City of Nelson Community Wildfire Protection Plan Update - 2015

Submitted to:

Fire Chief Len MacCharles
Nelson Fire & Rescue Service
City of Nelson
919 Ward St.
Nelson, BC V1L 1T5
Phone: 250-352-3101
Email: lmaccharles@nelson.ca

Submitted by:

B.A. Blackwell & Associates Ltd.
270 – 18 Gostick Place
North Vancouver, BC V7M 3G3
Phone: 604-986-8346
Email: bablackwell@bablackwell.com

Cathro Consulting Ltd.
Box 1193
Kaslo, BC, V0G 1M0
Phone: 250-505-3513
Email: cathro@netidea.com

B.A. Blackwell & Associates Ltd.

CONSULTING CATHRO

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and

Cathro Consulting Ltd.
Box 1193
Kaslo, BC, V0G 1M0
Phone: 250-505-3513
Email: cathro@netidea.com

RPF Printed Name		**RPF Printed Name**	
Bruce Blackwell	**RPF 2073**	**John Cathro**	**RPF 3769**
Date Signed		**Date Signed**	
December 13, 2016		December 13, 2016	
			
I certify that I have reviewed this document and I have determined that this work has been done to standards acceptable of a Registered Professional Forester.		I certify that I have reviewed this document and I have determined that this work has been done to standards acceptable of a Registered Professional Forester.	

ACKNOWLEDGEMENTS

The authors would like to thank the staff of the City of Nelson, particularly Len MacCharles, Fire Chief, for his assistance in the development of the plan and Fire Fighter Scott Jeffery, for his input and support.

In addition, the authors would like to thank, for their input and insight, Ministry of Forests, Lands and Natural Resource Operations staff including George Edney, District Manager Selkirk Resource District; Garth Wiggill, Director/Strategic Initiatives Kootenay Boundary Region; and Curt Nixon, Tenures Forester; as well as BC Wildfire Service Southeast Fire Centre Fuels Management Specialist Mike Morrow. This report would not be possible without the Strategic Wildfire Prevention Initiative (SPWI) Program and funding from the Union of British Columbia Municipalities (UBCM).

EXECUTIVE SUMMARY

The Community Wildfire Protection Plan (CWPP) Program was created in British Columbia as a response to the devastating 2003 wildfire in Kelowna. As an integral part of the Strategic Wildfire Prevention Initiative (SWPI), managed and funded through the Union of British Columbia Municipalities, CWPPs aim to develop strategic recommendations to assist in improving safety and to reduce the risk of damage to property from wildfires. In 2008, a Community Wildfire Protection Plan was completed for the Nelson Contract Fire Protection Area to help guide the City of Nelson in wildfire risk reduction and mitigation activities. This document intends to update the 2008 CWPP and the threat of wildfire within and around the municipality. Specifically, this 2015 CWPP Update reflects changes in the community and current conditions using the current provincially accepted standard methodology and baseline data for hazard and threat analysis. This CWPP Update also examines the effectiveness of completed work, identifies opportunities for improvement within existing programs, and describes future initiatives. Significantly, the City of Nelson is engaging in collaborative planning and implementation of wildfire risk reduction activities with neighbouring jurisdictions (Regional District of Central Kootenay and BC Parks) and this landscape level approach is reflected in the Plan.

Wildfire management requires a multi-faceted approach for greatest efficacy and risk reduction. Five key areas where changes can be made to address community wildfire risk are identified in this CWPP Update and include: Communication and Education; Structure Protection; Planning and Development; Emergency Preparedness; and Vegetation/Fuel Management. A total of 32 prioritized wildfire mitigation recommendations are made in this Plan and summarized below. While it is recognized that the City of Nelson will not likely have the resources required to act upon all recommendations, it is recommended that the City review and identify resource requirements and develop a timeframe for implementation of prioritized recommendations as available funding and resources allow.

Item	Priority	Recommendation	Estimated Cost ($)
Communication and Education (Section 7.1)			
Objective: To improve public understanding of fire risk and personal responsibility by increasing resident awareness of the wildfire threat in their community and to establish a sense of homeowner responsibility.			
1.	High	• Establish/ expand a school education program to engage youth in wildfire management. Consult ABCFP and BCWS (the zone) to facilitate and recruit volunteer teachers and experts to help with curriculum development and to be delivered in elementary and/or secondary schools. Educational programming can be done in conjunction with currently running programs on fire extinguisher training.	$5,000
2.	High	• Summaries of this report and associated maps to be made publicly available through webpage, social media, and public FireSmart meetings. Add fire threat spatial data to the interactive web-mapping tool to allow residents to find their property and the associated threat of wildfire.	May be within current operating costs
3.	Moderate	• Add a Wildfire-specific Fire Prevention Week (or day) in the spring, immediately prior to the fire season.	$2,500

Item	Priority	Recommendation	Estimated Cost ($)
4.	Moderate	• Consider door to door FireSmart assessment (and/or home owner self-assessment) along the Nelson interface in order to educate residents and to quantify the level the level of risk in the interface	Internally completed by NSFRS, may be within current operating costs
Objective: To enhance the awareness of elected officials and stakeholders regarding the resources required to reduce fire risk.			
5.	High	• Maintain and strengthen the regional Interface Working Group that includes Nelson, Area F and BC Parks to coordinate wildfire risk reduction efforts.	May be within current operating costs
6.	High	• Consider local planning departments to develop regional development permit standards, provide a group voice to the Building and Safety Standards Branch and other provincial entities, and align municipal bylaws.	$30,000
7.	High	• Consider the development of a coordinated approach to fuel management and hazard reduction within and adjacent to City by coordination with stakeholders including forest licensees and large private land owners to aid in the establishment of large, landscape-level fuel breaks or compliment current or proposed fuel treatment areas	$25,000
8.	High	• Maintain regular communication with the Technical Review Committee (see Section 2.4) to ensure that proposed activities maintain or enhance biodiversity values	May be within current operating costs
Structure Protection and Planning (Section 7.2)			
Objective: Enhance protection of critical infrastructure from wildfire.			
9.	High	• Consider completing a fire flow / water vulnerability assessment for each water system to identify and map all viable alternative water sources (reservoirs, streams, lakes, etc.). Identify areas where water availability may be improved and provide recommendations to reduce City's vulnerability.	$10,000
10.	High	• Consider completing a vulnerability assessment of all critical infrastructure in interface areas with FireSmart recommendations.	May be within current operating costs
11.	High	• Consider developing a relay pumping plan from Kootenay Lake and water sources at height, which may supplement emergency firefighting water requirements (not for drinking water)	$2,500
12.	High	• Consider completing a detailed review of back-up power source options for all critical infrastructure and upgrade as required.	May be within current operating costs

Item	Priority	Recommendation	Estimated Cost ($)
13.	High	• Consider completing more detailed hazard assessments and proactively (in advance of wildfire) developing response plans for stabilization and rehabilitation of burn areas in watersheds that are vulnerable to post-wildfire debris flows and floods. Opportunities may exist to coordinate study and planning with adjacent jurisdictions (i.e., RDCK and BC Parks). Refer to Section 4.2.1 for a description of potential debris hazards.	$25,000
Objective: Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.			
14.	High	• Consider completing WUI Site and Structure Hazard Assessments for interface homes, make hazard mapping for assessed homes publicly available, and provide informational material to homeowners on specific steps that they can take to reduce fire hazard on their property.	$10,000-$25,000 depending on number of neighbourhoods assessed
Municipal Policy (Section 7.3)			
Objective: To reduce wildfire hazard on private land and increase FireSmart compliance.			
15.	High	• Consider completing an OCP/ Development Permit review to strengthen and expand reach of the existing policy. Consider requiring development permit for major retrofits/ renovations or new builds (building permits), collecting bonds to be returned upon evidence of completing development and landscaping according to wildfire hazard assessment. Review District of North Vancouver DP process as a model.	$25,000
16.	High	• Obtain legal advice regarding the Building Act, specifically regarding the temporarily unrestricted matters and local government authority to set exterior building materials requirements. Use local government authority to mandate FireSmart construction materials beyond BC Building Code in wildfire hazard development permit area, as allowed.	May be within current operating costs
17.	High	• Consider developing a landscaping standard to be applied in interface/ DP areas. The standard should list flammable non-compliant vegetation, non-flammable drought and pest resistant alternatives, and tips on landscape design to reduce maintenance, watering requirements, and reduce wildfire hazard. Include meeting landscaping standard as a requirement of Development Permit.	$5,000
18.	High	• The City should consider proactively enforcing wildfire covenants requiring owners to maintain their properties free of elevated hazard on all properties in Natural Environment and Hazardous Lands Development Permit areas. Enforcement will serve to minimize fuel risks on problematic private properties which have allowed hazardous accumulation of fuels and provide improved protection to adjacent lands.	$15,000
19.	High	• The City should consider altering the zoning bylaw to require that developers leave building set backs on private land so that there is a minimum of 10 m distance between buildings and forest interface. The City should consider applying this standard to housing bordering both City owned and forested private land.	$5000

Item	Priority	Recommendation	Estimated Cost ($)
20.	Moderate	• The City should consider working with the Building and Safety Standards Branch to provide input into the Building Code revisions that would apply within the development permit areas to prevent the spread of wildfire.	May be within current operating costs
Emergency Response and Planning (Section 7.4)			
Objective: To improve structural and wildfire equipment and training available to City Fire and Rescue.			
21.	High	• Conduct annual structural and interface training with the BCWS. As part of the training, it is recommended to conduct annual reviews to ensure PPE and wildland equipment resources are complete, in working order, and the crews are well-versed in their set-up and use. Interface training may include completion of a mock wildfire simulation in coordination with BCWS and safety training specific to wildland fire and risks inherent with natural areas.	$2,000
22.	High	• Integrate Emergency Preparedness Committee and West Arm Interface Steering Committee. Coordination and information sharing are crucial to the development of a community well prepared for wildfire.	May be within current operating budget
23	High	• Consider updating the Emergency Program Structure (see Figure 6) to better illustrate how City of Nelson Emergency Management actions and decisions are made.	May be within current operating budget
24	High	• Consider being more proactive in Emergency Management programs such as disaster pre-planning and community awareness and operating an EOC with structure that recognizes the authority of both the City and regional governments.	May be within current operating budget
25.	Moderate	• Provide S215 training to all/some members of the City Fire Department to enhance wildfire suppression training. Consider investigating Office of the Fire Commissioner funding.	$5,000 (annually)
26.	Moderate	• Review UBCM-owned SPU request procedure. Complete training with SPU as required and assess needs based on training outcomes.	$2,000
27.	Moderate	• Conduct fire preplan assessment for key interface areas in the City of Nelson. Other jurisdictions have completed assessments that prioritize fire department-specific variables, such as distance to hydrants, response time from nearest fire station, etc. to produce local risk ratings. [1]	$5,000
Emergency Response Evacuation and Access (Section 7.4.1)			
Objective: To improve access and egress to neighbourhoods at risk and natural areas within the City.			
28.	High	• Develop a Total Access Plan to create, map and inventory trail and road network in natural areas for suppression planning, identification of areas with insufficient access and to aid in strategic planning. The plan should be updated every five years, or more regularly, as needed to incorporate additions or changes.	$8,000 + updating
29.	High	• Require that all new interface developments have a secondary access road.	May be within current operating costs

[1] FireSmart ratings for Regional District of Nanaimo: http://www.rdn.bc.ca/cms.asp?wpID=761

Item	Priority	Recommendation	Estimated Cost ($)
30.	Moderate	• Facilitate completion of emergency evacuation plans for key interface neighbourhoods with limited access that are within the jurisdiction for City of Nelson evacuation planning, in particular Granite Pointe Golf Club, Nelson Power Plant, Selby Street, and Silver King Road.	$2,500
Fuel Management (Section 7.5)			
Objective: Reduce wildfire threat on private and public lands through fuel management.			
31.	High	• Proceed with detailed assessment, prescription development and treatment of hazardous fuel units identified in this CWPP. Collaboration with BCTS, and other licensees, utilities, BC Parks and RDCK may facilitate larger projects.	UBCM SWPI Funding/Municipal Funding as available
Objective: Maintain treated areas under an acceptable level of wildfire fire threat (moderate).			
32.	Moderate	• As treatments are implemented, complete monitoring within 10 years of treatment (subject to site conditions) and maintenance every 15-20 years (subject to prescription and site conditions) on previously treated areas. Treated areas should be assessed by a Registered Professional Forester, specific to actions required in order to maintain treated areas in a moderate or lower hazard.	UBCM SWPI Funding/ Municipal Funding

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1.0 INTRODUCTION

The Community Wildfire Protection Plan (CWPP) Program was created in British Columbia (BC) to aid communities in developing plans to assist in improving safety and to reduce the risk of damage to property. The Program was developed in response to recommendations from the "Firestorm 2003 Provincial Review" (Filmon, 2003).

B.A. Blackwell and Associates Ltd and Cathro Consulting Ltd were retained by the City of Nelson ('the City' or 'Nelson') to complete an update to the 2008 Community Wildfire Protection Plan, completed by B.A. Blackwell and Associates Ltd.

Since 2008, considerable new development in the Wildland Urban Interface (WUI) has occurred. These areas either were not previously assessed for hazard, or the hazard and associated threat has increased due to the location and siting of the new development in relation to the assessment polygons. This CWPP update provides a reassessment of the level of risk with respect to changes in the community and reflects the current conditions. In addition, methods for assessing wildfire threat have evolved since 2008. This update uses the provincially accepted standard methodology and baseline data for hazard and threat analysis.

Specifically, the objectives of this update are to:

- Summarize implemented recommendations from the 2008 CWPP;
- Summarize wildfire risk mitigative actions implemented by the City which may be outside the recommendations of the 2008 CWPP;
- Provide the City with an updated threat assessment;
- Prioritize mitigative action recommendations to address communication and education, structure protection, emergency response, and fuel management;
- Provide a prioritized maintenance schedule for the areas that have been treated; and,
- Provide a current document that highlights best practices for smoke management and safe prescribed burning practices, as well as explores alternative avenues for reducing woody debris on fuel treatment areas.

This CWPP update will provide the City with a framework that can be used to identify methods and guide future actions to mitigate fire risk in the community. The scope of this project included three distinct phases:

I. Assessment of fire threat to the City to spatially identify those areas of the City most vulnerable or at highest risk of fire;

II. Consultation with representatives from the City's Parks, Planning, and Fire Departments, Ministry of Forests, Lands and Natural Resource Operations (MFLNRO), BC Wildfire Service (BCWS), Union of British Columbia Municipalities (UBCM), residents, stakeholder Groups and First Nations to assist with defining the objectives for wildfire protection, and to develop the mitigation strategy alternatives that would best meet the City's needs.

III. Development of the Plan which outlines measures to mitigate the identified risk through communication and education programs, structure protection, emergency response and management of forestlands adjacent to the community.

This CWPP is being developed in conjunction with adjacent Electoral Areas E and F of the Regional District of Central Kootenay (RDCK). In addition, West Arm Provincial Park is updating its Fire Management Plan (begun in 2010). Combined, these jurisdictions constitute a significant landscape. An Interface Working Group with senior staff from these agencies coordinates wildfire planning and activities. Each jurisdiction will have complimentary stand-alone CWPP documents.

1.1 GOALS AND OBJECTIVES OF THE PLAN

This is an update to the 2008 Nelson Contract Fire Protection Area Community Wildfire Protection Plan (Part 2 of the RDCK Community Wildfire Protection Plans, Risk Assessment and Hazard Mitigation Options for Four Application Areas in the Region). This update accounts for changes to forest fuel types due to forest growth, forest health, windthrow, forest harvesting, forest fires and new developments. This project has been undertaken with funds from the Strategic Wildfire Prevention Initiative (SWPI), administered through the Union of BC Municipalities (UBCM). The broad goals of this project are to restore and maintain landscapes, create fire adapted communities, and promote safe, effective and efficient wildfire response.

These objectives are achieved by creating an action plan that focuses on these fundamental components of a CWPP:

1) Communication and Education, as well as training;

2) Structure Protection;

3) Planning and Development;

4) Emergency Response; and,

5) Vegetation (Fuels) Management.

The CWPP update was developed in seven general phases:

1) Background research - general community characteristics, such as demographic and economic profiles, critical infrastructure, environmental and cultural values, fire weather, fire history, relevant legislation and land jurisdiction.
2) Initial GIS analyses – updating fuel typing, creating threat polygons for the Study Area, assigning initial threat based upon fuel type, aspect, slope, and proximity to structure.
3) Field work - site visits to the area allow for 1) meetings with City staff; 2) fuel type verification; 3) completing hazard assessment forms, 4) ground-truthing initial threat ratings, and 5) identification of site specific issues.
4) Consultation – meetings and consultation with MFLNRO District staff and Fire Department representatives, residents, stakeholders and First Nations.

5) Secondary GIS analyses – final fuel type updating and threat rating based upon field ground-truthing and results of hazard assessment forms.
6) Report and map development - identification of City challenges and successes, identification of measures to mitigate risks, and recommendations for action.
7) Report review - by City staff and representatives from the Selkirk Resource District and BCWS. (The Ktunaxa First Nation did not express an interest in reviewing the draft. Note, that all identified First Nations must be consulted during detailed assessment and prescription development for any fuel treatments and prior to any fuel treatments proceeding.)

Detailed methodology on the threat analysis can be found in Appendix 2. Reducing the level of wildfire risk to the City is the main focus of the CWPP. This document makes specific recommendations (planning tools) on how risk can be reduced by making changes to these five elements.

In order to protect the significant ecological, cultural and economic values of the surrounding forests the City has made significant progress at implementing recommendations from the 2008 CWPP. Nelson has shown provincial leadership in many aspects of wildfire mitigation activities, acknowledging the deep connection that local residents have to forest industry jobs, various recreational uses (mountain biking trails, rock climbing, etc.), aesthetic values and important ecosystem values such as water. This document intends to acknowledge work completed, assess progress to implementation of recommendations in the 2008 CWPP, offer improvements to currently existing programs, and recognize opportunities for improvements and new initiatives. A summary of the most pertinent recommendations implemented can be found throughout the document in the relevant sections, with highlights summarized in Section 2.3. A comprehensive table of recommendations and implementation status can be found in Appendix 4 – Previous CWPP Recommendations.

A Fire Management Plan has not been completed for the South East Fire Zone; consequently, linkages with a landscape level fire management plan were not possible at the time of writing.

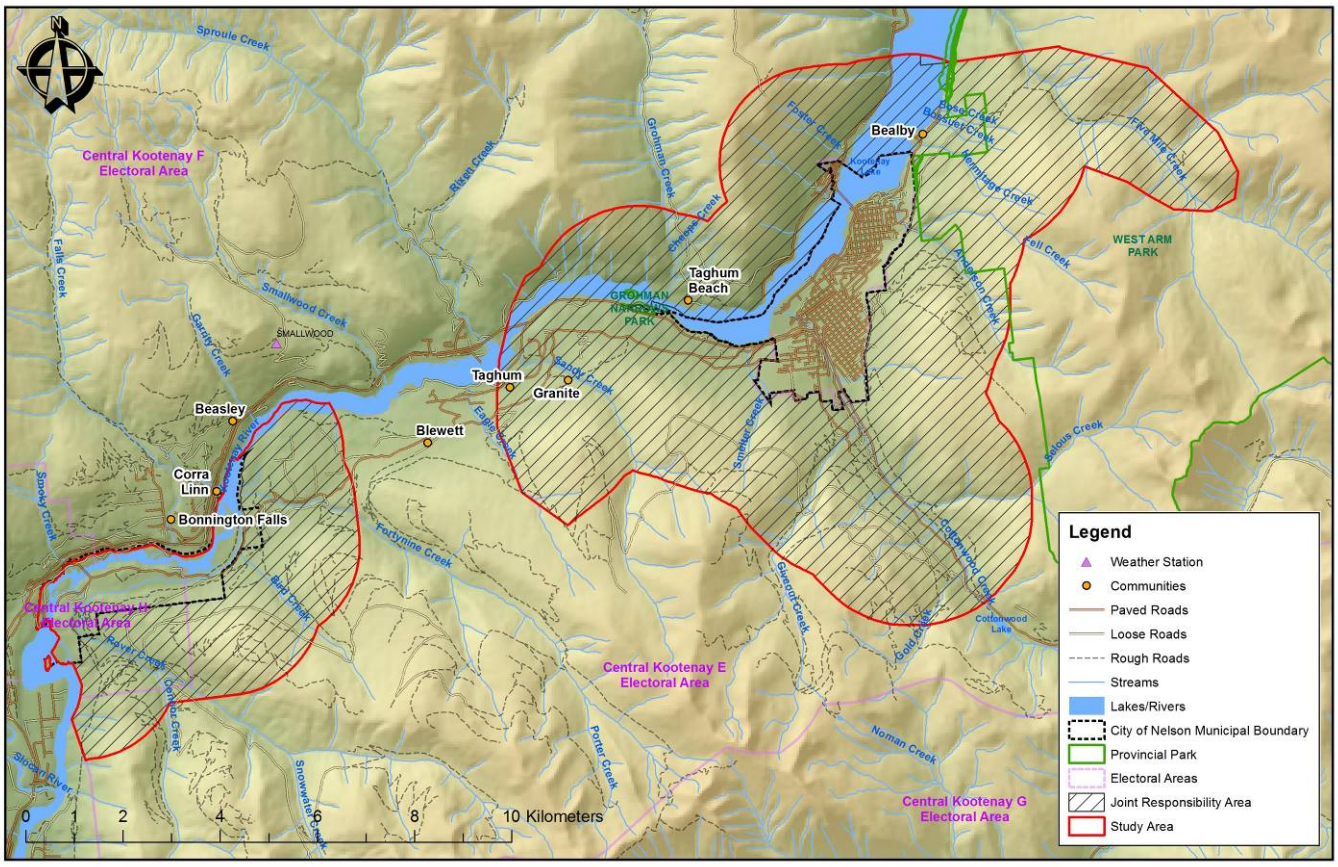
2.0 COMMUNITY DESCRIPTION

The City of Nelson is located at an elevation of approximately 520 m on the southern shore of the West Arm of Kootenay Lake, surrounded by the Selkirk Mountains. The total Study Area that makes up the City of Nelson's CWPP is situated in the Selkirk Resource District (Ministry of Forests, Lands and Natural Resource Operations) and the South East Fire Region and is shown in Map 1.

The Study Area includes a 2 km buffer around the municipal boundary and the portion of the municipal boundary surrounding the Bonnington Dam with modifications to the buffer to account for the presence of critical infrastructure. The Study Area also includes portions of the Joint Responsibility Area developed to ensure that fire hazard mitigation works are undertaken in cooperation between the City, the RDCK and BC Parks.

This Joint Responsibility Area uses the data supplied in the Provincial Strategic Threat Analysis (PSTA) data package and the British Columbia Wildfire Service (BCWS)-defined Wildland Urban Interface (WUI) Area. The PSTA WUI Area is based on structure density, with a buffer placed on areas that meet the SWPI program density criteria of more than 6 structures per hectare.

There is an extension of the Joint Responsibility Area into West Arm Provincial Park where the City of Nelson has water infrastructure. This area does not meet the density criteria but is established to protect critical infrastructure. The total Study Area for the 2015 City of Nelson CWPP Update is 12,568 hectares. The 2008 CWPP assessed the 2 km buffer surrounding the Nelson Contract Fire Protection Area that did not include Bonnington Dam, so this Update increases the Study Area and scope of responsibility for the City.



Map 1. City of Nelson Study Area.

The forest within and surrounding the Study Area is largely mixed coniferous second growth, resulting from early fires and forest management. Typical of the interior temperate rainforest, this forest is characterized on wet sites by dense western red cedar and western hemlock and on dry sites by Douglas fir, western larch and lodgepole pine. Several decades of fire suppression have resulted in patches of overstocked, high hazard forest.

The City of Nelson has a tourism and resource-based economy. Traditionally, the economy of Nelson and the surrounding area has primarily been based upon forestry and mining. While these industries still provide vital areas of employment, other sectors such as retail trade, health and social services, and educational services now contribute significantly also. Due to the scenery, numerous restored heritage buildings, and opportunities for recreational activity in the area, tourism has become a new and important sector within the economy of Nelson.

The City is also the provincial administrative centre for the Kootenay region and traditionally has supported many regional and district offices of the provincial government as well as some federal offices[2].

Nelson is accessed primarily by three routes. Highway 6 connects Nelson to Castlegar to the west, and Salmo to the south. Highway 3A continues east from Nelson to Balfour where it joins Highway 31 north to Kaslo and also crosses Kootenay Lake to go south down the East Shore to Creston. There is a small airport along Nelson's waterfront, but commercial flights operate from the Castlegar Regional Airport, approximately a half hour drive to the west.

Nelson's water is supplied from several sources. The primary source is Five Mile Creek, located in West Arm Provincial Park. Secondary sources include Anderson Creek Intake and Selous Creek Intake. Nelson collects and distributes water to all neighbourhoods in the Municipality, with the exception of the North Shore.

Five Mile Creek produces high quality water due to the protected catchment area. It was built in 1925 and has a catchment of 47.5 km^2. The water is collected by a small intake structure and conveyed to Mountain Station reservoir through a 6.7 km pipeline. The Diversion License is 16.8 million litres per day (M/d).

Anderson and Fell Creek are supplementary water sources with a combined catchment area of 13.5 km^2. Fell Creek has a small intake that routes water to the Anderson Creek intake. Anderson Creek was built in 1899 and has a combined diversion license of 13.6 Ml/d. This system produces good quality water but is prone to turbidity issues during spring freshet.

Selous Creek is a supplementary source for the City. It was built in the 1970s, has a catchment of 14.5 km^2 and a Diversion License of 4.5 Ml/d.

There are three water storage systems: Mountain Station, Fairview and Rosemont. The Mountain Station reservoir is the main reservoir with a capacity of 22.7 Ml. The Mountain Station reservoir provides storage of untreated water to help buffer demand and to provide fire flows. The Fairview Reservoir is a secondary reservoir with a capacity of 1.9 Ml. The purpose of the reservoir is to provide fire flow to the Fairview area. The Rosemont Reservoir is a secondary reservoir with a capacity of 1.36 Ml. The purpose of the reservoir is to provide fire flow to the Rosemont Area.

Other potential sources of water exist from Kootenay Lake, from groundwater, in Clearwater Creek and in Grohman Creek. The City has conducted initial assessments of these areas but no water licenses are in place. Costs of developing these systems range from a small supplementary plan pumping from Kootenay Lake at $1.5 M, $8 M for Clearwater Creek, $8.5 M to develop ground wells and related infrastructure, $11 M for Grohman Creek and $20 M for a large treatment facility and pumping station from Kootenay Lake.

There have been issues in the past with drought and the capacity of the reservoirs. In 2015 the Five Mile and Anderson reservoirs both nearly ran dry. Another limitation of the existing system is that reservoirs are independent of each other and water cannot be pumped between reservoirs. Section 7.0 sets out opportunities for increasing City fire fighting water capacity.

[2] http://www.discovernelson.com/htdocs/statistics.html

2.1 LOCAL GOVERNMENT DESCRIPTION

Nelson is governed by a Mayor and six-member Council. There are several boards, committees and commissions established to provide information and recommendations to Council on a wide range of programs, policies and services.

The population of the City in 2011 was 10,230 (Statistics Canada, 2016). This is just over a 10% increase since the 2006 census. There are nearly 4,900 dwellings. Nelson has a population density of about 850 people per square kilometer. Nelson serves as a hub for nearly 60,000 people living in the adjacent Regional District of Central Kootenay (RDCK).

There are five first nation groups within the Kootenay Lake Timber Supply Area (TSA) – the Lower Kootenay Indian Band, Shuswap Indian Band, Ktunaxa Nation Council, Okanagan Nation Alliance, and Shuswap Nation Tribal Council. The Lower Kootenay Indian Band and the Shuswap Indian Band have Forest and Range Agreements with the Province (Snetsinger, 2010).

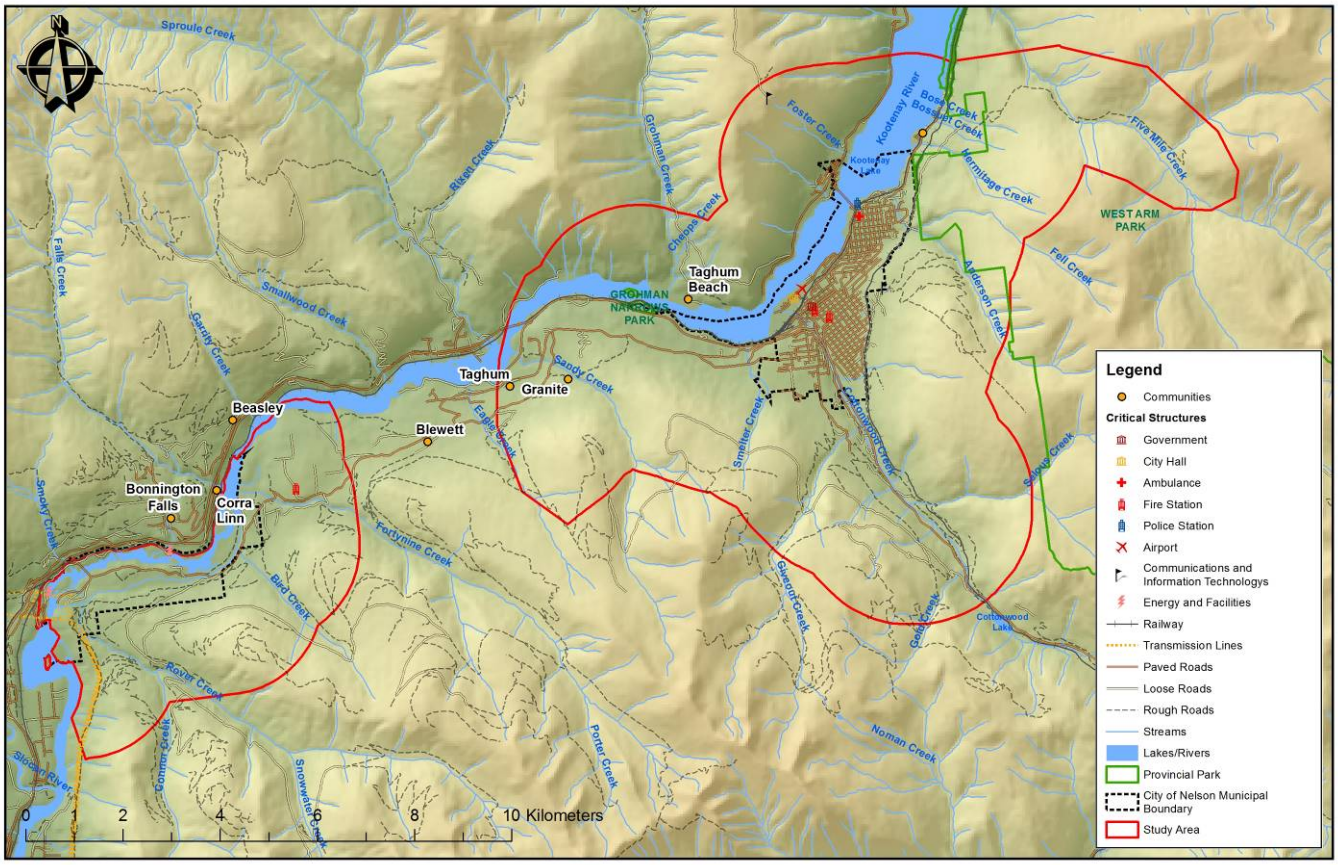
2.2 CRITICAL INFRASTRUCTURE

Protection of infrastructure during a wildfire event is important to ensure that emergency response is as effective as possible, to ensure coordinated evacuation can occur if necessary, and essential services in the Study Area can be maintained and/or restored quickly. Critical infrastructure includes emergency and medical services, water, electrical service, transportation, major water infrastructure, and communications infrastructure. Critical infrastructure locations were provided by the City and are illustrated below. Schools and government offices may serve as critical infrastructure, though they are not analyzed as part of this report.

The City of Nelson Emergency Operations Centre (EOC) maintains a database of the critical infrastructure within, and adjacent to, the Study Area. As part of this CWPP, information from the database, such as water, communications, emergency services, electrical, and medical infrastructure, are demonstrated below on Map 2. It is recognized that many other physical structures, systems, and facilities are extremely valuable to the City and are required for the healthy, efficient functioning of the economy and the City.

Emergency services within the Study Area include: an R.C.M.P./ police facility (detachment, district headquarters, telecommunications and radio workshop), Nelson Police Department, 911 dispatch service (police, ambulance or fire), Kootenay Lake Hospital, the Nelson Fire and Rescue Services (NFRS) station, Blewett Fire Hall (in the Bonnington Dam area), a BC ambulance service station, a primary Emergency Operations Centre (EOC) and the Nelson Regional Airport and associated services. The EOC is operated jointly by the RDCK and the City of Nelson and is used in times of significant emergency or disaster, when an Incident Commander requires more resource or an emergency is more widespread. There are two communications and information technology infrastructure features within the Study Area.

Electrical service for most of the Study Area is received through a network of wood pole transmission and underground distribution infrastructure supplied by Nelson Hydro and Fortis BC. Those neighbourhoods with small, street-side wooden poles to connect homes and subdivisions are particularly vulnerable to fire.



Map 2. Critical structures within the Study Area.

2.2.1 EMERGENCY PREPAREDNESS

The Nelson Fire and Rescue Service and Kootenay Lake Hospital, Nelson City Police, area RCMP, B.C. Ambulance and groups such as Nelson Search and Rescue are critical to emergency response service in the community. However, in the event of a localized emergency within the City, adjacent municipalities with health care and emergency response facilities may also be able to provide emergency response. The NFRS, BC Wildfire Service, and Nelson City Police provide the foundation for incident response during a large fire event and therefore must be prepared to deal with large and complex situations. The Emergency Operation Centre is another key piece of infrastructure that will be integral in coordinating response efforts.

Water service within the community is an important component of emergency response for a wildland urban interface fire in the event of a large-scale emergency, and in particular for structural fires. It should be noted; however, that a fuel free zone may be a greater benefit to firefighting resources than water in the event of a wildfire. Electrical service is less critical as the City's entire water system is gravity fed and the fire hall has a 17 KW power plant for backup power. The City has its own municipal water system. Water for firefighting is sourced from gravity fed hydrants. In the event of a wildfire occurring in Five Mile Creek, there is unlikely to be a high risk to the City's water supply or to water quality post-wildfire in terms of watershed impacts, apart from considerations of pipeline integrity (Jordan, 2016). However; the structural integrity of the pipeline coming from Five Mile Creek could be compromised by wildfire as the line is at times located less than 30 cm below the ground

surface. Joints with mortar could potentially be damaged by high heat in areas with high fuel accumulations. Nearby rivers and lakes could provide a source of water for firefighting.

A large fire has the potential to impact electrical service by causing a disruption in network distribution through direct or indirect means. For example, heat from the flames or fallen trees associated with a fire event may cause power outages. Consideration must be given to protecting this critical service and providing power back up at key facilities to ensure that the emergency response functions are reliable. Additionally, the loss of this utility would greatly hinder recovery efforts as revenue from the utility is integral to the City's annual operating budget.

2.3 PAST WILFIRE RELATED PROJECTS

The City of Nelson has been very active with respect to community wildfire planning. The City completed a CWPP in 2008 and have implemented, or are in the process of implementing, the majority of this plan's recommendations. A complete list of the status of the recommendations from 2008 can be found in Appendix 4.

Fuel treatments have been completed on approximately 107 ha of high priority land in the current Study Area (Map 9). These have been on municipal property or on RDCK property adjacent to municipal property to protect Nelson infrastructure (approximately 28 ha), RDCK property (approximately 16 ha), and within West Arm Provincial Park to protect Nelson's drinking water infrastructure (approximately 63 ha). Much of this work has been funded by UBCM/SWPI and Job Opportunities Program (JOP) funding. These treatments have reduced the risk profile of the City, but will require additional treatments to maintain effectiveness (see Map 9 and Section 7.5.3 for more details).

In the area of emergency preparedness and response, numerous initiatives have either been completed, planned or are in progress. Emergency response coordination with RDCK and BCWS has been formalized and strengthened through the implementation of the jointly operated Emergency Response and Recovery Plan (RDCK and member municipalities and communities). The City has also developed an evacuation plan that is currently being refined. Emergency preparedness with respect to minimizing access constraints has been strengthened by involving the fire department in the building review and approval process. Additionally, identified access constraints are shared with property owners and are considered in the evacuation plan as it is refined. The NFRS requires residences to install sprinkler systems on a case by case basis due to access constraints. Emergency response capacity has also improved with the City's acquisition of a 17 KW power plant for backup power and extensive and ongoing water main replacement.

Awareness of structure protection within the City has improved with the introduction of a Wildfire Interface Zone and Natural Environment and Hazardous Lands Development Permit Area. This includes guidelines that stipulate specific FireSmart recommendations related to siting of buildings and roads and specify non-combustible building materials. Additionally, the Fire Department coordinates reviews of new developments on a regular basis with the City's Planning Department to ensure urban interface protection considerations are addressed.

The City of Nelson leads FireSmart and public education initiatives through Nelson Fire and Rescue Services (NFRS). NFRS has designated spokespersons who utilize social media, the press and City Newsletter to provide fire information updates. FireSmart presentations have been extended to include NFRS's Regional District contract area to enhance awareness regionally. Other communication and education initiatives include an annual Fire

Prevention Week event including FireSmart outreach activities, a City of Nelson-organized multi-agency Disaster Day event and numerous fire awareness outreach programs delivered in schools as well as the posting of resources and notices on the City's website. Additionally, a FireSmart Show Home completed by the City and NSFRS members' personal contributions of time provided a demonstration of FireSmart building guidelines.

3.0 FOREST, FUEL AND PAST WILDFIRE INFORMATION

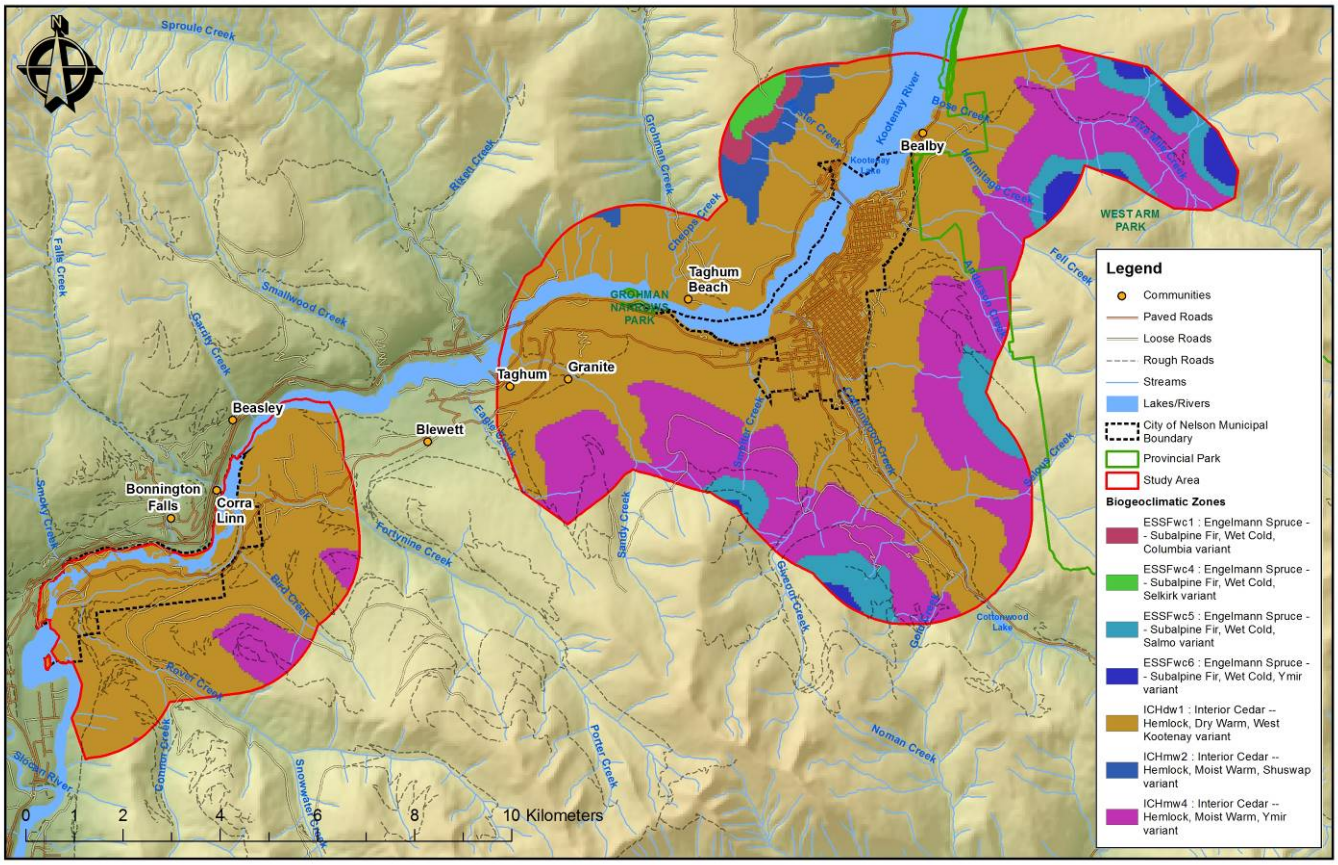
The forests of the region are some of the most ecologically diverse in the province. Fires are common, and are attributable to humans and lightning. The following section discusses the ecosystem classification of the Study Area, the timber harvesting land base, forest health and the wildfire history and fire weather.

3.1 BIOGEOCLIMATIC INFORMATION

The biogeoclimatic Ecosystem classification (BEC) system describes zones by vegetation, soils, and climate. Regional subzones are derived from relative precipitation and temperature. The Study Area occupies the ecologically diverse West Kootenay Region. The natural forest succession in this region provides for a mosaic of successional stages and species composition. See Table 1 for a breakdown of the Study Area by BEC zone, as well as Map 3 for the spatial distribution of these Zones in the Study Area.

Table 1. Biogeoclimatic zones and Natural Disturbance Types of the Study Area.

Biogeoclimatic Zone	Natural Disturbance Type	Area (ha)	Percent (%)
ESSFwc1: Engelmann Spruce -- Subalpine Fir, Wet Cold, Columbia variant	NDT1	82	1%
ESSFwc4: Engelmann Spruce -- Subalpine Fir, Wet Cold, Selkirk variant	NDT1	68	1%
ESSFwc5: Engelmann Spruce -- Subalpine Fir, Wet Cold, Salmo variant	NDT2	591	5%
ESSFwc6: Engelmann Spruce -- Subalpine Fir, Wet Cold, Ymir variant	NDT2	177	1%
ICHdw1: Interior Cedar -- Hemlock, Dry Warm, West Kootenay variant	NDT3	8,475	67%
ICHmw2: Interior Cedar -- Hemlock, Moist Warm, Shuswap variant	NDT2	203	2%
ICHmw4: Interior Cedar -- Hemlock, Moist Warm, Ymir variant	NDT2	2,973	24%
TOTAL		**12,568**	**100%**



Map 3. Biogeoclimatic zones of the Study Area.

By far, the largest amount of area lies within the ICH dw 1. This is the valley bottom ecosystem; the mountainous topography quickly gives way to wetter ecosystems (ICH mw 4). The ICH dw is an ecosystem typified by hot, moist summers and very mild winters. Major growth limiting factors include moisture on dry sites and frost on some low elevation sites. Climax forest stands are composed of western red cedar and western hemlock. Seral stands are mixed with Douglas-fir, paper birch, western larch and white pine, and provide important habitat for ungulate winter range. This is the most diverse subzone in the province in terms of tree species, containing 14 commercial species. In this area, fire-origin stands composed of Douglas fir and larch are common, many of these stands originating from burning during mining activity at the turn of the century (Braumandl and Curran, 1992).

BEC zones have been used to classify the Province into five Natural Disturbance Types (NDTs). NDTs have influenced the vegetation dynamics and ecological functions and pathways that determine many of the characteristics of our natural systems. The physical and temporal patterns, structural complexity, vegetation communities, and other resultant attributes should be used to help design fuel treatments, and where possible, to help ensure that treatments are ecologically and socially acceptable (Province of BC, 1995).

The majority of the Study Area falls into the NDT3 – ecosystems with frequent stand-initiating events. These are forest ecosystems that experience frequent wildfires of various sizes, with the largest fires in the province often occuring in this NDT. The mean return interval for this NDT is approximately 150 years in the ESSF and ICH units

(Province of BC, 1995). Douglas fir occurs through this NDT in the ICH, and in combination with western larch, is an important component of structural diversity during and after forest harvesting operations.

3.2 TIMBER HARVESTING LAND BASE

There are many resources associated with the timber harvesting land base of the Study Area. There are multiple values associated with the land base, including recreation and tourism, wildlife habitat, drinking water supplies, and many others.

The Study Area falls in the Kootenay Lake Timber Supply Area, administered by the Selkirk Natural Resource District. The current Allowable Annual Cut (AAC) is 640,000 cubic meters per year. The last Timber Supply Review (TSR) was completed in 2010. The TSR determined that the land base contributing to harvesting is 199,282 hectares, removing parks and protected areas, old growth management areas, inoperable areas, uneconomic areas, low timber productivity areas, problem forest types, caribou no-harvest habitat, sensitive terrain areas, riparian areas, roads and trails, railways and transmission lines from 'forested areas' (Snetsinger, 2010).

There are several forest licensees operating within the Study Area: BC Timber Sales, Kalesnikoff Lumber Company, and Atco Lumber. In addition, there is a woodlot license held by Smoky Woodlot Management that occupies a parcel that intersects the Joint Responsibility Area, and a second woodlot held by Bear Spring Enterprises Ltd to the north of the Study Area.

Fuel reduction treatments are not anticipated to have a measurable effect on the timber harvesting land base. Typically, forest stands identified for fuels treatment are highly constrained for conventional logging, and are often in undesirable or uneconomic stand types. The opportunity exists to work with local licensees on commercial thinning projects that meet fuels management objectives. This has been explored with local licensees. See Section 7.0 (Recommendations) for opportunities to build relationships with forest industry licensees.

3.3 IMPORTANT FOREST HEALTH ISSUES

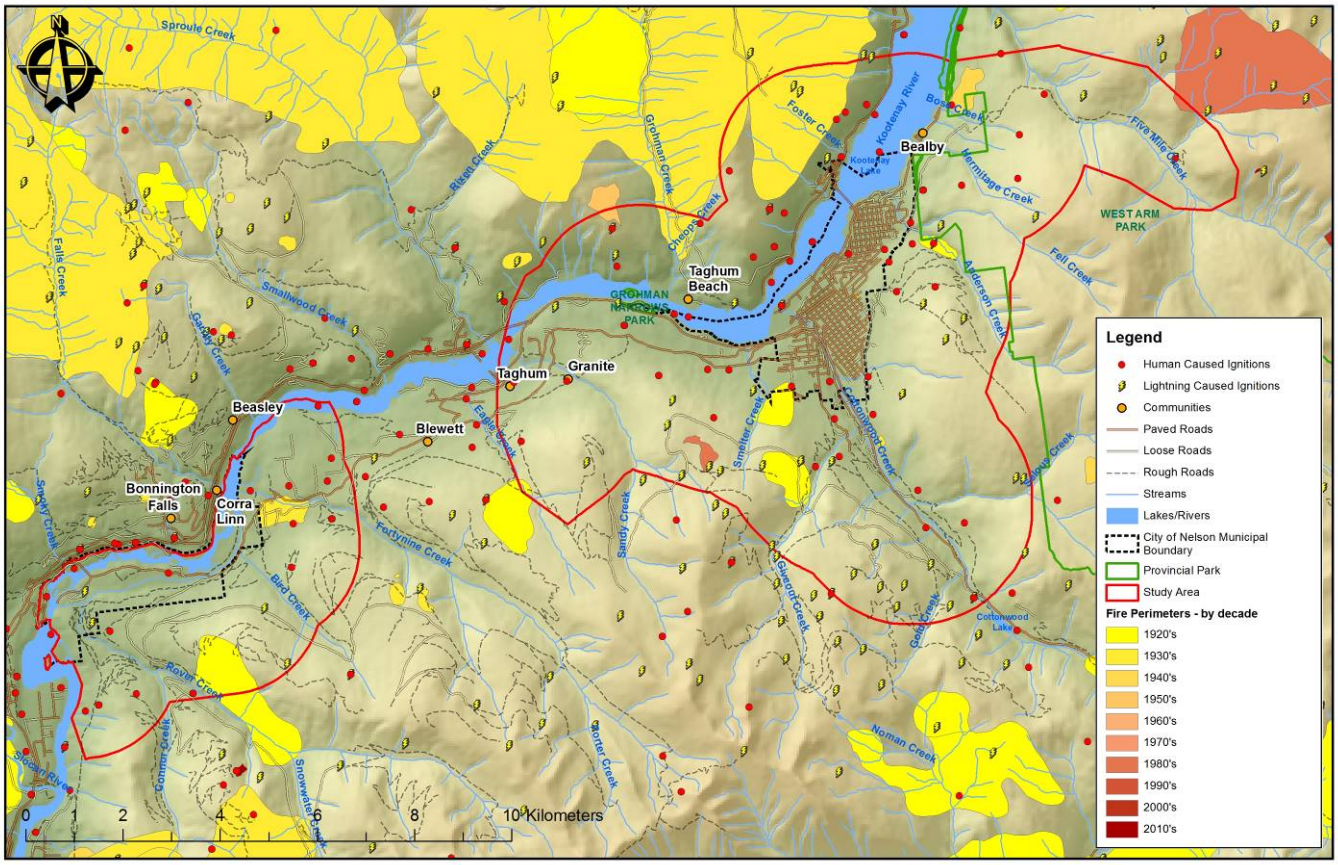
One of the most prevalent forest health issues in the Kootenay Lake Timber Supply Area are bark beetles; primarily mountain pine beetle and western balsam bark beetle, and to a lesser degree, Douglas-fir beetle, and spruce beetle. The 2015 Aerial Overview Survey (Maclauchlan & Buxton, 2015) found that the mountain pine beetle infestations are decreasing, as are Douglas-fir beetle populations, while western balsam bark beetle has increased slightly. Spruce beetle activity was very limited. Aspen serpentine leaf miner is significant and is the most widespread damaging agent of deciduous trees in the TSA with widespread defoliation reported around Nelson. The birch leaf miner continues to affect paper birch trees. Other damaging agents noted are larch needle blight (in scattered small pockets), wildfire, drought mortality (mixed Douglas-fir-lodgepole pine plantations), flooding, and windthrow.

Climate change is anticipated to have largely negative impacts to forest health, especially within the interface areas. Tree stress caused by drought and greater windthrow are expected to allow insect populations to increase in weakened mature stands. This is particularly the case with Douglas-fir beetle, western balsam beetle, spruce beetle and western hemlock looper. Immature stands may see increases of spruce leader weevil, white pine blister rust, stem rusts of lodgepole pine, foliar diseases of lodgepole pine and larch, and Armillaria root disease.

Lodgepole pine stands in particular are at elevated risk of insect and disease impacts with climate change (Holt, Utzig, Pinnell and Pearce, 2012).

3.4 LOCAL WILDFIRE HISTORY/STARTS AND FIRE WEATHER

The Study Area lies in a fire-dominated ecosystem. This is evidenced by the number and size of historical fires in the area. Fire perimeters and fire igintion points provided in the PSTA data package were reviewed for this Plan. This data show that many large fires burned in the earlier part of the century. Most (77%) fire ignition points are attributed to human causes, with the remainder due to lightning.



Map 4. Fire history for the Study Area.

The Canadian Forestry Service developed the Canadian Forest Fire Danger Rating System (CFFDRS) to assess fire danger and potential fire behaviour. A network of fire weather stations during the fire season are maintained by the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) and are used to determine fire danger, represented by Fire Danger Classes, on forestlands within a community. The information can be obtained from the MFLNRO British Columbia Wildfire Service (BCWS) and is most commonly utilized by municipalities and regional districts to monitor fire weather, and to determine hazard ratings, associated with bans and closures.

Fire Danger Classes provide a relative index of how easy it is to ignite a fire and how difficult control is likely to be. The BC *Wildfire Act* [BC 2004] and *Wildfire Regulation* [BC Reg. 38/2005], which specify responsibilities and

obligations with respect to fire use, prevention, control and rehabilitation, and restrict high risk activities based on these classes. Fire Danger Classes are defined as follows:

- **Class 1 (Very Low)**: Fires are likely to be self-extinguishing and new ignitions are unlikely. Any existing fires are limited to smoldering in deep, drier layers.
- **Class 2 (Low)**: Creeping or gentle surface fires. Ground crews easily contain fires with pumps and hand tools.
- **Class 3 (Moderate)**: Moderate to vigorous surface fires with intermittent crown involvement. They are challenging for ground crews to handle; heavy equipment (bulldozers, tanker trucks, and aircraft) are often required to contain these fires.
- **Class 4 (High)**: High-intensity fires with partial to full crown involvement. Head fire conditions are beyond the ability of ground crews; air attack with retardant is required to effectively attack the fire's head.
- **Class 5 (Extreme)**: Fires with fast spreading, high-intensity crown fire. These fires are very difficult to control. Suppression actions are limited to flanks, with only indirect actions possible against the fire's head.

It is important for the development of appropriate prevention programs that the average exposure to periods of high fire danger is determined. 'High fire danger' is considered as Danger Class ratings of 4 (High) and 5 (Extreme). Danger class days were summarized to provide an indication of the fire weather in the Study Area and it is worthy to note that fire danger in the Study Area can vary from season to season. Considering fire danger varies from year to year, historical weather data can provide information on the number and distribution of days when the Study Area is typically subject to high fire danger conditions, which is useful information in assessing fire risk.

The fire weather data for the Nelson (Smallwood) weather station show that on average (from 1991 to 2015), moderate, high and extreme fire danger days are prevalent in July and August. Average danger class days for each month of the fire season (May – September) are illustrated in Figure 1.[3]The location of the Smallwood weather station is illustrated in Map 1.

The wind rose data is compiled hourly by the MFLNRO This data provides an estimate of prevailing wind directions and wind speed in the area of the weather station. For the Smallwood weather station, the prevailing wind direction is from the south and southwest (Figure 2). The wind rose indicates that the majority of winds are less than 14km/hour, with a small percentage of the prevailing winds that are between 15 and 19.9km/hr.

[3] Smallwood weather station, data from 1991-2015, courtesy of the Ministry of Forests, Lands and Natural Resources Operations.

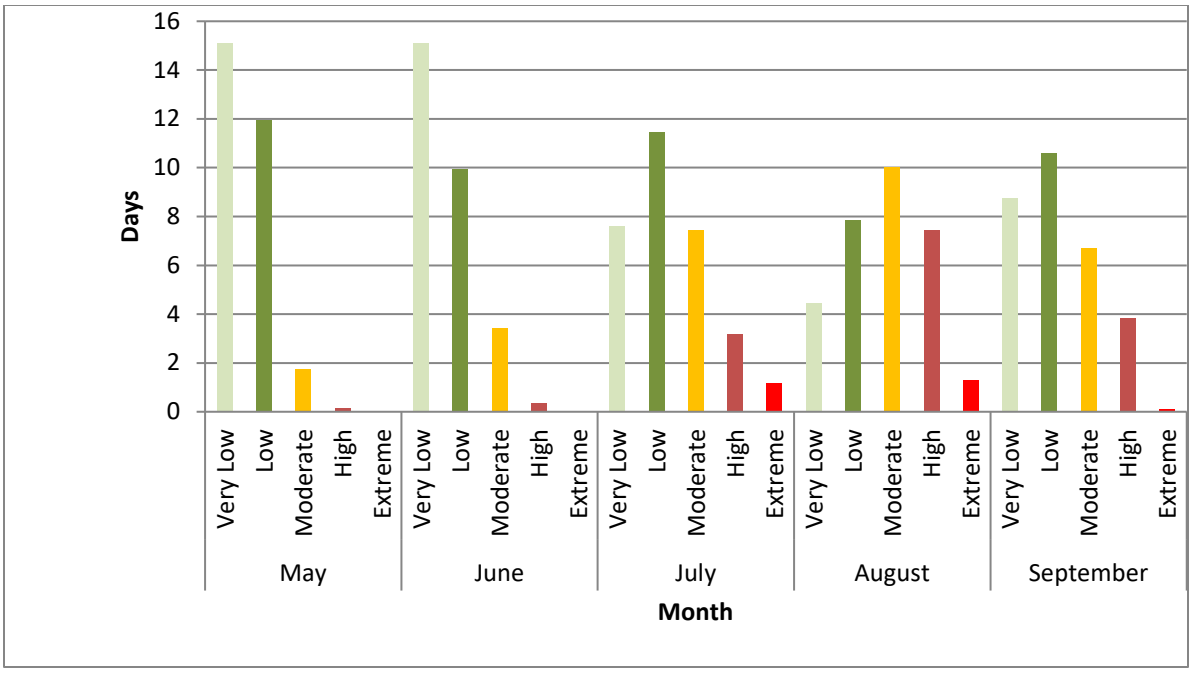


Figure 1. Average Fire Danger Class days per month (May to September) over 25 years recorded at the Smallwood weather station.

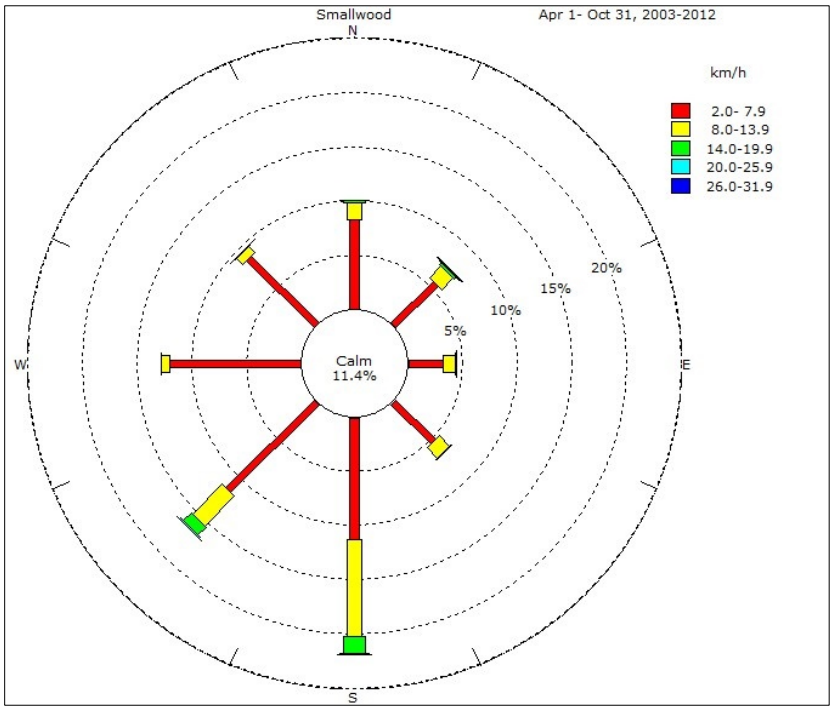


Figure 2. Wind rose data for Smallwood weather station, hourly data from 2003-2012. Courtesy of MFLNRO.

4.0 LOCAL ISSUES, VALUES AND SUPPORT

As with many places in BC, there are numerous overlapping values and resources on the landscape. Residents demand to be involved in ensuring these values are maintained. To meet this requirement, this plan has been developed with considerable engagement across the community. This includes consultation with resource professionals, local government staff, resident associations, water user groups, forest licensees and MFLNRO staff. This approach to engagement is consistent with community expectations and, when matched at the prescription development and treatment implementation phases, has resulted in broad public support for wildfire hazard reduction work.

Within the scope of this CWPP and associated Study Area, land jurisdictions include the RDCK Area E and BC Parks (West Arm Provincial Park). These are guided by higher-level plans such as the Kootenay Boundary Higher Level Plan (see Section 5.2).

4.1 RESOURCE ISSUES AND OPERATIONAL CONSTRAINTS

There are many resource values in the area, outlined in the Kootenay Boundary Higher Level Plan, which is the guiding document for other plans for the area, including the City of Nelson and RDCK Official Community Plans and licensee Forest Stewardship Plans. Within the Study Area, potential fuel management activities are constrained mainly by steep and difficult terrain, the need to accommodate a wide range of recreational users of public land in the Study Area, and the requirement for multi-agency coordination of fuel treatments occurring within the joint area of interest (RDCK, City of Nelson and BC Parks). A working group of these agencies is committed to the coordinated planning and implementation of wildfire management activities on the landscape level.

4.2 ENVIRONMENTAL AND CULTURAL VALUES

Environmental, cultural and recreational values are high throughout the Study Area. The City and surrounding areas provide a range of outdoor activities for tourists and residents, and cultural values within or overlapping the Study Area are traditional lands of local First Nations, comprising fish bearing habitat, hunting grounds, archaeological sites, and sites of cultural significance. The City of Nelson has several heritage buildings that lend to the character and visitor experience of the City.

4.2.1 ENVIRONMENTAL VALUES OVERVIEW

The Conservation Data Centre (CDC), which is part of the Environmental Stewardship Division in the Ministry of Environment, is the repository for information related to plants, animals and ecosystems at risk in BC. The CDC database was used to identify species and ecosystems at risk within the Study Area. The CDC keeps two classes of data: non-sensitive occurrences for which species and ecosystems at risk and their locations are available, and masked sensitive occurrences where only generalized location information is available.

Within the Study Area there are no sensitive masked occurrences, and nine publicly available species at risk including four terrestrial animal and plant species, four aquatic species and one palustrine species. A list of these species is provided in Appendix 3. Those species at risk that are strictly lake and river habitats are not impacted by fuels treatment or other fire hazard mitigation activities. The Painted Turtle is a notable palustrine species at risk occupying herbaceous wetland habitats and is not likely to be impacted by fire hazard mitigation activities. Site

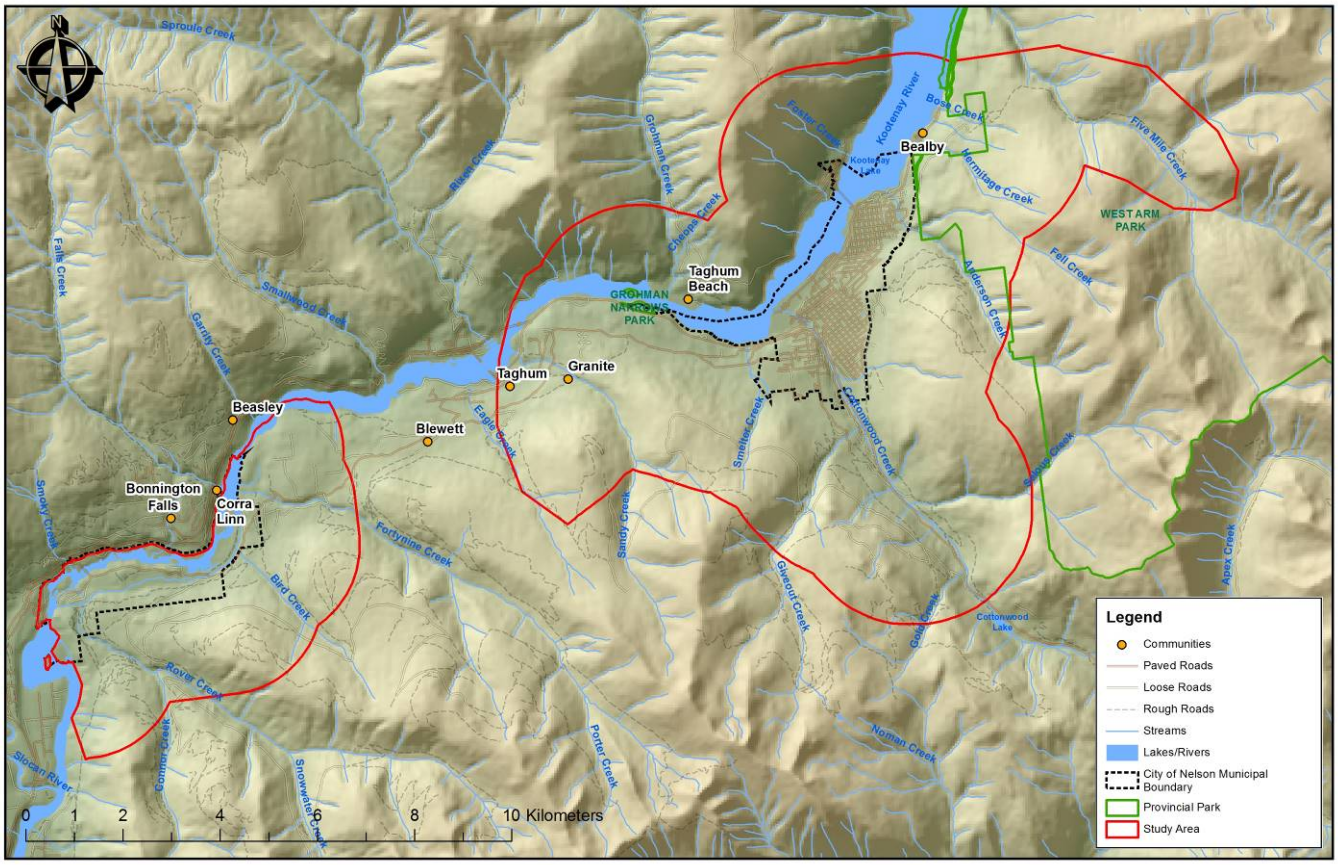
level, operational plans must determine through consultation with the CDC and a biologist or qualified professional if fuel management or other wildfire mitigation activities will impact these occurrences. All future fuel treatment activities and those associated with recommendations made in this plan should consider the presence of, and impact upon, potentially affected species. Additionally, all site level operational plans should consult the most recent data available to ensure that any new occurrences or relevant masked occurrences are known and considered in the operational plan to mitigate any potential impacts on species at risk.

In the event of a wildfire burning a large area of the watersheds within the Study Area, potential vulnerability to post-wildfire debris flows and floods exists where creeks drain steep slopes and in particular, in areas of the City and adjacent rural areas built on the alluvial fans of these creeks (Jordan, 2016). Extensive research by MFLNRO has found that the likelihood of debris flows and other landslides in susceptible terrain is significantly increased following severe wildfire in the snow-dominated environment of the southern interior of BC (Jordan, 2015). Specifically, numerous debris flow incidents have occurred in the West Kootenays following 2003 and 2007 wildfires including Sitkum Creek northeast of the Study Area (Jordan, 2015).

Locally, creeks that may be subject to high risks from post-wildfire debris flows include Smelter Creek, a small creek above Uphill, the small creeks above Bealby Point, the two small creeks draining Elephant Mountain above Johnstone Road and 1-Mile, and Garrity Creek above Beasley (Jordan, 2016). There could also be significantly increased flood hazards on Anderson Creek, Giveout Creek, Sandy Creek, Eagle Creek, and Bird Creek (Jordan, 2016). MFLNRO routinely conducts post-wildfire risk analyses where large wildfires have occurred above inhabited areas or in community watersheds (Hope et al., 2015). Post wildfire risk analysis reports are posted on the RDCK's website under Post-Emergency Hazard Reports[4]. Water quality is not likely to be significantly impacted by a wildfire in the Five Mile Creek watershed (Jordan, 2016). Based on a watershed-scale study of three post-wildfire study sites in southeastern BC near Nelson, Slocan and Trail, effects on water quality were found to be minimal (Jordan, 2012).

The City should consider completing more detailed hazard assessments and proactively developing response plans for these sub-drainages in advance of a wildfire. It was noted in the 2008 CWPP that the water supply in the Nelson Fire Protection Area is vulnerable to watershed disturbance and recommendations for stabilization and rehabilitation of burn areas were provided.

[4] http://www.rdck.ca/EN/main/services/emergency-management/geotechnical-hazards.html



Map 5. Creek drainages within and above the Study Area, including some creeks potentially at risk of debris flow post-wildfire.

4.2.2 CULTURAL HERITAGE VALUES OVERVIEW

There are five first nation groups within the Kootenay Lake TSA – the Lower Kootenay Indian Band, Shuswap Indian Band, Ktunaxa Nation Council, Okanagan Nation Alliance, and Shuswap Nation Tribal Council. The Lower Kootenay Indian Band and the Shuswap Indian Band have Forest and Range Agreements with the Province. The Ktunaxa Nation is currently involved in the BC Commission Treaty process.

Archaeological sites in BC are protected by the *Heritage Conservation Act* (HCA), which applies on both private and public lands. Archaeological remains in the Province of British Columbia are protected from disturbance, intentional and inadvertent, by the Heritage Conservation Act (HCA). Archaeological sites that pre-date 1846 are automatically protected under the Heritage Conservation Act whether on public or private land. Sites that are of an unknown age that have a likely probability of dating prior to 1846 (e.g., lithic scatters) as well as Aboriginal pictographs, petroglyphs, and burials (which are likely not as old but are still considered to have historical or archaeological value) are also automatically protected. Under the HCA, protected sites may not be damaged, altered or moved in any way without a permit. It is a Best Practice that cultural heritage resources such as culturally modified tree (CMT) sites be inventoried and considered in both operational and strategic planning.

Prior to stand modification for fire hazard reduction, and depending on treatment location, preliminary reconnaissance surveys may be undertaken to ensure that cultural heritage features are not inadvertently

damaged or destroyed. Pile burning and the use of machinery have the potential to damage artifacts that may be buried in the upper soil horizons. Above ground archeological resources may include features such as Culturally Modified Trees, which could be damaged or accidentally harvested during fire hazard reduction activities. Prior to and during fuel management prescription development the professional forester will request archaeological site records for the specific area and if either cultural or archaeological values are identified then prior to operational fuel treatment activities commence, the project supervisor must commission a reconnaissance survey (or if required) an Archaeological Impact Assessments. Due to site sensitivity, the locations of archaeological sites may not be made publicly available. The RDCK should apply for direct access to Remote Access to Archaeological Data (RAAD), which will allow the RDCK to look up or track any archeological sites in the area.[5]

First Nations consultation for treatments on Crown Land would be required with all identified First Nations at the detailed assessment and prescription stage before any future fuel management treatments proceed and as directed by the Selkirk Resource District.

4.3 COMMUNITY SUPPORT

There is widespread recognition and awareness, both in City staff and the community members in general, of the threat posed to the community by wildfire, and general support for hazard mitigation activities. Broad community engagement played a key role in developing this CWPP. The following consultation was undertaken to ensure community support:

Table 2. Consultations undertaken during the development of the CWPP update

Group	Activity	Outcome
Interface Working Group	Quarterly meetings between City of Nelson, RDCK and BC Parks senior staff to provide project oversight	Clear progress updates, issues identified get resolved, external communication is consistent.
Harrop Procter Community Forest	Several field tours to conduct WUI threat analyses and discuss options for collaboration	Alignment on CWPP and operational considerations
West Kootenay EcoSociety, Conservation Committee	Tuesday May 24 Meeting to review project scope and discuss areas of common interest especially the process going forward to protect biodiversity at the strategic planning, prescription and operational phases.	Shared understanding of project scope and agreement to strike a technical review committee

[5] https://www.for.gov.bc.ca/archaeology/accessing_archaeological_data/obtaining_access.htm

Group	Activity	Outcome
West Arm Interface Steering Team (WIST)	The WIST was established to facilitate communication between groups and agencies responsible for wildfire preparation and response and is comprised of City of Nelson, RDCK, local fire departments, forest companies, MFLNRO, BCWS, Ministry of Environment, BC Parks and other local organizations. Wednesday May 25 Meeting at RDCK office to review progress and seek feedback from local licensees, MFLNRO staff, City staff, RDCK staff and local conservation representatives	Shared understanding of project scope and time lines, invitation extended to attend field tours, public meetings or technical sessions when the draft plan is ready to be reviewed.
Licensee Field Tour #1	Thursday May 26 field tour with local licensee to review interface fuel reduction objectives, project timelines and opportunities for collaboration	Agreement to work together on a priority west of Nelson in Area F
Ktunaxa First Nation	Information sharing with Ktunaxa Lands and Resources Agency Lands Stewardship Manager	Shared understanding of project scope and time lines, invitation extended to review the draft CWPP. The Ktunaxa representatives expressed no concern with the CWPP but requested consultation at the prescription phase of any fuel management project work.
Technical Review Committee	The Technical Review Committee is comprised of local biologists and ecologists associated with the Nelson EcoSociety. Meeting on Monday July 4 to review preliminary priority areas, discuss treatment options and agree to progress	Agreement to collaborate and review the draft CWPP
Svoboda Road Resident Association meeting	Project met with the Svoboda Road Resident Association to summarize the project and discuss appropriate actions of private land owners	Commitment from Svoboda Road Resident Association to engage with Nelson and RDCK staff on implementation of the CWPP, including exploring fuel reduction treatments on private land
Field Tour #1	July 5 field tour to the east shore north of Creston with City of Nelson, City of Creston, BC Parks and RDCK staff and elected officials to discuss the draft plan, review previous fuel reduction projects and discuss overall plan implementation.	Shared understanding of project scope and time lines, invitation extended to attend field tours, public meetings or technical sessions when the draft plan is ready to be reviewed.
Licensee Field Tour #2	Thursday July 7 field tour with local licensee to review interface fuel reduction objectives, project timelines and opportunities for collaboration	Agreement to work together on a priority area adjacent to the Municipal boundary, once the Plan is complete

Group	Activity	Outcome
Field Tour #2	August 9 field tour to various locations in Nelson with City of Nelson, BC Parks and RDCK staff and elected officials to discuss the draft plan, review previous fuel reduction projects and discuss overall plan implement	Shared understanding of project scope and time lines, invitation extended to attend field tours, public meetings or technical sessions when the draft plan is ready to be reviewed.
Public Meeting #1	August 17 open house in Nelson to provide the public, land managers, local elected officials and government staff an opportunity to review the draft plan and provide feedback	Comments received and incorporated into the CWPP
Public Meeting #2	August 18 open house on the North Shore to provide the public, land managers, local elected officials and government staff an opportunity to review the draft plan and provide feedback	Comments received and incorporated into the CWPP
Technical Review Committee	September 9 review and comment on draft proposed Areas of Interest.	Comments received on how to ensure protection of biodiversity and incorporated into the final plan
Critical Infrastructure and Fire fighting status Review	September 7-26 review of Draft CWPP by City staff to ensure that critical infrastructure data. emergency response and water systems are described appropriately	Comments received and incorporated into the final plan

Combined, these various engagement opportunities have generated a shared understanding of the CWPP objectives, project timelines and expected outcomes among local government, stakeholders, residents and land managers.

4.4 KEY CONTACT, PARTNERSHIP AND FUNDING OPPORTUNITIES

There are key funding opportunities, partnership opportunities and key contacts that are specific to the City of Nelson. These are summarized below.

Table 3. Funding sources, partnership opportunities and key contacts for the City of Nelson.

Partnership Organization	Key Contact	Partnership Opportunity
Union of BC Municipalities, Strategic Wildfire Protection Initiative	Peter Ronald, Programs Officer pronald@ubcm.ca http://www.ubcm.ca/EN/main/funding/lgps/strategic-wildfire-prevention.html	SWPI provides direct funding to local governments for development of CWPPs, Fuel Modification Prescriptions. Operational Treatments and Demonstration Projects
Forest Enhancement Society of BC (FESBC)	Greg Anderson, Executive Director anderson.greg.c@gmail.com	FESBC provides funding through the Forest Enhancement Program (FEP) to local governments and licensees to prevent and mitigate wildfire impacts and/or improve wildlife habitat and damaged

Partnership Organization	Key Contact	Partnership Opportunity
		forests.
Columbia Basin Trust	Tim Hicks, Manager, Water and Environment	CBT has provided 50% of local government funding for RDCK and City of Nelson SWPI projects

Additionally, there are other sources of funding or support that may become available.

- **Provincial Government**
    - BC Parks – West Arm Provincial park, east of the City and within the Study Area poses significant wildfire threat to the City. In addition, this park is at risk from fires starting within the City. The City may wish to explore partnerships with BC Parks.
    - Other Crown land areas that are not currently high threat may increase with time, as these areas revegetate and recover from previous large-scale forest fires and the mountain pine beetle outbreak (SWPI and FEP funding are applicable).
- **Utility companies** – right of way clearing and fuel hazard should be discussed with Nelson Hydro, and FortisBC. These companies should be encouraged to maintain rights of way in a low hazard state (frequent brushing, with brushed material removed prior to curing).
- **Forestry Licensees** –Kalesnikoff Lumber Company, Atco Lumber, BC Timber Sales (BCTS), woodlot licensees. Partnership opportunities may exist for commercial harvest of hazardous areas that may not qualify under the SWPI program (i.e., too far from infrastructure, but which may still pose a spotting risk to the community or could be leveraged into a landscape level fuel break).

5.0 EXISTING PLANS AND BYLAWS

To ensure consistency among plan documents, a review was conducted of existing plans that may impact or be impacted by this CWPP. These include, the Selkirk Resource District Fire Management Plan, higher level plans such as the Kootenay Boundary Higher Level Plan and the City of Nelson Official Community Plan and bylaws therein that pertain to or affect wildfire hazard mitigation.

5.1 FIRE MANAGEMENT PLANS

The Selkirk Resource District Kootenay Lake Fire Management Plan (FMP) (MFLNRO, 2016) identifies values at risk on the landscape and prioritizes broad categories of values as ‘themes’ for categorizing response through the Resource Strategic Wildfire Allocation Protocol (RSWAP). The four themes are 1) Human Life and Safety, 2) Property and Critical Infrastructure, 3) High Environmental and Cultural Values, and 4) Other resource values (timber, rangelands, etc.). The organization of values is intended to provide the information needed to make

appropriate fire response decisions in complex emergency situations. The Selkirk Resource District FMP was reviewed and this CWPP Update is consistent with the FMP prioritization framework.

The development of FMPs is the responsibility of each MFNLRO Resource District. The FMPs recognize the importance of CWPP-defined risk areas and fuel management recommendations within communities which can augment other treatments on a landscape scale. The Selkirk Resource District FMP has some linkages to the RDCK's 2008 CWPP. Additionally, the strategic direction presented in the District-wide FMP planning processes must be considered for future fuel treatments, as these FMPs and, specifically, landscape level fuel breaks and fuel treatments, are further developed and made available publicly and through consultations with the Resource

5.2 HIGHER LEVEL PLANS

KOOTENAY BOUNDARY HIGHER LEVEL PLAN

The Study Area falls within the Kootenay Boundary Higher Level Plan (KBHLP). The Study Area is within the Kootenay Lake Resource Management Zone within which are defined Biodiversity Emphasis areas, Old and Mature forests, green-up requirements, Grizzly bear habitat and connectivity corridors, consumptive use streams, enhanced resource development zones for timber, fire-maintained ecosystems, visuals, and social and economic stability. It must be noted that many of the KBHLP objectives have been replaced with other legislation such as Government Actions Regulation (GAR) for special management of certain forest values including Cariboo habitat. The remaining objectives not provided special management under other legislation are carried forward in the KBHLP. The fire-maintained ecosystem provision in the KBHLP allows the possibility to restore and maintain the ecological integrity of fire-maintained ecosystems, providing for treatments that will restore shrubland, open range, open forest, and managed forest ecosystem components in NDT4. There are no NDT4 ecosystems in the Study Area, most ecosystems are classified as NDT3.

CITY OF NELSON OFFICIAL COMMUNITY PLAN

The Official Community Plan (OCP) recognizes wildfire as a significant threat to residences in the wildland-urban interface, and recognizes the balance between natural beauty and potential hazard (City of Nelson, 2013). The Wildfire Interface Zone is defined in Schedule D, and appropriate siting and building materials are defined for new developments (Schedule H).

OTHER

All forest licensees in the Study Area have Forest Stewardship Plans (FSPs), that detail how each licensee will achieve Forest and Range Practices Act objectives, as well as those in the KBHLP.

5.3 RELEVANT LEGISLATION, PLANS, BYLAWS AND POLICIES

LOCAL GOVERNMENT

Local policies and guidelines and relevant bylaws include:

- The City of Nelson Natural Environment and Hazardous Lands Development Permit Area (DPA #3, Bylaw No. 3247, Schedule H) (Nelson, 2013) applicable to the WUI zone along the periphery of the City limits and

in particular along the southerly and westerly areas of the Nelson WUI. The purpose of the DPA is to minimize risk to life and property from potential wildfires and protect aquatic habitat and riparian areas with guidelines applicable to new developments.

- City of Nelson Fire Regulation and Fire Prevention bylaw (Bylaw No. 3268, revised June 7, 2016[6]) prohibiting open air burning with exceptions for brief periods of time at the discretion of the Fire Chief and with a temporary burn permit.
- RDCK Emergency Management Plan (described below).

The RDCK Emergency Management Plan (Black Shield Preparedness Solutions 2016), which includes the City of Nelson, describes the organization, roles, procedure and other higher level factors in managing emergencies. The potential emergencies and disasters are characterized in Annex B. 'Fire - Urban and Rural' is ranked the most likely hazard, and 'Wildfire' is rated third. In terms of severity, wildfire is ranked highest.

The ERP identifies a number of possible reception centres that would be determined appropriate based on the location, type and extent of the emergency. The RDCK also has an Emergency Response and Recovery Plan (Regional District of Central Kootenay 2016) that coordinates the response to, and recovery from, an emergency or disaster. Recommended actions are suggested for the different types of emergencies. An interface fire should be managed using unified command between the BC Wildfire Service and the local fire department(s). If no fire department covers the area involved in a wildfire, the RDCK Emergency Operations Centre will handle the response in coordination with the BC Wildfire Service.

Opportunities exist for the City of Nelson to share costs and benefits of implemented recommendations between the adjacent RDCK Areas E and F (each jurisdiction will have complimentary stand-alone CWPP documents) and also with West Arm Provincial Park for which a Fire Management Plan is in progress of being updated. a working group with senior staff from these agencies has been formed and combined, these jurisdictions provide a coordinated, regional approach.

RELEVANT PROVINCIAL LEGISLATION

- **Wildfire Act and Wildfire Regulation** – dedicated to wildfire management in BC. Key objective of the legislation is to specify responsibilities and obligations with respect to fire use, prevention, control and rehabilitation.

- **Forest and Range Practices Act and Forest Planning and Practices Regulation** – operational planning, forest practices and resource protection. This legislation provides the power to authorize the destruction or damage of Crown timber for wildfire hazard reduction purposes. The Regulation stipulates minimum forest practices to protect resources.

- **Park Act** – gives power to prohibit or control the use of fire within Parks.

- **Environmental Management Act** – governs waste emissions, including particulate matter (smoke). The Open Burning Smoke Control Regulation regulates open burning including favorable conditions for smoke dispersion.

[6] https://nelson.civicweb.net/filepro/documents/488?preview=18081

- **Emergency Program Management Regulation** – provides the guiding principles to the Provincial Emergency Program by identifying roles and responsibilities, and has the responsibility to identify potential emergencies and disasters, and the requirement to provide advice and assistance in the event of emergency.

- Other (Hydro and Power Authority Act, Special Accounts Appropriation and Control Act, Annual Rent Regulation)

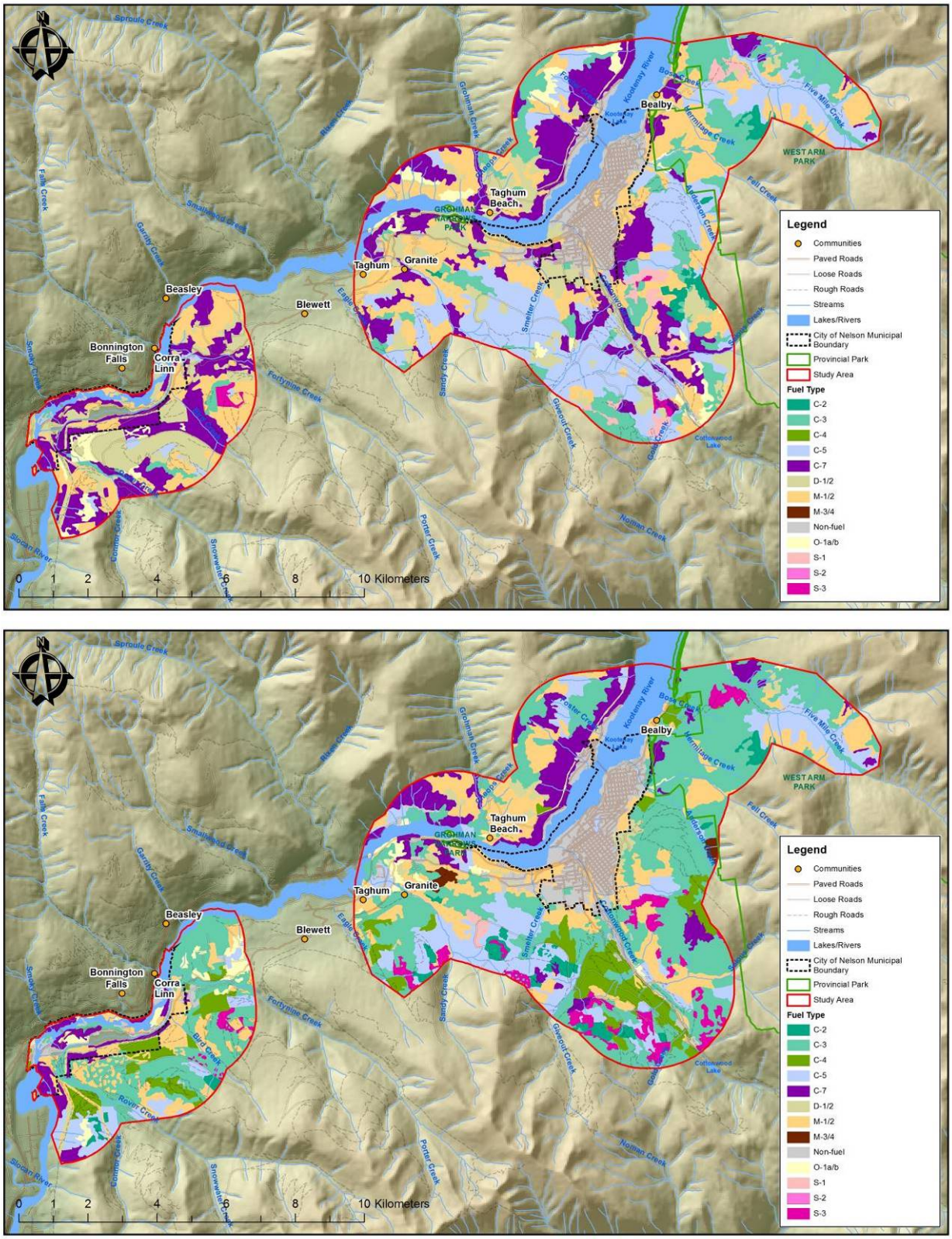
6.0 WILDFIRE BEHAVIOUR AND WUI THREAT ASSESSMENT

As part of the field assessment completed for this report, the wildfire threat was determined surrounding or within the community area by establishing fuel types based on the Canadian Forest Fire Danger Rating System, CFFDRS classification system, and by completing Wildland Urban Interface Threat Assessments.

6.1 LOCAL FUEL TYPE SUMMARY

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines five major fuel groups and 16 fuel types based on characteristic fire behaviour under defined conditions (Forestry Canada Fire Danger Group, 1992).

The initial starting point for Study Area fuel typing is the 2015 Provincial Strategic Threat Analysis (PSTA), which is based on the FBP fuel typing system. PSTA data is limited by the accuracy and availability of information within the Vegetation Resource Inventory (VRI) provincial data; confidence in fuel type provincial fuel type data is low on private land. For the above reasons, fuel types from the PSTA data have been updated using orthophotographs of the Study Area and with field fuel type verification as illustrated in Map 6A and B.



Map 6A and B. Unverified fuel types (PSTA Fuel Types) and the field verified fuel types (CWPP Fuel Types).

Overall, fuel types designated in the PSTA dataset were notably different from the Blackwell corrected fuel typing, and extensive field and photo interpretation validation was required prior to spatial analysis. Table 4 summarizes the fuel types by general fire behaviour and total area for the Study Area.

Table 4. A summary of the fuel types occurring within the Study Area.

Fuel Type	Description	Wildfire Behaviour Under High Wildfire Danger Level	Area (ha) in Study Area	Percent of Study Area
C-2	Plantations older than 20 years. High density with high canopy and low crowns.	Almost always crown fire, high to very high fire intensity and rate of spread.	248	2%
C-3	Fully stocked, mature forest, crowns separated from ground	Surface and crown fire, low to very high fire intensity and rate of spread	4,171	33%
C-4	Dense pole-sapling forest, heavy dead and down, dead woody fuel, vertical crown fuel continuity	Almost always crown fire, high to very high fire intensity and rate of spread.	801	6%
C-5	Well-stocked mature forest, crowns separated from ground	Low to moderately fast spreading, low to moderate intensity surface fire.	1,432	11%
C-7	Open, mature forest.	Surface fire spread, torching of individual trees, rarely crowning (usually limited to slopes > 30%), moderate to high intensity and rate of spread	969	8%
D-1/2	Moderately well-stocked deciduous stands (D1 leafless or D2 green)	Always a surface fire, low to moderate rate of spread and fire intensity	222	2%
M-1/2	Moderately well-stocked mixed stand of conifer and deciduous species, low to moderate dead, down woody fuels, crowns nearly to ground (M1 – leafless, M2 – in leaf)	Surface, torching and crowning, moderate to very high intensity and spread rate (depending on slope and percent conifer and season (in leaf vs leafless)	2,103	17%
M-3/4	Moderately well-stocked mixed stands of conifer and deciduous species, where the conifer species may be dead, in varying percentage. Not typically used In BC except as red-phase MPB-attacked pine stand. M4 (leafless) not used in BC (Perrakis and Eade, 2015)	Rapid spreading, high to very high fire intensity and rate of spread (M3)	56	<1%
O1a/b	Shrub type with volatile species, matted or standing grass	Rapid spreading, intense surface fire	250	2%
S1/S2/S3	Continuous and uncompacted slash type with large fuel loads and deep slash depth. Varies depending on species composition of slash.	Ranges from surface fire, low to moderate intensity to moderate to high rate of spread and high to very high intensity surface fire.	422	3%
W	Water	N/A	948	8%
NF	Non-fuel	N/A	947	8%
		Total	**12,568**	100%

The most abundant fuel type in the area is C-3. There are also large tracts of mixed forest (M-1/2), in this case being partly attributed to stands with a western larch component. Western larch is a deciduous conifer, and for the purposes of fire behaviour, is considered less flammable than evergreen conifers due to higher moisture content of leaves that are produced each spring. The next most abundant fuel type is C-5. The presence of some M-3/4 indicates mountain pine beetle-killed stands with deciduous regeneration. Much of the deciduous species component in this region is paper birch, a more flammable species than other deciduous species of the area such as trembling aspen.

Developed areas have been accurately identified as non-fuel areas, as they do not fit into the classification system that is only appropriate to classify forested lands. The assignation of non-fuel should not be interpreted as areas representing low, or no hazard, as planted landscaping and other vegetation, planted and naturally regenerating, on private lands and within a developed matrix may present extreme hazard. This is particularly relevant, as planted landscaping on private lands can present a considerable hazard in interface areas.

6.2 THE WILDLAND URBAN INTERFACE

The Wildland Urban Interface (WUI) is generally defined as the place where the forest meets the community. There are different WUI conditions, which are variations on 'perimeter interface' and 'intermix'. A perimeter interface condition is generally where there is a clean transition from urban development to forest lands. Smaller, more isolated developments that are embedded within the forest are referred to as intermixed areas. An example of interface and intermixed areas is illustrated in Figure 3.

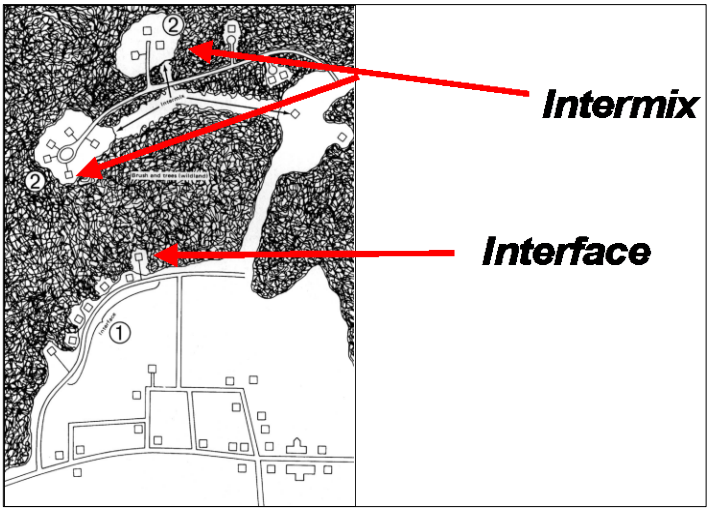


Figure 3. Illustration of intermix and interface areas.

In interface and intermixed communities, fire has the ability to spread from the forest into the community or from the community out into the forest. Although these two scenarios are quite different, they are of equal importance when considering interface fire risk. Regardless of which scenario occurs, there will be consequences for the community and this will have an impact on the way in which the community plans and prepares for interface fires.

6.2.1 VULNERABILITY OF THE WILDLAND URBAN INTERFACE TO FIRE

Fires spreading into the WUI from the forest can impact homes in two distinct ways:

1. From sparks or burning embers carried by the wind, or convection that starts new fires beyond the zone of direct ignition (main advancing fire front), and alight on vulnerable construction materials or adjacent flammable landscaping (*i.e.* roofing, siding, decks, juniper, etc.) (Figure 4).

2. From direct flame contact, convective heating, conductive heating or radiant heating along the edge of a burning fire front (burning forest), or through structure-to-structure contact. Fire can ignite a vulnerable structure when the structure is in close proximity (within 10 meters of the flame) to either the forest edge or a burning house.

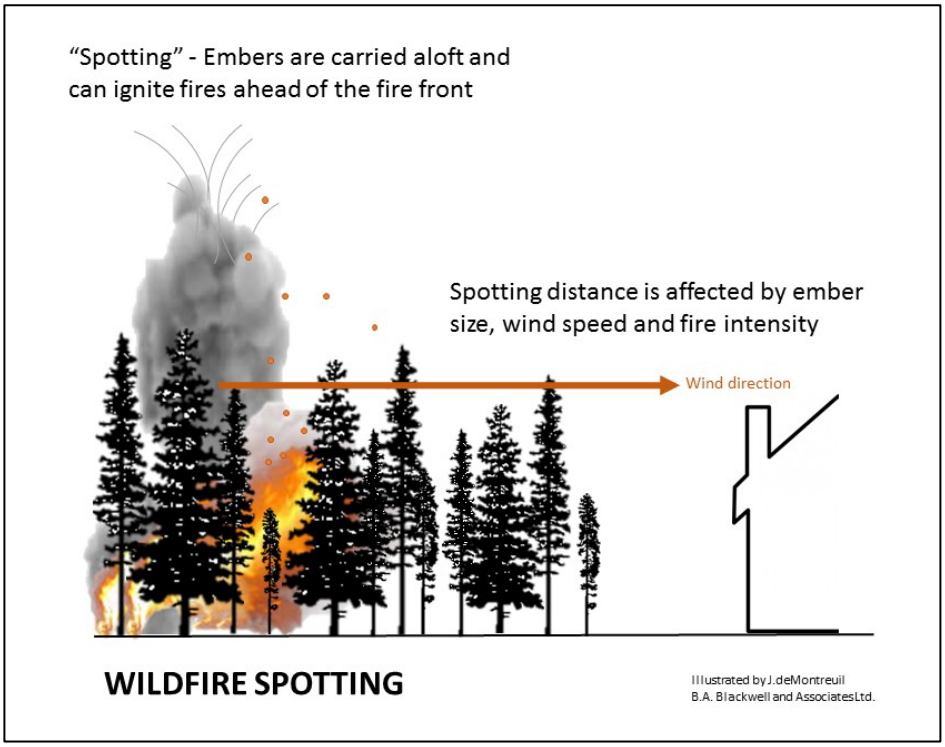


Figure 4. How homes in the interface are impacted by wildfire through 'spotting'.

6.3 WUI THREAT ASSESSMENTS

WUI threat assessments were completed during the early part of the field season of 2016, from March to July, in conjunction with verification of fuel types. WUI Threat Assessments were completed in the interface areas of the Study Area, in order to support development of priority treatment areas, and in order to confidently ascribe threat to polygons which may not have been visited or plotted, but which have similar fuel, topographic, and proximity to structure characteristics to those that were. To assess risk on treated and untreated polygons, the *Provincial WUI Wildfire Threat Rating Worksheets* (worksheet) were used, as required by UBCM[7] in addition to professional judgment. The worksheet provides point ratings for four components that contribute to wildfire risk. These components include fuels, weather, topography and structural values at risk. The original WUI threat plot forms have been submitted as a separate document.

A total of 25 WUI threat plots were completed in the City of Nelson Combined Study Area, in conjunction with fieldwork for CWPP updates for the RDCK Areas E and F. The data collected and field observations recorded from

[7] http://www.ubcm.ca/assets/Funding~Programs/LGPS/Current~LGPS~Programs/SWPI/Resources/swpi-WUI-WTA-Guide-(2012-Update).pdf

the plots and field stops inform much of this document. The Study Area overall has 'high' fire behaviour threat class ratings, and a range of WUI threat ratings, demonstrated in Table 5 below.

Table 5. Wildland Urban Interface Threat Assessments completed in the Study Area

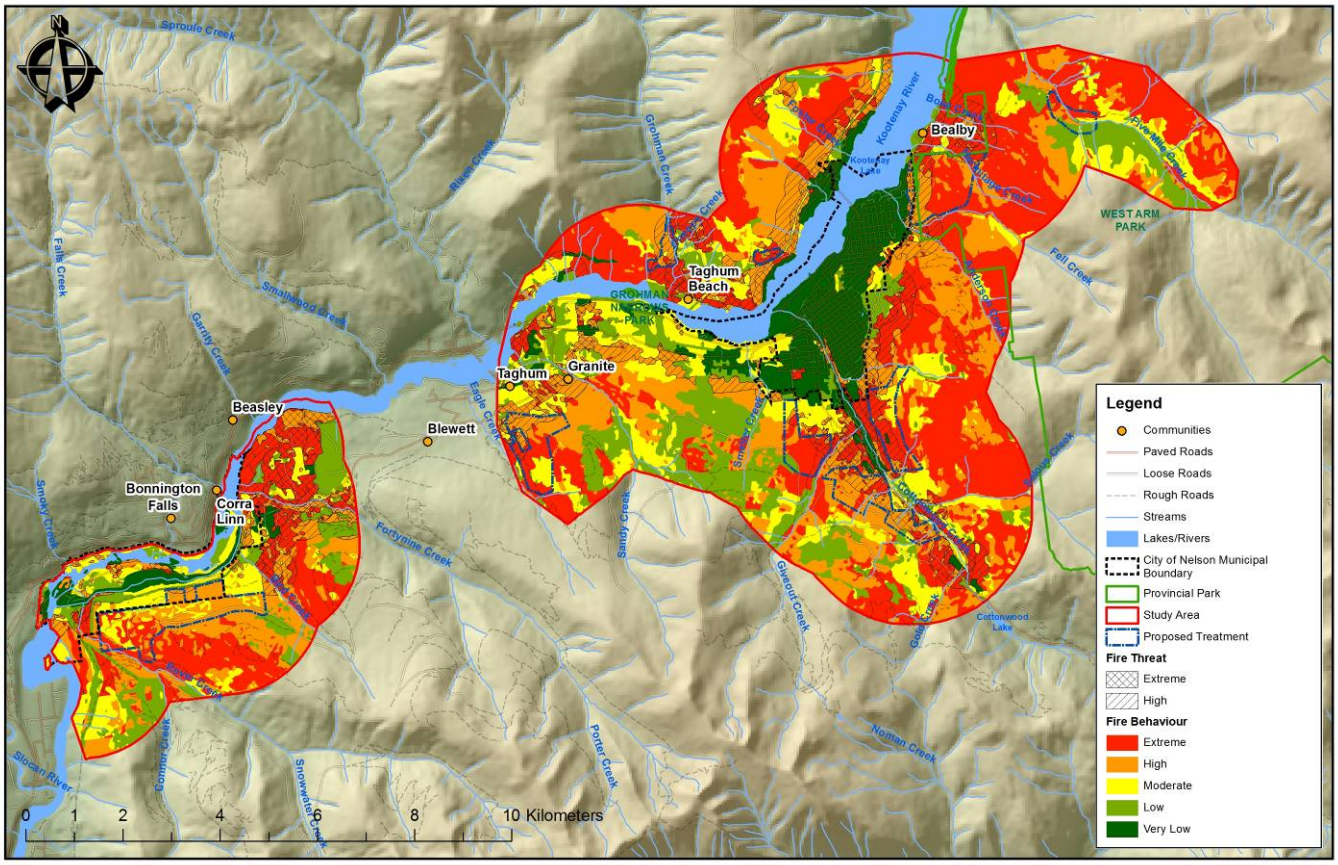
Plot Number	General Location	Fire Behaviour Score	Fire Behaviour Class	WUI Threat Score	WUI Threat Class
AC1	Anderson Creek	115	High	33	High
AC2	Anderson Creek	138	High	33	High
BL2	Blewett	131	High	14	Moderate
GN2	Grohman Narrows	123	High	38	High
GN3	Grohman Narrows	131	High	28	Moderate
GO1	Giveout Creek	119	High	14	Moderate
GO2	Giveout Creek	127	High	23	Moderate
GO3	Giveout Creek	127	High	23	Moderate
GO4	Giveout Creek	145	High	28	High
GO5	Giveout Creek	134	High	32	High
GO6	Giveout Creek	122	High	14	Moderate
GO7	Giveout Creek	134	High	14	Moderate
MS1	Mountain Station	141	High	28	High
MS2	Mountain Station	121	High	25	Moderate
PR1	Pulpit Rock	134	High	28	High
ROV1	Rover FSR	128	High	20	Moderate
ROV2	Rover FSR	125	High	45	Extreme
SEL1	Selous Creek	139	High	16	Moderate
SEL2	Selous Creek	157	Extreme	16	Moderate
SVO1	Svoboda Road	121	High	40	Extreme
WA1	Waldorf School	119	High	32	High
WAPP1	West Arm Provincial Park	120	High	18	Moderate

6.3.1 STUDY AREA THREAT RATING

There are two main components of the threat rating system: the wildfire behaviour threat class (fuels, weather and topography sub-components) and the WUI threat class (structural sub-component). The map below illustrates the Fire Behaviour and Fire Threat (WUI Threat class), determined as a result of a spatial data analysis (for methodology, see Appendix 2). Areas that are proposed for further assessment for fuel hazard modification are shown in blue on the map. These areas are on crown land only, which is not delineated on the map.

The result of the analysis shows large tracts of landscape that have high or extreme fire behavior potential. Areas of high or extreme WUI threat are limited to those areas that have a high or extreme fire behavior rating, *and* are

in close proximity to homes. Some areas proposed for fuels modification extend beyond the WUI threat areas, in order to establish landscape-level breaks.



Map 7. Fire Threat and Fire Behaviour for the Study Area.

7.0 RECOMMENDATIONS AND ACTION PLAN

The following recommendations and action plans provide recommendations on how to implement the CWPP. The recommendations discussed in this section include: Communication and Education; Structure Protection; Emergency Preparedness; Planning and Development; and Vegetation/Fuel Management.

These recommendations, including cost estimates, are summarized in Tables 6 to 11. The cost estimates are intended to suggest a value of the recommended work to be completed. Estimated costs in these tables reflect work that may be possible to be completed as part of the normal work plan or as extra work. Recommended work that is incremental to the normal work plan may be possible to be completed internally by existing staff or may require a portion of a full time equivalent position or consultant to complete.

7.1 COMMUNICATION AND EDUCATION

Awareness and understanding support the adoption of tools to reduce fire risk. In communities where the dangers of wildfire are understood there is increased support and interest in reducing fire risk. The establishment of tools to reduce fire risk is one of the keystones to building a FireSmart community. A more detailed discussion

of nationally accepted FireSmart principles is provided in Appendix 1. Without the support of the community, the efforts of public officials, fire departments, and others to reduce wildfire will be hindered. In many communities there is generally a lack of understanding about interface fire and the simple steps that can be taken to minimize risk. Additionally, public perception of fire is often underdeveloped due to public confidence and reliance on local and provincial fire rescue services.

Based on the consultation completed during development of this Plan, it is evident the City has a good level of awareness of fire risk in the interface; however, field observations highlighted the need to further educate the community on what private land owners can do to contribute to a FireSmart community. The Communication and Education objectives for the Study Area are:

- To improve public understanding of fire risk and personal responsibility by increasing resident awareness of the wildfire threat in their community and to establish a sense of homeowner/landowner responsibility; and
- To enhance the awareness of elected officials, protection staff and stakeholders about the resources required to mitigate fire risk.

The two principal goals for the City to enhance wildfire related Communication and Education should be to:

- Reduce human caused fire ignitions; and
- Encourage reduced fire risk on private property and critical infrastructure.

Communicating effectively is the key aspect of education. Communication materials must be audience specific, and delivered in a format and through mediums that reach the target audience. Audiences should include home and landowners, school students, local businesses, elected officials, City staff, local utilities, and forest tenure holders. Education and communication messages should be simple yet comprehensive. A basic level of background information is required to enable a solid understanding of fire risk issues and the level of complexity and detail of the message should be specific to the target audience.

The City has undertaken many public education and FireSmart initiatives in schools, the community, and on-line. These can be expanded upon and/or adapted to further enhance wildfire preparedness and education. The City should consider expanding their current school fire education program to include an increased element of wildfire preparedness education to be presented annually in elementary schools. Programming could include volunteer / advocacy work from professional foresters, wildland firefighters or prevention officers, and City staff. The City should consider holding a wildland specific Fire Prevention Day or Week, or similarly formatted event, in the spring prior to the wildfire season. Timely educational materials to increase preparedness would be most effective immediately prior to the fire season.

Provincial funding for fuel management is only provided for public lands. It is important for homeowners to understand what they can do to reduce the risk of wildfire damage to their property or adjacent residences. In particular, property owners need to be aware of their responsibility to implement FireSmart mitigation measures on their properties and also understand how their contributions benefit community wildfire safety.

FireSmart information material is readily available and simple for municipalities to disseminate. It provides concise and easy-to-use guidance that allows homeowners to evaluate their homes and take measures to reduce fire risk. However, the information needs to be supported by locally relevant information that illustrates the vulnerability of individual houses to wildfire. As per the 2008 CWPP, it is recommended that educational material be made available to all private landowners.

Bringing organizations together to address wildfire issues that overlap physical, jurisdictional or organizational boundaries is a good way to help develop interagency structures and mechanisms to reduce wildfire risk. Engagement of various stakeholders can help with identifying valuable information about the landscape and also help provide unique and local solutions to reducing wildfire risk. The City should consider strengthening the effectiveness of the West Arm Interface Steering Committee to coordinate wildfire risk reduction efforts. Coordination of fuel management activities on a regional level with forest licensees could significantly aid in the establishment of large, landscape-level fuel breaks or compliment current or proposed fuel treatment areas.

Table 6. Summary of Recommendations for Communication and Education

Communication and Education			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
Objective: To improve public understanding of fire risk and personal responsibility by increasing resident awareness of the wildfire threat in their community and to establish a sense of homeowner responsibility.			
1.	High	• Establish/ expand a school education program to engage youth in wildfire management. Consult ABCFP and BCWS (the zone) to facilitate and recruit volunteer teachers and experts to help with curriculum development and to be delivered in elementary and/or secondary schools. Educational programming can be done in conjunction with currently running programs on fire extinguisher training.	$5,000
2.	High	• Summaries of this report and associated maps to be made publicly available through webpage, social media, and public FireSmart meetings. Add fire threat spatial data to the interactive web-mapping tool to allow residents to find their property and the associated threat of wildfire.	May be within current operating costs
3.	Moderate	• Add a Wildfire-specific Fire Prevention Week (or day) in the spring, immediately prior to the fire season.	$2,500
4.	Moderate	• Consider door to door FireSmart assessment (and/or home owner self-assessment) along the Nelson interface in order to educate residents and to quantify the level the level of risk in the interface	Internally completed by NSFRS, may be within current operating costs
Objective: To enhance the awareness of elected officials and stakeholders regarding the resources required to reduce fire risk.			

Communication and Education			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
5.	High	• Maintain and strengthen the regional Interface Working Group that includes Nelson, Area F and BC Parks to coordinate wildfire risk reduction efforts.	May be within current operating costs
6.	High	• Consider local planning departments to develop regional development permit standards, provide a group voice to the Building and Safety Standards Branch and other provincial entities, and align municipal bylaws.	$30,000
7.	High	• Consider the development of a coordinated approach to fuel management and hazard reduction within and adjacent to City by coordination with stakeholders including forest licensees and large private land owners to aid in the establishment of large, landscape-level fuel breaks or compliment current or proposed fuel treatment areas	$25,000
8.	High	• Maintain regular communication with the Technical Review Committee (see Section 2.4) to ensure that proposed activities maintain or enhance biodiversity values	May be within current operating costs

7.2 STRUCTURE PROTECTION AND PLANNING

Establishing a FireSmart community will reduce losses and impacts related to wildfire. For this Plan two classes of structures were considered: critical infrastructure and residential / commercial infrastructure. Critical infrastructure provides important services that may be required during a wildfire event or may require additional considerations or protection. As outlined in Appendix 1, FireSmart principles are important when reducing wildfire risk to both classes of structure and are reflected in the recommendations. The structure protection objectives for the City are to:

- Enhance protection of critical infrastructure from wildfire; and
- Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.

The two main avenues for implementing FireSmart include:

- Change the vegetation type, density and setback from the structure; and
- Change the structure (where feasible) to reduce vulnerability to fire and reduce the potential for fire to spread to or from a structure.

Critical infrastructure is important to consider when planning for a wildfire event. The use of construction materials, building design and landscaping must be considered for all structures when completing upgrades or establishing new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart recommendations.

Detailed FireSmart assessments were not completed for critical infrastructure. The NFRS should consult with City staff to systematically assess critical infrastructure in interface areas and to provide FireSmart recommendations based on their findings.

As noted in the 2008 CWPP, water is the single most important suppression resource. Recommendations provided in the 2008 CWPP are still valid; implementation work on the recommendations is ongoing. Recommendations include: installing reservoir or hydrant systems in areas of poor water availability where feasible, identifying and mapping alternative water sources, and ensuring new developments have sufficient hydrant coverage. Hydrant coverage and locations should be reviewed by the NFRS. Improving water availability in identified areas and mapping alternative water sources is ongoing and should continue.

Full assessments of the water availability and vulnerability of water sources was not possible under the scope of this report. Back-up power sources should be installed for vulnerable critical infrastructure to ensure the City can continue to operate at an acceptable level during a wildfire event. Completion of a Fire Flow/ Water Supply Vulnerability Assessment for each of the City's water systems will identify those areas that may have insufficient or unreliable water supplies.

Table 7. Summary of Recommendations for Protection of Critical Infrastructure

Structure Protection and Planning			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
Objective: Enhance protection of critical infrastructure from wildfire.			
9.	High	• Consider completing a fire flow / water vulnerability assessment for each water system to identify and map all viable alternative water sources (reservoirs, streams, lakes, etc.). Identify areas where water availability may be improved and provide recommendations to reduce City's vulnerability.	$10,000
10.	High	• Consider completing a vulnerability assessment of all critical infrastructure in interface areas with FireSmart recommendations.	May be within current operating costs
11.	High	• Consider developing a relay pumping plan from Kootenay Lake and water sources at height, which may supplement emergency firefighting water requirements (not for drinking water)	$2,500
12.	High	• Consider completing a detailed review of back-up power source options for all critical infrastructure and upgrade as required.	May be within current operating costs

Structure Protection and Planning			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
13.	High	• Consider completing more detailed hazard assessments and proactively (in advance of wildfire) developing response plans for stabilization and rehabilitation of burn areas in watersheds that are vulnerable to post-wildfire debris flows and floods. Opportunities may exist to coordinate study and planning with adjacent jurisdictions (i.e., RDCK and BC Parks). Refer to Section 4.2.1 for a description of potential debris hazards.	$25,000

7.2.1 WILDLAND URBAN INTERFACE SITE AND STRUCTURE ASSESSMENTS

Another way to encourage change is through education and increased awareness of fire hazard on private property. The reduction of wildfire hazards on private lands generally depends on the homeowner. This includes choices in exterior building materials, setbacks from forest edges and landscaping. In other jurisdictions, notably Colorado Springs, Colorado[8] and Whistler, BC, programs to increase awareness of fire hazard and spur homeowner action have been implemented successfully. In these jurisdictions, fire hazard assessments were completed for homes in the Wildland Urban Interface. The results of the assessments were shared with the homeowner / property owner at the time of assessment. The results of the hazard assessments were compiled into a geo-spatial database and made available to the public. Each home and property owner could look up to see the hazard of their property, as well as their neighbours' (Figure 5). This database may be useful for the NFRS in targeting educational efforts, triage assessments and as an aid in suppression planning.

[8] http://gis.coloradosprings.gov/Html5Viewer/?viewer=wildfiremitigation.

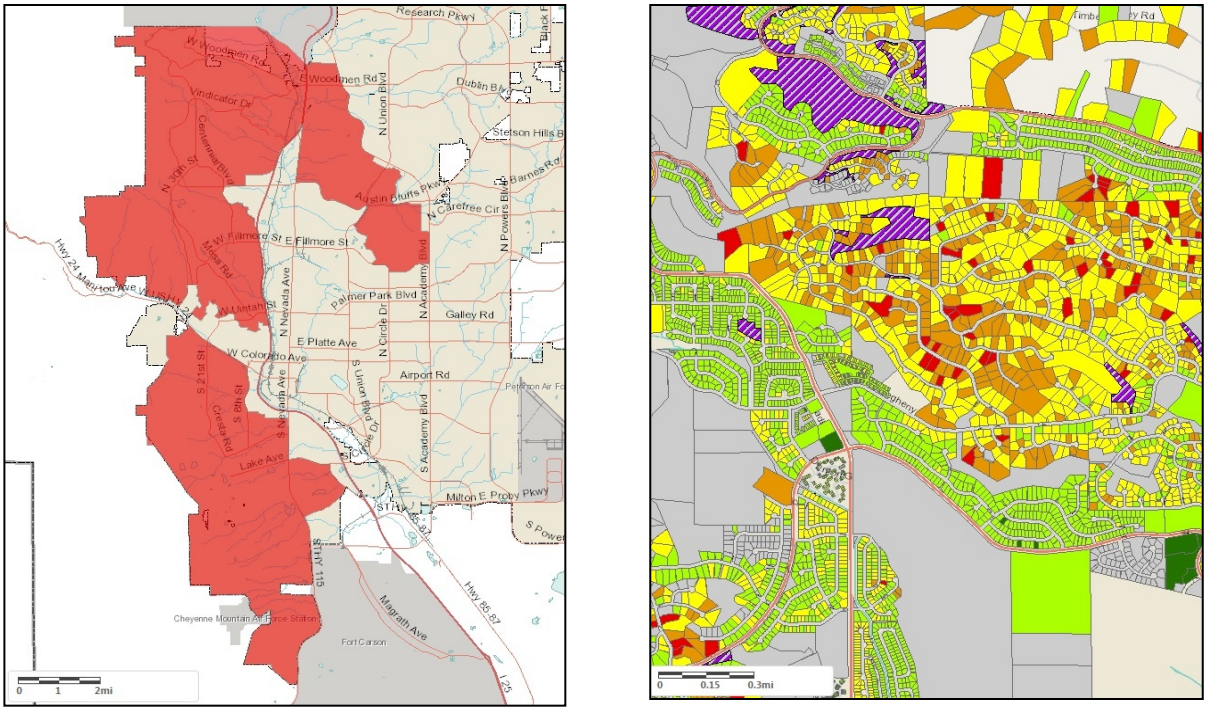


Figure 5. Screen captures of Colorado Springs, Colorado public internet mapping service.

The left figure displays the WUI area in red in which fire hazard assessments were completed. The right figure displays a neighbourhood within the WUI area and the fire hazard for each individual property. In these diagrams red is extreme, orange is very high, yellow is high, bright green is moderate and dark green is low risk.

The City should consider developing a similar fire hazard assessment program. Individual properties within an established Wildfire DP Area should be assessed using a FireSmart site and structure assessment form and to provide the results and opportunities for hazard mitigation to the property owner/resident. The City's internet mapping site should make available to the public the fire hazard results by property. Property owners could request a re-assessment upon completion of various mitigative actions and updates posted periodically on the mapping site.

This program could be combined with other City initiatives, such as a neighbourhood chipping program, free yard waste drop-off, a scheduled garden debris burning weekend, or include distribution of additional educational materials, such as FireSmart landscaping design and FireSmart plant selection information. The program will be most effective if it evaluates hazard, as well as provides property owners the information they need to effectively reduce the hazard and methods to dispose of materials removed.

It is recognized that this program could come at considerable cost to the City. Opportunities for saving may include utilizing on duty crews, three person shifts during shoulder seasons, and one to two Auxiliary Training Wednesdays each year. The program could also be targeted to the highest priority (highest threat) neighbourhoods and expanded as resources allow. Another cost saving option may be to hold a training session for individual FireSmart champion volunteers from interface neighbourhoods to complete assessments for their

respective neighbourhoods and to provide the results of their assessments to the City (and Regional District) to complete the mapping.

The recently launched SWPI FireSmart Grant Program provided funding of up to $10,000 to undertake FireSmart planning activities for private lands. At the time of report development, applications for this program are no longer being accepted. The City should stay up to date on all UBCM/SWPI funding initiatives, in order to leverage FireSmart funding for this and other FireSmart programs, if funding again becomes available.

Table 8. Summary of Recommendations for Structure Protection and Planning

Structure Protection and Planning			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
Objective: Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.			
14.	High	• Consider completing WUI Site and Structure Hazard Assessments for interface homes, make hazard mapping for assessed homes publicly available, and provide informational material to homeowners on specific steps that they can take to reduce fire hazard on their property.	$10,000-$25,000 depending on number of neighbourhoods assessed

7.3 PLANNING AND DEVELOPMENT

Municipal policy and bylaws are tools available to mitigate wildfire risk to the City. All levels of government (municipal, regional district, provincial, and federal) and individual landowners need to work together to successfully reduce their risk. Local and regional governments can educate the public on the associated risks, and show leadership to help reduce that risk to the City and the individual community members, their homes and properties, and other values at risk.

7.3.1 WILDFIRE HAZARD DEVELOPMENT PERMIT AREA

A development permit process exists to address the risk of interface wildfire. Using the threat mapping from the 2008 CWPP, a Natural Environment and Hazardous Lands Permit Area is defined. Within this area, guidelines exist for building materials. Increasing the scope of guidelines to include landscaping and building siting may help strengthen this permit process. The wildfire hazard development permit process can most effectively advance the objective of developing FireSmart communities through the following strategies:

- Increasing the number of homes and properties in the interface that are FireSmart compliant (building materials, design and landscaping) and are thus less vulnerable to ignition through radiant heat or ember spotting. This can be achieved by extending the reach and scope of the Development Permit;
- Ensure that future development is completed with public safety and property protection in mind (road network facilitates suppression and emergency vehicles and public evacuation in the case of wildfire, water availability is sufficient for suppression activities, sufficient setbacks from forested edge and top of slope).

- Ensure that natural lands turned over to the City and adjacent to new development are a moderate threat rating or lower; and,
- Ensure that the natural lands turned over to the City are accessible to fire crews, as well as for future maintenance activities to keep the areas at a moderate or lower threat rating.

A review of other jurisdictions' successfully implemented DP processes suggests that DPs can be used effectively to gradually phase in FireSmart practices on private land, both in sub-division and individual lot re-development phase. The District of North Vancouver has a robust Wildfire Hazard Development Permit process, which could serve as a model for opportunities to improve current practices for the City. Within the Wildfire Hazard DP area in the District of North Vancouver, DPs are triggered at the building permit phase. Bonds collected by the District are not returned to the homeowner or developer until a QP has provided a post-development inspection sign off and photographs to ensure that recommendations regarding landscaping, setbacks, and building materials were met. Through this process, the new lots and existing housing stock within the District of North Vancouver is rapidly converting to meeting FireSmart standards in both building materials and landscaping.

Section 5 of the Building Act provides local governments the authority to set local building bylaws for unrestricted and temporarily unrestricted matters, such as exterior design and finish of buildings in relation to wildfire hazard and within a development permit area. Until revisions of the Building Code to include requirements specific to prevention of wildfire spread are completed, local governments have the ability to set exterior requirements within the development permit area.[9] It is recommended that the City of Nelson seek legal advice regarding the Building Act and to mandate and enforce within the Development Permit process that exterior building materials are FireSmart compliant to the extent legally possible. It is also recommended that the City of Nelson work with the Building and Safety Standards Branch to provide input into the Building Code revisions that would apply within the development permit areas to prevent the spread of wildfire.

Many landscaping designs include highly flammable vegetation such as cedar hedging. This increases fire hazard on private properties and immediately adjacent to homes (priority zone 1). The City should consider developing a landscaping standard to be applied within the DP area to all new properties and upon existing properties when building permits are requested for new builds, retrofits or major renovations. If enforcement is not possible with currently available resources, the City should consider requiring a bond and post-development sign-off from a Qualified Professional (QP), to reduce enforcement costs. As an alternative, education and incentives for homeowners to plan and implement FireSmart landscaping should be considered.

[9] Building and Safety Standards Branch. 2016. Bulletin No. BA 16-01 Building Act Information Bulletin: Update for Local Governments.

Table 9. Summary of recommendations for Municipal Policy

Municipal Policy			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
Objective: To reduce wildfire hazard on private land and increase FireSmart compliance.			
15.	High	• Consider completing an OCP/ Development Permit review to strengthen and expand reach of the existing policy. Consider requiring development permit for major retrofits/ renovations or new builds (building permits), collecting bonds to be returned upon evidence of completing development and landscaping according to wildfire hazard assessment. Review District of North Vancouver DP process as a model.	$25,000
16.	High	• Obtain legal advice regarding the Building Act, specifically regarding the temporarily unrestricted matters and local government authority to set exterior building materials requirements. Use local government authority to mandate FireSmart construction materials beyond BC Building Code in wildfire hazard development permit area, as allowed.	May be within current operating costs
17.	High	• Consider developing a landscaping standard to be applied in interface/ DP areas. The standard should list flammable non-compliant vegetation, non-flammable drought and pest resistant alternatives, and tips on landscape design to reduce maintenance, watering requirements, and reduce wildfire hazard. Include meeting landscaping standard as a requirement of Development Permit.	$5,000
18.	High	• The City should consider proactively enforcing wildfire covenants requiring owners to maintain their properties free of elevated hazard on all properties in Natural Environment and Hazardous Lands Development Permit areas. Enforcement will serve to minimize fuel risks on problematic private properties which have allowed hazardous accumulation of fuels and provide improved protection to adjacent lands.	$15,000
19.	High	• The City should consider altering the zoning bylaw to require that developers leave building set backs on private land so that there is a minimum of 10 m distance between buildings and forest interface. The City should consider applying this standard to housing bordering both City owned and forested private land.	$5000
20.	Moderate	• The City should consider working with the Building and Safety Standards Branch to provide input into the Building Code revisions that would apply within the development permit areas to prevent the spread of wildfire.	May be within current operating costs

7.4 EMERGENCY PREPAREDNESS AND RESPONSE

The Nelson Fire and Rescue Services is a combination department that operates with ten fulltime firefighters (two on duty at all times) and up to 20 Auxiliary members available on a callout basis[10]. The main objective for recommendations in regards to Emergency Preparedness is to increase the level of training and equipment for department fire fighters to utilize in an interface fire situation.

The NFRS responds to approximately 1,300 calls per year within the City limits and a defined contract portion of Area E. These responses include (but are certainly not limited to) fire, first responder, motor vehicle collisions and technical rescue calls (high/low angle, confined space and water surface). There were a total of 25 wildfire or brush-related call outs in the 2015 fire season.[11]. Statistics for call-outs are on an upward trend that can be attributed to population growth within the community.

Fire departments within and adjacent to the Study Area (Beasly, Blewett, Ymir, and North Shore Volunteer Fire Departments) are responsible for first emergency response within their defined fire protection areas. Outside the municipal boundary and contracted response area, the NFRS has mutual aid agreements in place with all adjacent RDCK Fire Departments to provide one Tender and two personnel. Currently, Council must approve additional resources that exceed the mutual aid agreement resources (as per Bylaw No. 3268). This mutual aid agreement with the RDCK is used 2 to 3 times per year, on average.

The majority of fire training for the NFRS focuses on structural firefighting but does include annual wildland interface training as part of the spring training curriculum. There has been very little recent cross-training with MFLNRO BCWS. All NFRS members should, at a minimum, have S100 and S215 (or equivalent) training. The Structure Protection Program (SPP) Wildland Firefighter (WWF) Level 1 training is a suitable equivalent and will replace the S100 training for structure fire fighters (Emergency Management BC, 2013). The NFRS and BCWS should coordinate annual cross-training events, for example a joint wildfire simulation exercise. This could be completed in cooperation with other area Fire Departments (RDCK) to further strengthen regional emergency response training.

The NFRS has four emergency response vehicles, two general purpose vehicles, and the ability to task the public works department with appropriate emergency response duties.

The NFRS has one sprinkler protection unit (SPU) with 160 sprinkler heads and associated equipment. In times of reduced local hazard, The NFRS SPU may be deployed outside the City by permission of the Fire Chief, in order to lend assistance to outside municipalities and regional districts. The UBCM owns four complete SPUs, each equipped to protect 30 – 35 structures. The kits are deployed by the MFLNRO/ BCWS incident command structure and are placed strategically across the province during the fire season based on fire weather conditions and fire potential. When the kits are not in use, they may be utilized by fire departments for training exercises. SPUs can be useful tools in the protection of rural/ interface homes in the event of a wildfire. The City should stay up to date on the location of, and request process for, a UBCM-owned SPU in the event of a wildfire where additional SPU resources may be needed and where SPUs would be an effective structural protection tool.

[10] Personal communication: NFRS (2016)
[11] Statistic provided by the NFRS (2016).

Emergency preparedness and response is jointly managed regionally through cooperation with the Regional District of Central Kootenay and member communities as set out in Figure 6[12]. The 'Emergency Program Management Plan 2016' details the program structure, jurisdictional boundaries, guiding principles, and the overall planning and response to emergencies including risk assessments, mitigation, response and response levels, and recovery. The designation of Emergency Operations Centers is made in this document (for Nelson the primary EOC is the RDCK office). The City of Nelson is grouped operationally with the RDCK Electoral Areas E and F, with an Emergency Response Coordinator shared with Kaslo and Area D, and a dedicated Emergency Preparedness Committee. This report recommends that the City become more active in Emergency Management including EOC operations and community preparedness. It also recommends incorporating the West Arm Interface Steering Committee into the meetings of the Emergency Preparedness Committee.

[12] Excerpt from Emergency Program Management Plan for the Regional District of Central Kootenay, June 2012 (revised April, 2016)

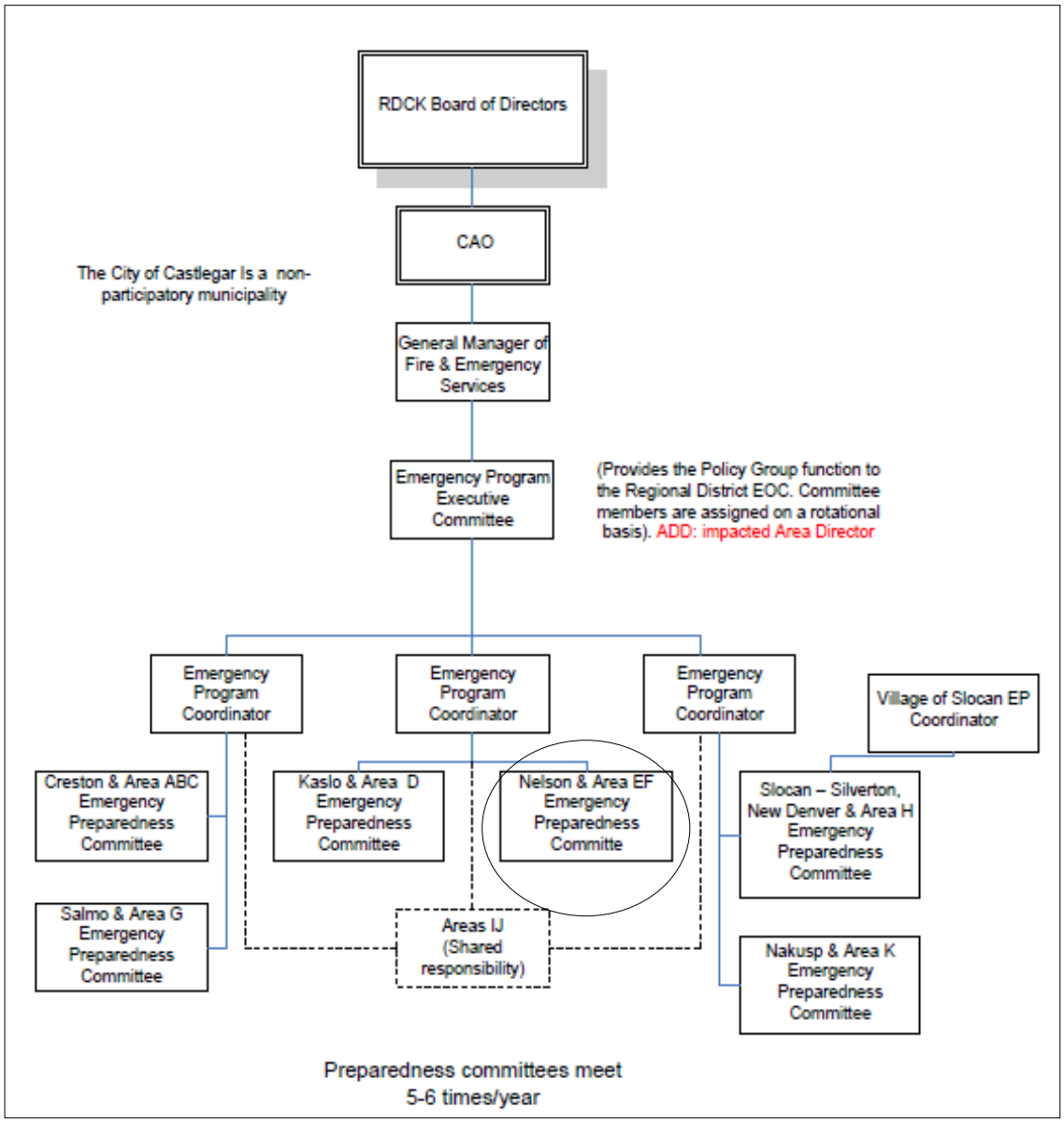


Figure 6. RDCK Emergency Program Structure (Black Shield Solutions, 2012 [revised 2016]). Note: this structure is current with the exception that the emergency coordinator for Nelson & Area E F and Kaslo & Area D is now also responsible for Areas I & J.

Nelson Fire & Rescue Services strives to provide equal fire protection to all residents, but recognizes that "operational triage" may be necessary for the safety of firefighting crews and success of operational tactics during a dynamic and developing wildfire incident in the WUI. Homeowners that have followed FireSmart Principles help to reduce the likelihood of ignition and thereby enhance firefighter safety.)

Many homes could benefit from preplan assessments to ensure accessibility and safety for firefighters. Preplan assessments are conducted as preventative measures whereas triage is employed during the fire attack that considers the circumstances of the advancing fire. Operational triage is an important tool used by fire suppression crews to improve safety, and ensure limited resources are best applied towards protecting the broader community, rather than a single structure. The process involves determining which houses have the greatest

likelihood of surviving a wildfire and depending on circumstances of a possible WUI fire some homes may be prioritized for additional protective measures such as setting sprinklers or spraying retardant. Triage assessments are dependent on five main factors that include: firefighter safety, structure design and material, fuels around the structure, fire behavior, and available resources. Conducting assessments of housing in the WUI prior to a fire can assist in suppression efforts; however, this report recognizes that homeowners may or may not introduce FireSmart principles on their properties and that ultimately the responsibility for following FireSmart rests with the property owner. The assessments can also be used to educate homeowners as to what protection they might receive during a fire event and what changes they can make to improve the probability of their home surviving a fire event. See Section 7.2.1 for details regarding WUI wildfire hazard assessments and associated recommendations.

Table 10. Summary of recommendations for Emergency Response and Planning

Emergency Response and Planning			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
Objective: To improve structural and wildfire equipment and training available to City Fire and Rescue.			
21.	High	• Conduct annual structural and interface training with the BCWS. As part of the training, it is recommended to conduct annual reviews to ensure PPE and wildland equipment resources are complete, in working order, and the crews are well-versed in their set-up and use. Interface training may include completion of a mock wildfire simulation in coordination with BCWS and safety training specific to wildland fire and risks inherent with natural areas.	$2,000
22.	High	• Integrate Emergency Preparedness Committee and West Arm Interface Steering Committee. Coordination and information sharing are crucial to the development of a community well prepared for wildfire.	May be within current operating budget
23	High	• Consider updating the Emergency Program Structure (see Figure 6) to better illustrate how City of Nelson Emergency Management actions and decisions are made.	May be within current operating budget
24	High	• Consider being more proactive in Emergency Management programs such as disaster pre-planning and community awareness and operating an EOC with structure that recognizes the authority of both the City and regional governments.	May be within current operating budget
25.	Moderate	• Provide S215 training to all/some members of the City Fire Department to enhance wildfire suppression training. Consider investigating Office of the Fire Commissioner funding.	$5,000 (annually)
26.	Moderate	• Review UBCM-owned SPU request procedure. Complete training with SPU as required and assess needs based on training outcomes.	$2,000

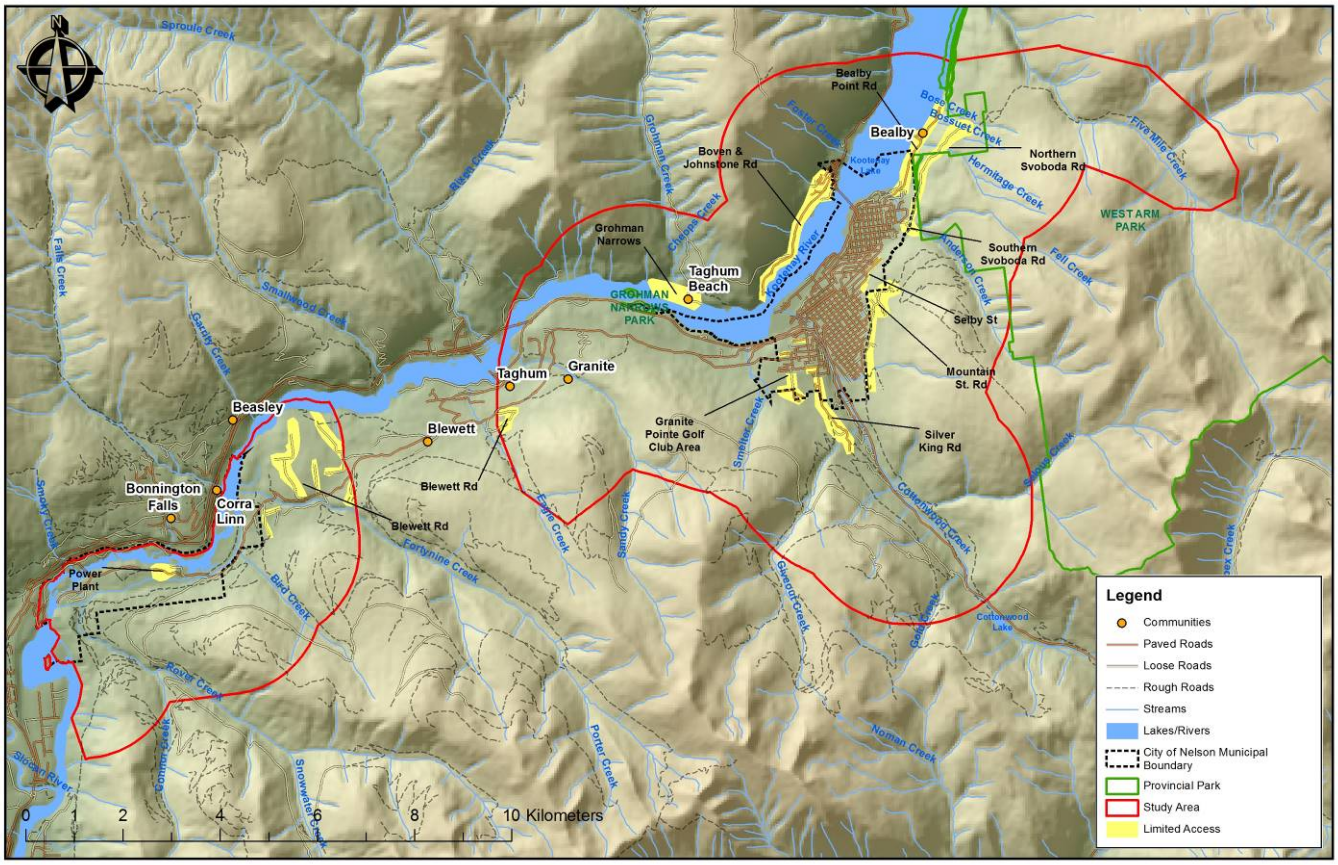
Emergency Response and Planning			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
27.	Moderate	• Conduct fire preplan assessment for key interface areas in the City of Nelson. Other jurisdictions have completed assessments that prioritize fire department-specific variables, such as distance to hydrants, response time from nearest fire station, etc. to produce local risk ratings. [13]	$5,000

7.4.1 EVACUATION AND ACCESS

Road networks in a community serve several purposes including providing access for emergency vehicles, providing evacuation routes for residents, and creating fuel breaks. Access and evacuation during a wildfire emergency often must happen simultaneously and road networks should have the capacity to handle both. Access throughout the Study Area is variable however most areas within the City boundary have multiple access routes for evacuation and capacity for emergency vehicle access.

There are communities within the Study Area that are accessed by cul-de-sac or dead end roads; these neighbourhoods are of particular concern for fire suppression, emergency response, and evacuation and were identified in the 2008 CWPP. Identified areas of concern have been updated from the 2008 CWPP, and are displayed below in a map adapted from the 2008 CWPP map. These areas should be reviewed for secondary access options where possible.

[13] FireSmart ratings for Regional District of Nanaimo: http://www.rdn.bc.ca/cms.asp?wpID=761



Map 8. Areas that have limited access or egress in the event of emergency.

Emergency access and evacuation planning is of particular importance in the event of a wildfire event or other large-scale emergency. An evacuation plan should:

- Map and identify safe zones, marshaling points and aerial evacuation locations;
- Plan traffic control and accident management;
- Identify volunteers that can assist during and/or after evacuation;
- Create an education/communication strategy to deliver emergency evacuation procedures to residents.

Recreation trails built to support ATVs can provide access for ground crews and act as fuel breaks for ground fires, particularly in natural areas. Strategic recreational trail development to a standard that supports ATVs, and further to install gates or other barriers to minimize access by unauthorized users can be used as a tool that increases the ability of local fire departments to access interface areas.

The creation of a map book or spatial file that displays the trail network available for the NFRS to access during an emergency or for fire suppression planning must accompany any fire access trail building activities. In order to effectively use the trails as crew access or as fuel breaks during suppression efforts, it is recommended to develop a Parks Access Plan, or Total Access Plan. This plan should be made available to the NFRS and the BCWS in the event that they are aiding suppression efforts on an interface fire in Nelson or RDCK Parks. The plan should include maps and spatial data, identify the type of access available for each access route, identify those trails that

are gated or have barriers, and provide information as to how to unlock / remove barriers. The plan should also identify those natural areas where access is insufficient. Access assessment should consider land ownership, proximity of values at risk, wildfire threat, opportunities for use as fuel break / control lines, and requirements for future maintenance activities such as operational access for fuel treatments and other hazard reduction activities.

In addition to providing the safest, quickest, and easiest access routes for emergency crews, a Total Access Plan would minimize the need for using machinery or motorized access in an otherwise undisturbed area. This would reduce the risk of soil disturbance and other environmental damage, as well as reduce rehabilitation costs.

Table 11. Summary of Recommendations for Emergency Evacuation and Access.

Emergency Response (Evacuation and Access)			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
Objective: To improve access and egress to neighbourhoods at risk and natural areas within the City.			
28.	High	• Develop a Total Access Plan to create, map and inventory trail and road network in natural areas for suppression planning, identification of areas with insufficient access and to aid in strategic planning. The plan should be updated every five years, or more regularly, as needed to incorporate additions or changes.	$8,000 + updating
29.	High	• Require that all new interface developments have a secondary access road.	May be within current operating costs
30.	Moderate	• Facilitate completion of emergency evacuation plans for key interface neighbourhoods with limited access that are within the jurisdiction for City of Nelson evacuation planning, in particular Granite Pointe Golf Club, Nelson Power Plant, Selby Street, and Silver King Road.	$2,500

7.5 FUEL MANAGEMENT

Fuel management, also referred to as vegetation management or fuel treatment, is a key element of a FireSmart approach. The City has completed extensive fuel management activities within and adjacent to the City (see Map 9). To complement the work completed to-date and to further reduce the wildfire risk in the Study Area, the objectives for fuel management are to:

- Reduce wildfire threat on private and public lands through shovel-ready fuel management projects;
- Establish landscape-level fuel breaks to enhance community protection; and,
- Establish a long-term monitoring program and maintenance schedule for those areas that have been treated.

These objectives will enhance protection to homes and critical infrastructure by proactively reducing fire behaviour.

Fuel treatments are designed to reduce the possibility of uncontrollable crown fire through the reduction of surface fuels and ladder fuels and the creation of crown separation. This varies by ecosystem type, forest fuel type, fire weather, slope and other variables. While fuel management can be an effective method of reducing fire

behaviour it does not stop wildfire. The effectiveness of fuel modification must be supported by other key CWPP elements.

Fuel management can be undertaken with minimal negative or even a positive impact on the aesthetic, recreational and ecological quality of the surrounding forest and does not necessarily mean removing most or all of the trees. The focus for fuel modification in the interface is not to stop fire but to ensure that fire intensity is low enough that wildfire can be fought on the ground. For example, FireSmart activities around a home may prevent structure ignition due to direct flame contact. The ability of the home to survive the fire would come down to whether construction materials can withstand an ember shower.

One of the constraints with fuel management is lack of funding. Funds from UBCM are available only for fuel modification on Crown lands. The best approach to mitigate fuels on private lands is to promote FireSmart. A FireSmart approach to fuel management improves defensible space around structures and reduces the likelihood that a house fire could spread to adjacent forests.

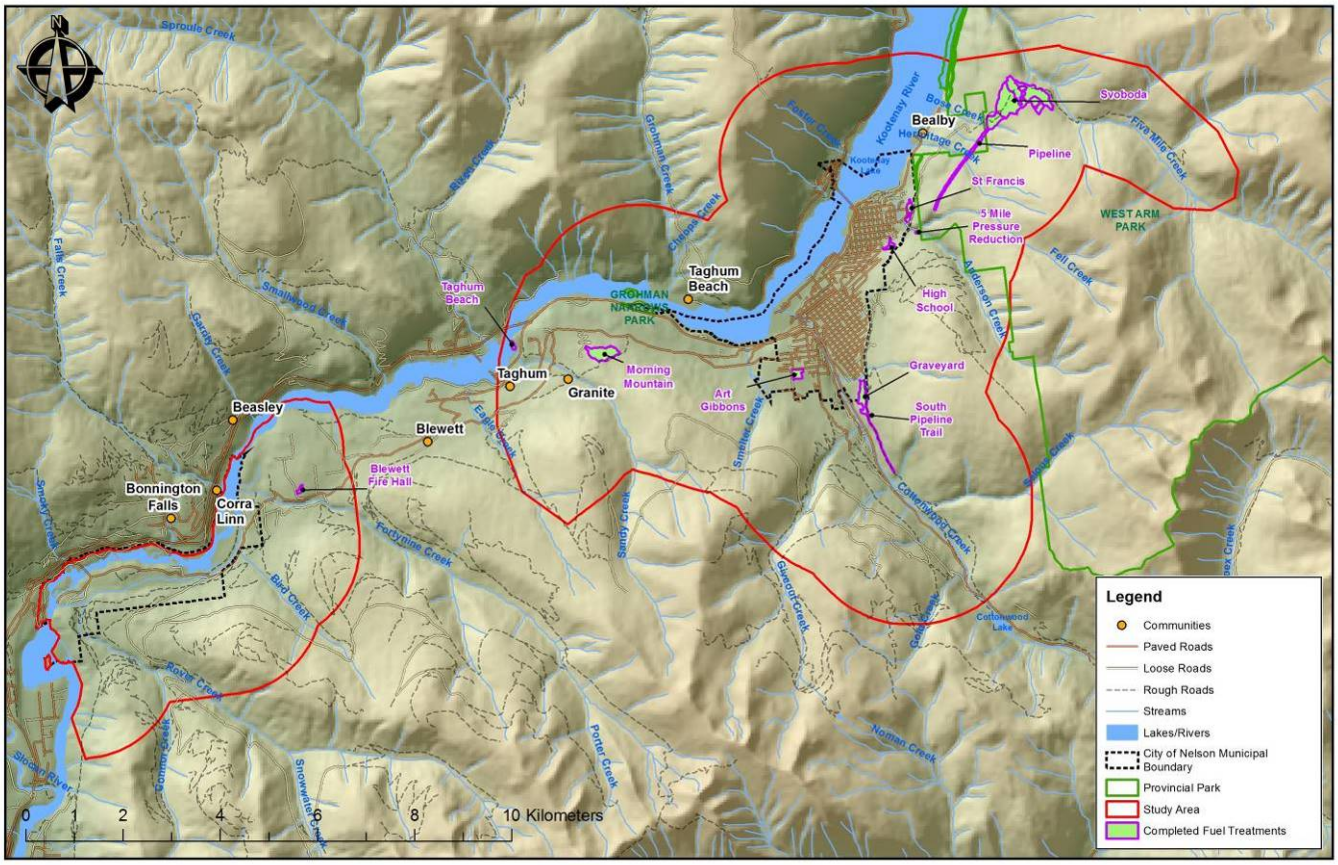
When considering fuel management to reduce fire risk, the following steps should be followed:

- A qualified professional forester must develop the prescriptions;
- Public consultation should be conducted during the process to ensure community support;
- Treatment implementation must weigh the most financially and ecologically beneficial methods of fulfilling the prescriptions goals;
- Pre- and post-treatment plots should be established to monitor treatment effectiveness; and
- A long-term maintenance program should be in place or developed to ensure that the fuel treatment is maintained in a functional state.

Based on recommendations from the 2008 CWPP, fuel treatments activities were completed within the Study Area and on all the high priority polygons and many of the moderate priority polygons within the Municipal boundaries. The total area treated within the Study Area since 2008 is approximately 107 hectares. Ongoing maintenance of these treated areas is required to ensure they continue to function as effective fuel treatments.

Proposed projects to reduce the wildfire hazard to the Study Area through fuel modification are summarized in Section 7.5.2. To assess risk, the *Provincial WUI Wildfire Threat Rating Worksheets* (worksheet) were used, as required by UBCM[14], in addition to professional judgment (WUI summaries are provided as a separate document). The worksheet provides point ratings for four components that contribute to wildfire risk. These components include fuels, weather, topography and structural values at risk.

[14] http://www.ubcm.ca/assets/Funding~Programs/LGPS/Current~LGPS~Programs/SWPI/Resources/swpi-WUI-WTA-Guide-(2012-Update).pdf



Map 9. Previous fuels treatment projects undertaken by the City and the RDCK within the Study Area

7.5.1 BURNING AND SMOKE MANAGEMENT

Prescribed fire, when used properly and in appropriate circumstances, is an extremely important, and effective, tool for mitigating hazard and reducing fuels. Air curtain burners, piling and burning, and prescribed broadcast burning are methods of fuel reduction/debris management that should be considered during fuel reduction activities and, when implemented properly, can be completed with low emissions and little impact on air quality: much less smoke and particulates than is released in a wildfire.

SMOKE MANAGEMENT

Smoke management is integral to the success of any burning operation. Site, or area specific, smoke management plans should be in place to ensure that emissions are minimized and are operations are compliant with all relevant legislation such as the Operational Burning and Smoke Control Regulation. Strategies to minimize impacts of smoke include:

- burn under acceptable venting, wind and weather conditions only;
- light a test pile before burning to ensure that local conditions match published venting conditions;

- practice concurrent burning, also called hot-fed piles (piling and burning at the same time to achieve a moderate level of fuel compaction and a good mixture of small and large diameter wood);
- utilize tools, such as leaf blowers, to maintain a hotter fire with more complete combustion;
- stop burns immediately should venting, weather, or wind conditions become undesirable;
- utilize trained and knowledgeable personnel;
- time burns when the least amount of people will be impacted (e.g. during school holidays); and
- notify the public and offer alternatives for those with serious health concerns.

Burning completed by knowledgeable and competent personnel, guided by a smoke management plan, and directed by an experienced professional can often be completed with minimal impacts to public health or air quality. While burning within the City is Prohibited by Bylaw, this Bylaw may be temporarily rescinded by order of the Fire Chief, for the purposes of reducing fuel load and forest fire hazard. Burning pilot projects may allow the City to enhance the education of the public as to the value and importance of controlled, well planned burning to reduce fuel load.

AIR CURTAIN BURNERS

Air curtain burners are wood incinerators. By providing high-velocity air to wood waste in either an earthen or metal fire box, wood waste is able to be burned with more complete combustion and less smoke emissions. Air curtain burners require a flat and wide location; forest fuels must be yarded to a road and/or transported to the burner location.

PILE BURNING

Pile burning is an effective use of fire in locations where access is limited, making chipping or fuel removal impossible or too costly. Smoke management and control during pile burning has improved in recent years and there are a number of strategies that can be employed to reduce smoke emissions to an acceptable level. They include: checking local venting indices prior to burning; lighting a small test pile to check venting prior to starting larger operations; burning concurrently (lighting small piles and continually adding to the pile throughout the day, rather than accumulating large piles to burn); adding oxygen through the use of leaf blowers, or similar hand-held devices to encourage more complete combustion.

Prescribed burning is just one method of woody debris management and fuel reduction and can be used in combination with other methods, such as chipping, mulching, or scattering fuels, in the same treatment unit to further reduce emissions. The utilization of woody fuels commercially should be considered in all projects. For example, chips can be used as biofuel. Local market demand for these products will dictate the availability of commercial utilization for fuels treatment projects.

The City is currently considering a bio-fuel District Energy System that would heat local municipal buildings. Some material from fuel treatments within the City could be processed to be used as fuel for this system. The City should investigate the utilization of City fuels generated through fuel treatments and/or other tree-related works in the City.

7.5.2 LIST OF PRIORITY TREATMENT AREAS

There are 11 polygons recommended for initial fuel management activities (four high priority and seven moderate priority) totaling 887 ha. These are detailed in Table 12 below. These new treatment polygons represent areas of predominantly high, to extreme fire behaviour threat which are close to values at risk. The Five-Mile Creek polygon is recommended for critical water infrastructure protection. Funding opportunities are currently limited to Crown Provincial, Regional District, or Municipal land. As such, priority treatment areas were limited to Crown land which is eligible for current funding opportunities. Recommended treatment types are thinning such as conifer understory and overstory, surface fuel reduction, pruning, removal of dead trees, and removal of surface fuels. Some of the polygons identified for treatment are eligible for UBCM funding.

A number of these treatment polygons fall within an area of shared responsibility between RDCK Area E and the City of Nelson as indicated with an asterisk in Table 12 below and are included in both CWPP Updates.

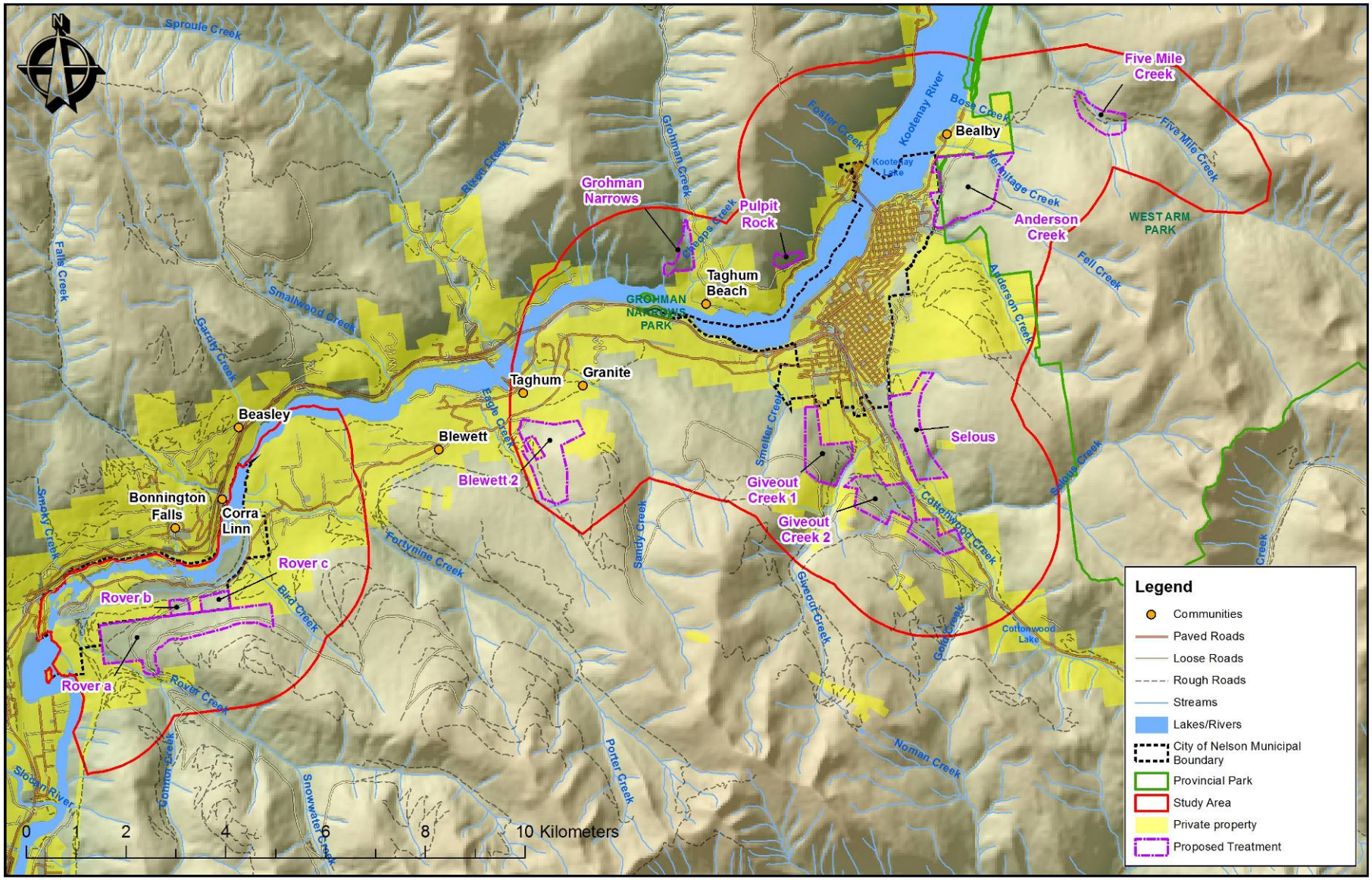
Site-specific operational challenges exist in almost all treatment areas. Debris disposal and management are constrained by access limitations and steep slopes that pose challenges and increase operational costs. Opportunities exist to utilize appropriate and innovative equipment such as the Menzie Muck M540/M545 (http://www.menzimuck.com/en/product-groups/menzi-muck-walking-excavators/). If enough fuel treatment work is provided by contract, this will create incentive for the local contracting community to purchase appropriate equipment for use in these challenging areas. Many polygons are located on steep slopes that may not easily be accessible by machinery and pose limits to manual labour. Housing developments and private land often surround proposed treatment areas. Additionally, proximity to structures will impact the possibility of using pile burning as a cost-effective method of debris disposal; pile burning must comply with the Open Burning Smoke Control Regulations which sets out minimum distances from institutions and residences and the Nelson Fire Regulation and Fire Prevention bylaw as applicable.

Table 12. List of Priority Treatment Areas

Treatment Polygon	WUI Threat Plot (Wildfire Behaviour Threat Score)	Priority	Fuel Type	Area (ha)	Recommended Treatment Type
Giveout Creek 1*	GO 7 (134, High)	High	Mosaic of C-3, C-4, C-5 and M-1/2	83.1	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure Consider collaboration with Atco Lumber Company to remove small diameter merchantable logs
Giveout Creek 2*	GO1 (119, High) GO2 (127, High) GO3 (127, High) GO5 (134, High) WA1 (119, High)	High	C-4	128.6	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure • Consider formalizing trail / road network to provide suppression capability south west of Nelson Consider collaboration with Atco Lumber Company to remove small diameter merchantable logs

Treatment Polygon	WUI Threat Plot (Wildfire Behaviour Threat Score)	Priority	Fuel Type	Area (ha)	Recommended Treatment Type
Selous*	SEL2 (157, Extreme) MS1 (141, High)	High	Predominantly C-3 with M-1/2	99.7	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure Consider collaboration with Kalesnikoff Lumber Company to remove small diameter merchantable logs
Five Mile Creek*	-	High	Predominantly C-3 with C-5 and M-1/2	43.3	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure • Consider collaboration with BC Parks to remove small diameter merchantable logs Complete WUI Threat Plots at time of prescription development
Anderson Creek*	AC1 (115, High) WAPP1 (120, High)	Moderate	Predominantly C-3 with C-2 and C-7	149.3	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure
Blewett 2*	BL2 (131, High)	Moderate	Predominantly C-3 with C-2 and C-5	117.3	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure • Consider collaboration with Atco Lumber Company to remove small diameter merchantable logs
Grohman Narrows	GN2 (123, High) GN3 (131, High)	Moderate	Predominant C-4 with M1/2	27.5	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure
Pulpit Rock	PR1 (134, High)	Moderate	C-4	11.8	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure
Rover a	ROV1 (128, High)	Moderate	Mosaic of C-3, C-4 and M-1/0	196.5	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure • Collaborate with licensee to develop prescriptions to remove merchantable timber
Rover b	ROV1 (128, High)	Moderate	Predominant C-4 with M1/2	11.1	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure • Collaborate with licensee to develop prescriptions to remove merchantable timber
Rover c	ROV1 (128, High)	Moderate	C-4	18.8	• Prune trees to 3 m; • Reduce woody surface fuels; • Thin dense patches to 40% crown closure • Collaborate with licensee to develop prescriptions to remove merchantable timber
Total				**887.0**	

*Polygon falls within an area of shared responsibility between the City of Nelson and RDCK Area E and is included in both CWPP Updates.



Map 10. Location of proposed treatment areas for the City of Nelson Study Area.

7.5.3 MAINTENANCE OF EXISTING TREATMENT AREAS

The City has shown leadership in completing fuel management projects within the Study Area to reduce the associated hazard. These activities started with the completion of the CWPP in 2008 and with fuel treatments commencing in 2009. Fuel treatments have been completed on approximately 107 ha of land. These polygons are in various states of hazard and some of them will require additional fuel management activities in the future in order to maintain or to re-attain moderate threat ratings. Furthermore, maintenance is recommended for all future treatments based on polygon ecosystem and productivity.

Based on 2016 field visits of representative existing treatments, there will be no requirement for maintenance until approximately 15-20 years from date of treatment, with the exception of localized blowdown areas as indicated in Table 13 below. This generalized schedule (for previously treated areas and future treatment areas) should be confirmed by reviewing the maintenance schedule in the original treatments prescriptions. Additionally, the maintenance schedule is subject to inspection of all existing treatments within 10 years of treatment. Areas that have experienced significant blowdown should be maintained as soon as possible provided funding is available. Currently, only minor blowdown has been observed in three treatment units (SU2, SU3, and SU5). Recent windstorm blowdown in SU1 has been treated by the City (see Table 13). All treatment units are a low priority for maintenance except for one high priority treatment unit in West Arm Park that has experienced thrifty regrowth of lodgepole pine. The treatment areas field verified are indicated in Table 13 below. Where the site was not field verified, recommendations are extrapolated from existing field verifications and informed by year of treatment and site productivity.

Maintenance activities may include such tasks as removing blowdown debris and brushing to remove regenerating conifers and woody shrub species.

Table 13. Maintenance schedule for previously treated polygons within the Study Area.

Treatment Unit Name	Year Treated	Area (Ha)	Project	Field Verified (Y/N)	Priority for Main-tenance	Target Timeline	Comment
Svoboda (6 treatment units)	2009	62.8	West Arm Provincial Park	Y	High	2019 (inspection)	Thrifty regrowth of lodgepole pine, minimal surface fuels
SU1 (Art Gibbons Park)	Initial: 2011 Maintenance: 2016	4.2	City of Nelson	Y	Low	2026 (inspection)	Blowdown of several dozen trees from 2015 windstorm was treated by the City in 2016
SU2 (Graveyard)	2011	7.9	City of Nelson	Y	Low	2021 (Inspection)	Minor blowdown observed
SU3 (South Pipeline Trail)	2011	2.6	City of Nelson	Y	Low	2021 (Inspection)	Minor blowdown observed
SU4 (St. Francis)	2011	2.8	City of Nelson	N	Low	2021 (Inspection)	Prescription fully implemented.
SU5 (Pipeline)	2011	8.4	City of Nelson	N	Low	2021 (Inspection)	Prescription fully implemented. Minor blowdown

Treatment Unit Name	Year Treated	Area (Ha)	Project	Field Verified (Y/N)	Priority for Main-tenance	Target Timeline	Comment
SU6 (Five Mile Pressure Reduction)	2011	0.2	City of Nelson	Y	Low	2021 (inspection)	Prescription fully implemented
SU7 (High School)	2011	2.1	City of Nelson	N	Low	2021 (inspection)	Prescription fully implemented.
Blew-1 (Blewett Fire Hall)	2015	1.3	RDCK UBCM	Y	Low	2025 (inspection)	Prescription fully implemented.
NC-1 (Taghum Beach)	2014	1.1	RDCK UBCM	Y	Low	2024 (inspection)	Prescription fully implemented
NC-2 (Morning Mountain)	2015	13.7	RDCK UBCM	Y	Low	2025 (inspection)	Prescription fully implemented.
TOTAL		**107.1**					

Table 14. Summary of Fuel Management Recommendations

Fuel Management			
Item	**Priority**	**Recommendation**	**Estimated Cost ($)**
Objective: Reduce wildfire threat on private and public lands through fuel management.			
31.	High	• Proceed with detailed assessment, prescription development and treatment of hazardous fuel units identified in this CWPP. Collaboration with BCTS, and other licensees, utilities, BC Parks and RDCK may facilitate larger projects.	UBCM SWPI Funding/Municipal Funding as available
Objective: Maintain treated areas under an acceptable level of wildfire fire threat (moderate).			
32.	Moderate	• As treatments are implemented, complete monitoring within 10 years of treatment (subject to site conditions) and maintenance every 15-20 years (subject to prescription and site conditions) on previously treated areas. Treated areas should be assessed by a Registered Professional Forester, specific to actions required in order to maintain treated areas in a moderate or lower hazard.	UBCM SWPI Funding/ Municipal Funding

8.0 CONCLUSIONS

This 2015 update to the 2008 CWPP reflects existing community priorities and the current provincial standard methodology and baseline data for hazard and threat analysis. This CWPP Update takes into account the considerable new development that has occurred in the WUI and provides an assessment or reassessment of the hazard associated with these development changes, as well as other changes in the community. Specifically, it accounts for changes to forest fuel types due to forest growth, forest health (i.e., mountain pine beetle impacts), windthrow, forest harvesting, and forest fires, in addition to new developments.

Another significant change since 2008 is the formation of the Interface Working Group with the RDCK and BC Parks to collaboratively plan and implement fire hazard mitigation works in the Joint Responsibility Area. Consequently, this CWPP Update increases the area and scope of responsibility for the City while taking a strategic landscape level approach.

In addition, methods for assessing wildfire threat have evolved since 2008. This update uses the provincially accepted standard methodology and new BC Provincial Strategic Threat Analysis baseline data for hazard and threat analysis. Due to the PSTA updates, expanded scope of responsibility and changes in the community, 887 ha have now been identified as hazardous fuels.

The City has made significant progress at implementing recommendations from the 2008 CWPP and has shown provincial leadership in many aspects of wildfire mitigation activities.

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APPENDIX 1 – FIRESMART

One of the most important areas with respect to forest fire ignition and the damages associated with a wildfire is the zone adjacent to buildings and homes. *FireSmart, Protecting Your Community from Wildfire*[15] is a guide developed by Partners in Protection that provides practical tools and information on how to reduce the risk of loss from interface fires. The FireSmart website can be visited at: https://www.firesmartcanada.ca/resources-library/protecting-your-community-from-wildfire

Wildfire is often considered an external threat to residences; however, in many cases fire can originate as a house fire and spread into the interface. In both cases, fire coming from the forest to a building or spreading from a building to the forest, home owners and businesses can take steps to reduce the probability of this occurring. There are two main avenues to FireSmart a home: 1) change the vegetation type, density, and setback from the building (fuel treatments and landscaping) and 2) change the structure to reduce vulnerability to fire and the potential for fire to spread to or from a building.

FIRESMART BUILDING MATERIALS AND DESIGN

An important consideration in protecting the WUI zone from fire is ensuring that homes can withstand an interface fire event. Often, it is a burning ember traveling some distance and landing on vulnerable housing materials (spotting), rather than direct flame contact (vegetation to house) or radiative heat that ignites a structure. Alternatively, the convective or radiant heating produced by one structure may ignite an adjacent structure if it is in close proximity. Structure protection is focused on ensuring that building materials and construction standards are appropriate to protect individual homes from interface fire. Materials and construction standards used in roofing, exterior siding, window and door glazing, eaves, vents, openings, balconies, decks, and porches are primary considerations in developing FireSmart neighbourhoods. Housing built using appropriate construction techniques and materials are less likely to be impacted by interface fires.

While many BC communities established to date were built without significant consideration with regard to interface fire, there are still ways to reduce home vulnerability. Changes to roofing materials, siding, and decking can be achieved over the long-term through changes in bylaws and building codes.

The FireSmart approach has been adopted by a wide range of governments and is a recognized template for reducing and managing fire risk in the wildland urban interface. The most important components of the FireSmart approach are the adoption of the hazard assessment systems for wildfire, site and structure hazard assessment, and the proposed solutions outlined for vegetation management, structure protection, and infrastructure. Where fire risk is moderate or greater, at a minimum, the FireSmart principles should be applied to new subdivision and structure developments and, wherever possible, the principles should be integrated into existing subdivisions and built up areas when renovations occur or landscaping is changed.

The following link accesses an excellent four-minute video demonstrating the importance of FireSmart building practices during a simulated ember shower: http://www.youtube.com/watch?v=_Vh4cQdH26g.

[15] For further information regarding the FireSmart program see *www.pep.bc.ca/hazard_preparedness/FireSmart-BC4.pdf*

Roofing Material:

Roofing material is one of the most important characteristics influencing a home's vulnerability to fire. Roofing materials that can be ignited by burning embers increases the probability of fire related damage to a home during an interface fire event.

In many communities, there is no fire vulnerability standard for roofing material. Homes are often constructed with unrated materials that are considered a major hazard during a large fire event. In addition to the vulnerability of roofing materials, adjacent vegetation may be in contact with roofs, or roof surfaces may be covered with litter fall from adjacent trees. This increases the hazard by increasing the ignitable surfaces and potentially enabling direct flame contact between vegetation and structures.

Building Exterior - Siding Material:

Building exteriors constructed of vinyl or wood are considered the second highest contributor to structural hazard after roofing material. These materials are vulnerable to direct flame or may ignite when sufficiently heated by nearby burning fuels. Winds caused by convection will transport burning embers, which may lodge against siding materials. Brick, stucco, or heavy timber materials offer much better resistance to fire. While wood may not be the best choice for use in the WUI, other values from economic and environmental perspectives must also be considered. It is significantly cheaper than many other materials, supplies a great deal of employment in BC, and is a renewable resource. New treatments and paints are now available for wood that increase its resistance to fire and they should be considered for use.

Balconies and Decking:

Open balconies and decks increase fire vulnerability through their ability to trap rising heat, by permitting the entry of sparks and embers, and by enabling fire access to these areas. Closing these structures off limits ember access to these areas and reduces fire vulnerability.

Combustible Materials:

Combustible materials stored within 10 m of residences are also considered a significant issue. Woodpiles, propane tanks and other flammable materials adjacent to the home provide fuel and ignitable surfaces for embers. Locating these fuels away from structures helps to reduce structural fire hazards and makes it easier and safer for suppression crews to protect a house.

FIRESMART TREATMENTS

One effective method of reducing how easily fire can move to and from a home is by altering the vegetation around the home. The following information regarding fuel treatments is based on the FireSmart Manual (Partners in Protection 2002).

Priority Zone 1 is a 10 m fuel free zone around structures. This ensures that direct flame contact with the building cannot occur and reduces the potential for radiative heat to ignite the building. While creating this zone is not always possible, landscaping choices should reflect the use of less flammable vegetation such as deciduous bushes, herbs and other species with low flammability. Coniferous vegetation such as juniper or cedar bushes and hedges should be avoided, as these are highly flammable. Any vegetation in this zone should be widely spaced

and well setback from the house. Special attention should be place to the “Primary Ignition Zone” within 1 meter of a home. Any combustible in this area has the potential to propagate an ignition from the fuel to the structure.

Priority Zone 2 extends from 10 to 30 m from the structure. In this zone, trees should be widely spaced 5 to 10 m apart, depending on size and species. Tree crowns should not touch or overlap. Deciduous trees have much lower volatility than coniferous trees, so where possible deciduous trees should be preferred for retention or planting. Trees in this area should be pruned as high as possible (without compromising tree health), especially where long limbs extend towards buildings. This helps to prevent a fire on the ground from moving up into the crown of the tree or spreading to a structure. Any downed wood or other flammable material should also be cleaned up in this zone to reduce the ability of fire to move along the ground.

Priority Zone 3 extends from 30 to 100 m from the home. The main threat posed by trees in this zone is spotting, the transmission of fire through embers carried aloft and deposited on the building or adjacent flammable vegetation. To reduce this threat, cleanup of surface fuels as well as pruning and spacing of trees should be completed in this zone (Partners in Protection).

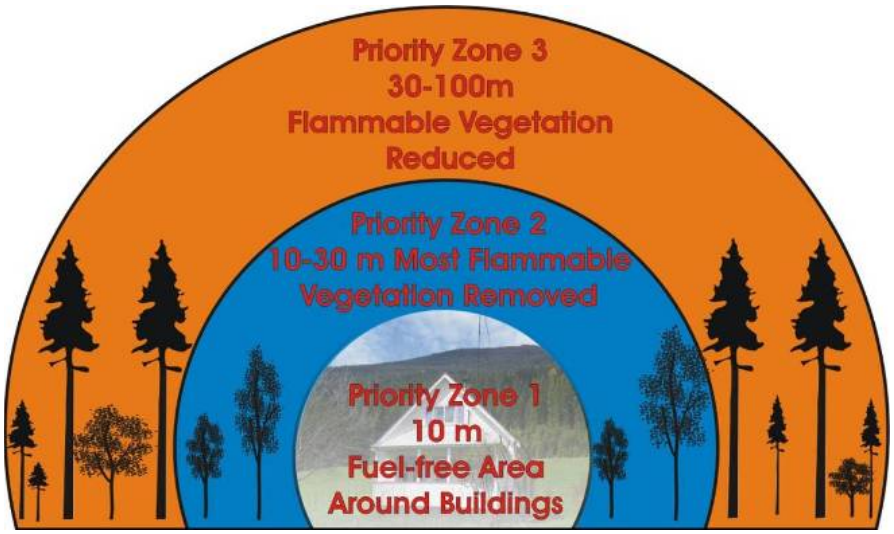

Figure 7.Illustration of FireSmart zones.

APPENDIX 2 – FIRE THREAT METHODOLOGY

As part of the CWPP process, spatial data submissions are required to meet the defined standards in the Program and Application Guide. As part of the program, proponents completing a CWPP or CWPP update are provided with the Provincial Strategic Threat Analysis (PSTA) dataset. This dataset includes:

- Current Fire Points
- Current Fire Polygons
- Fuel Type
- Historical Fire Points
- Historical Fire Polygons
- Mountain pine beetle polygons
- PSTA Head Fire Intensity
- PSTA Historical Fire Density
- PSTA Spotting Impact
- PSTA Threat Rating
- Structure Density
- Structures (sometimes not included)
- Wildland Urban Interface Buffer Area

The required components for the spatial data submission are detailed in the Program and Application Guide Spatial Appendix – these include:

- AOI
- Fire Threat
- Fuel Type
- Photo Location
- Proposed Treatment
- Structures
- Threat Plot
- Wildland Urban Interface

The provided PSTA data does not necessarily transfer directly into the geodatabase for submission, and several PSTA feature classes require extensive updating or correction. In addition, the Fire Threat determined in the PSTA is fundamentally different than the Fire Threat feature class that must be submitted in the spatial data package. The Fire Threat in the PSTA is based on provincial scale inputs - fire density; spotting impact; and head fire intensity, while the spatial submission Fire Threat is based on the components of the Wildland Urban Interface Threat Assessment Worksheet. For the scope of this project, completion of WUI Threat Assessment plots on the entire AOI (Study Area) is not possible, and therefore an analytical model has been built to assume Fire Threat based on spatially explicit variables that correspond to the WUI Threat Assessment worksheet.

FIELD DATA COLLECTION

The primary goals of field data collection are to confirm or correct the provincial fuel type, complete WUI Threat Assessment Plots, and assess other features of interest to the development of the CWPP. This is accomplished by traversing as much of the Study Area as possible (within time, budget and access constraints). Threat Assessment plots are completed on the latest version (2013) form, and as per the Wildland Urban Interface Threat Assessment Guide.

For clarity, the final threat ratings for the Study Area were determined through the completion of the following methodological steps:

1. Update fuel-typing using 2015 orthophotography provided by the client and field verification.
2. Update structural data using critical infrastructure data provided by the client and orthophotography
3. Complete field work to ground-truth fuel typing and threat ratings (completed 25 WUI threat plots, and over 100 field stops within the City of Nelson Study Area)
4. Threat assessment analysis using field data collected and rating results of WUI threat plots – see next section.

SPATIAL ANALYSIS

Not all attributes on the WUI Threat Assessment form can be determined using a GIS analysis on a landscape/polygon level. To emulate as closely as possible the threat categorization that would be determined using the Threat Assessment form, the variables in Table 15 were used as the basis for building the analytical model. The features chosen are those that are spatially explicit, available from existing and reliable spatial data or field data, and able to be confidently extrapolated to large polygons.

Table 15. WUI Threat Sheet attributes used in the spatial analysis.

WUI Threat Sheet Attribute	Used in analysis?	Explanation
Fuel		
1. Duff depth and Moisture Regime	No	Many of these attributes assumed by using 'fuel type' as a component of the Fire Threat analysis. Most of these components are not easily extrapolated to a landscape or polygon scale, or the data available to estimate over large areas (VRI) is unreliable.
2. Surface Fuel continuity	No	
3. Vegetation Fuel Composition	No	
4. Fine Woody Debris Continuity	No	
5. Large Woody Debris Continuity	No	
6. Live and Dead Coniferous Crown Closure	No	
7. Live Deciduous Crown Closure	No	
8. Live and Dead Conifer Crown Base height	No	
9. Live and Dead suppressed and Understory Conifers	No	
10. Forest health	No	
11. Continuous forest/slash cover within 2km	No	
Weather		
12. BEC Zone	Yes	Although included, these are

WUI Threat Sheet Attribute	Used in analysis?	Explanation
13. Historical Fire Weather Occurrence	Yes	broad classifications, meaning most polygons in the Study Area will have the same value
Topography		
14. Aspect	Yes	
15. Slope	Yes	Elevation model was used to determine slope.
16. Terrain	No	
17. Landscape/topographic Limitations to Wildfire Spread	No	
Structural		
18. Position of Structure/Community on slope	No	Too difficult to quantify – this is a relative value.
19. Type of development	No	Too difficult to analyze spatially.
20. Position of assessment area relative to values	Yes	Only distance to structures is used in this analysis. Being above, below or sidehill is too difficult to analyze spatially.

The field data is used to correct the fuel type polygon attributes provided in the PSTA. This corrected fuel type layer is then used as part of the spatial analysis process. The other components are developed using spatial data (BEC zone, fire history zone) or spatial analysis (aspect, slope). A scoring system was developed to categorize resultant polygons as having relatively low, moderate, high or extreme Fire Threat, or Low, Moderate, High or Extreme WUI Threat. Table 16 below summarizes the components and scores to determine the Fire Behaviour Threat.

Table 16. Components of Fire Threat Analysis

Attribute	Indicator	Score
Fuel Type	C-1	35
	C-2	
	C-3	
	C-4	
	M-3/4,>50% dead fir	
	C-7	20
	M-1/2, >50% conifer	
	M-3/4, <50% dead fir	
	C-5	5
	C-6	
	M-1/2, <50% conifer	
	O-1a/b	10

Attribute	Indicator	Score
	S-1	
	S-2	
	S-3	
	D-1/2	0
	W	0
	N	0
Weather - BEC Zone	AT, irrigated	1
	CWH, CDF, MH	3
	ICH, SBS, ESSF	7
	IDF, MS, SBPS, CWHsds1 & ds2, BWBS, SWB	10
	PP, BG	15
Historical Fire Occurrence Zone	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7	1
	G3, G8, R3, R4, V6, G1, G9, V8	5
	G7, C5, G4, C4, V1, C1, N6	8
	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2	10
	N7, K4	15
Slope	<16	1
	16-29 (max N slopes)	5
	30-44	10
	45-54	12
	>55	15
Aspect (>15% slope)	North	0
	East	5
	<16% slope, all aspect	10
	West	12
	South	15

These attributes are combined to produce polygons with a final Fire Behaviour Threat Score. To determine the Wildland Urban Interface Score, only the distance to structures is used. Buffer distances are established as per the WUI Threat Assessment worksheet (<200, 200-500 and >500) for polygons that have a 'high' or 'extreme' Fire Behaviour Threat score. Polygons with structures within 200m are rated as 'extreme', within 500m are rated as 'high', within 2km are 'moderate', and distances over that are rated 'low'.

There are obvious limitations in this method, most notably that not all components of the threat assessment worksheet are scalable to a GIS model, generalizing the Fire Behaviour Threat score. The WUI Threat Score is greatly simplified, as determining the position of structures on a slope, the type of development and the relative position are difficult in an automated GIS process. Structures are considered, but there is no consideration for structure type (also not included on threat assessment worksheet). This method uses the best available information to produce accurate and useable threat assessment across the Study Area in a format that is required by the UBCM SWPI program.

APPENDIX 3 – SPECIES AT RISK INFORMATION

Table 17. Publicly available occurrences of Blue and Red listed species in the Study Area[16]

Common Name	Scientific Name	Category	BC List	Habitat
Columbia Sculpin	*Cottus hubbsi*	Vertebrate Animal	Blue	LACUSTRINE; SHALLOW WATER
Heterocodon	*Heterocodon rariflorum*	Vascular Plant	Blue	TERRESTRIAL: Roadside, Grassland/Herbaceous
Monardella	*Monardella odoratissima ssp. discolor*	Vascular Plant	Red	TERRESTRIAL
Nuttall's Waterweed	*Elodea nuttallii*	Vascular Plant	Blue	LACUSTRINE
Painted Turtle - Intermountain - Rocky Mountain Population	*Chrysemys picta pop. 2*	Vertebrate Animal	Blue	PALUSTRINE: Herbaceous Wetland
Umatilla Dace	*Rhinichthys umatilla*	Vertebrate Animal	Red	RIVERINE; BIG RIVER; MODERATE GRADIENT; LACUSTRINE; SHALLOW WATER
Western Screech-owl, Macfarlanei Subspecies	*Megascops kennicottii macfarlanei*	Vertebrate Animal	Red	TERRESTRIAL: Forest Broadleaf, Urban; RIVERINE: Riparian
Western Skink	*Plestiodon skiltonianus*	Vertebrate Animal	Blue	TERRESTRIAL: ROCK OUTCROP, COARSE TALUS/BOULDERS, GRASSLAND/HERBACEOUS, FOREST NEEDLELEAF
White Sturgeon (Kootenay River Population)	*Acipenser transmontanus pop. 1*	Vertebrate Animal	Red	RIVERINE: Big River; Moderate Gradient; Low Gradient; Pool; LACUSTRINE: Deep Water

[16] Data current as of October 21, 2016.

APPENDIX 4 – PREVIOUS CWPP RECOMMENDATIONS

The original Nelson Contract Fire Protection Area Community Wildfire Protection Plan (Part 2 of the RDCK Community Wildfire Protection Plans, Risk Assessment and Hazard Mitigation Options for Four Application Areas in the Region) was completed in 2008. Since then, the City of Nelson has implemented many of its recommendations. The previous recommendations and progress to date are summarized below. Some of the previous recommendations are paraphrased. Agency names and stakeholders or partners originally referred to may have subsequently changed. These changes have been acknowledged in the reported progress as applicable. For full recommendation text, see the City of Nelson CWPP Action Plan 2008.

Recommendation		Progress
Communication and Education		
#1	The City should consider developing a communication plan. • outline the purpose, methods and desired results • Cover the principles of fire risk to the community, fire behaviour, spotting, structure protection and vegetation management. • Stakeholder specific. • identify spokespersons	Communications include: • Sporadic Updates posted on Facebook and Twitter (consider increasing frequency of public safety and fire information messages). • Seasonally regular contributions of WUI relevant material to City Newsletter and press releases. Firefighter Jeffery and Firefighter Thibault are designated Spokespersons.
#2	The City should consider working with other Central Kootenay municipalities, the RDCK and the MOFR to develop a regional approach to enhancing education and communication.	Fire prevention and FireSmart presentations have extended to the Regional District Contract area in the past three years. This has enhanced awareness and education. The Interface Working Group, comprised of the City, RDCK and BC Parks has been formed and is committed to coordinated planning and implementation of wildfire mitigation at the landscape level. Additional resources would be required to expand the scope of this Planning Group to include an educational role.

Recommendation		Progress
#3	The Fire Department education program targeting: • Local business community, particularly businesses that depend on forest use (*i.e.,* tourism and recreation) on FireSmart preparation and planning. • Elementary schools • Individual residences (FireSmart certification)	The City of Nelson holds a Fire Prevention Week in conjunction with the national event. During the 2015 and 2016 event, fire department crews stopped by individual homes to check smoke alarms as well as to answer questions about the FireSmart program and general fire safety as well as held a number of FireSmart outreach activities. Nelson schools participate in the Nelson Junior Fire Inspectors Survey each year and there are competitions during Fire Prevention Week to encourage involvement. The City of Nelson organized and participated in a multi-agency "Disaster Day" on Hall Street – numerous contacts were made and the event was a significant success for the community.
#4	The standard for website information about fire should include an outline of community fire risks and fire danger. Include information on campfire bans and wildfire hazard ratings.	This information to be added to the City website
#5	The community should access local newspapers or community bulletins to deliver FireSmart educational materials and to communicate information on fire danger.	The current City of Nelson website includes up to date 'interface fire emergency notices - http://www.nelson.ca/EN/main/residents/emergency-safety/forest-fires/emergency-messages.html and information on FireSmart and wildfire preparedness: http://www.nelson.ca/EN/main/services/fire-rescue-services/wildfires.html. Education initiatives undertaken by Nelson Fire & Rescue Services: • Elementary school program, including Fire Prevention Week, Burn Awareness Week and the annual Fire Drill Competition; • Preschool and youth group visits and tours at the fire hall, including those for Beavers, Sparks, Brownies and Cubs; • Juvenile Fire Setters program for children; • Fire safety planning for homes and businesses in Nelson; • Fire extinguisher training; • Emergency Preparedness program; • Fire Smart program and information (FireSmart Home Owners Manual and Home and Site Hazard Assessment are posted on the City's website); • FireSmart awareness information included in the local newspaper.

Recommendation		Progress
#6	Signage consisting of current fire danger, campfire bans and general warnings regarding fire safety should be posted at all major entrances to the City or surrounding Fire Protection Area and updated with current fire information as required.	Awaiting coordination with recommendation to upgrade City branding of entry and exit signs.
#7	The community should investigate working with local developers, Habitat for Humanity, the RDCK or other groups to construct a FireSmart show home to be used as a tool for education. The demonstration home would be built to FireSmart standards using recommended materials for interface communities. Additionally, vegetation adjacent to the home would be managed to guidelines outlined in the FireSmart program.	FireSmart Show Home donated to Kootenay Lake Hospital for CT Scanner Fundraiser. Project completed by the City and NSFRS Members who contributed their own time.
Structure Protection		
#8	The City should consider working with the Building Policy Branch to create a policy structure that would enable the municipality to better address wildland urban interface protection considerations for buildings.	Conduct regular briefings with the City's planning department that requests Fire Department recommendations early in the development stages of projects (i.e. Golf Course development on Chauquette).
#9	The City should consider requiring roofing materials that are fire retardant with a Class A and Class B rating within new subdivisions.	Homes within the "Wildfire Interface Zone" and "Natural Environment and Hazardous Lands" DPA must have roofing materials that are metal, asphalt, fire retardant wood shingles and shakes, fire rated re-cycled composite shingles, concrete or ceramic tiles, or flat bitumen based roofing with aggregate finish. Soffits must be screened. Untreated wood shingles or shakes and open soffits are not permitted.
#10	Access constraints to residences should be addressed. Homeowners should be made aware of access constraints that may prevent the Fire Department from attending a wildland fire that could threaten their property.	Identified access constraints on existing properties are shared with property owners. New construction where access constraints exist are addressed by NFRS as part of the building review/approval process. There are a number of residences that have been required to install residential sprinkler systems to NFPA 13D design standards due to access constraints.

Recommendation		Progress
#11	The community should investigate the policy tools available for reducing wildfire risk within the City such as: • voluntary fire risk reduction for landowners, • bylaws for building materials and subdivision establishment, • covenants for vegetation set-backs, • delineation of Wildfire Development Permit areas, • incentives such as exclusion from a fire protection tax, and • education. Specifically, the City should investigate a process to create and/or review and revise existing bylaws to be consistent with the development of a FireSmart community. Consideration should be given to the creation of a Wildfire Bylaw that mandates sprinkler protection, provides for good access for emergency response, and specifies fuel management on both public and private property.	Wildfire Interface Design Guidelines are applicable within the "Wildfire Interface Zone" on Schedule D of the OCP (updated 2013). • Buildings and roads must be sited to accommodate fire fighting vehicles and equipment. • FireSmart Priority Zones are defined. • Building Materials are specified to non-combustible exterior finish materials (roofing, siding, windows).
#12	Where homes and businesses are built immediately adjacent to the forest edge, the City should consider incorporating building setbacks into bylaw with a minimum distance of 10 m when buildings border the forest interface.	The Natural Environment and Hazardous Lands DPA does not consider a set-back distance from vegetation.
#13	Subdivision design plans should continue to be reviewed by the Fire Department to ensure that suitable access routes exist, that hydrant accessibility is adequate where applicable, and that interface fire related issues are addressed.	This is done on an ongoing basis.
Emergency Response		
#14	A formal communication structure should be established with the MOFR so that information regarding fires in the region is communicated in a timely manner to the communities and Fire Departments adjacent to active fires. This might be best achieved through joint cooperation with the Regional District of Central Kootenay, other Central Kootenay municipalities and the MOFR. **Work In Progress.**	The Emergency Response and Recovery Plan developed by the RDCK and updated in 2016 indicates that interface fires will be coordinated in a 'unified command' between the RDCK and the Ministry or BC Wildfire Service.

Recommendation		Progress
#15	Consideration should be given to developing a community evacuation plan. Appropriate evacuation routes should be mapped, considering Disaster Response Routes (DRR). Major evacuation routes should be signed and communicated to the public. The plan should identify loop roads and ensure access has sufficient width for two way traffic. In addition, alternative emergency responder access should be considered. **Work In Progress.**	City of Nelson has an evacuation plan; however, it requires further work and exercising. Resources are limited but Emergency Management planning is ongoing.
#16	The City should consider conducting a review of projected future needs and water supply under drought conditions to ensure that water storage and supply are adequate during peak summer times. The review should consider vulnerability of reservoirs and the susceptibility of pipelines to fire to ensure a safe water supply during suppression efforts.	The water usage of the City between 2008 and 2015 was catalogued and is reported on the City website. The bar graph on the website shows cubic meters per month. In the period from 2009 to 2015, the City achieved a 5% decrease in gross community water demand[17]. The Columbia Basin trust indicates that there is ongoing data collection and analysis, as well as infrastructure repair and replacement program. Water use planning is underway. Water main replacement has taken place in a number of locations and is ongoing. City Public Works has a draft plan for additional work supply options and is currently assessing the most feasible options.
#17	New subdivisions should be developed with access points that are suitable for evacuation and the movement of emergency response equipment. The number of access points and their capacity should be determined during subdivision design and be based on threshold densities of houses and vehicles within the subdivisions. **Work In Progress.**	Project planning and development is under the jurisdiction of the City's planning department with Fire Department review and input as outlined (#8) above There is very limited opportunity for new subdivisions within the City. Some approved ones have less than ideal access and evacuation points but ongoing evacuation planning will consider these circumstances.
#18	The City should work towards improving access in areas of the community that are considered isolated and that have inadequately developed access for evacuation and fire control (for example, by opening dead end roads and connecting roads).	Assessing for feasibility is ongoing.

[17] https://www.cbt.org/watersmart/cm-nelson.asp

Recommendation		Progress
#19	During a large wildfire it is possible that critical infrastructure within the City could be severely impacted by smoke. It is recommended that contingency plans be developed in the event that smoke causes evacuation of the community's incident command centres. The City should co-operate with provincial and regional governments to identify alternate incident command locations and a mobile facility in the event that the community is evacuated.	The Emergency Response and Recovery Plan details the activation of Emergency Operations Command Centres (EOCs). The RDCK operates a two-tiered EOC system with Local Area EOCs and a Regional EOC. The EOC facility is intended to be offsite, away from the emergency or disaster, and therefore should not need to be evacuated.
#20	Where forested lands abut new subdivisions, consideration should be given to requiring roadways to be placed adjacent to those lands. If forested lands surround the subdivision, ring roads should be part of the subdivision design. These roads both improve access to the interface for emergency vehicles and provide a fuel break between the wildland and the subdivision.	This is not considered in the DPA guidelines for 'Natural Environment and Hazardous Lands' area. Roads may prove difficult in steep terrain filled with granite blocks.
#21	Given the values at risk identified in the CWPP, it is recommended that, during periods of high and extreme fire danger (danger class IV and V), the City work to maintain a local helicopter with a bucket on standby within 30 minutes of each community	Encourage pre-positioning by BCWS contract machines and ensure viability of Downtown Airport.
#22	Key agencies involved in emergency response should assess direct communication abilities between agencies and the readiness and capability of backup power systems in the event of power failure.	Utility failures are specifically considered in the Emergency Response and Recovery Plan. The plan indicates that utility providers are responsible to restore power, gas or telecommunication services, and each emergency agency (RCMP, fire, etc) are responsible to develop their own plans to handle utility failures. Nelson Fire and Rescue Services has a 17KW backup power with twin fixed propane power source.
#23	The city should consider establishing standpipes along the pipeline from Five Mile Creek to aid in suppression efforts.	The viability was investigated. Tying into the existing line during future upgrades via a "saddle Tap" may be possible.
Training/Equipment		
#24	The following training should be maintained or if not currently in practice considered: 1) The S100 course training should be continued on an annual basis; 2) Municipal Parks outside staff should be trained in the S100 course; 3) A review of the S215 course instruction should be given on a yearly basis; 4) The S215 course instruction should be given to new career staff and Paid On-Call Officers on an ongoing basis; and, 5) Incident Command System training should be given to all career and Paid On-Call Officers	The RDCK Emergency Program Management Plan recommends training of emergency staff on a) Introduction to Emergency Management, b) Emergency Operations Centre Essentials, and c) Incident Command System 100 and 200. NFRS staff conduct annual wildland interface training as part of the spring training curriculum (S100, S215 equivalent).

Recommendation		Progress
#25	The community should consider reviewing its existing inventory of interface fire fighting equipment to ensure that items such as large volume fire hoses, portable pumps and fire fighter personal protection equipment (PPE) are adequate to resource the interface area. Fire Department personnel should have correct personal protective equipment and wildland fire fighting tools. Hoses, pumps and other equipment should be compatible with MOFR wildland fire fighting equipment.	NFRS and City Public Works have numerous resources to address an interface fire but adequacy would depend on the scale and conditions of a WUI fire. Fire Dept personnel have correct PPE, wildland tools etc. and basic WUI fire training.
#26	The Fire Department should meet with the MOFR prior to the fire season to review the incident command system structure in the event of a major wildland fire. As it may be most effective for this to occur at a regional level, the City and Fire Department should work in conjunction with Regional District staff to establish clear command structures and lines of communication with MOFR to ensure efficient operations during wildfire events. This should include designated radio channels and operating procedures.	This is discussed with MFLNRO from time to time.
#27	The City should consider working with other municipalities and the Regional District to coordinate the creation of a sub-regional mobile cache of wildland fire fighting equipment and communications equipment for a mobile incident command centre. This would reduce the cost of purchasing and maintaining the cache and provide additional resources in the event of a wildfire.	Nelson shares a phone cache with surrounding fire departments.
#28	Training needs related to the deployment and use of the emergency sprinkler kit should be reviewed annually	Ongoing review is done.
Vegetation (Fuel) Management		

Recommendation		Progress
#29	The community should investigate the potential for fuel management programs. A number of high hazard areas immediately adjacent to or embedded in the City have been identified as part of the wildfire risk assessment. These high hazard areas should be the focus of a progressive thinning program that is implemented over the next five to ten years. Thinning should be focused on the highest priority areas of C2, C3 and C4 fuel types. In some areas it may be necessary to work closely with the RDCK and the province to implement treatments. Prescriptions should be developed by a Qualified Forest Professional, taking into consideration the many values and constraints on the landscape.	The City undertook prescription and treatment of all areas of high priority on public land. Approximately 28 hectares were treated (SU1, SU2, SU3 SU4, SU5, SU6 and SU7).
#30	The mountain pine beetle has the potential to cause significant changes in fuels and fire risk over the next decade and beyond. Where applicable, fuel treatment strategies should target removal of beetle susceptible lodgepole pine. The City should consider working with the province and private land owners to monitor and quantify changes in fire risk associated with the mountain pine beetle outbreak.	Completion and implementation of the West Arm Provincial Park Fire Management Plan will begin to address some of the most critical mountain pine beetle impacted stands.
#31	The provincial government and the UBCM have funding programs specifically to address wildfire hazard and the wildfire hazard associated with mountain pine beetle on Crown and municipal lands. The City should consider applying for UBCM funding to carry out fuel treatments that will strategically mitigate fuel hazard within 2 km of the community. The 39.2 ha priority 1 treatment area would be the focus for funding	Above-mentioned fuels treatments were completed with UBCM funding, either through the Job Opportunities Program (JOB) or the Strategic Wildfire Prevention Initiative (SWPI).
#32	The City should investigate the potential for additional funding options, such as a cogeneration plant, a composting program or a minimal increase in property taxes, which could be used to encourage and aid property owners with fuel mitigation and to facilitate treatments on public lands. Efficiencies may be gained if this is coordinated at a regional level.	A Biomass Feedstock Analysis was completed in August 2011 to support Phase 2 of the City of Nelson District Energy Feasibility Study. City of Nelson News Bulletin (March 23, 2016) indicates work on developing a viable model for a bio-fuel District Energy System.

Recommendation		Progress
#33	The City should investigate the potential for partnering with residents to promote treatment of public lands adjacent to private property. Private land owners could be encouraged to not only clean their own yards of debris and brush but also to be responsible for the removal of debris and brush from immediately adjacent public lands to a depth of 20 meters. Removal of material could be coordinated with a spring yard waste pickup program.	A Burn Bylaw Rescind Period each spring allows for burning of difficult to transport waste.
#34	The City should consider lobbying the province to identify and document hazardous fuel types on Crown lands that are not within 2 km of the municipal boundary but that are within 5 km of residential areas that could be impacted by a wildland urban interface fire. Effort should be directed at encouraging the province to initiate a fuel treatment program for these lands. This may include coordinating lobbying initiatives with other local governments from within the Regional District of Central Kootenay.	Expanded area of interest with new Interface Working Group to coordinate wildfire planning and activities with the RDCK Areas E and F and BC Parks (West Arm Provincial Park). Looking at Landscape level fuel break options. Opportunity to upscale with the participation of industry.
#35	The City should work with Nelson Hydro and West Kootenay Power to ensure that: 1) transmission infrastructure can be maintained and managed during a wildfire event; and 2) the right-of-way vegetation management strategy includes consultation with the community and the Fire Department so that wood waste accumulations do not contribute to unacceptable fuel loading or diminish the ability of the right-of-way to act as a fuel break.	Exploring opportunities to tie in required vegetation management work by Nelson Hydro and Fortis BC (formerly West Kootenay Power) with fuel mitigation needs.
#36	The City should identify volatile shrub complexes near city structures in Priority Zone 1 and mitigate the associated wildfire hazards. The City should use these as demonstration tools to educate residents regarding the types of hazardous fuels that exist adjacent to structures and the available mitigation measures	Have surveyed and removed some conifers. Need to complete this job.
#37	The City should continue to use FireSmart to educate its citizens regarding the risks, fuel hazards, and mitigation measures adjacent to homes	FireSmart is the best fitting plan and will continue to be used to address community needs.
#38	The City should support and encourage programs at the local, municipal and provincial level that aid residents in addressing wildfire hazards such as free curbside pick-up, waste to energy programs and other incentive programs	Have partnered with Rotary Club for Curbside pickup as a fundraiser in the past.

Recommendation		Progress
#39	The City should work in collaboration with other government agencies to reduce wildfire risk in adjacent areas.	Updated CWPP incorporating BC Parks (West Arm Provincial Park), Area E, Area F and Nelson.
Wildfire Rehabilitation Planning		
#40	The City should develop a plan for post fire rehabilitation that considers the procurement of seed, seedlings and materials required to regenerate an extensive burn area (1,000-5,000 ha). The opportunity to conduct meaningful rehabilitation post fire will be limited to a short fall season (September to November). The focus of initial rehabilitation efforts should be on slope stabilization and infrastructure protection. These issues should form the foundation of an action plan that lays out the necessary steps to stabilize and rehabilitate the burn area.	PTR Nursery is available as a resource in Harrop.
41	The City should conduct an impact study to investigate the long and short term socioeconomic and environmental impacts of a large wildfire.	Post-wildfire hazards have been studied extensively by MFLNRO (including in community watersheds) and a large increase in incidence of debris flows in susceptible (steep) terrain have been found. This has highlighted areas of concern and the need for further study of streams at high risk for debris flows that may impact the City in the event of wildfire.