Twin Lakes

FIRESMART COMMUNITY ASSESSMENT REPORT

Prepared for

REGIONAL DISTRICT OF OKANAGAN SIMILKAMEEN

Andy Low, RPF
Brandy Maslowski, BA
DWM WILDFIRE MANAGEMENT INC. | 11510 UPPER SUMMIT DRIVE, COLDSTREAM BC V1B 2B4

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1.0 Introduction

The FireSmart Canada Community Recognition Program is designed to provide an effective management approach for preserving wildland living aesthetics while reducing community ignition potential during a wildland-urban interface (WUI) fire. The program can be tailored for adoption by any community and/or neighborhood association that is committed to ensuring its citizens maximum preparation for wildland fire. The following Community Assessment Report (CAR) is intended to be a resource for residents of Twin Lakes for carrying out the recommendations and actions contained in the Twin Lakes FireSmart Community Plan (FCP).

Both the CAR and FCP have been developed by a trained Local FireSmart Representative (LFR). Funding for the Twin Lakes FireSmart project was provided by the Union of BC Municipalities (UBCM) Strategic Wildfire Prevention Initiative (now the Community Resiliency Investment program) in the form of a FireSmart Planning Grant to the Regional District of Okanagan-Similkameen (RDOS). The grant enabled the RDOS to retain the services of Davies Wildfire Management Inc. to conduct the project.

Community assessments were carried out in July 2018 by Andrew Low, RPF. A community meeting was held on July 11th at the Twin Lakes Golf Course.

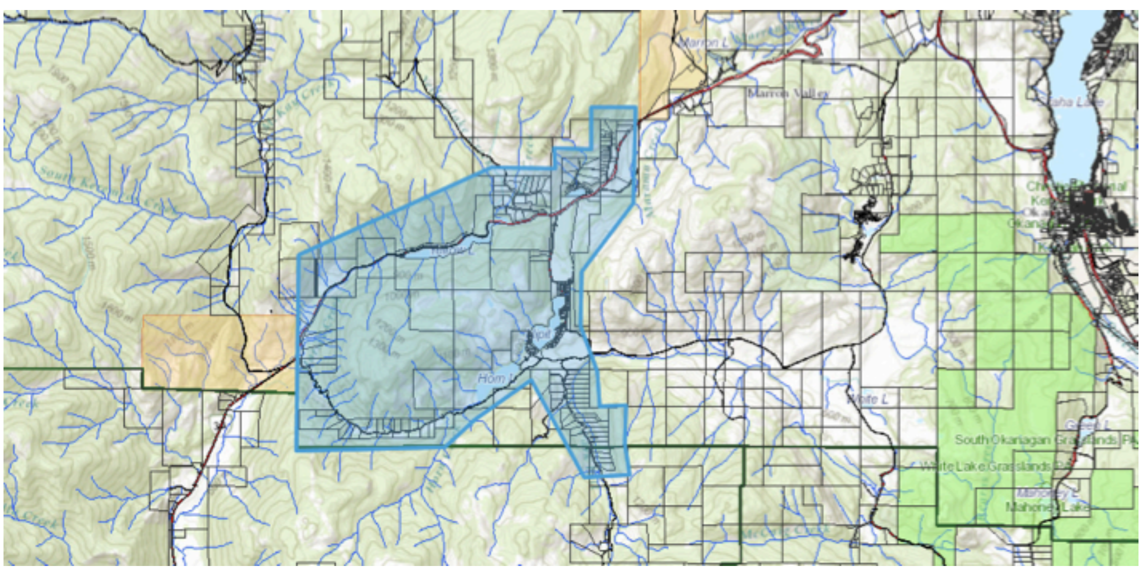

Figure 1 The Twin Lakes FireSmart project

2.0 Definition of the Ignition Zone

Twin Lakes is situated in a wildfire environment. The wildland areas surrounding the community are typical of ecosystems that have developed with historically frequent low intensity fires. With the advent of modern forest protection policies, the typical fire cycle has been interrupted, contributing to a host of cascading ecological effects, including a buildup of forest fuels.

Wildfires have and will continue to occur in the South Okanagan/Similkameen – attempting to eradicate fire has proven to be an impossible strategy. The variables in a wildfire scenario are when the fire will occur, and where. This assessment report addresses the wildfire-related characteristics of Twin Lakes and examines the area's exposure to wildfire as it relates to home ignition potential. The assessment does not focus on specific homes but examines the entire neighbourhood.

A house ignites during a wildfire because of its relationship with everything in its surrounding ignition zone - the house and its immediate surroundings. To avoid a home ignition, a homeowner must eliminate the wildfire's potential relationship with their house. This can be accomplished by interrupting the natural path a fire takes. Changing a fire's path by clearing the ignition zone is an action that can prevent home loss. To accomplish this, flammable items such as excessive vegetation and flammable debris must be removed from the area immediately around the structure to prevent direct flame contact with the house. Reducing the volume of live and dead vegetation will affect the intensity of the wildfire as it nears the home.

Included in this assessment are observations made while visiting Twin Lakes. The assessment addresses the ease with which home ignitions can occur under severe wildfire conditions and how these ignitions might be avoided within the ignition zones of affected residents. Twin Lakes residents can reduce the risk of structure loss during a wildfire by taking actions within their ignition zones. This zone principally determines the potential for home ignitions during a wildland fire; it includes a house and its immediate surroundings within 100 m (Figure 2). Given the extent of this zone, the ignition zones of several homes sometimes overlap, and often spill over onto adjacent public or community land.

The results of the assessment indicate that wildfire behaviour and subsequent losses will be dominated by the residential characteristics of this area. The good news is that residents will be able to substantially reduce their exposure to loss by addressing neighbourhood vulnerabilities. Relatively small investments of time and effort will reap great rewards in wildfire safety.

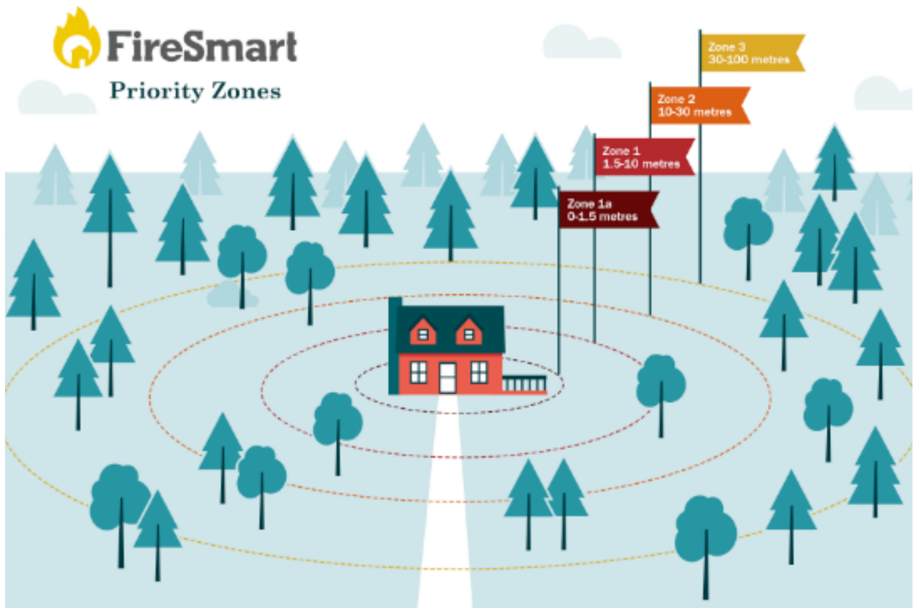

Figure 2 FireSmart Canada utilizes the concept of priority zones surrounding a home to help residents prioritize their hazard reduction efforts. A home's immediate surroundings (Zones 1 and 1a) are of immediate concern to the homeowner and should be targeted aggressively to reduce ignition hazards to the home.

3.0 Description of the Fire Environment

Wildland fire behavior is influenced by the interaction of three broad environmental factors: fuel, weather and topography. Collectively, these factors describe the fire environment and determine the intensity and rate of spread of a wildland fire. A working knowledge of the factors that characterize the fire environment is helpful to building an awareness of hazard mitigation at the site level.

3.1 Fuels

In the context of wildland fire, fuel refers to the organic matter involved in combustion. When referring to the wildland-urban interface, structures, vehicles and other improvements become a component of the fuel complex. An awareness of the fuel conditions around the home will help residents properly assess and mitigate fuel hazards.

In Canada, wildland fuels are classified into 16 fuel types within the Canadian Forest Fire Behavior Prediction (FBP) System. The FBP system is informed by the Canadian Forest Fire Danger Rating System (CFFDRS), which is the primary tool to obtain predictive wildfire management intelligence used by agencies across Canada.

3.1.1 Fuel Layers

The structure and arrangement of fuels are described in terms of their horizontal and vertical continuity within three broad layers of the fuel complex – ground fuels, surface fuels and canopy (or aerial) fuels (Figure 3).

Ground fuels occupy the *duff layer* and the uppermost portions of the soil mineral horizon. In general terms, the duff layer is comprised of decomposing organic material and is found beneath the litter layer and above the uppermost soil mineral horizon (A-horizon). The constituents of the duff layer lack identifiable form due to decomposition (as opposed to the *litter layer*, which is composed of identifiable material).

The surface fuel layer begins above the duff layer and extends 2 m vertically. Surface fuels are characterized by the litter layer (leaves, needles, twigs, cones etc.) as well as plants and dead woody material up to a height of 2m. In some cases, surface fuels may act as *ladder fuels* that can carry fire from the surface fuel layer into the canopy layer.

Canopy fuels are the portions of shrubs and trees that extend from 2 m above the duff layer, upwards to the top of the fuel complex. Certain tree species, such as several spruce species (*Picea sp.)* are characterized by branches extending down to the forest floor, whereby these lower branches act as ladder fuels. Other species, particularly those found in drier, fire-maintained ecosystems, such as Ponderosa pine, lack these ladder fuels and form a distinct separation between the surface fuel layer and canopy fuel layer.

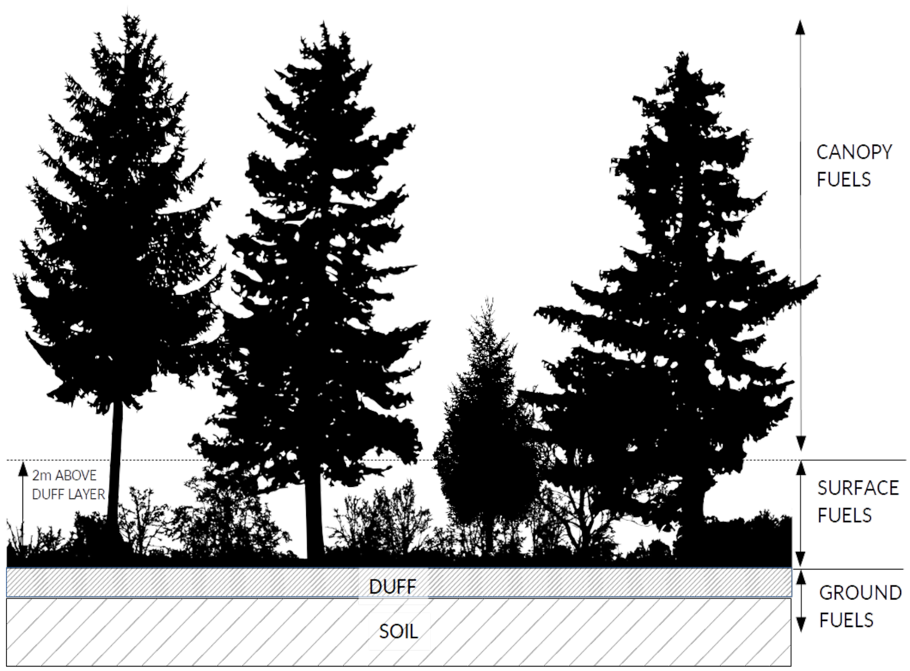

Figure 3 Wildland fuels can be described within three broad fuel layers: Ground fuels, surface fuels (to a height of 2 m above the duff layer), and canopy fuels. Canopy fuels are also referred to as aerial fuels.

3.1.2 Fuel Size

Wildland fuel can be further described in terms of relative size – so called *fine fuels* and *coarse* or heavy fuels. Fine fuels include leaves and conifer needles, grasses, herbs, bark flakes, lichen, twigs etc. Large branches, downed logs and other large woody material are considered coarse or heavy fuels. Fine fuels have a higher surface area/volume ratio than coarse fuels, and this characteristic influences the rate of drying and ease of ignition.

With a higher surface area/volume ratio than coarse fuels, fine fuels are more readily influenced by changes in environmental conditions (e.g. relative humidity, wind, precipitation etc.). Dead fine fuels react to changes in environmental conditions at a relatively faster rate than green (i.e. live) fine fuels.

When available to burn, fine fuels ignite more easily and spread fire faster than coarser fuels. This characteristic makes fine fuels particularly susceptible to ignition from embers. For any given fuel, the more there is and the more continuous it is, the faster the fire spreads and the higher the intensities. Finally, fine fuels take a shorter time to burn out than coarser fuels.

3.2 Weather

Weather conditions affect the moisture content of wildland fuels and influence the rate of spread and intensity of a wildland fire. Weather is the most dynamic element of fire environment and the most challenging to assess and forecast.

3.2.1 Wind

Wind speed and direction influences the rate and direction of spread of a wildland fire. The application of wind on open flame has the effect of tilting the flame away from the wind, and, in the case of wildland fire, placing the flame into closer proximity (or contact) with downwind fuels, and contributing to fire spread. Wind can also contribute to a preheating effect on fuels immediately downwind from open flame.

Wind can also hasten the drying process of exposed fuel, with the rate of drying being a function of the surface area/volume ratio. Having a relatively higher surface area/volume ratio, fine fuel moisture content is affected to a greater degree by wind when compared to coarse fuel.

3.2.2 Precipitation and Relative Humidity

The effect of moisture, in the form of precipitation or atmospheric moisture, on wildland fuel is dependent on the size and state of the fuel. The moisture content of dead fine fuel is highly reactive to changes in relative humidity, precipitation and wind. Fine fuels require less precipitation to reach saturation than do coarse fuels, and in turn dry out at a faster rate.

The moisture content of wildland fuel is constantly seeking to equalize with the moisture content of the surrounding air. This effect is most pronounced with dead fuel. When the relative humidity is high, dead fine fuels will readily absorb moisture *from* the air and conversely, when the relative humidity is low, dead fine fuels will readily give up moisture *to* the air.

3.3 Topography

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

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

3.4 Twin Lakes Fire Environment

Twin Lakes is situated in a fire environment that requires an awareness of the conditions and critical elements of hazard mitigation at the site level.

3.4.1 C7 Fuel Type

Classifying fuel complexes in BC according to the FBP fuel types is an imperfect process, given the diversity of ecosystems in the province in comparison to the rest of Canada. When considering FBP fuel types for a particular fuel complex, the actual species composition is of less importance than the overall stand structure characteristics. The FBP fuel types referenced below specify certain species not found in BC (e.g. red pine and eastern white pine, etc.), however the overall structural characteristics of the fuel types share similarities with the Twin Lakes site conditions. Herein lies the challenge of classifying certain BC forest types into a handful of FBP fuel types. In the Twin Lakes area, the most appropriate FBP fuel type is;

C7 - Ponderosa Pine - Douglas-fir. The C7 fuel type is characterized by relatively open (<50% canopy closure), uneven-aged stands of Ponderosa pine and Douglas-fir (*Pseudotsuga menziesii).* Generally, surface fuels are characterized by perennial grasses, herbs, and scattered shrubs. In the absence of periodic fire (or other maintenance), needle litter tends to build up and persist for some time. Duff layers are relatively shallow – typically less than 3 cm.

3.4.2 Fire Weather

The climatic conditions of the southern interior of British Columbia are broadly characterized by warm, dry summers and cool winters. The south Okanagan is classified as a cold semi-arid climate. Not surprisingly, July - August is the period with lowest average relative humidity and highest daily average temperatures.

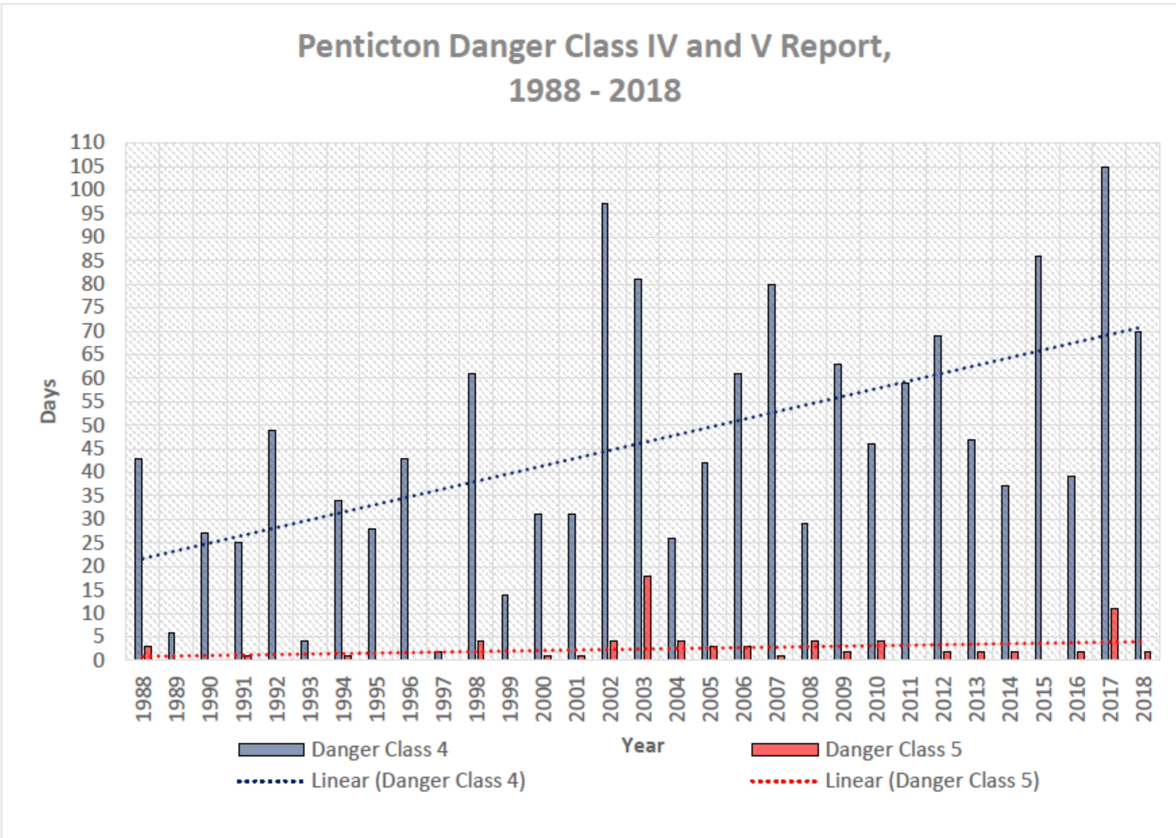

Figure 4 Danger class 4 & 5 report for the Penticton fire weather station, 1998 to 2018. The 2003 fire season recorded the most Danger Class 5 days and the 2017 fire season recorded the most Danger Class 4 days and also showed over a dozen Class 5 days.

In BC, fire weather conditions are often summarized in terms of the *Fire Danger Class.* Fire Danger Class is defined in the Wildfire Regulation and is a rating derived from outputs of the Canadian Forest Fire Weather Index (FWI) System. Although the sole intent of the Fire Danger Class rating scheme is to restrict high risk activities (primarily industrial) occurring on or about forest and grassland areas, the use of Fire Danger Class has been extended to the community wildfire planning field as a straightforward means of characterizing fire weather conditions in an area represented by a weather station. The classification scheme is arranged so that Fire Danger Class 1 is Low, and Fire Danger Class 5 is Extreme.

A Fire Danger Class report for the Penticton fire weather station has been prepared for this assessment. The report (Figure 4) indicates that the annual occurrence Danger Class 4 and 5 days are increasing and that 2017 saw the greatest number of cumulative Danger Class 4 and 5 days.

3.4.3 Topography

Twin Lakes properties are situated around a kettle lake and to the north of the highway 3A. There are valley bottom lakeshore residences and homes to the north of the highway that range from valley bottom to lower third of the slope. A handful of properties are situated along the portion of White Lake Road that is accessed via highway 3A – this road no longer connects through to Twin Lakes Road.

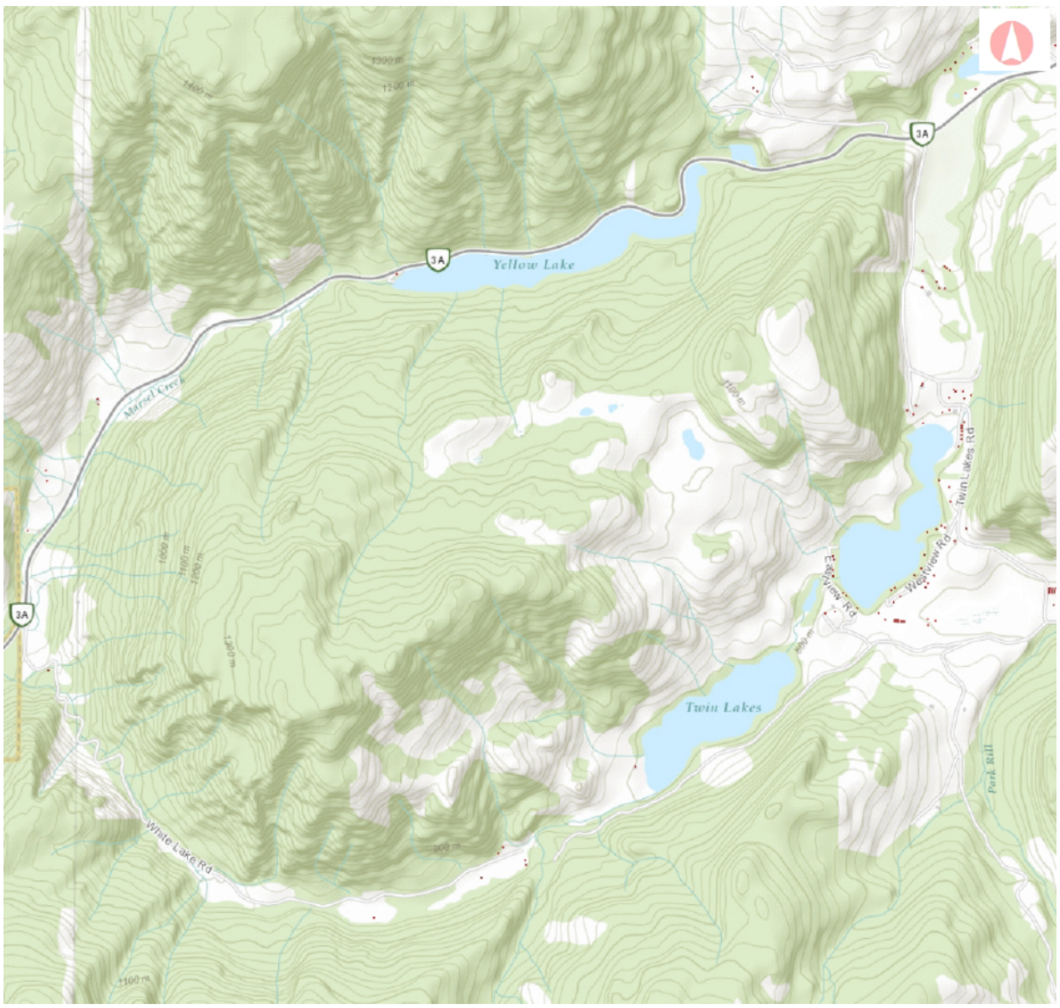

Figure 5 Contour map of the Twin Lakes area.

4.0 Site Description

The Twin Lakes FireSmart project area is a vast area as per the request of the local government. The highest structure density is around the lake. Other portions of the area are larger property sizes and more semi-rural estates.

4.1 Fire History

Fire history data from the provincial government indicates that wildfires have been a frequent occurrence in the Twin Lakes area (Appendix 3), since contemporary fire record-keeping began in the early 1900s. The ecology of the area is typical of landscapes that experienced frequent low-intensity natural and anthropogenic fires. At the landscape scale, numerous areas have burned multiple times over the past century alone. Over thousands of years, wildfire would have been a regular occurrence throughout the area.

In the 1950s detailed wildfire record-keeping was standardized and is available from the province for analysis. This dataset indicates that a few smaller fires (< 3 ha) have occurred in close proximity to the Twin Lakes FireSmart area since that time.

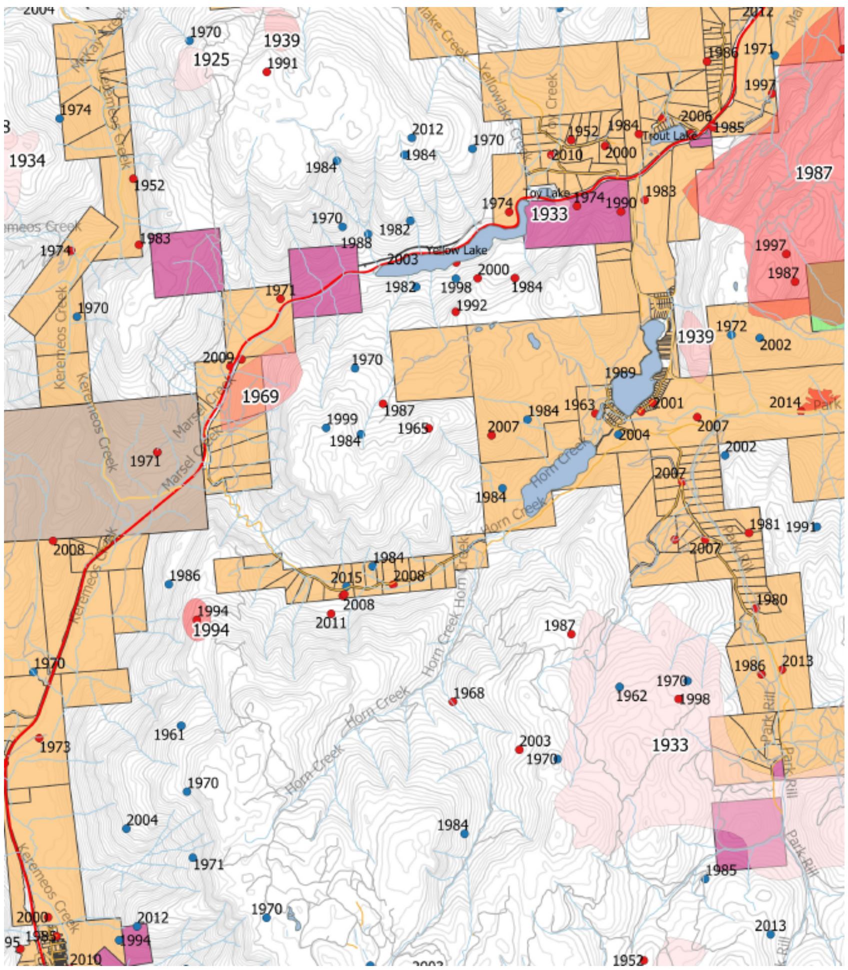

Figure 6 A fire history analysis of the region around Twin Lakes indicates that several large fires occurred in the area in the 1920s. A full fire history map has been created for Twin Lakes owners as an attachment to this assessment report.

5.0 Assessment Process

An initial reconnaissance of the project area was conducted in July 2018 by the author to gain familiarity with the neighbourhood in the context of FireSmart guidelines. The assessment process follows the three-phased approach of the FireSmart Canada Community Recognition Program (FCCRP).

A letter and event brochure were distributed to residents of the Twin Lakes project area, inviting them to the initial FireSmart community meeting, held on July 11th, 2018 at the Twin Lakes Golf Course. The meeting was an opportunity to learn about the FireSmart Communities Program and explain the community recognition process and was well attended.

A more in-depth landscape assessment was conducted on July 18th and 19th. A hazard assessment follow-up event is still planned for the spring of 2019. This will be an opportunity to ground truth some of the big picture perceptions of the landscape assessment while also establishing some baseline data points that residents could refer to.

6.0 Observations and Issues

Full observations were noted during the community wildfire hazard assessment. See Appendix 1 to view the entire community wildfire hazard assessment form and notations.

6.1 Roof Assemblies

A home's roof is the largest surface most exposed to embers during a wildfire. Homes with a flammable wood shake roof have a much higher probability of igniting during a wildfire compared to non-wood roofing systems. In Twin Lakes a mix of roofing materials in use. Roofing materials observed include ULC rated materials (mainly asphalt) as well as several homes with wood shakes. Asphalt provides a rated degree of fire resistance (e.g. Figure 7) but the wood shakes pose the highest degree of ignition concern during wildfire. Most roofs observed had some amount of accumulated combustible debris. The fire resistance of most roofing materials is reduced when accumulated debris burns on the roof surface.

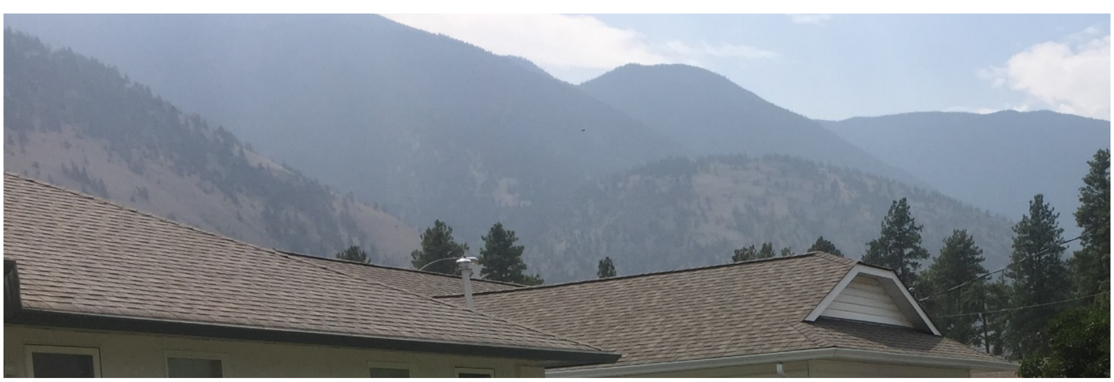

Figure 7 Roofs with a ULC rating, such as these asphalt composite shingles, provide a degree of fire resistance able to withstand ember ignition.

6.2 Building Exteriors

Risk factors associated with the exterior surface of a structure are less dependent on the characteristics of the exterior cladding system (e.g. stucco vs. cement board vs. vinyl siding etc.) and more dependent on the likelihood of direct flame contact and/or ember accumulation on the structure. Accumulated fuel along an exterior wall can negate the fire-resistant advantages that any particular exterior cladding system provides, should the fuel ignite.

This is especially important when assessing features that are attached to a home, such as decks and porches. Decks are often used for dry storage of a variety of materials, including firewood, building materials, outdoor furniture etc. Should these stored materials ignite, the deck above is likely to ignite as well, most likely leading to the ignition and subsequent destruction of the home.

Decks that extend out over a slope require careful assessment (Figure 8). A fuel-laden slope leading up towards a deck could result in direct flame contact or ember accumulation on the deck or stored material under the deck. The underside of the deck may also trap heat from a fire coming upslope towards the structure, further contributing to increased ease of ignition.

Figure 8 Decks that extend out over a slope require careful assessment of downslope fuels and the ignition potential of the deck.

When boards are used for the decking surface, any gaps between boards should be viewed as avenues for organic debris to fall through and accumulate underneath the deck. These gaps can also permit embers to fall through and ignite accumulated debris under the deck, likely resulting in the ignition of the deck and the house.

If combustible material is going to be stored under a deck, this area should be sheathed in 12 mm exterior-grade plywood or screened with 3 mm non-corrosive metal screening to prevent embers from entering the space and igniting the stored material. Areas underneath deck boards should be assessed for debris accumulations and cleaned out as needed. When a deck extends out over a slope, fuel mitigation efforts need to be extended further down the slope. FireSmart Canada has developed a guideline for expanding the treatment area on slopes below a structure, as illustrated in Figure 9.

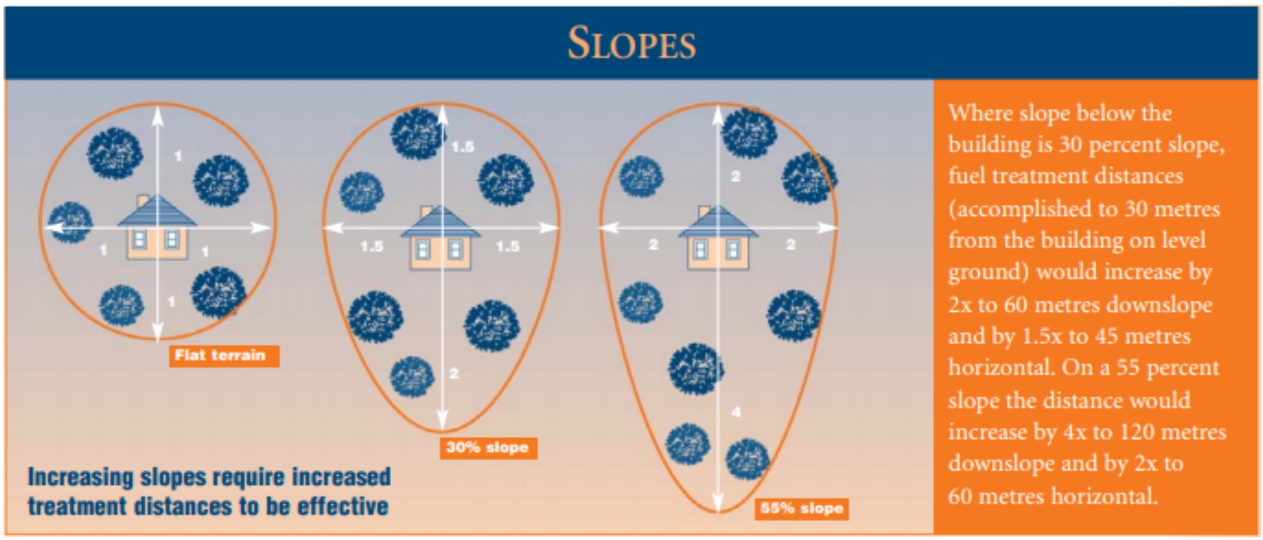

Figure 9 FireSmart Canada recommends expanding the treatment areas downslope from a home to account for the increased rate of spread and associated fire intensity of a fire spreading upslope towards the house (Figure reproduced from the Protecting Your Community from Wildfire manual published by FireSmart Canada and Partners in Protection).

6.3 Vegetation

Vegetation is assessed in three concentric zones around a home (Figure 2), with Zone 1 being the area occupying the first 10 m around the structure. More recently Zone 1 has been further divided to distinguish the importance of the first 1.5 m from a structure. The quantity and condition of canopy, ladder and surface fuels are the key factors assessed.

At Twin Lakes, many locations lack overstory. Where overstory exists in the PZ-1 its predominantly Ponderosa pine (Py) and Douglas-fir (Fd). A secondary component of ornamental conifers is well-established in PZ-1 and in most cases, these are presenting a fuel hazard to adjacent homes.

Figure 10 The cedar hedges pictured here have ladder fuels almost to the ground and have junipers beneath them. The junipers could ignite from embers and the trees could wick fire to the truck and subsequently ignite the house.

One vegetation feature that is popular and pervasive in landscaping is arborvitaes (cedar) and juniper shrubs and hedges (figure 10). The presence of these conifers in Zone 1 needs to be carefully considered, as they are extremely volatile from a fire behavior standpoint. Having a cedar or juniper shrub growing against a house could be the source of a home ignition in the event that these plants combust during a wildfire. A long cedar hedge that leads to a house can be viewed as a veritable wick of fuel waiting for a wildfire to light it.

Another popular, low maintenance landscaping strategy that presents a home ignition hazard is the use of bark mulch as a ground cover. During the hot summer months, bark mulch will dry out and become extremely receptive to ember ignition and conducive to persistent surface fire spread. Bark mulch should be viewed as a fuel bed that can effectively transport fire throughout its extent. Homeowners should consider any flammable connections between a bark mulch bed and the house (e.g. wood siding, wood stairs etc.) as a pathway for direct flame contact that could result in the ignition of the home. Twin Lakes has several examples of bark mulch used in landscaping.

Many of the homes in Twin Lakes have overlapping Zones where one home's Zone 1 is the adjacent home's Zone 1. This is a common characteristic of higher-density WUI areas and it reinforces the view that many individual FireSmart efforts can increase the overall wildfire resilience of the entire neighbourhood. Unfortunately, the same holds true when one (or more) homes aren't FireSmart and pose a threat to adjacent homes that are.

6.4 Nearby Combustibles

In the context of the structure and site hazard assessment, *nearby combustibles* refer to non-vegetative fuel, such as firewood, wood fences, sheds etc. One such fuel in this category is firewood stacked within 10 m (or directly adjacent) of the structure. (Figure 11) Firewood stacked against the house, in a carport, in a nearby open shed or under an open deck space during the summer, is a bad combination. A stack of firewood has ample gaps and surface area where embers could deposit and ignite, and if the stack is situated too close to the house, ignition of the structure is likely. Avoid this possibility during the summer by storing firewood well away from the home (a minimum of 10 m), so that if the firewood stack does ignite during a wildfire, the house won't follow suit. If firewood is stored in a woodshed within 10 m of the house, and the shed can't be relocated further away from the house, the woodshed should be retrofitted to prevent embers from entering the shed and igniting the firewood. This retrofit can be accomplished through a combination of 12 mm exterior-grade plywood sheathing and 3 mm non-corrosive screening, and still provide adequate airflow to season the stored firewood.

Figure 11 The presence of nearby vegetation and/or combustibles such as a woodpile that can ignite with relative ease and burn with high-intensity can present a hazard to a building's exterior. In this example, the woodpile has been situated far enough from the house so as to minimize this hazard.

Wood fences, particularly those that attach to the house (e.g. Figure 12), can provide a pathway for fire to potentially ignite the house. Where a wood fence is within 10 m of a house, the entire fence should be assessed for locations where the fence intersects any fine fuel beds, such as bark mulch, natural grasses etc.

For example, a wood fence with a bark mulch bed up against it is susceptible to embers igniting the bark mulch and in turn igniting the fence.

As well, a wood fence that backs onto natural grasses could ignite from a low-intensity surface fire moving through the grass. In either case, the length of the fence could burn, including the portion where the fence attaches to the house, potentially leading to ignition of the structure. One strategy that can help to maintain the privacy of a wood fence while also lowering the chance of a connected fence from igniting the house, is to install a metal gate at or near the fence-house junction.

Figure 12 This wood fence bisects a bark mulch bed and connects to the house. Embers could ignite the bark mulch, leading to the fence catching on fire and posing a threat to the attached house. Note: this photo is not from Twin Lakes.

Even innocuous items commonly found around the outside of a home may act as combustibles that could ignite the structure. Flammable patio furniture (particularly seat cushions), sisal doormats and rugs, or even a corn broom leaning against the house are all potential fuels that could ignite from ember accumulation.

6.5 Evacuation Routes

Residents who live on the portion of White Lake Road that is accessed from Hwy 3A no longer have the option of evacuating to the east to Twin Lakes Road (Figure 13). Rather, their only option is to proceed west down White Lake Road to Hwy 3A. This portion of White Lake Road includes several switchbacks on the decent to the highway through a moderately dense stand of Douglas-fir and Ponderosa pine.

This stretch of White Lake Road also includes an area that has experienced several person-caused fires in recent years, attributable to a specific location. This type of situation can be difficult for residents, as there are often overlapping areas of regulatory jurisdiction and little sense of arriving at a solution. What is needed in this particular area is advocacy for the residents for increased fire prevention so that they can feel a greater sense of safety.

A potential scenario that is of significant concern is one where a wildfire occurs close to Hwy 3A and burns upslope towards the switchbacks on White Lake Road. As this route is the only means of ground evacuation for the residents further up along White Lake Road, this scenario could prevent an evacuation from occurring, or put people at risk while attempting to evacuate.

Figure 13 The White Lake Road no longer connects between Hwy 3A and Twin Lakes Road.

7.0 Recommendations

The FireSmart Canada Community Recognition Program promotes a resilient balance between residential safety and the natural aesthetics of living in the WUI. Homeowners already balance their decisions about fire protection measures against their desire for certain flammable components on their properties. It is important for them to understand the implications of the choices they are making. These choices directly relate to the ignition potential of their home ignition zones during a wildfire.

Homeowners and the community must focus attention on the home and surrounding area and eliminate a wildfire's potential relationship with the house. This can be accomplished by disconnecting the house from high and/or low-intensity fire that could occur around it, and by being conscious of the effects of wind-driven embers.

The following recommendations are intended to guide homeowners and the RDOS in focusing their efforts to reduce private property fuel hazards and the likelihood of a home ignition:

- reduce or eliminate the amount of cedar and juniper shrubs and hedges on private property within 10 m of a structure. A cedar or juniper shrub/hedge should never be grown directly against the home in the WUI;
- replace bark mulch with a non-flammable ground cover where it adjoins the home or intersects with a wood structure attached to the home;
- Remove flammable material from under deck spaces. If the space under a deck is to be unsheathed or unscreened, the space must be free of any material that could ignite via ember or direct flame contact.
- maintain the existing high degree of roof cleanliness;
- carefully assess the ignition potential of wood fences, especially those that are connected to the house. Consider a metal gate or fence panel to eliminate connectivity between the house and a susceptible wood fence;
- RDOS should seek to have the White Lake Road reopened between Hwy 3A and the Twin Lakes Road to permit a secondary evacuation route for residences on White Lake Road that are accessed via Hwy 3A;
- RDOS needs to recognize that a wildfire setting issue has existed along the portion of White Lake Road that is accessed via Hwy 3A and should help to bring resident concerns forward to the multiple agencies that have jurisdiction over such issues (i.e. BCWS, RCMP, FLNRORD, COS).

8.0 Successful FireSmart Mitigations

When adequately prepared according to FireSmart guidelines a house can likely withstand a wildfire without the intervention of the fire service. Furthermore, a house and its surrounding neighbourhood can be both FireSmart and compatible with the area's ecosystem. The FireSmart Communities Program is designed to enable neighbourhoods to achieve a high level of protection against wildfire loss while maintaining a sustainable ecosystem balance.

Other than the replacement of an unrated wood roof or replacing a flammable deck, most FireSmart hazard mitigations around the home are inexpensive and straightforward. In many ways, hazard mitigation and spring yardwork go together and can be scheduled as such. Most often it is the small things that a homeowner attends to that can make a big difference in whether their home will survive during a WUI fire. The following are good examples of small steps that homeowners in the Twin Lakes area have put in place to make their neighbourhood more resilient to wildfire.

8.1 Fire-Resistant Roofing

Replacing a roof is one of the single-most expensive FireSmart improvements. The combination of a rated roof that is free of fuel accumulations is a big step to improving the survivability of a home during a wildfire event.

Figure 14 Roofing materials observed were predominantly ULC rated materials (mainly asphalt) and a few with wood shakes.

8.2 Landscaping

Residents of Twin Lakes can strive to establish less-flammable vegetation and landscaping solutions in their respective Zone 1 areas. The use of landscape rock and less-flammable vegetation is one such example (Figure 15) but the replacement of bark mulch and the situation of coniferous trees within 10 m of the home will add points to the home hazard assessment. Keep the understory around your home relatively clean by raking up fire fuels and having rock or a clean lawn. Maintaining a green lawn and placing walkways and patios are also examples of landscape design that serve to disconnect the home from direct flame contact from adjacent fuel. Landscaping employed according to FireSmart principles has the effect of minimizing the chance of embers igniting fuel adjacent to the home and reducing the chance of direct flame contact to occur.

Figure 15 An example of non-flammable ground cover and less-hazardous plant selections being used in landscaping.

9.0 Next Steps

A FireSmart Board for Twin Lakes needs to be firmed up as one of the next steps in the spring. The following standards have been incorporated into the Twin Lakes FireSmart Community Plan for when the FireSmart Board is in place:

- Support the Twin Lakes FireSmart Board in their goal to maintain the Twin Lakes FireSmart Community Plan and ongoing recognition status.
- Invest a minimum of $2.00 annually per capita in its local FireSmart Events and activities (work done by municipal employees or volunteers, using municipal or other equipment, can be included, as can provincial/territorial grants which are dedicated to that purpose).
- Hold a FireSmart Event (e.g. FireSmart Day) each year that is dedicated to a local FireSmart project.
- Submit an application form or annual renewal application form with supporting information to FireSmart Canada. This application or renewal process documents continuing participation in the FireSmart Communities Program with respect to the above criteria.

10.0 Signature of Local FireSmart Representatives

Signed: 	Date signed: January 25 2019	Andrew K. Low, RPF Andy Low, RPF Davies Wildfire Management andy@daviewwildfire.com
Signed: 	Date signed: January 25 2019	Brandy Maslowski, FLSE Davies Wildfire Management brandy@davieswildfire.com

APPENDIX 1 - Community Wildfire Hazard Assessment Form for Twin Lakes

This Community Wildfire Hazard Assessment form provides a written evaluation of the overall community wildfire hazard – the prevailing condition of structures, adjacent vegetation and other factors affecting the FireSmart status of a small community or neighbourhood. This hazard is based on the **hazard factors** and **FireSmart recommended guidelines** found in **FireSmart: Protecting Your Community from Wildfire** (Partners in Protection, 2003) and will assist the Local FireSmart Representative in preparing the FireSmart Community Assessment Report. **NOTE: Mitigation comments refer to the degree to which the overall community complies or fails to comply with FireSmart recommended guidelines with respect to each hazard factor**

Community Name: RDOS – Twin Lakes		**Date: July 18-19, 2018**
Assessor Name: A.Low		**Accompanying Community Member(s):N/A**
Hazard Factor	**Ref**	**Mitigation Comments**
1. Roof Assemblies		
a. Type of roofs ULC rated (metal, tile, asphalt, rated wood shakes) unrated (unrated wood shakes)	2-5 3-21	A mix of roofing materials in use. Roofing materials observed were predominantly ULC rated materials (mainly asphalt) and a few with wood shakes.
b. Roof cleanliness and condition * *Debris accumulation on roofs/in gutters; curled damaged or missing roofing material; or any gaps that will allow ember entry or fire impingement beneath the roof covering*	2-6	Most roofs observed had few accumulated combustible debris. The fire resistance of most roofing materials is reduced when accumulated debris burns on the roof surface. Gutter accumulations were not able to be observed.
2. Building Exteriors		
2.1 Materials		
a. Siding, deck and eaves	2-7 2-8 2-9	A broad range of siding materials were observed, including wood, stucco, vinyl and cement board. Eave conditions were not observed.

b. Window and door glazing (single pane, sealed double pane)	2-10	Window construction can be difficult to assess at the community level. However, given the age and characteristics of the homes in the community, it can be assumed that most windows are double pane, which provide at least moderate protection. Regarding windows, focus vegetation management or removal within 10m of windows and glass doors, paying particular attention to fuels that could impinge on large picture windows.
c. Ember Accumulator Features (scarce to abundant) * *Structural features such as open eaves, gutters, unscreened soffits and vents, roof valleys and unsheathed crawlspaces and under-deck areas*		Moderate. Most exposure is attributed to under-deck areas and deck board surfaces. For under-deck areas, remove combustible accumulations that could that could be ignited by embers. If able to do so, enclose or at minimum screen, ember accumulator features. Screening should consist of corrosion-resistant, 3mm non-combustible wire mesh.
d. Nearby Combustibles – firewood, fences, outbuildings	2-11	Mainly firewood and wood fences. During fire season, store firewood at least 10m from the building. When choosing fencing options that adjoin the building, consider the flammability of the fencing, particularly where it attaches to the house.

Hazard Factor	Ref	Mitigation Comments
3. Vegetation		
3.1 **PZ-1:** Vegetation - 0 - 10m from structure **Page Reference 3-5**		
a. Overstory forest vegetation (treated vs. untreated)	2-14	Many locations lack overstory. Where overstory exists in the PZ-1 its predominantly Ponderosa pine (Py) and Douglas-fir (Fd). A secondary component of ornamental conifers are well-established in PZ-1 and in most cases, these are presenting a fuel hazard to adjacent homes.
b. Ladder fuels (treated vs untreated)	2-17	Majority of ladder fuels in PZ-1 are attributed to juvenile conifers or ornamental spruce and cedar hedges that have branches extending down to ground level, as well as some use of mature cedar hedges established along lot boundaries for privacy. Mature Py and Fd are generally self-pruning.
c. Surface fuels - includes landscaping mulches and flammable plants (treated vs untreated)	2-16	Bark mulch is being used on several properties for landscaping ground cover; in some cases, immediately adjacent to buildings. Coniferous ornamental plants (e.g. juniper; cedar; and cypress) are also highly abundant and often found immediately adjacent to buildings. Bark mulch is a receptive fuel bed for ember ignition, when available to burn. In general, ornamental conifers are highly flammable, due to volatile compounds, as well as a form and structure conducive to ignition and flaming combustion.

3.2 **PZ-2:** Vegetation - 10 - 30m from structures **Page Reference 3-9**		
a. Forest vegetation (overstory) treated vs untreated	2-14	Primarily Ponderosa pine with a Douglas-fir component within overlapping priority zones.
b. Ladder fuels treated vs untreated	2-17	Majority of ladder fuels are attributed to ornamental spruce and cedar hedges within overlapping priority zones..
c. Surface fuels treated vs untreated	2-16	PZ-2 transitions to native plants (e.g. pinegrass, big sagebrush). Ponderosa pine needle litter accumulations present. Examples of landscaping extending from PZ-1 to PZ-2.
3.3 **PZ-3:** Vegetation - 30 - 100m from structures **Page Reference 3-13** Provide mitigation comments on the prevailing PZ3 fuel type		
a. Light fuel - deciduous – grass, shrubs	2-16	PZ-2 transitions to native plants (e.g. pinegrass, big sagebrush). Ponderosa pine needle litter accumulations present.

Hazard Factor	**Ref**	**Mitigation Comments**
b. Moderate fuel - mixed wood – light to moderate surface and ladder fuels, shrubs	2-17	Sparse to scattered. Mainly understory Douglas-fir and occasional deciduous shrubs.
c. Heavy fuel - coniferous - moderate to heavy surface and ladder fuels, shrubs	2-14	C7 fuel types tend to be characterized by an open stand structure when managed for typical condition.

d. Logging slash, dead/down fuel accumulations	2-16	No slash or significant dead/down fuel accumulations observed.
e. Diseased forest – without foliage vs with foliage		No significant forest health factors observed.
f. Fuel islands <u>within</u> community - treated vs untreated		The project area is fairly large, with extensive areas of inter-mix and what could be considered fuel islands. These are all on private land.
4. Topography		
4.1 Slope (within 100m of structures)		
a. Slope - Flat or < 10 %, 10 – 30% or >30%	2-19	Variable ranging from flat to 30%+.
4.2 Buildings setback on slopes >30 %, position on slope Provide mitigation comments on items a – c as applicable		
a. Setback from top of slope > 10m, or bottom of slope – valley bottom. b. Buildings located mid-slope c. Setback from top of slope <10m, or upper slope	2-12	Building sites are generally valley bottom or lower 1/3 slope. There are examples of homes on the lower slopes that have minimal setback. Fortunately, these tend to be in the open or at least sparsely treed.

Hazard Factor	Ref	Mitigation Comments
5. Infrastructure – Access / Egress, Roads, Driveways and Signage		
5.1 Access Routes – Road Layout To FireSmart Recommended Guideline?		

a. Single Road or Looped Road	3-28	Several dead-end roads. Most concerning is the White Lake Road from HWY 3A, the road is washed out and impassable by truck between Twin Lakes and HWY 3A.
5.2 Roads- width, grade, curves, bridges and turnarounds		
a. To FireSmart Recommended Guideline?	3-30	White Lake Rd from HWY 3A has steep grades and tight switchbacks.
5.4 Fire Service Access / Driveways - Grade, Width/Length, Turnarounds		
a. To FireSmart Recommended Guideline?	3-30	Typical residential driveways and inconsequential for fire response.
5.5 Street Signs / House Numbers		
a. To FireSmart Recommended Guideline?	3-30	Yes.
6. Fire Suppression - Water Supply, Fire Service, Homeowner Capability		
6.1 Water Supply		
a. Fire Service water supply – hydrants, static source, tender or no water supply	3-32	Natural or residential water sources. Well water is generally reliant on power unless a backup system is available.
6.2 Fire Service		
a. Fire Service < 10 minutes or > 10 minutes, no fire service	2-25	No fire service other than wildfire.
6.3 Homeowners Suppression Equipment		

a. Shovel, grubbing tool, water supply, sprinklers, roof-top access ladder	3-28	Limited to typical garden tools and equipment.

Hazard Factor	Ref	Mitigation Comments
7. Fire Ignition and Prevention – Utilities, Chimneys, Burn Barrel / Fire Pit, Ignition Potential		
7.1 Utilities		
a. To FireSmart Recommended Guideline?	2-24	Overhead, wood pole powerlines.
7.2 Chimneys, Burn Barrel / Fire Pit		
a. To FireSmart Recommended Guideline?	2-22	Not assessed.
7.3 Ignition Potential Provide mitigation comments on items a – d as applicable		
a. Topographic features adversely affect fire behaviour b. Elevated probability of human or natural ignitions c. Periodic exposure to extreme fire weather or winds d. Other	2-21	a. This varies across the project area. The most challenged area is the portion of White Lake Rd accessed from HWY 3A.. b. Yes. History of fire setting in the area. The portion of White Lake Rd accessed from HWY 3A has a history of fire setting problems. c. The Okanagan typically experiences periods of extreme fire weather each summer. d. Landscaping choices are contributing to home ignition potential in this area. A reduction in the amount of ornamental conifers within PZ-1 should be a high priority for homeowners.

General Comments

With no fire protection service Twin Lakes residents are reliant on themselves and the BC Wildfire Service during a wildfire in their area. This further exemplifies the need to prepare homes to survive the passage of a wildfire without the intervention of BC Wildfire, as their response is not always guaranteed, so can they quickly attend to a large number of threatened structures. Fortunately, the fuel types found in the Twin Lakes area are predominantly light and easy to manage. Creating separation between structures and surrounding fuel is vital in the first 1.5m from a building and should extend out to 10m ideally.

APPENDIX 2 - Structure and Site Hazard Assessment Form

STRUCTURE AND SITE HAZARD ASSESSMENT FORM

Factor	Page reference	Characteristics and point ratings					Score
1 Roofing material	2-5	Metal, tile, asphalt, ULC-rated shakes or non-combustible material	Unrated wood shakes				
		0	30				
2 Roof cleanliness	2-5	No combustible material	Scattered combustible material, <1 cm in depth	Clogged gutter, combustible material ≥1 cm in depth			
		0	2	3			
3 Building exterior	2-7	Non-combustible stucco or metal siding	Log, heavy timbers	Wood or vinyl siding or wood shake			
		0	1	6			
4 Eaves, vents and openings	2-8	Closed eaves, vents screened with 3 mm mesh and accessible	Closed eaves, vents not screened with 3 mm mesh	Open eaves, vents not screened, debris accumulation			
		0	1	6			
5 Balcony, deck or porch	2-9	None, or fire-resistant material sheathed in	Combustible material, sheathed in	Combustible material, not sheathed in			
		0	2	6			
6 Window and door glazing	2-10	Tempered	Double Pane		Single Pane		
			Small/medium	Large	Small/medium	Large	
		0	1	2	2	4	
7 Location of nearby combustibles	2-11	None or >10 metres from structure	<10 metres from structure				
		0	6				
8 Setback from edge of slope	2-12	Adequate	Inadequate				
		0	6				
9 Forest vegetation (overstory)	2-14	Deciduous	Mixed wood	Coniferous			
				Separated	Continuous		
<10 metres		0	30	30	30		
10 - 30 metres		0	10	10	30		
10 Surface vegetation	2-15	Lawn or non-combustible material	Wild grass or shrubs	Dead and down woody material			
				Scattered	Abundant		
<10 metres		0	30	30	30		
10 - 30 metres		0	5	5	30		
11 Ladder fuels	2-17	Absent	Scattered	Abundant			
10 - 30 metres		0	5	10			
						Total Score for Factors 1 – 11	
						Structure and Site Hazard Level	

Hazard Level	Low <21 points	Moderate 21-29 points	High 30-35 points	Extreme >35 points

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APPENDIX 3 – Fire History Map