non-Fuel	247.03
Unclassified Water	1491.6

(See Appendix 2 for descriptions of generic Fuel Types. *C-5 is dominant at AOI.)

Several problems were encountered in mapping Fuel Types:

- As noted in a BCWS publication on Fuel Typing¹¹, where conifer stands have with sparse tree cover (10 – 30%), VRI data is often weak with respect to understory structure, so biogeoclimatic zone information is often used to infer the flammability of understory fuels. Fuel types are mostly assigned to be less volatile (lower Rate of Spread and fire intensity) than would be associated with a fully stocked similar stand. For example, in an open or dense juvenile conifer stand typed as C-3, the similar stand with sparse density would be typed as C-5, or even C-7.

Wide areas on the western slopes of Bald Mountain were cleared in recent decades (mostly by developers) and subsequently became overgrown with invasive brush (mainly broom) and non-native grasses, and sparse tree cover. These areas, while supporting conifer trees, are dominated by continuous brush, and are situated on warm, south facing slopes above and/or intermixed with rural residential development. These areas are associated with increased risk of wildfire.

- Also as noted in the BCWS publication on fuel typing, while the C-3 fuel type is generally used to represent classic stands of fully stocked, mature lodgepole pine, it can be used to represent several species and stand structure combinations, including pure and mixed, dense conifer stands dominated by juvenile Douglas-fir.
- Similarly, the C-5 fuel type describes a forest type from eastern Canada that does not exist in BC. However, due to the high crown base height and high deciduous shrub component of this fuel type, it has been used to represent fire behaviour in mature coastal conifer stands at low to mid elevations. As was observed during the fieldwork mapping Fuel Types in the study area, surface fuel loading in mature west coast conifer stands greatly exceeds the benchmark red and white pine stands in Ontario. Consequently, fuel consumption and fire intensity would be higher than predicted by the C-5 fuel type under drought conditions. The C-5 Fuel Type was dominant in the study area, with 5,960.4 ha mapped as C-5.



View from lower Bald Mountain looking south towards Mesachie Lake.

4.3.2 /3 Proximity of Fuel to the Community / Fire Spread Patterns

The local wildfire threat assessment process subdivides the WUI into 3 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 4: 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

¹¹ Perrakis, D.D.B., Eade, G. British Columbia Fuel Typing and Fuel Type Layer Description. 2015 Final Version. BC Wildfire Service HQ. MFLNRO.

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		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.

* Distances are based on spotting distances of high and moderate fuel type spotting potential and threshold to break crown fire potential (100m). These distances can be varied with appropriate rationale, to address areas with low or extreme fuel hazards.

Over 85% of the Fuel Plots evaluated in conjunction with this CWPP identified values at risk within 100 m of the Wildland Urban Interface (WUI 100). In fact, the majority of values assessed were interspersed in the WUI.

Fire moves fastest uphill. The steeper the slope, the faster a wildfire will spread. Homes on hills or at the top of hills face the greatest risk from wildfire. The first 10 metres around a home or structure should be considered the first Priority FireSmart zone. The second priority zone extends 10 to 30 m beyond the home or structure. Because fires spread more easily up hill, it's important to extend the second priority zone precautions further on downhill slopes and on windward exposures https://www2.gov.bc.ca/.../wildfire.../bcws_homeowner_firesmart_manual.pdf

Wind speed, wind direction, and fine fuel moisture condition influences wildfire trajectory and rate of spread, and is generally summarized in the Initial Spread Index (ISI) (wind) Rose(s) from local representative BCWS weather station(s). Wildfire that occurs upwind of a value poses a much more significant threat to that value than a fire that occurs downwind. ISI Rose data from from Mesachie Lake are applicable:

[https://www.for.gov.bc.ca/ftp/HPR/external/!publish/Website/ISI%20Roses/Daily_ISI_Roses/ISI%20Roses%20Coastal%20Fire%20Centre%20\(July%202016\).pdf](https://www.for.gov.bc.ca/ftp/HPR/external/!publish/Website/ISI%20Roses/Daily_ISI_Roses/ISI%20Roses%20Coastal%20Fire%20Centre%20(July%202016).pdf) as are NavCanada data: https://www.meteoblue.com/en/weather/forecast/modelclimate/lake-cowichan_canada_6048316; <http://www.navcanada.ca>

Like temperature and precipitation, the wind velocity changes with location and season. Summer over the South Coast tends to be fairly benign, especially when compared to a typical winter. Frontal systems occur from time to time, but generally not a cause of any concerns. Approaching from the Gulf of Alaska, but with little in the way of cold air to feed their development, these systems develop slowly and are relatively weak. Typically, thin clouds and light precipitation over the northern end of Vancouver Island dissipates to scattered broken cloud and showers in the south. Behind these fronts, a ridge of high pressure will build towards the coast. Rising pressures ahead of this ridge will then give a period of brisk northwest winds to the coast. The strongest northwest winds are often reported where the air stream is funneled between the mountains of the mainland and Vancouver Island. This effect is particularly noticeable in the spring months, as the

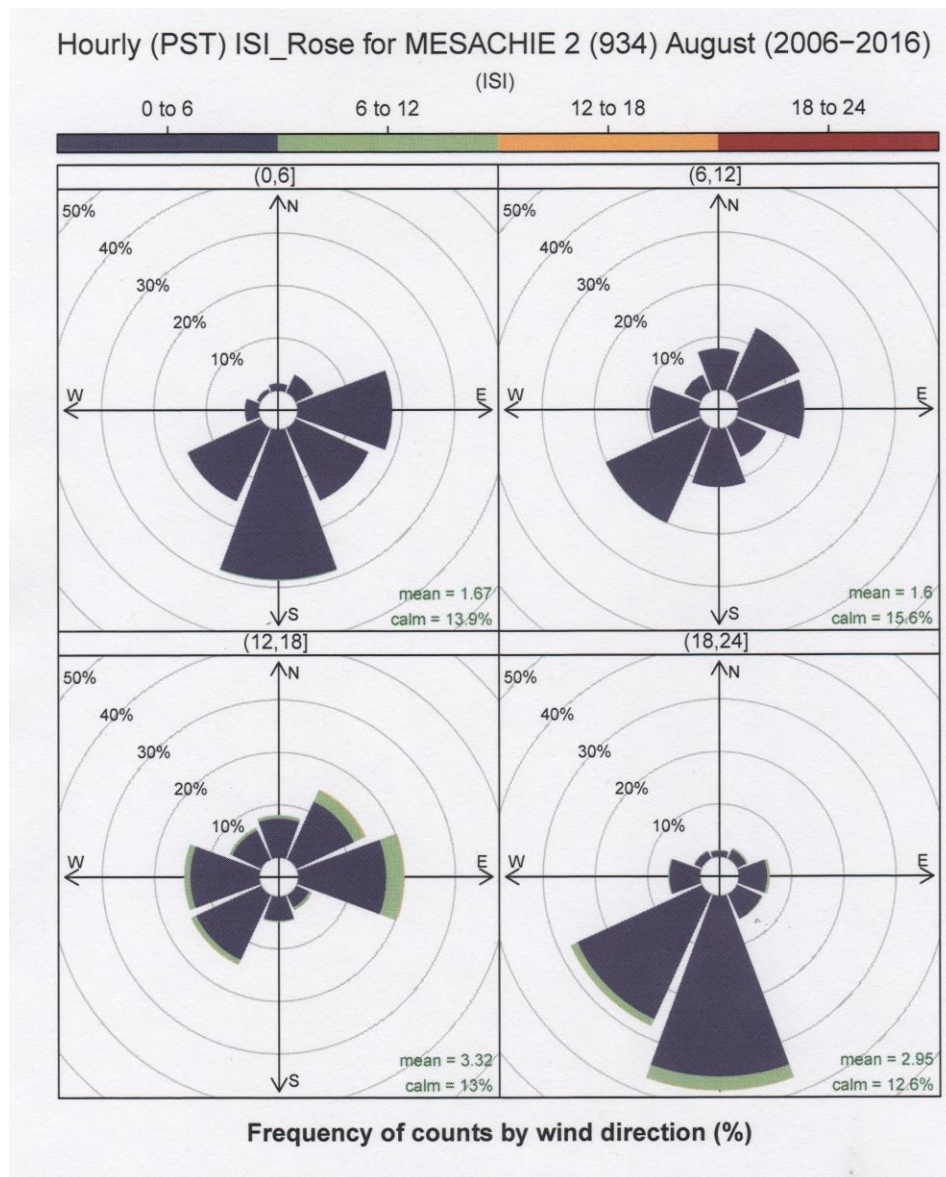
fronts still retain some of the strength of winter storms, but is not uncommon in the summer months.

Weather systems at Cowichan Lake typically move from west to east. Onshore winds are a frequent feature of summer afternoons. The Initial Spread Index (ISI) is considerably higher in areas with increased slope gradient and available fuel loading. If a wildfire starts on a hillside adjacent to Lake Cowichan, the tendency of fire to burn uphill will likely cause it to move away from development concentrated in the valley lowlands, and into the upper elevations of the surrounding mountains. However, if a fire started in forests or brush along the lake, and if there were strong westerly winds coming down the lake, the entire community could be at risk, as there is continuous fuel loading. Fuel breaks are required to build resilience to mitigate the potential impacts from wildfire.

At Lake Cowichan, a gentle breeze is common at the Town of Lake Cowichan and surrounding areas of the central Cowichan valley. The wind speed tends to increase by mid-day, and may not subside until after dusk. On occasion the area can experience very strong winds that funnel through the Cowichan Valley.

Greatest spread potential at Lake Cowichan is from westerly (southwesterly) winds. From the perspective of a fire start, a higher level of risk is assigned to the west/southwest quadrants of the community. Wildfires south or west of the town would have the immediate impact on leeward areas of Bald Mountain (Sunny Beach Estates, Woodland Shores, Marble Bay Road and Meade Creek Road area). Due to the continuity of fuel surrounding the entire community, and interspersed within the community, strong winds could readily fan a wildfire throughout the entire community, including the town core and areas to the east (along the Cowichan River). Management at BC Parks have stated that there is high potential for wildfire at Cowichan River Park, where thousands of tubers congregate every summer. Fire starts associated with parties and alcohol are not uncommon.

Although the lake at Lake Cowichan constitutes a fuel break, the large size of the lake results in localized weather with associated wind patterns.



ISI Rose. Mesachie Lake. Ten-year average (2006-2016) for the month of August (August generally is the month with the highest number of days in extreme DGR). Information is useful for determining spread patterns; it takes into account FFMC (Fine Fuel Moisture Code), in addition to wind speed and direction.

4.3.4 Topography

Topography and terrain can have both small-scale and large-scale influences on a wildfire, and represent a key input to the “head fire intensity” data layer. Topography can affect fire spread and intensity due to several processes: slope, aspect, landform, and various topography-weather interactions, such as elevation effects on temperature and humidity, diurnal effects on wind, and terrain channeling and funneling, which also affect wind patterns.

Fire on a slope will burn faster uphill and slower downhill. This is caused primarily by increased radiation and convection effects on uphill fuels caused by the tilting of the flame angle on the slope. When fire burns uphill, fuels are preheated in front of the fire, causing it to ignite quicker. On very steep slopes, flames can bathe the fuel in front of the fire, leading to very rapid and unpredictable spread. The opposite effects happen when fire is burning downhill.

Weather and topography are often fundamentally linked. Terrain shape and features can contribute to very localized weather influences by trapping heat and air (forming inversions and thermal belts), funneling winds, and creating eddy effects in the lee of ridges and peaks.

Slope percentage and slope position of the value are both considered. Slope percentage influence a fires’ trajectory and rate of spread. Slope position of the value relates to the ability of a wildfire to gain momentum during an uphill run and affects the potential impact to the value.

Slope Class

General fire behaviour implications of slope classes are summarized in the following table:

Table 5: Slope Percentage and Fire Behaviour Implications

Slope Percent Class	% AOI Values at Risk	Fire Behaviour Implications
<20%	27	Very little flame and fuel interaction caused by slope, normal rate of spread.
21-30%	23	Flame tilt begins to preheat fuel, increase rate of spread.
31-45%	19	Flame tilt preheats fuel and begins to bathe flames into fuel, high rate of spread.
46-60%	16	Flame tilt preheats fuel and bathes flames into fuel, very high rate of spread.
>60%	15	Flame tilt preheats fuel and bathes flames into fuel well upslope, extreme rate of spread.



Steep slopes rise sharply along the flanks of Bald Mountain above the Cottages at Marble Bay.

Slope Position of the Value

Slope position of a value relates to the ability of a wildfire to gain momentum during an uphill run. A value at the bottom of the slope is equivalent to a value on flat ground; a value on the upper 1/3 of the slope would be impacted by high preheating and faster rates of spread than a value on flat ground.

General fire behaviour implications of slope position to the value are summarized in the following table:

Table 6: Slope Position of Value and Fire Behaviour Implications

Slope Position of Value	% of AOI Values	Fire Behaviour Implications
Bottom of Slope/ Valley Bottom	44	Impacted by normal rates of spread.
Mid Slope - Bench	17	Impacted by increase rates of spread. Position on a bench may reduce the preheating near the value. (Value is offset from the slope).
Mid slope - continuous	20	Impacted by fast rates of spread. No break in terrain features affected by preheating and flames bathing into the fuel ahead of the fire.
Upper 1/3 of slope	19	Impacted by extreme rates of spread. At risk to large continuous fire run, preheating and flames bathing into the fuel.

Aspect

The predominant aspects in the AOI range from flat to south, although there is wide variability (i.e., portions of Marble Bay Road and Baldy area also face west). Similarly, Lambs Hill neighbourhood is predominately south, but includes many localized variations. Warm, southerly and westerly slopes are more conducive to fire starts and faster rate of spread. Slope gradients range from flat to gently sloping in downtown areas, some neighbourhoods east of the town, and some lower areas along Meade Creek Road. Much of the community is located on moderately sloping terrain (i.e., lower Neva Road, Brookside, portions of Lambs Hill, the Cottages at Warmland Shores). A lesser component of the AOI occupies steeper slopes (i.e., upper Neva Road, Sunny Beach Estates, some portions of Marble Bay Road).

4.3.6 Local Wildfire Threat Classification

The WUI was classified into Local Wildfire Threat Classes based on the updated fuel map. The following explains the process used in determining local wildfire threat:

1. Provincial Strategic Threat Analysis and metadata were acquired from BCWS and clipped to the area of interest.
2. Using the previously corrected fuel type map for the area of interest, areas where the fuel types have changed were noted. For areas where there is no fuel type change, the PSTA threat score was used.
3. Looking at similar fuel types in the local area, HFI values were crosswalked from the similar fuel type to the corrected fuel type polygon and placed into a table to recalculate the wildfire threat for the corrected polygon. Fire density and spotting impact numbers should not change due to any input at a local level.

The following table shows how values have changed for a priority area (Bald Mt), where there have been changes in fuel structure and composition (in addition to new development in the area).

Table 7: PSTA Inputs Cross Walk Table

	Head Fire Intensity (60%)	Fire Density (30%)	Spotting Impact (10%)	Wildfire Threat Score (100%)
Original PSTA Score: lower slope of Baldy	7/10	6/10	6/10	
Weighted Value	4.2	1.8	0.6	6.6/10 (Moderate)
Corrected Threat (based on fuel type change)	8/10	6/10	6/10	
Weighted Value	4.8	1.8	0.6	7.2/10 (High)

NB: This example shows that the locally corrected fuel type has higher head fire intensity than the PSTA fuel type and a higher wildfire threat score (7.2 vs. 6.6).

4.3.7 Local Wildfire Risk Classification

“Risk” is classically defined as probability x consequences of a negative outcome. This is often calculated as expected loss (a monetary figure) and requires an estimate of the replacement cost of the values at risk (VAR) that would potentially be impacted by fire.

As part of the CWPP analysis, local wildfire risk needed to be determined. The following factors were assessed to determine the local wildfire risk score.

1. Corrected wildfire threat (based on locally verified fuel type changes). This category is weighted at 30% of the total risk score.
2. Proximity of Fuel to the Community. This weighs the risk of fuel based on distance from the community, giving a higher score for risk nearest to the values at risk in the community. This is described as “working from the value outward to mitigate risk”. This category is weighted at 30% of the total risk score. At the Lake Cowichan CWPP study area, the vast majority of Fuel Plots were located within close proximity to the community.
3. Fire spread patterns using ISI roses and fire perimeter history to forecast the most likely potential fire spread direction for an approaching wildfire to the relative position of the community. The WUI was stratified into areas that tended to be downwind, upwind, or off-set, to these fire spread patterns. Due to the high variability of this information from community to community, local evaluation and weightings are based on the strength of the local wind direction and intensity patterns is required. This category is weighted at 30% of the total risk score (when clear patterns are evident). Predominant wind patterns at Lake Cowichan are westerlies (southwesterlies).
4. Topography (Section 4.3.4) is an important factor in increasing the rate of spread and the resulting head fire intensity of a wildfire. Slope may have little influence depending on the area of the province where the community is located. This category is weighted at 10% (5% for position and 5% for slope class) of the total risk score. While the central portion of the town core is located on gently sloping lands, much of the community at large is situated on moderate (to steep) gradients (i.e., Neva Road above Youbou Road extends up a steep hill into private forest lands).

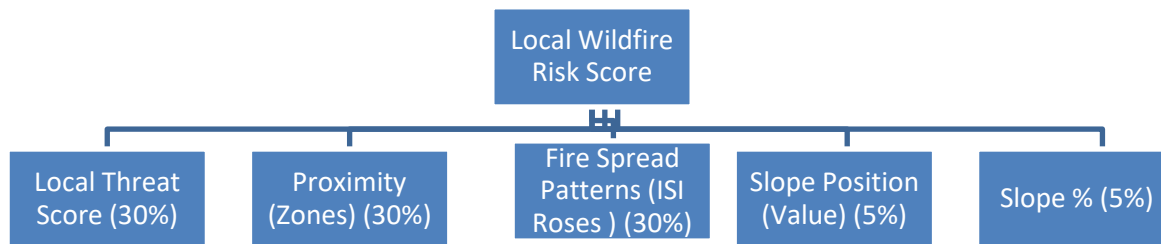


Figure 1: Local Wildfire Risk Inputs

Local Threat Scores were weighted with weighted scores from the specific values (proximity zones, fire spread patterns, slope positions, and slope gradient percents) to calculate Wildfire Risk Scores at 70 Fuel Type plots within the CWPP study area. Values were then “cross-walked,” (extrapolated) to determine Local Wildfire Risk Scores across the area. Ratings were reviewed with the Lake Cowichan Fire Department, and field-truthed in several cases.

An example of the weightings used in determining local wildfire risk is shown below:

Table 8: Local Wildfire Risk Summary

Local Examples (see next pg. for Description of Relative Risk Ratings)

Local Threat Score (30%)	Proximity (30%)	Fire Spread Patterns (30%)	Slope Position (5%)	Slope Percent (5%)	Wildfire Risk Score (100%)
Old School Grossleg 8/10	9/10 (within 100 m of value)	8/10 west of community with predominant SW wildfire spread pattern	5/10 (lower part of the slope)	5/10 (30% slope)	8/10 (High)
2.4	2.7	2.4	0.25	0.25	8.0
Local Threat Score (30%)	Proximity (30%)	Fire Spread Patterns (30%)	Slope Position (5%)	Slope Percent (5%)	Wildfire Risk Score (100%)
Hudgrove Road 8/10	8/10 (within 100 m of value)	7/10 east of, outside of Town Core, winds variable, extensive fuels	1/10 (lower part of the slope)	2/10 (30% slope)	7.35/10 (High)
2.4	2.4	2.1	0.05	0.1	7.35
Local Threat Score (30%)	Proximity (30%)	Fire Spread Patterns (30%)	Slope Position (5%)	Slope Percent (5%)	Wildfire Risk Score (100%)
Lk Cow FN mid slope 9/10	8/10 (within 100 m of value)	Midslope, close to Town Core, variable winds from lake, fuels +/- continuous	4/10 (lower part of the slope)	4/10 (30% slope)	8.75/10 (High)
2.7	2.7	2.7	0.4	0.25	8.75

The Local Wildfire Risk is High at the majority of the AOI (*Refer to Document 2, Map 7: Local Wildfire Risk*). Elevated ratings for the Lake Cowichan community are attributed to several factors, including: long narrow shape of study area, with some long response times, extensive fuels along the entire boundary, strong southwesterly winds combined with frequent long periods of drought in summer, the growing number of summer visitors, and the vulnerability of a significant component of the society (seniors are a growing segment of the population).

The wildfire risk assessment process provides a means to determine the wildfire risk as it applies to forest fuel hazard, proximity of fuel to the community, fire spread patterns and topography. These factors all influence how a wildfire could impact the community if ignition was to occur. It is also important to consider and assess high forest fire risk activities, human use, and other environmental factors that affect wildfire threat and risk within different areas of the WUI.

As more and more visitors flock to Lake Cowichan between the May long weekend and September, the Lake Cowichan Fire Department is increasingly concerned about wildfire risk. The population more than doubles in the busy summer months with outdoor enthusiasts attracted by river tubing, camping, RV'ing, and hiking. Sunfest, a country music event that has recently moved from North Cowichan to Lake Town Ranch at Cowichan Lake, draws thousands of visitors during the BC Day long weekend at the height of what is typically the driest and warmest period of the summer. The Fire Department is under continual threat all summer.

Table 9: Local Wildfire Risk Weighting

Relative Risk	Weighting
Low	0 – 3.9
Moderate	4 – 6.9
High	7 – 8.9
Extreme	9+

NB: The scoring system is based on a maximum score of 10.

4.3.8 Summary of Fire Risk Classes

Low (Green): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it a lower potential for threatening a community. These stands will support surface fires, single tree or small groups of conifer trees could torch/ candle in extreme fire weather conditions. Fuel type spot potential is very low, low risk to any values at risk.

Moderate (Yellow): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns and known local wildfire threat factors make it possible that a wildfire in this area would threaten the community. Areas of matted grass, slash, conifer plantations, mature conifer stands with very high crown base height, and deciduous stands with 26 to 49% conifers. These stands will support surface fires, single tree or small groups of conifer trees could torch/ candle. Rates of spread would average between 2-5 meters/ minute. Forest stands would have potential to impact values in extreme weather conditions. Fuel type spot potential is unlikely to impact values at a long distance (<400m).

High (Orange): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it likely that a wildfire in this area would threaten the community. This includes stands with continuous

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surface/ crown fuel that will support regular torching/ candling, intermittent crown and/or continuous crown fires. Rates of spread would average 6 -10 meters/ minute. Fuel type spot potential is likely to impact values at a long distance (400 -1 000m).

Extreme (Red): The combination of the local fuel hazard, weather influences, topography, proximity to the community, fuel position in relation to fire spread patterns, and known local wildfire threat factors make it very likely that a wildfire in this area would threaten the community. Stands with continuous surface/ crown fuel and fuel characteristics that tend to support the development of intermittent or continuous crown fires. Rates of spread would average >10 meters/ minute. Fuel type spot potential is probable to impact values at a long distance (400 -1 000m or greater). These forest stands have the greater potential to produce extreme fire behaviour (long range spotting, fire whirls and other fire behaviour phenomena.



A high wildfire risk is associated with much of the AOI, including new residential developments such as Woodland Shores, on the lower slopes of Bald Mountain.

“We are under continual threat all summer.”

Lake Cowichan Fire Department



Summer tubing on the Cowichan River is gaining huge popularity



Sunfest at Lake Country Ranch brings in thousands of visitors on the August long weekend

Discussion (Input from the Lake Cowichan Fire Department)

“Lake Cowichan Fire Department has a very large Fire Service Protection Area with a 71 kilometer perimeter of area in which they respond to calls for fire incidents (structure & brush), vehicle accidents & fires, lake and river emergencies with their rigid inflatable, low slope rescue calls as well as medical assistance calls and Mutual Aid with the other 5 fire departments in our area. They are also the Mutual Aid partner and back up for Safety and Fire Suppression on the Pacific Marine Route which connects Mesachie Lake to Port Renfrew. In the summer when the temperature is warm and sunny skies are the normal the population of the Lake Cowichan area will double or triple with everyone coming out to the area to experience all of the outdoor activities. The potential for an emergency requiring LCFD to attend increases greatly, as well as the risk of a wildfire in our area also potentially needing LCFD to respond. During our FireSmart Education Awareness presentations with the public, local service groups and forestry industry we talk about why FireSmart principles are so important to apply to home or property. The reason comes down to response by the agency tasked to assist to put out the fire at your home or property. We explain that treating your home to FireSmart status reduces the risk of the fire actually starting the structure on fire, it will burn outside of the 10 m priority zone 1 and quickly pass to consume more combustibles. If the home or property is not FireSmarted and the structure does ignite needed the fire department to attend it will take an average of 16 fire fighters to fight this fire. If we have 2 structures on fire then 32 and so on. Lake Cowichan Fire Department is a paid on call fire department meaning that the members are paged out when needed and although they have 30 members not all of the department may in town at any one given moment, anything more than 2 homes on fire at the same time would cause the fire department to go into defensive mode as they would be overwhelmed and the resources available would be maxed out to capacity. Mutual Aid agreements are in place with the other 5 area Fire Departments but that would take time and in the end throwing more fire trucks at the problem would not solve it, which is why FireSmart is so important when you live in are with so much Wildland Urban Interface and the potential threat that exists from Wildfires. Lake Cowichan Fire Service Protection Area and the WUI buffer is the prime example of threats to communities that live in and are surrounded by WUI. The wildland surrounds us and enters into the community with finger like extensions that will act like candle wicks and has the potential threat everywhere we look. This along with the dynamics and forestry conditions of the plots observed and noted in the WUI buffer is why the area surround the Town of Lake Cowichan threat level is extreme to high.

The Cowichan Lake area is extremely popular with outdoor adventure seekers as there are so many activities to do here. There are many hiking trails including the Trans Canada Trails, Cowichan Valley trail, Bald Mountain Trail, Fisherman’s Trail, and others. The Town of Lake Cowichan has a public camping area at Lakeview Park along the southern shore of Lake Cowichan that also has trails throughout. Cowichan Lake and Cowichan River offer the marine enthusiast the ability to fish, water ski, swim or float down the river. These areas that are used for recreation are increasingly popular and many are accessible year round. Accessibility to these areas can be difficult for First Responders (RCMP, BCAS, Fire Rescue) as they trails are not always near roads or the responding agency does not have the equipment necessary to perform the service (e.g. . Quad to go on narrow trail) . The Cowichan River’s popularity as a destination for tubers from across the Island has increased tenfold over the last few years. The Lake Cowichan Fire Department has respond to many, many rescue/assistance calls .They will continue to prepare to respond to rescue events on the river and have taken Swift Water Training, purchased and trained with a rigid hull inflatable boat with a jet drive engine. The trails and waterways allow the public to access the areas in the Lake Cowichan Fire Department Service Protection Area and 2 kilometer WUI buffer that if they are not diligent and practice safety during long periods of drought during fire season also have to the potential to cause the threat of a human caused wildfire to increase in these areas.”

SECTION 5: Risk Management and Mitigation Factors

Mitigating wildfire risk is a proactive approach to reducing potential impacts and subsequent losses from devastating wildfires, and is best conducted in a coordinated fashion amongst applicable land managers/owners that may include provincial and federal governments, local governments, First Nations, and private landowners. Understanding and assessing all of the risks that apply to a given community is a key consideration when determining actions that local governments or First Nations can undertake to mitigate and manage the wildfire risk within and adjacent to their respective jurisdictions.

There are many different risk mitigation options available. Three have been identified for this CWPP:

1. Fuel Management – reduce fire behaviour potential
2. FireSmart – reduce fire spread into community and impacts to values
3. Communication and Education – reduce fire occurrence

5.1 Fuel Management (See Document 2, Map 8: Fuel Treatment)

Fuel management is a high priority in the western portion of the AOI in an extensive stretch from Marble Bay Road (i.e., Sunny Beach Estates and Woodland Shores) to North Shore Road (i.e., Lake Cowichan First Nation). Onshore winds from the lake on summer days would exacerbate rate of spread of wildfire. While these western areas are high priority for fuel management, fuel treatment is also proposed in other strategic areas of the AOI in order to meet the needs of the community and build resilience to mitigate the potential impacts of wildfire. Proposed fuel management would emulate the work done at the interior community of Logan Lake, where FireSmart fuel treatments in broad zones around the community have proven effective against wildfires.

The Wildfire Threat Analysis undertaken as part of this CWPP will inform the Strategic Wildfire Prevention Initiative (SWPI), when combined with Wildland Urban Interface (WUI) data to identify areas that may be at risk of damage from wildfires. Under SWPI, fuel management is the process of modifying or reducing the amount of forest fuels to help reduce aggressive wildfire behavior in interface areas.

A key change in approach in the CWPP going forward is to move from designing fuel treatments based on hazard and threat at the fuel polygon level, to strategically identifying the highest wildfire threat areas within the WUI and designing logical fuel treatment units that are functional from fire behaviour and fire suppression perspectives.

Interface Fuel Break:

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 improve suppression outcomes. Interface Fuel Breaks are approximately 100 meters wide and when treated with appropriate fuel reduction measures, break the crown fire threshold and reduce the risk of a crown fire reaching private lands and structures. Interface Fuel Break width can be varied to allow for alignment and to take advantage of natural and man-made fire resilient features that enhance effectiveness. Surface fire spread across the fuel break and spotting over the fuel break, are both concerns and rely on suppression actions to be effective. In order to reduce potential fire intensity and spotting, fuel on private land between the Interface Fuel Break and structures should be treated according to FireSmart vegetation management standards. Structures in interface areas should be constructed or retrofitted to FireSmart design standards.

Primary Fuel Break: (not generally feasible here due to private land constraints)

Primary Fuel Breaks are located on Crown Land in strategic locations beyond the Interface Fuel Break. The location of Primary Fuel Breaks depends on land ownership (Crown vs. private), existing natural and man-made features, fuel types, and wind patterns. Primary Fuel Breaks are designed to modify fire behaviour and create fire suppression options that reduce the risk of a crown fire reaching a community and/or adjacent private lands. 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 have sufficient width and appropriate fuel reduction measures to break the crown fire threshold and reduce fire intensity such that overstory fire moves to the ground surface and spread rates are reduced. While there are no absolute standards for fuelbreak width or fuel manipulation in the literature and fuel break width will vary based on fuel type, topography, and expected fire behaviour¹². Fuel breaks should be designed to take advantage of natural and man-made fire resilient features and topography to enhance effectiveness. Surface fire spread across, and spotting over the fuel break is a concern, and depends on the application of suppression resources to be effective. Provide a summary table and map any high priority areas where operational constraints limit the ability to complete fuel management activities, such as access, soil conditions, topography, land ownership and other local issues.

A key change is a shift from designing fuel treatments based on hazard and threat at the fuel polygon level, to strategically identifying the highest wildfire threat areas within the WUI, and designing logical fuel treatment units that are functional from fire behaviour and suppression perspectives. Logical and strategic options for fuel treatment are proposed upwind of values, and perpendicular to predominant winds.

Approximately 556 ha are proposed for high priority fuel management at seven strategic locations in the AOI (Refer to CWPP Document 2, Map 8: Fuel Treatment). Private lands present overlapping values/constraints, but have been removed from proposed fuel treatments. The Lake Cowichan Fire Department would also like to see the area between the Cowichan Valley Trail and TransCanada Trail, a large area with extensive forest fuels extending from Hudgrove Road to Mayo/McLean Road, considered for fuel management (in coordination with CVRD-West CWPP planning).

Table 10: Fuel Treatment Summary Table

High Priority Areas highlighted in yellow. On-the-ground assessment is required to determine exact areas.

FTU # and Stratum	Total Area (ha)	Treatment Unit Type / Objective *	Local Fuel Threat (Hectares)			Over-lapping Values / Treatment Constraints **	Treatment Rationale ***
			Extreme / High	Mod	Low		
A-1 Baldy /Marble Bay	76	1,2,3	High (some areas Extreme)			C, P, R, Rec, Ss	a
A-1. The Baldy, Marble Bay area is upwind of values. There are high Values at Risk: Bald Mt repeater, high value residential properties, scenic hiking trails, and sensitive terrestrial herbaceous ecosystems.							

¹² Mooney, Colleen. 2010. Fuel Break Effectiveness in Canada’s Boreal Forests: A synthesis of current knowledge. FP Innovations.

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B-1 Meade Ck/ Spring Beach	60	1,2,3	High (some areas Extreme)	P, R, Rec, Rip, Res	a
B-1. The Meade Ck Road/ Spring Beach Area includes high residential, and also comprises Spring Beach Park, a popular Area I forested park with a public beach where campfires are allowed.					
C-1 Youbou Rd N	54	1,2	High	P, R, Rip, Ss	a
C-1. This sloping area above the Youbou Highway directly abuts logging areas, and contains an old logging road.					
D-1 Youbou Rd E	34	1,2	High	P, R, Rip, Ss	a
D-1. This area on the northwest side of the Town contains a mix of scattered residential, light industry, and private forest lands, and straddles the Youbou Highway.					
E-1 Mesachie Lk/Beaver Lk	104	1,2	High (some areas Extreme)	P, R, Rec, Rip, Res, SC	a
E-1. The Mesachie /Beaver Lk area abuts active logging on TW lands, and also contains an area currently being harvested by the local First Nation band. CLEC and Lakeview campground in this area are on Crown lands leased to the Town of Lake.					
F-1 “Meditation Hill,” Lk Town Ranch, Beaver, Bear Rds	52	1,2	High (some areas Extreme)	P, R, Rec, Rip, SC, Ss	a
F-1. “Meditation Hill,” named after the Buddhist camp in the area, is a predominately forested area with some recent clearcuts. It borders Lake Country Ranch and residential properties along Beaver Road. There is limited access to parts of this area from Bear Road. After an area to the west was logged by a private company no hazard abatement tool place.					
G-1 N Shore Rd/Lk Cow FN	78	1,2	High	P, R, Rec, Rip, Res, SC	a
G-1. This area contains a range of varying ages of forest stands, including recently logged blocks with unabated hazards. The Lake Cowichan First Nation is planning on future development in this area.					
H-1 Youbou Rd N	30	1,2	High	P, R, Rip, Ss	a
H-1. This strip of forested land fringing the Youbou Highway contains residential, commercial properties, and institutional properties, including a tire truck, a church, and also overlaps Cowichan Lake First Nation. This area also contains motels and condominiums. A new development is planned for the eastern portion of this area where an area above the highway was recently logged by a private developer.					
I-1 Town- south	40	1,2	High	P, R, Rip	a
I-1. This area is heavy to residential (including seniors apartments), but also contains some commercial buildings.					
J-1 CVT/ TCT N	48	1,2,3,4	High (localized areas of Extreme)	P, R, Rec, Rip, SC, Ss, Env	a
J-1. The Cowichan Valley Trail (TransCanada Trail N) corridor includes power transmission lines and important communications: internet, and tv. This important corridor includes Highway 18 and old Cowichan Highway, main access routes to communities in the west. Residential development is spread out along this corridor.					

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K-1 Trans-Canada Trail S	85	1,2,3	High (localized areas of Extreme)	P, Rec, Rip, SC, Ss, Env	a	
K-1. This corridor along the TransCanada Trail (south) contains the Cowichan River, a BC Heritage and Canadian Heritage River with high environmental and high recreational values. This area also interfaces with logging.						
L-1 TCT SW	20	1,2,3	High (localized areas of Extreme)	P, R, Rec, Rip, SC, Ss, Env	a	
L-1. This area straddling Hudgrove Road borders active logging and interfaces the western end of proposed treatment area “L” in the WUI. Future residential development is proposed in this area.						
M-1 Lakeview/ CLEC	86	1,2,3	High (localized areas of Extreme)	P, R, Rec, Rip, SC, Ss, Env	a	
M-1. The forested area encompassing Lakeview Campground, Cowichan Lake Education Centre, and several private recreational sites also includes a newly developed area slated for residential subdivision by the local First Nation.						

***Treatment Unit Type/Objectives:**

- 1 – Conduct fuel treatments in the WUI to create residual stands characteristics that do not support active crown fire
- 2 – Apply prescribed fire under suitable conditions to provide ecological benefits, reduce fuel loading, and reduce the probability of catastrophic fire in the future
- 3 – candidates for ecosystem restoration program/Forest Enhancement Program/habitat conservation
- 4 – previous fuel treatment > 10 years ago; fuel treatment maintenance required

****Overlapping Values/Treatment Constraints:**

C – Repeater Tower in vicinity P – Private lands (adjacency considerations) R – Rural residential Rec – Trails
 Rip – Riparian, water quality
 Res – Research station/research plots SC – campground, seasonal and/or permanent camp facilities
 Ss – steep terrain

*****Treatment Rationale:**

a - Build resilience to mitigate potential impacts of wildfire

The Town of Lake Cowichan plans to work cooperatively with CVRD and private landowners to create effective fuel treatment polygons in CVRD-west.

5.2 FireSmart Planning & Activities

5.2.1 FireSmart Goals & Objectives

The general goal of FireSmart is to encourage private land holders 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:

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

Research has shown that a value that has been treated in accordance with FireSmart principles has a much larger chance of survival in a wildfire situation¹³. Treatment of adjacent fuels further enhances survival probability - “Work from the value out to the wildfire threat”.

5.2.2 Key Aspects of FireSmart for Local Governments

A KPMG report on lessons learned from the Fort McMurray wildfire of 2016 recommends improved prevention measures, together with better disaster management and evacuation planning www.cbc.ca/news/canada/edmonton/fort-mcmurray-wildfire-review-survey. The Fort McMurray wildfire torched more than 2,500 homes and caused \$3.6 billion in insured property damage. The report stated that in the years leading up to the fire, very little was spent on wildfire prevention programs in the region. Fort McMurray Mayor Melissa Blake, said before the fire, there was push-back from residents about tree-clearing, but since the fire, people have become more open to the idea. Mayor Blake said other communities in Canada facing the threat of wildfires can learn from Fort McMurray’s experience by stepping up prevention work such as clearing trees and brush from around homes. “Unfortunately, what we have experienced in the community is that when you take trees off a greenbelt, people get quite concerned and agitated by it,” said Blake. “Fire-smarting is absolutely a critical component to helping to mitigate.”

Local FireSmart Community Champions at the Town of Lake Cowichan are promoting the findings from Fort McMurray to encourage their neighbours to implement FireSmart strategies to build resilience to mitigate the potential impacts of wildfire (i.e., Lambs Hill community FireSmart newsletter, Fall 2017).

There are many different ways that members of the community and stakeholders can provide options to mitigate the risk (FireSmart, 2003).

1. Elected officials approve bylaws that promote FireSmart principles related to infrastructure and safety.
2. Municipal planners design green belt and other open space areas in strategic locations.
3. Developers design and build FireSmart buildings
4. Private land owners and residents modify fuels around their property and buildings and follow FireSmart principles (Appendix 1).
5. Industrial managers and business with interface values ensure that facilities are constructed and maintained following FireSmart guidelines.

Refer to Table 11 for a summary of FireSmart practices and activities that have been adopted and/or planned by the Town of Lake Cowichan.

Table 11: FireSmart Practices and Activities at Lake Cowichan

Topic	FireSmart Examples Implemented and/or Planned at Town of Lake Cowichan 2017
Communication, Education &	<ul style="list-style-type: none"> • <i>Hosted a FireSmart day – National FireSmart Day May 6, 2017</i> • <i>Use local government and First Nation newsletters and social media - LCFD used social media – FB/Twitter – to promote FireSmart</i>

¹³ Partners in Protection. 2003. Firesmart: Protecting Your Community from Wildfire. Second edition. Partners in Protection. Edmonton, AB.

<p>Partnerships</p>	<p>awareness - Residents' associations at LambsHill and The Slopes produced newsletters and delivered these door to door to promote FireSmart awareness</p> <ul style="list-style-type: none"> • <i>Undertake FireSmart Local Representative or Community Champion training</i> -FireSmart Community Champion training took place spring/summer 2017 • <i>Apply for FireSmart Community Recognition</i> - LCFD applied for FireSmart Community Recognition for 6 communities • <i>Form a FireSmart committee</i> -LCFD Fire Chief, LCFD Risk Management Officer, RPF, 3 FireSmart Community Champions • <i>Encourage homeowners and/or neighborhoods to undertake FireSmart site assessments and area assessments</i> - Through FireSmart public meetings and seminars, homeowners in six different neighbourhoods undertook FireSmart site assessments. Six Community FireSmart assessments were undertaken.
<p>Vegetation management</p>	<ul style="list-style-type: none"> • <i>Develop policies and practices for FireSmart maintenance of public spaces, such as parks and open spaces</i> - CWPP recommendations include fuel management at public spaces, including parks and open spaces • <i>Use landscaping requirements in zoning and development permits to require fire resistive landscaping</i> • <i>Provide access to a chipper or dumpster for debris drop-off from pruning or thinning on private properties</i>
<p>Planning & Development</p>	<ul style="list-style-type: none"> • <i>Develop policies and practices for FireSmart construction and maintenance of public buildings</i> • <i>Establish Development Permit Areas for Wildfire Hazard in order to require FireSmart exterior finishing</i> • <i>Consider wildfire prevention and suppression in the design of subdivisions (e.g. road widths, turning radius for emergency vehicles, and access and egress points)</i> • <i>Coordinate the reviews of new developments across multiple departments, including the fire department</i> • <i>Consider mutual-aid fire control agreements</i>
<p>Increasing local capacity</p>	<ul style="list-style-type: none"> • <i>Develop and maintain Structural Protection Units (SPU) and/or learn how Emergency Management BC deploys SPUs for interface fires</i> • <i>Provide sprinkler kits (at cost) to residents</i> • <i>Cross-train fire departments to include structural fire and wildfire training</i>

Partnerships and Funding are available at:

FireSmart Canada:

The nationwide FireSmart Community Recognition Program is a core component of the larger FireSmart Canada initiative which is led by Partners in Protection Canada, a non-profit association and the originators of the FireSmart concept. The Program is designed to encourage local self-

organized groups of neighbours to implement solutions for wildfire safety by engaging and supporting homeowners, community leaders, planners, developers, firefighters and government agencies in shared efforts to protect people and property from wildfire. The FireSmart Canada initiative is supported by contributions from various provincial and territorial agencies, the National Fire Protection Association, the Institute of Catastrophic Loss Reduction and private donors. Partners in Protection Canada continues to seek additional support in order to maintain and expand programs that encourage and enable people to work together to reduce the risk of wildfire losses in the wildland/urban interface.

FireSmart Canada helps individuals understand the potential of wildfire affecting your home and your community. Communities across Canada are encouraged to participate in wildfire mitigation projects. Funding is available to help cover a portion of these activities

www.firesmartcanada.ca

South Island Fire Management Organization:

The South Island Fire Management Organization (SIFO) is a regional enlistment of representatives from forest companies and agencies on southeast Vancouver Island. All of these partners have WUI jurisdictional concerns. The philosophy of the SIFMO is for all members to provide assistance to their member neighbours and to attack any fire vigorously. The SIFMO provides strategic direction, advice and recommendations to agencies with interface fire jurisdiction through the expertise of staff at member companies and agencies. The Lake Cowichan Fire Department regularly attends the twice annual SIFO meetings.

Regional Community to Community Form Program:

The goal of the Regional C2C Forum is increased understanding and improved overall relations between First Nations and local governments. To qualify for funding, C2C Forms must include direct dialogue between elected officials and/or senior staff of neighbouring First Nation and local governments and work toward a number of specified objectives.

Union of BC Municipalities/Strategic Wildfire Prevention initiative (UBCM/SWPI):

SWPI is a suite of funding programs administered by UBCM and managed through the Strategic Wildfire Prevention Working Group. Through SWPI, UBCM provides a voice from local government, serving to advocate policy development and implementation regarding fuel mitigation. Since 2004, the initiative has supported communities in their efforts to mitigate wildfire risk.

Forest Enhancement Society of BC (FESBC):

The Forest Enhancement Society of BC is a newly established society formed in 2016 by the BC Government. The organization is designed to advance and advocate for environmental and resource stewardship in BC forests by doing the following:

- Preventing and mitigating the impact of wildfires.
- Improving damaged or low value forests.
- Improving habitat for wildlife.
- Supporting the use of fibre from damaged/low value forests.

FESBC has a fund of 85 million dollars to be spent over the next five years on forestry projects. In order to ensure the best management of funds and compliance with Softwood Lumber Agreement rules and regulations, funding is subject to annual financial audits and sound business principles. To qualify for FESBC funding, applicants must have a current CWPP in place (updated within the last 5 years), should be seeking or already have SWPI funding and must use a competitive bid process for treatment projects.

FESBC funding is intended for projects outside of the WUI because the SWPI program is already in place to serve this purpose. However, FESBC will be looking to partner with UBCM once its projects are underway in an effort to create a continuum of treated areas around towns and infrastructure. FESBC is not a land management entity; the planning and use of Crown land is the responsibility of the BC Government. FESBC is responsible for project funding approval based on wildfire risk, forest rehabilitation and recovery project plan preparation. High risk and shelf ready project plans will garner a better chance at funding.

Nature Trust, Habitat Conservation Fund, Nature Conservancy of Canada:

These organizations offer funding for projects which primarily serve to enhance or preserve ecological and/or wildlife habitat. Although the main focus of such projects is not wildfire mitigation, any treatment which serves to reduce forest ingress (growth of trees into grassland), and/or reduce fuels, will help mitigate wildfire threats.

5.2.3 Identify Priority Areas within the Area of Interest for FireSmart

The table below identifies relative priority areas for FireSmart in relation to the level of wildfire risk, current level of implementation, and next steps for increasing FireSmart activities.

Table 12: Summary of FireSmart Behaviour

Area ID	Wildfire Risk Rating (E/H/M/L)	FireSmart Y/N	FireSmart Canada Recognition Received Y/N	Recommended FireSmart Activities
Priority Area:				
1. Sunny Beach Estates	H	Y for all: FireSmart plans completed for 2017	2018 FireSmart Canada Recognition achieved	Applicable to all six Communities: <ul style="list-style-type: none"> ✓ FireSmart Champion Orientation Training ✓ Form a FireSmart Board ✓ FireSmart and Wildland Fire Education ✓ Organize and Perform Community Clean-up and Chipper Day ✓ Apply for FireSmart Community Recognition Program ✓ (indicates done) 2018: Goals – increase efforts at existing FireSmart Communities re: address signage, fuel treatment, awareness. -Expand into other communities at risk.
2. Woodland Shores	H			
3. Lake Cowichan First Nation	H			
4. The Slopes	H			
5. Brookside	H			
6. Lambs Hill	H			

The FireSmart program initiated at Lake Cowichan in 2017 was very successful. Six communities formed FireSmart boards, achieved FireSmart Canada Recognition. The program will be expanded in 2018 to ensure ongoing maintenance at FireSmart Communities, and will target inclusion of additional communities at risk (i.e., upper Neva Road, Hudgrove Road, Hundred Houses, Lakeview, etc).

2017 Community Wildfire Protection Plan – Town of Lake Cowichan Fire Prevention Area

Application of FireSmart principles to isolated critical infrastructure, such as the Bald Mountain 911 Repeater, is also a priority.



Fire Smart Community Champions. Lake Cowichan. July 2017

FireSmart Canada awarded the Town of Lake Cowichan a FireSmart Community Protection Achievement Certificate in 2017.



FireSmart Community Protection Achievement Certificate awarded in 2017 by FireSmart Canada to the Town of Lake Cowichan for exemplary efforts in fire prevention activities

5.3 Community Communication and Education

The CWPP will only be successful if the community is engaged, informed and supportive of the process and the recommendations. Moving from the CWPP to implementation of specific activities requires that the community is well informed of the reasons for, and the benefits of specific

mitigation activities. The following steps describe how the Town of Lake Cowichan is actively engaged in wildfire mitigation activities:

1. The CWPP will be made accessible/available to the general public (posted on Town website, introduced at public meetings in 2017, with plans to highlight at public meetings and events in 2018, etc.). A copy of the CWPP will be placed at the Town library.
2. A communication strategy is being developed by the Town, in consultation with the LCFD, regarding wildfire risk and priority mitigation measures that are being undertaken by the community.
3. Through consultation with private forest land owners, stakeholders in the natural resource sector are identifying opportunities for mutually beneficial forest/fuel treatments (i.e., fibre recovery/salvage programs in WUI areas).
4. The Town, in concert with the LCFD, will be developing a public education strategy designed to reduce human caused fires. BCWS Fire Cause data provided by the fuel Management Specialist will help to identify local historical patterns of human caused fires. As identified by the Lake Cowichan Fire Department, there is a high risk for wildfire in the WUI between the CWPP boundary and adjoining private forest lands.
5. Six FireSmart communities are currently developing a FireSmart communication plan.
6. Application for another FireSmart grant in 2018 will enable Lake Cowichan Fire Department to expand the FireSmart program to other neighbourhoods at risk.

The FireSmart communication plan includes the following discussion about megafires:

Living (Dangerously) in an Era of Megafires. Dr. Paul Hessburg/TEDxBend

<https://www.youtube.com/watch?v=edDZNkm8Mas>

Dr. Paul Hessburg delivered an excellent presentation on Ted Talks in 2017 about the dangers of megafires. Although he was speaking in the United States, his presentation applies equally to British Columbia. According to Mr. Hessburg and other forest professionals, forests of one hundred and fifty years ago were much different than they are today. Forest landscapes were constantly evolving areas of open forest and closed canopy with distinct patchy areas. Different forest types, different topographies, and various natural mechanisms combined to resist spread of fire. Burned patches helped the rest of the forest to “be forests.” Native populations used fire as a tool. European settlement in the late 1800’s into the early 1900’s started a drastic change in the forest landscape. In 1910 a huge wildfire engulfed an enormous area from Washington to Montana, burning 3 million acres. It killed 87 people – mostly firefighters. Wildfire became Public Enemy Number 1. The US Forest Service decreed that all wildfires must be put out. From that point on, the US Forest Service was successful in extinguishing 95% of all wildfires. Fire Suppression, not wildfires, became a shaper of the forests. After 150 years, a dense carpet of trees covered the forest landscape. Now tree species and sizes were similar.

Climate change is resulting in fire seasons 40-80 days longer each year. Tools such as prescribed burning produce less smoke than wildfires, but are currently regulated under air quality rules as avoidable smoke. Far too little prescribed burning occurs – instead we “continually eat smoke” in the summer from wildfires. It’s a social problem.

Public support for prescribed burning and managed fires is low. Dr. Hessburg stresses we must advocate for lawmakers to make prescribed burning a necessary tool to prevent forest fires and megafires. “If we’re unsuccessful,” says Dr. Hessburg, “where will you go to play when your favourite places are black. Where will you go to breathe deep and slow?”

5.4 Other Prevention Measures

Fire prevention can be achieved through communication and education initiatives, as well as through the development and implementation of policies and regulations, including operational guidelines and restrictions. Fire prevention can be addressed at the community level through various avenues. Danger class rating signs within fire protection zones, public communication, industrial work restrictions and fire bans are examples of public fire prevention measures.

As an example of local actions and strategies related to wildfire prevention not already mentioned in Section 5, the Lake Cowichan Fire Department has taken special effort to ensure its members understand that wildfire prevention is an intrinsic focus of structural fire fighting, particularly during the fire season from April to October. FireSmart Workshops are being hosted annually by the LCFD on National FireSmart Day in May. A local Broombusters group has taken the initiative to cut combustible broom along Highway 18.

The following list describes actions or strategies that are being undertaken at the Town of Lake Cowichan to reduce the threat of wildfire ignitions.

5.5 Summary of Recommendations

<i>Recommendation</i>	<i>Responsibility/Funding Source</i>	<i>Next Steps</i>
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2017 Community Wildfire Protection Plan – Town of Lake Cowichan Fire Prevention Area

<i>Apply to SWPI for Fuel Treatment Prescription Funding</i>	<i>Town (UBCM)/SWPI</i>	<i>Town to apply for SWPI funding for:</i> <ul style="list-style-type: none"> - <i>Demonstration Forest (Friendship Park)</i> - <i>Fuel Management Prescriptions</i>
<i>More Communication about Evacuation Routes</i>	<i>Town/local government</i>	<i>Town to meet with local Emergency Responders, CVRD Emergency Preparedness Post public information on Town website</i>
<i>Address signage</i>	<i>Town/Local Residents</i>	<i>Town, in conjunction with LCFD, to promote address signage on website, town noticeboards</i>
<i>Fuel cleanup – local residents</i>	<i>Town/Local Residents</i>	<i>Town, in conjunction with LCFD, to promote FireSmart program</i>
<i>Enhance/Expand FireSmart Project</i>	<i>Town/LCFD/Local Community Champions</i>	<i>Expand FireSmart program to other high risk neighbourhoods</i>
<i>Communicate with neighbouring Private Managed Forest Landowners to mitigate fire risks in the interface -i.e., utilization standards, fibre recovery, etc.</i>	<i>LCFD/Town</i>	<i>Meet at SIFMO Fall Mtg Dec 2017, and also plan to address forest land stakeholders and PFLA in 2018</i>
<i>Annually promote FireSmart at LakeDays</i>	<i>LCFD/Town</i>	<i>Plan to promote FireSmart at National FireSmart Day 2018, Lake Days 2018, and other community events</i>
<i>Develop a DP for Wildfire in new OCP</i>	<i>Town</i>	<i>OCP is to be updated; incorporate DP for Wildfire in new OCP</i>
<i>Fire Management Planning</i>	<i>Town / SINRD / BC Parks</i>	<i>Town to encourage provincial gov. to include Town's interests in fire management planning processes at the Forest District and BC Parks levels</i>
<i>Local Government Planning</i>	<i>Town/LCFD/CVRD</i>	<i>Coordinate CWPP recommendations for wildfire prevention in boundary areas of CVRD West.</i>
<i>LCFD Communication</i>	<i>LCFD</i>	<i>Ensure members of LCFD understand FireSmart principles and strategies</i>

SECTION 6: Wildfire Response Resources

Interface fires are complex incidents that typically involve both wildland and structural fires. During times when many fires are burning in the Province and threatening multiple communities at

the same time, resource requests can exceed the resources available. In B.C. these resources are deployed according to [BC Provincial Co-ordination Plan for Wildfire Revised July 2016](#).

6.1 Local Government and First Nation Firefighting Resources

6.1.1 Fire Departments and Equipment

The Lake Cowichan Fire Department responds to all fires within the Cowichan Lake Fire Protection Service Area. Fire Departments within CVRD operate under a mutual aid agreement with other fire departments within (and outside) the region. In the case of a serious fire, mutual aid from adjoining fire departments (i.e., Honeymoon Bay, Youbou) benefits fire suppression by pooling manpower and resources (water supply, water tenders, etc.). Fire Departments in the CVRD automatically respond to structure fires and small, easily accessible bush fires. Assistance from the BC Wildfire Service is requested when larger brush fires and/or forest fires occur in the area.



Lake Cowichan Fire Department, North Shore Road.

The Lake Cowichan Fire Department is comprised of the Fire Chief and approximately thirty on-call members. In addition to emergency response services, the Fire Department is very active in the community promoting fire prevention and suppression programs.

The Lake Cowichan Fire Department Resources and Training consist of:

- SPP-WFF 1 Level 1 Trained
- SPP-115 Structure Protection Trained
- Local FireSmart Representatives (2)
- Type 2 SPU Trailer
- Low Slope Rescue
- Swift Water Rescue
- Medical Aid Response-OFA Level 3 First Aid Attendants (10)
- Hazmat Ops/Awareness Trained (4 Members)
- ICS 100 & ICS 200
- STSS

- Structural Fire Fighting Live Fire 101, 201, 301 fully trained and equipped with all PPE & SCBA to perform Interior Firefighting.
- 2 Water Tenders 1800 IG & 1700 IG one with Pump & Roll/Foam
- 15' 6" Polaris Rigid Hull Inflatable w/65hp Jet drive Honda 390 WAJAX Pump
- 2 Structural Fire Fighting Engines (1 w/CAFF 1050 IG Pump & 1000 IG Water Tank) other 1000 IG Pump & Water Tank
- 1 F350 Quad Cab outfitted with Honda 390 WAJAX pump, 250 IG water tank, 100' rubber hose reel, hard suction hose, equipped with foam and forestry rapid attack pack, hose, wyes, nozzles, shovels.
- 1 Command/Rescue Vehicle with awning, rehab, light tower, SCBA filling station. This unit has our JAWS, RDC inflatable, medical, cribbing for MVA's, air power tools & hand tools.
- 3 Members that were deployed in 2017 to Elephant Hill Fire (Cache Creek-Loon Lake-Clinton area) as part of a Structural Protection Team with LCFD Tender #2 working with Burnaby, & Duncan Fire Departments

The Lake Cowichan Fire Department provides fire services to the Lake Cowichan First Nation under contract through the Town. The Lake Cowichan First Nation does not have its own firefighting resources.

6.1.2 Water Availability for Wildfire Suppression

The Town of Lake Cowichan has nearly completed a new water reservoir with a capacity of approximately 1.3 million imperial gallons. Most of the town is hydranted. For areas that are not hydranted, the Lake Cowichan Fire Department is an accredited Superior Tanker Shuttle Service (STS) Fire Department (since 2012). The Fire Department has two tenders to shuttle water to the two engines, and has ample water supply from Lake Cowichan, with known, reliable filling locations identified at strategic locations along the lake. These filling locations have been used for many years during practices and calls.

Both the Town sewer and water treatment facilities have backup power from generators.

6.1.3 Access and Evacuation

The Town of Lake Cowichan is currently engaged in emergency planning with the Cowichan Valley Regional District (CVRD). Currently there are no designated emergency evacuation routes. It is recommended that emergency evacuation routes and procedures be posted on the Town website.

The FireSmart program at the Fire Protection Area found a high number of residences do not have address signage, or if they do, it is concealed. The Lake Cowichan Fire Department is cooperating with FireSmart communities on a program to install reflective address signs.

6.1.4. Training

The Town of Lake Cowichan is currently reviewing its Emergency Response Plan, and has been active in providing training for the public works staff and office staff in Emergency Management, Emergency Operations Centre (EOC), and Incident Command System (ICS) 100. This training has been facilitated with the assistance of the Cowichan Valley Regional District (CVRD), and has involved some members of the Lake Cowichan Fire Department. As indicated in Section 6.1.1., the Lake Cowichan Fire Department has been trained in SPP-WFF1 Level 1 in addition to SPP-115 Structure Protection. Seven members of the department took the SPP-WFF1 train the trainer course in 2017, and have been and will continue to train and certify membership to that standard.

The fire department regularly trains with its neighbouring mutual aid fire departments, and is hopeful to include the BC Wildfire Service in future training events.

Forest industry stakeholders operating in the area require their contractors to take S-100 (Basic Wildfire Fighting) and to do annual refreshers.

6.2 Structure Protection

The Lake Cowichan Fire Department has a fully equipped Type 2 SPU trailer located at the fire hall in the Town of Lake Cowichan. Members have been trained to the SP-115 standard, and would be ready and able to deploy the unit and its contents if required during a wildland urban interface fire in the Cowichan Lake Fire Protection Service Area. Prime locations have been identified for SPUs. The Lake Cowichan Fire Department has strived to educate the public about home and property protection in the event of a wildfire.

6.3 Summary of Recommendations

<i>Recommendation</i>	<i>Responsibility/Funding Source</i>	<i>Next Steps</i>
<i>Joint Training</i>	<i>Town/LCFD & BCWS</i>	<i>As recommended at SIFMO (Dec. 2017), cooperate on joint wildfire training exercises</i>
<i>Develop public procedures for Evacuation Routes</i>	<i>Town/local government</i>	<i>Town to meet with local Emergency Responders, CVRD Emergency Preparedness Post public information on Town website</i>
<i>Address signage</i>	<i>LCFD / Local Residents</i>	<i>Encourage local residents to install address signage through LCFD bulk orders for reflective address signs</i>

Appendix 1 FireSmart Interface Priority Zones

In interface areas, FireSmart advocates the establishment and maintenance of Fuel Management Zones* extending outward from structures and along access routes:

Zone 1a (0-1.5 m) non-combustible zone

FireSmart Priority Zone 1 (0-10 m).

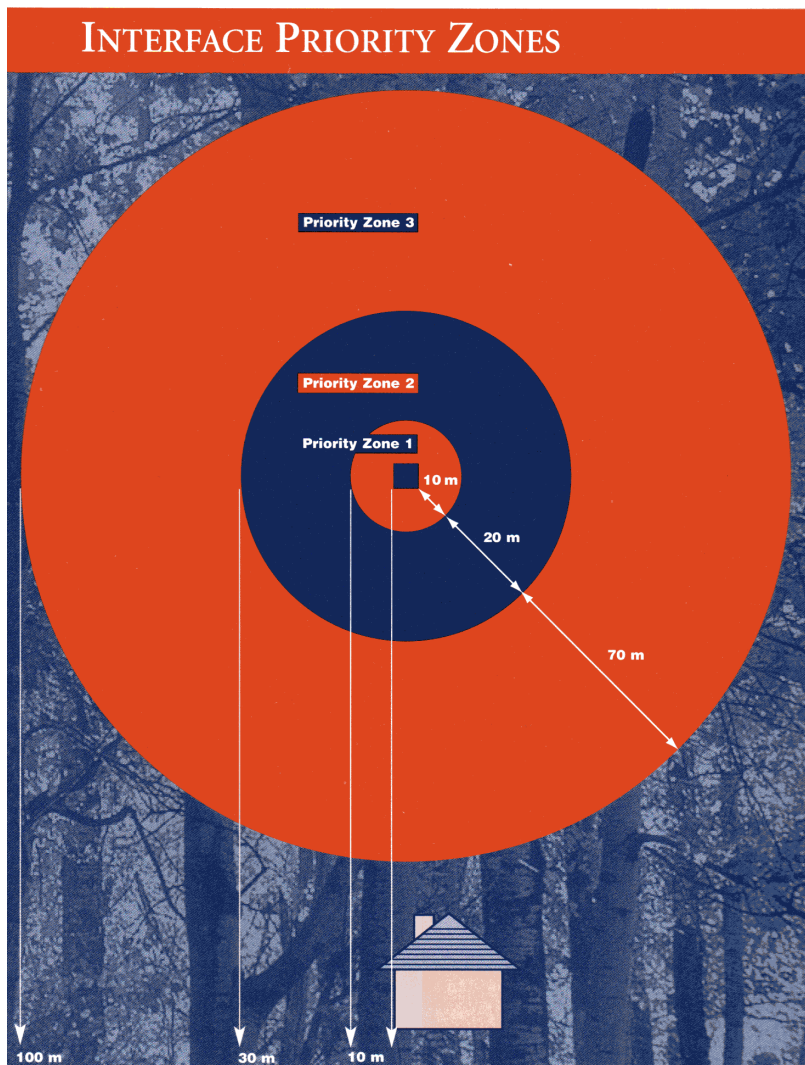
Fuel Reduced Zone 2 (10-30 m).

Fuel Reduced Zone 3 (30-100 m).



Work with your neighbours in any overlapping priority zones!





(FireSmart Partners in Protection)

Priority Zone 1 (0-10 m): The main objective of vegetation management is to create an environment that will not support fire. Vegetation management focuses on fuel removal, conversion, and reduction.

Priority Zone 2 (10-30 m): Where treatment in PZ 1 is not sufficient to significantly reduce the fire hazard due to fuel loading, extend the fuel modified area with a variety of thinning and pruning actions.

Priority Zone 3 (30-100 m): Where fuel modification in PZ1 and PZ2 is insufficient to protect structures and/or property, FireSmart advocates treatment in Priority Zone 3 with a variety of thinning and pruning actions in order to create an environment that will not support high-intensity crown fires.

*Setback Zone distances may be extended depending on aspect, slope, fuel loading, etc.

Appendix 2 CFFDRS Generic Fuel Types (click to follow link)

- [C1 - Spruce–Lichen Woodland](#)
- [C2 - Boreal Spruce](#)
- [C3 - Mature Jack or Lodgepole Pine](#)
- [C4 - Immature Jack or Lodgepole Pine](#)
- [C5 - Red and White Pine](#)
- [C6 - Conifer Plantation](#)
- [C7 - Ponderosa Pine–Douglas-Fir](#)
- [D1 - Leafless Aspen](#)
- [S1 - Jack or Lodgepole Pine Slash](#)
- [S2 - White Spruce–Balsam Slash](#)
- [S3 - Coastal Cedar–Hemlock–Douglas-Fir Slash](#)
- [O1 - Grass](#)
- [M1 - Boreal Mixedwood–Leafless](#)
- [M2 - Boreal Mixedwood–Green](#)
- [M3 - Dead Balsam Fir Mixedwood–Leafless](#)
- [M4 - Dead Balsam Fir Mixedwood–Green](#)

Appendix 3 Fuel Type Change Rationale

Wildfire Threat Assessment – FBP Fuel Type Change Rationale: C5 (previous) changed to modified C-2
Fuel Types 7,8,9,10 (coordinates N 48 50 8/ W 124 07 48; N 48 50 03/ W 124 07 971; N 48 50 175 W 124 08 110; N 48 50 14 W 124 09 246) and 57,67 (N 48 50 316/W 124 08 432; N48 50 535 W124 08 735) are located on lower, south-facing slopes of Bald Mountain in the Marble Bay area, in the western part of the AOI. This area was previously typed as C-5. Wide swaths of the Bald Mountain's lower slopes were logged approximately fifteen years by developer(s). Unlike managed forest lands, the area was not replanted with conifers. Where mature conifer stands once stood, there is now extensive brush interspersed by fragmented stands of mixedwood and conifers. While not an exact fit, vegetation on these slopes can be classified into a modified C-2 Fuel Type. It is important to remember that the CFFDRS Fuel Types are Generic Fuel Types.

Classification of Fuel Types is particularly challenged by conifer stands with sparse, discontinuous tree cover. The type of vegetation cover is not typically seen in other Fuel Types. Regenerating, clumpy Douglas-fir and pine in this area are combined with the high proportion of 1-2 metre high broom and other native and invasive shrubs. Transitional between forested and non-forested areas, the surface and ladder fuels consist largely of continuous brush. Down woody fuels range from low to moderate. The sparse, mostly open-grown trees cover often have crowns nearly to the ground. Fire behaviour associated with this Fuel Type would consist of fast-moving fires. One-hour spread rates would be higher than many other Fuel Types due to the continuity of fuel and the location on warm, south-facing slopes. On-shore afternoon winds from Lake Cowichan would serve to dry out the fuel complexes.

Photos show the variability of forest cover type – fragmented stands of uneven-aged conifers alternate with patchy clumps of conifers and swaths of brush/grass. Continuous grass is limited to park area on lower slope at Warmland Cottages and Woodland Shores.



Extensive areas along the lower, south-facing slopes of Bald Mt were logged within the last fifteen years.