COMMUNITY WILDFIRE PROTECTION PLAN

Extension, BC

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Developed through a grant from the Union of British Columbia Municipalities to the Regional District of Nanaimo for:
The Extension Volunteer Fire Department
Extension, BC

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There is no doubt in my mind that, whether it is due to global climate change or natural weather cycle, B.C. communities that build up near forests will face increasing threats of fires. They must do everything possible to restore the forests to good health and plan the design of their communities and the construction of their homes and properties to minimize the inevitable fires in the future.

The Honourable Gary Filmon, Chairman, Firestorm 2003 Provincial Review
In Stories from the Firestorm
Okanagan Valley Newspaper Group, 2004

From the perspective of fire protection the intermix environment is often the worst of all worlds....There is little zoning for fire control. There are few building codes to reduce hazards such as wooden roofs. There is scant pressure to reduce wildland fuels around dwellings. Open spaces that serve as buffer zones shrink as houses and woodlands expand....Narrow roads to sheltered homesites, rustic wooden houses with shake-shingle roofs, lush vegetation dripping over walls and roofs, distances from prying officials and taxes – all this is why the exurban communities were created. To render them fireproof is to recreate the environments from which the residents fled in the first place.

World Fire. 1995, Stephen J. Pyne,

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COMMUNITY WILDFIRE PROTECTION PLAN
EXTENSION, BC

SYNOPSIS

1. Many areas of Extension have a medium to high interface fire hazard rating.
   In 2005, Extension received a grant from the Union of BC Municipalities to develop a Community Wildfire Protection Plan (CWPP).

2. Extension's Community Wildfire Protection Plan:
   1) defines risk areas for interface fires,
   2) identifies measures necessary to mitigate risks, and
   3) outlines an action plan (Section 7) for improving fire protection and prevention in the interface.
   The success of a Community Wildfire Protection Plan hinges on public education.

3. If implemented over the next several years, the actions identified in the CWPP will help Extension clarify and refine priorities for the protection of life, property, and essential infrastructure and resources in the wildland-urban interface.

SECTION 1: INTRODUCTION AND PLANNING PROCESS

The wildland-urban interface (WUI) is commonly described as the zone where structures and other human developments meet and intermingle with undeveloped wildland or vegetative fuels. Interface areas can be sharp geographical edges, or zones of ever increasing risk potential.

The Healthy Forests Restoration Act (HFRA, 2003) in the United States defines the wildland-urban interface as an area extending about 1.1 kilometre from the boundary of an at-risk community, or an area within about 2.2 kilometres of the boundary of an at-risk community if the area has a sustained steep slope or geographic feature that creates the potential for wildfire behaviour endangering the at-risk community.

Wildfires are a part of the natural ecological cycle of forests. Human encroachment onto forested lands increases the risk of interface fire. Loss of life, property, and infrastructure are threatened. One of the most dangerous operations for fire fighters involves fire suppression in the interface zone.

COMMUNITY WILDFIRE PROTECTION PLAN PROGRAM

The concept of community-based interface planning is not new. The "Firestorm 2003 Provincial Review" provided the impetus for BC communities to participate in strategic planning. The Firestorm report, prepared by The Honourable Gary Filmon, provided a review of the damage caused in 2003 when devastating interface fires in British Columbia's interior destroyed 260 000 ha of forest, 334 homes and businesses, forced the evacuation of more than 45 000 people from their communities, and resulted in the loss of lives of three fire fighting airmen.

The "Firestorm 2003 Provincial Review" recommended the province of BC take a leading role in the development of strategic interface management plans in cooperation with local governments. The Community Wildfire Protection Plan program, initiated by the province in 2004, is aimed at improving fire prevention in the interface.

The Community Wildfire Protection Plan is directed at medium-to high-risk interface communities. The CWPP is administered by the Union of BC Municipalities (UBCM) and funded by the Ministry of Forests and Range.

The purpose of the CWPP program is to assist communities in the development of plans to assist them in improving fire prevention and protection in the interface.

The objective of the CWPP program is to improve community safety and reduce the risk of damage to property and wildlands.

The intent of the CWPP is to establish a cooperative framework under which interface management programs are developed and implemented to protect human and natural resources values in an effective and efficient manner.

SECTION 2: PROFILE OF EXTENSION, BC

THE SETTING:

The small historic community of Extension is located on southeast Vancouver Island, southwest of Nanaimo. Nearly a century ago Extension was one of the great coal mining centres of Vancouver Island. Situated in a shallow basin surrounded by forested hills, the area was settled in the late nineteenth century by farmers. When coal was discovered in 1896, island coal baron Robert Dunsmuir acquired the rights to the mine, but after "skimming the cream", sold the operation in 1910. Work continued until the 1930's. At the height of production, the Extension coal field was almost seven kilometres long and over two kilometres wide, with an average thickness of two and a half metres. Slag heaps and old buildings are visible reminders of the area's past. Today the valley is dotted with small homes and farms.

Plate 1. Extension Village area, viewed from Extension Ridge.

The basin in which Extension lies has moderately rolling to strongly rolling relief. Slopes vary from 5 to 100%. Soils in the area developed in shallow colluvial or morainal deposits, generally less than 1 m thick, overlying sedimentary bedrock. Soils are generally well-drained, although many small wetland areas have imperfect drainage. Average elevation is approximately 100 m a.s.l.

Second- (and third-) growth coniferous forests cover a significant portion of the lands in Extension. Old-growth forests in the area were originally harvested beginning in the late 1800's. Predominant forest cover in the area is Douglas-fir, with lesser amounts of western red cedar. Mixed forests of coniferous /deciduous species (red alder, bigleaf maple, cottonwood) are common in wetland areas. Arbutus is found on well-drained, warmer upland slopes.

Extension, together with the surrounding unincorporated lands of Cranberry-Bright and Arrowsmith-Benson, constitute Electoral Area C of the Regional District of Nanaimo. Area C, with 100 000 ha, is the largest jurisdiction in the Nanaimo Regional District, while the actual land area of Extension – 10 ha (~1.15 km2) - is very small in comparison. Extension Village is the only area in Area C within an urban border. Area C and the majority of the Nanaimo Regional District are located in the Nanaimo Lowland physiographic subdivision.

LAND USE

Forestry and agriculture support the local economy. Agricultural operations include scattered large farms and several smaller holdings. Forestry is a dominant component of the landscape. The majority of forested lands within the area is within the Forest Land Reserve. One small saw mill is located in Extension.

The character and economy of Extension are defined by the natural resource value of the land for forestry and agriculture. The community is committed to protecting the rural land base for rural uses, particularly resource uses such as logging and farming.

ENVIRONMENTAL AND OTHER VALUES

Extension and the surrounding lands in Electoral Area C are an important recharge area for the Nanaimo River, one of Vancouver Island's most important freshwater sources. The Nanaimo River and its associated creeks and wetlands are valued sources of irrigation, domestic water, fish, wildlife habitat, and recreational opportunities.

The forested landscape of Extension provides many recreational opportunities, ranging from mountain biking to wildlife viewing. The 6-km Extension Ridge Trail, part of the Trans Canada Trail, follows the high point of land through Extension, with stunning views of the Strait of Georgia (Plates 3, 4). The trail is a local favourite for hikers and mountain bikers.

Plates 3 and 4. The Extension Ridge Trail is a popular biking and hiking trail.

POPULATION

The population of Extension is approximately 234 (2001 stats). There are approximately 99 households. The rate of growth in Extension from 1996 to 2001 was 10.9%, double the average rate of growth in the Nanaimo Regional District over the same period of time. The majority of the population resides close to the village core.

Many residents of Extension are drawn to the area for its green space, water resources, and natural features. While these attributes contribute to the character and livability of the area, various factors, including enforcement of building codes, are beyond the jurisdiction of the Regional District of Nanaimo.

Plate 5. Building codes are not enforced in Extension. (Note the coal slag heap in the background.)

The Official Community Plan for Electoral Area C notes that the Snuneymuxw (Nanaimo) First Nations has assessed the Plan is within their traditional territory.

ACCESS

The road system within Extension is essentially an internal system. Extension Road operates primarily as a connector to major roadways and highways outside Extension. The majority of the population has reasonable access to the City of Nanaimo's road network, the Trans Canada Highway and Inland Island Highway, Nanaimo Airport, and Duke Point and Departure Bay ferry terminals.

INFRASTRUCTURE

Major infrastructure in and adjacent to Extension consists of the Nanaimo River water source and a BC Hydro power transmission Right of Way.

The Greater Nanaimo Water District obtains water from the Nanaimo River to supply most of the urbanised areas of Nanaimo Regional District. Within the Extension Village, Urban Boundary, the Southwest Extension Waterworks District maintains and operates a water distribution system. Outside of the Extension Village, Urban Boundary, groundwater is the principal source of water supply.

Hydrants in Extension are limited to the Village centre. There are 7 "Fire Department" hydrants and 2 "City Hydrants". Water volume and pressure from older "City Hydrants" is not as reliable as the other, newer hydrants.

A BC Hydro power transmission Right of Way in neighbouring Cedar closely parallels the eastern boundary of Extension. Easy access to the right of way, which is surrounded by forestlands and brush, is responsible for high recreational use by dirt bikers, hikers, and quads.

CLIMATE

Extension is classified as CDFmm (Moist Maritime Coastal Douglas-fir Subzone), with warm dry summers and mild, wet winters. The CDFmm represents the mildest climate in Canada. Western fringes of Extension lie within the Very Dry Maritime Coastal Coastal Western Hemlock Subzone (CWHxm), which has warm dry summers and moist mild winters. Growing seasons in both the CDFmm and CWHxm are long. Summer droughts are not uncommon, during which time the Fire Danger Rating Class reaches or exceeds Danger Class 3 for many days.

FIRE PROTECTION

Fire services in the Extension Fire Protection Area (FPA) are the responsibility of the Extension Volunteer Fire Department, under Fire Chief Bruce Deinstadt. The force of 20 regular members maintains one fully equipped fire hall and two rated engines.

Plate 6. Extension Volunteer Fire Department.

The Nanaimo Regional District plans soon to expand the boundaries of the Extension Fire Response Area to include the Nanaimo River Road and South Fork area, which is beyond the 8-kilometre service limit. Six residences at the end of Kelsey Road are also looking for protection. The South Fork area attempted to obtain coverage from the City of Nanaimo, which is the next closest fire department, but the city does not provide fire protection outside its boundaries. A new fire hall (Extension #2) is scheduled to be built at South Fork.

According to the Extension Fire Chief, the yearly call volume of Extension is "low". Due to the small size of the community and backup available from BC Ambulance, Extension firefighters no longer provide medical aid. The force does, however, perform at least one or two high-angle rescues every year on the treacherous cliffs of the Nanaimo River.

Firefighters on the Extension crew regularly receive training in both structure and bush fires, and river rescues. In addition to standard structure fire fighting equipment, the Extension FD has climbing ropes for river rescues, and equipment for fighting brush fires: pilaskis, rakes, and shovels. A certified faller on the crew is supplied with a proper faller's hardhat with goggles and ear muffs, a chain saw, and faller's chaps.

High dedication to the Extension Volunteer Fire Department is likely attributable to the compact size of the community. The chief has 20 years of service on the force, while members of the crew have multiple years of service. The average age of a firefighter on the Extension Volunteer FD is 40 years, with a range of ages from 25 to 65 years. While the offspring of a couple members are on the crew, Extension, like many other rural volunteer fire departments, finds it difficult to recruit and retain young volunteers due to rising property values and poor employment prospects in the immediate area.

Mutual Aid

The Extension Fire Department is responsible for fire suppression action on all lands within its fire protection boundaries. The Extension FD operates under a Mutual Aid Agreement with neighbouring fire departments. Where wildfire threatens forest or other wild land values, the Wildland Fire Service of the Ministry of Forests and Range (MoFR) has a responsibility to ensure that appropriate fire suppression takes place, regardless of ownership or land status. The MoFR Coastal Fire Centre maintains an established commitment to mutual aid on all wildfires which are beyond the capability of a local fire department.

INTERFACE HAZARD:

Extension contains a volatile mix of homes, structures, economic bases, infrastructure, and trails located within and adjacent to forested areas. Living, working, and recreating in a fire-prone environment poses risk to homes, public safety, a critical watershed, important infrastructure, and natural resources.

FIRE HISTORY:

Interface fire history is an important indicator of hazard rating. The majority of wildfires in Extension over the last twenty years were started by humans. A small percentage of fires can be attributed to lightning. In 2003 lightning was responsible for 3 bush fires in the area. Several years ago a lightning bolt struck an insulator on a tree next to an inhabited residence. The lightning split the tree, sending a power surge into the house, but fortunately the lone inhabitant was unharmed. (The Extension Fire Chief noted that, if building inspections were mandatory in Extension, incidents such as this would be preventable.)

According to the Extension Fire Chief, interface fire within the last fifteen years occurred at the following locations:

- Private forest tenure bordering Extension
  (a crown fire on Weyerhaeuser forest lands a few years ago threatened to jump the Nanaimo River, jeopardising an ammunition storage plant; local residents were put on evacuation warning; Ministry of Forests (MoF) intervention involved air attack
- Gogo's mill
  (required MoF intervention)
- Haslam Creek
  (started by downed power line)
- Nanaimo River
  (frequent escape campfires; MoF intervention has often been necessary)

Despite Extension's small size, the scale of wildland fires that have occurred in the area is considerable. Mutual aid and Ministry of Forests air support have often been necessary to constrain fires. Extension's Fire Chief remarks that the "community has actually been very lucky – it could be much worse."

Plate 7. The Extension Fire Chief took this photo of a recent fire on Extension's borders.

SECTION 3. PREPARATION OF A COMMUNITY WILDFIRE PROTECTION PLAN

A community should follow basic steps in the development of a wildfire protection plan. Community interface fire planning need not be a complex process.

Practical approaches to community planning are in effect in several countries with interface fire problems. Australia has developed guidelines to improve safety in Bushfire Prone Areas. The national Fire Safe program in the United States is responsible for providing access to and interpretation of fire safe laws and regulations covering general fire prevention and wildland fire safety.

The FireSmart program in Canada uses up-to-date scientific information to provide practical tools and information for use by interface residents, government, firefighters, and industries that operate in the wildland/urban interface. The following basic steps for developing a community wildfire protection plan are adopted from FireSmart (*FireSmart: Protecting Your Community from Wildfire*, Partners in Protection, 2003).

STEP ONE: Plan overview - develop programmatic goals

The first step in developing a Community Wildfire Protection Plan should be liaison with key, decision-making agencies responsible for forest and land-use planning: local government, local fire authorities, and Ministry of Forests and Range Protection. Programmatic goals can be formulated at this time.

STEP TWO: Data Acquisition and Information Sharing

The next step is to acquire data in order to share perspectives, priorities, and other information relevant to the planning process.

The intent is not to duplicate existing data, but to integrate information and resources.

Several useful community-planning guides and resources were used in the development of this project:

- *FireSmart – Protecting Your Community from Wildfire* (2nd Edition, Partners in Protection, 2003)
- *Firestorm 2003 Provincial Review*
- *Addressing the Interface Fire Hazard – A Case Study of the District of Langford* (District of Langford, 2002)
- *Water Supply for Public Fire Protection (*Fire Underwriters Survey, 1999*)*
- *National Fire Protection Association (NFPA) Standards* (NFPA, Massachusetts, US*A)*
- *Official Community Plan* (Electoral Area C)

STEP THREE: Hazard - Risk Assessment

A community hazard - risk assessment is an effective means of identifying areas at risk.

Various models are available to evaluate interface hazard and risk. Models selected should consider a range of factors, including:

- Fuel hazards
- History of wildfire occurrence
- Structures, features, and essential infrastructure at risk
- Other community values at risk
- Local preparedness and firefighting capability

Jurisdictions developing Community Wildfire Protection Plans were encouraged to use Strategic Threat Analysis (STA) mapping, a GIS mapping resource recently available in the province of BC. Existing STA mapping coverage of southeastern Vancouver Island is extremely limited in coverage; due to its dubious applicability, STA mapping was not used in this project.

STEP FOUR: Base Hazard mapping

Based on hazard-risk assessments, interface hazard mapping is developed to identify:

- Areas at potential risk from wildland fire
- A designation of the community's wildland-urban interface zone

Ortho photography is useful in field mapping. Final mapping can be presented in digital format (GIS), using cadastral, topographic, and TRIM information.

STEP FIVE: Community Hazard Reduction Priorities

Once the community assessment and base map are completed, local protection and hazard mitigation needs should be addressed. The community may also want to identify and develop strategies to improve emergency preparedness and fire response capability.

STEP SIX: Develop an Action Plan

Measures necessary to mitigate risks need to be identified in an action plan.

STEP SEVEN: Finalise the CWPP

The core group of key, decision-making agencies should reconvene to mutually agree on fuels treatment priorities, preferred methods for fuels treatment projects, location of the wildland/urban interface, and other information and actions to be contained in the final CWPP.

STEP EIGHT: Education and Awareness

Effective public education and awareness will help motivate people to create FireSmart communities. Once the base awareness program is developed, target a wider audience. Substantive input from a diversity of interests will ensure the final plan reflects the highest priorities of the community. It will also help to facilitate timely implementation of recommended projects. The process of developing a CWPP can lead community members through valuable discussions regarding management options and implications.

STEP NINE: Implementation

Finally, establish an assessment strategy for the CWPP to ensure the plan maintains its relevance and effectiveness over the long term.

SECTION 4: HAZARD-RISK ASSESSMENT

HAZARD ASSESSMENT METHODOLOGY

Hazard assessment methodology used in the development of the Community Wildfire Protection Plan was based on standard fire danger and hazard assessment models.

Canadian Forest Fire Danger Rating System (CRRDFS):

The Canadian Forest Fire Danger Rating System (CFFDRS), developed by Forestry Canada, is a highly accredited system for evaluating daily forest fire danger (Figure 1). The CFFDRS comprises two major subsystems: the Fire Weather Index (FWI) system and the Fire Behaviour Prediction (FBP) system.

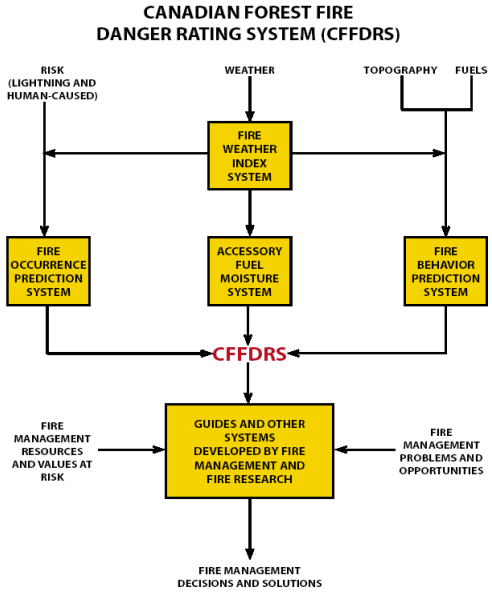


Figure 1. Canadian Forest Fire Danger Rating System

Six components of the FWI account for the effects of fuel moisture and wind on ignition potential and probable fire behaviour. Three fuel moisture codes reflect the fuel moisture content of fine surface litter (Fine Fuel Moisture Code – FFMC), loosely compacted duff of moderate depth (Duff Moisture Code – DMC), and deep compact organic matter (Drought Code – DC).

The FWI fuel moisture codes plus wind are linked in pairs to form two intermediate and one fire behaviour index. The Initial Spread Index (ISI) combines the effects of wind and fine fuel moisture content (FFMC). The Buildup Index (BUI), based on DMC and DC represents a measure of the total fuels for combustion.

Each component of the FWI System conveys direct information about certain aspects of wildland fire potential. For example, the FFMC is a useful indicator of the probability of human-caused ignition, as is the DMC for lightning-caused ignitions. The DC and BUI are

excellent indicators of smoldering combustion or fire persistence in deep, compact organic layers, and hence of mop-up difficulty.

The FBP System predicts the rate of spread, fuel consumption, and intensity of wildfires. These characteristics are determined by the prevailing weather severity, fuel type, slope steepness, geographic location, elevation, and calendar date.

The FBP System also addresses variation in fuel types. The FBP System provides quantitative outputs of fire behaviour characteristics for 16 major Canadian fuel types with different stand structure and composition, surface and ladder fuels, and forest floor cover and organic (duff) layer.

Interface Community Fire Hazard Analysis

In this project, data obtained from the CFFDRS was integrated in the Ministry of Forests Protection Branch "Interface Community Fire Hazard" analysis. The MoF analysis, adopted from FireSmart (and customised for use on the BC south coast) provides a quantitative procedure for assessing the interface fire hazard (i.e., potential fire behavior, structures at risk, susceptibility to ignition, and suppression constraints). Assigning points – the greater the hazard, the greater the number of points – indicates how each item contributes to the hazard. Hazard categories are low, moderate, high, and extreme. An interface area, site, or structure is not considered to be "fire safe" unless it obtains a low or moderate assessment score.

Hazard, Impact, Risk and Vulnerability (HIRV) Process

A community-based model, developed by Dr. L. Pearse at UBC, provides an integrated approach for community Hazard, Impact, Risk and Vulnerability (HIRV) analysis. The HIRV model, which offers a community-based approach to sustainable hazard mitigation, is designed to assist local government in the development of mitigative strategies vis-à-vis hazards.

Hazard and risk factors identified in the CFFDRS and Interface Community Fire Hazard analyses were incorporated in the Hazard, Impact, Risk and Vulnerability model.

The HIRV process consists of:

- Hazard Identification
- Risk Analysis
- Vulnerability Assessment
- Impact Analysis
- Risk Management

Hazard can be loosely thought of as the product of risk, vulnerability, exposure, and the capacity of humans to respond to extreme conditions. For the purposes of this report, hazard refers to an unplanned or unwanted natural or human-caused fire, or a prescribed fire that threatens to escape its bounds.

Risk is a measure of the probability of occurrence of an event and the expected severity, and an analysis of potential factors (human or natural) which can contribute to the potential for fire occurrence.

Risk should not be confused with risk of ignition. For the purposes of this report, the risk of ignition can be accounted for by assigning a higher hazard rating to areas where fires are most likely to be started. Table 1 compares risk of ignition at common locations.

Table 1. Risk of ignition.

Location	Ignition Risk
Areas within 20 m of any roads and/or trails	Moderate to High
Areas within 20 m of power lines	High
Areas within 50 m of housing	High

Vulnerability defines the ability of people, property, industry, resources, and areas of environmental and historic concern to weather, resist, or recover from the impacts of a hazard in the long term as well as the short term.

Impact is assessed through the use of social factors, environmental factors, and political factors. Impact analysis provides the necessary links between vulnerabilities and hazards.

The following factors need to be present to successfully implement the HIRV model:

- risks must be clearly communicated
- available data must be accessible
- process must be educational for the community at large
- process must provide for equity across the community
- scientific and technical knowledge need to be included
- hazards and risk factors must be comprehensively identified
- process must be a politically legitimate process
- public participation is essential

HIRV ANALYSIS

The first step in the risk analysis phase of the HIRV model is to divide the community into areas or polygons with similar characteristics. Stratification of the community into WUI Risk and Vulnerability Areas allows a comparative analysis of risks and hazards.

WUI Risk and Vulnerability Areas in this project were stratified using various criteria implemented in the foregoing models, including: general location, fuel types, fuel loading, fire history, aspect, access, important infrastructure, and cultural, environmental, economic, social, recreational, and political values.

Some discretion needs to be used in the precise location of hazard boundaries. Areas rated “extreme” or “high” for fire hazard are generally contiguous to, or consist of extensive timbered areas with high fuel loading. Due to the proximity of undeveloped

areas to several inhabited areas, and the fuel that some types of buildings can provide for wildfire, fire risk boundaries could be extended into residential areas if there are no significant firebreaks separating the high risk fire hazard areas and development.

The hazard rating is directly impacted by response time, water supply for fire fighting, and size and configuration of an interface property. In any case, an interface area, site, or structure is not considered to be “fire safe” (FireSmart) unless it obtains a low or moderate rating.

SECTION 5: RISK-VULNERABILITY

The following WUI Risk and Vulnerability Areas were identified at Extension:

WUI Area 1: Extension Village

WUI Area 2: Rural residential/small farms: Bramley Rd. to Flander Pl., Midora Rd., Myles Lake Rd., McLean's Rd., Colwell Rd., River Terrace, Colwell Rd.

WUI Area 3: Rural residential: Nanaimo River Road and White Rapids Road

WUI Area 4: South Forks (assessed – not yet officially in Extension FPA)

WUI Risk and Vulnerability Area 1 Risk: Low to Mod Vulnerability: Mod to High

Extension Village

General Description: Well-established historic community with high proportion of older, combustible residences and structures; most structures have well-maintained lawns and gardens - fuel (vegetation) loading around structures is generally low; hydrant coverage; close to fire hall; within close proximity to wildlands.

Interface Issues:

- Significant proportion of older, combustible structures
- Invasive brush at several abandoned properties
- Building inspections not required
- Hydrant coverage is not always reliable
- Cedar shake roofs common
- Many residences do not have fuel-free zones

Plate 8. Older residences and structures are common in Extension Village.

WUI Risk and Vulnerability Area 2 Risk: Mod to High Vulnerability: Mod to High
Rural residential / small farms

General Description: The majority of Extension consists of rural residential properties intermixed with small agricultural holdings. Local relief varies from rolling, forested hills to steep fault-line escarpments. Vegetation consists of discontinuous to continuous second-growth forest.

Interface Issues:

- No community piped water
- Many older, combustible structures
- Many homes do not have a fuel-free 10 m zone
- Many areas with narrow, unlit, one-way access (i.e., Colwell Rd., Midora Rd.)
- House numbering not evident in many areas
- Many homes with cedar shake roofs
- Access areas for recreation routes common throughout area – small fires evident at many sites
- Perimeter areas border contiguous forestlands
- Several newly logged settings along Extension's border
- Forestlands in area have high fuel loading
- Some brush areas with limited accessibility
- Fire poses significant risk to homes in area

Plate 9. Rural acreages intermixed with trees and brush characterise Extension.

WUI Risk and Vulnerability Area 3 Risk: High Vulnerability: Moderate
Rural residential: Nanaimo River Road and White Rapids Road

General Description: Lightly populated, significant travel corridors bordering contiguous fuel (forest and brush).

Interface Issues:

- No community piped water
- Many older, combustible structures
- Most homes do not have a fuel-free 10 m zone
- House numbering not evident in many areas
- Many homes with cedar shake roofs
- House numbering not always evident
- Off-road access points common
- Roadside vegetation poses a risk in dry periods
- Contiguous fuels
- Nanaimo River attracts party-goers

Plate 10. Many fires are started every summer in dry brush and grass on the banks of the Nanaimo River.

WUI Risk and Vulnerability Area 4 Risk: High to Extreme Vulnerability: Moderate South Forks / Twilight (Assessed, not mapped – not officially in Extension FRA)

General Description: Existing and proposed acreages at Twilight and further west to Nanaimo River Road are currently outside the 8-km limit of the Extension Fire Protection Area.

Interface Issues:

- No community water for fire fighting
- Despite a high proportion of newer homes, most don't have fuel-free zone
- Some cedar roofs
- House numbering not always evident
- Many debris piles on residential properties
- Contiguous fuels
- Outside Fire Protection Area

Plate 11. Rural residential properties in the South Fork area do not currently have fire protection.

Risk and Vulnerability Analysis

HIRV models were developed for each of the WUI Areas. The following tables demonstrate the range of risk factors found in different areas of the district (WUI Area 1 – Extension Village, and WUI Zone 4 – South Fork).

Table 2. Hazard Impact Risk and Vulnerability Model

Hazard	Risk Rating	Certainty	Vulnerability Rating	Certainty	Impact Analysis*	Certainty	Risk and Vulnerability Analysis
WUI Area 1 Extension Village	**Mod**	**Well established**	**Moderate to High**	**Well establish'd**	**Env=2 Soc=2 Econ=2 Pol=2**	**Well established**	**Risk= Mod Vulnerability= Mod**

***** Env=Environmental Soc=Social Econ=Economic Pol=Political Ratings: 1=Low, 2=Moderate, 3=High, 4=Extreme

Table 3. Hazard Impact Risk and Vulnerability Model

Hazard	Risk Rating	Certainty	Vulnerability Rating	Certainty	Impact Analysis*	Certainty	Risk and Vulnerability Analysis
WUI Area 4 South Fork	**High To Extreme**	**Well-posed certainty**	**Low to Moderate**	**Well-posed certainty**	**Env=3 Soc=2 Econ=2 Pol=2**	**Well-posed certainty**	**Risk=High to Extreme Vulnerability= Moderate**

***** Env=Environmental Soc=Social Econ=Economic Pol=Political Ratings: 1=Low, 2=Moderate, 3=High, 4=Extreme

Table 4 evaluates risk probability versus consequence. The table evaluates the WUI fire hazard with the potential threats to life, property, and the environment. Ranking criteria are presented in Table 5.

Table 4. Risk Rating

Identified Hazards	Life Safety	Property Damage	Environmental Damage	Economic Impact
WUI Vulnerability Zone 1 Extension Village	Mod to High	Mod to High	Moderate	Low to Moderate
WUI Vulnerability Zone 2 Rural Residential	Moderate	Moderate	Moderate	Moderate
WUI Vulnerability Zone 3 Rural Residential	Moderate to High	Low to Moderate	Moderate to High	Moderate
WUI Vulnerability Zone 4 South Forks	High to Extreme	Moderate	Moderate to High	Moderate to High

Table 5. Ranking Criteria

Consequence Criteria		
Life Safety	**Low**	Injuries limited to the area of effect. <10
	Medium	Serious injuries >10
	High-	Multiple fatalities, serious injuries
	Extreme	Multiple fatalities, critical and serious injuries
Property Damage	**Low**	Minimal damages
	Medium	Structural damages evident
	High-	Loss of structures
	Extreme	Large-scale loss of structures
Environmental Damages	**Low**	Minimal impact at area of effect
	Medium	Regional damage
	High-	Long-term recovery. Requires significant after action
	Extreme	Severe long-term effects
Economic Impact	**Low**	Economic impact minimal
	Medium	Loss of business
	High-	Regional long term loss
	Extreme	Chronic long-term economic downturn

SECTION 6: DISCUSSION: MITIGATION AND SOLUTIONS

EDUCATION AND PUBLIC AWARENESS

The crucial key to preventing or minimising fire risk in the wildland / urban interface is effective public education. An informed, knowledgeable community will make the best decisions about interface management.

> "By developing the plan in true collaboration with the community and agency partners, you've always got people who want to maintain it."
>
> North Fork Wildfire Plan, Sundance, Utah

Promotion of interface management should always involve community fire agencies (local fire department and Ministry of Forests and Range wildland fire service).

Discuss programmatic goals with:

- Local government
- Homeowners

Be assured of public participation:

- Provide access to the CWPP on the internet
- Notify property owners in high hazard areas by phone or mail
- Facilitate scheduled public meetings for residents living in the wildland / urban interface

Once the awareness program is developed, target:

- School-age children (school programs)
- Building contractors (promote fire resistant building materials)
- Real estate firms (promote FireSmart structures and neighbourhoods)
- Insurance industry (adequate fire response)
- Media
- Utility companies
- Tourism- and recreation-related businesses (educational pamphlets, signage)
- Ministry of Transportation and Highways (informative meetings)
- Appropriate First Nations

Strategic approaches are required for specific audiences.

Recommendations:

- ***Continue to distribute the FireSmart booklet to all property owners in the spring.***

- ***Cooperate with MoF Protection on a "short" version of the FireSmart booklet.***

MITIGATION

Mitigative measures to reduce the hazard posed by interface fire should target:

- Vegetation Management
- Structural Options
- Infrastructure

VEGETATIVE MANAGMENT

Vegetation (fuel) management in interface areas is vital to the reduction of fire danger. During a major interface fire with a number of homes at risk, firefighters may be forced to prioritise their actions using a triage concept – saving only those structures that can be readily protected.

Fuel Modified Zones

FireSmart recommends the establishment of fuel modified areas around structures in the interface. Fuel modified areas between a building and a potential wildland fire have combustible materials and vegetation removed, reduced, or converted to reduce the potential for an advancing wildland fire to spread to the building, or conversely, for a building fire to spread to the adjacent wildland (Figure 1).

Priority Zone 1: Area within 10 m of a building – Fuel Removal and Conversion

Priority Zone 2: Area 10-30 m from a Building – Fuel Reduction

Priority Zone 3: Area 30-100 m from a Building – Fuel Reduction and Conversion

Figure 2. Vegetation management in neighbourhoods with a high interface hazard should focus on the establishment and maintenance of Priority Zones around structures.

Recommendations:

- ***Fuel Modification Zones should be established and maintained around new structures in areas with a high to extreme interface hazard.***

- ***In high to extreme interface hazard areas, property owners at existing lots should be encouraged to establish and maintain Fuel Modification Zones around residences and other structures.***

Community Fireguards

Community firebreaks act as barriers to fire spread. Firebreaks are made by clearing or thinning vegetation (fuels) on a strip of strategically located land.

Recommendations:

- ***Determine the feasibility of establishing firebreaks on edges of rural residential areas bordering areas with significant long-term fuel loading (i.e., western boundaries of Extension).***

- ***Pursue funding through UBCM to conduct Fuel Treatment Pilot Projects in high hazard interface areas (i.e., neighbourhoods bordering forest tenures)***

Disposal of Vegetation (Fuels)

Fuel reduction can result in large amounts of material requiring disposal. Homeowners burning backyard piles often start several brush fires. Disposal of vegetation can use several methods:

- Landfill disposal
- Composting
- Chipping
- Salvage
- Prescribed Burning

Recommendations:

- ***Promote community composting program***

- ***Encourage homeowners to compost deciduous litter and grass clippings***

- ***Determine feasibility of using mechanical chippers to process slash:***
  -Chipped material could be used by landscape industry, horse ranches, and gardeners.

- ***Utilise non-merchantable material – firewood- cleared from public and private lands for community fundraisers (i.e., fire department equipment)***

- ***Use prescribed burning as a viable tool for reducing on-site fuel loading (under careful supervision, and under optimum weather conditions)***

STRUCTURAL OPTIONS

Fire mitigation strategies must address the safety of buildings in the interface zone. Design standards for the construction or retrofit of interface buildings should include:

- Roofing – fire-retardant roof covering assemblies rated Class A, B, or C (i.e., metal, tile, ULC-rated asphalt)
- Siding – non-combustible siding materials (i.e., stucco, metal siding, brick, cement shingles or cementitious materials, poured concrete, or ULC-rated wood siding)
- Protective sprinkling

Recommendations:

- ***Require new structures in high to extreme interface areas to be constructed with fire-retardant roofing and non-combustible siding.***
- ***Require interior sprinkling to be installed in new structures (including single-family residences) in 1) high to extreme interface areas.***
- ***Consider installing interior sprinkling in new residences in high to extreme interface areas.***

INFRASTRUCTURE

Infrastructure includes the network of roadways, open spaces, water supply and utilities that comprises a community. Infrastructure also includes planning tools available to local government to protect life and property in the interface.

Access

> "With all subdivisions, you need ingress and egress, otherwise you put people, including our volunteer firemen, at risk…
>
> Lewis & Clark county commissioner
> *At Home in the Woods*. FEMA, 2004

Access routes should be built and maintained to facilitate safe and efficient access for both residents and firefighters. Roads should be designed using looped networks capable of accommodating two-way access. All development should have at least two access routes. Roads should meet minimum standards for width, gradient, and curvature standards.

Driveways should not restrict the access of the largest emergency vehicle likely to be operated on the driveway. Like roads, driveways should meet minimum standards for width, gradient, and curvature standards. Long driveways should provide an adequate turnaround at the closed end, and should provide adequate turnouts.

Recommendations:

- ***Require standards of new roads and driveways to meet minimum FireSmart guidelines, to be designed in accordance with the latest edition of the "Manual on Geometric Design Standards for Canadian Roads and Streets".***

Water Supply

An adequate and reliable water supply for firefighting is an essential part of the fire protection system of a community. A piped system in common with domestic potable water service is customarily used in built-up areas. In rural areas lacking a community water system, the Fire Underwriters Survey Guide (FUS) and National Fire Protection Association (NFPA) standards recommend a minimum fireflow of 1 000 L/min for 2 hours.

Insurance standards

The industry standard distance for water tender response is 8 km (10 minutes). This assumes the area being protected is a low hazard type of area. The industry standard for hydrant coverage in areas with community piped water is 300 m.

Response times vary at Extension, depending on the time of day and year, and the location of the call. Hydrants are restricted to the Village centre.

Fireflow in rural areas

Water supply for fire suppression must be balanced with actual performance. A fireflow of 1 000 L/min for 2 hours (120 000 L) is easily met in an area with a water distribution system and hydrants, or, in some cases with a pumper relay operation, but may be difficult to use in conventional tanker-shuttle operation. The ability to direct relay pump to structures close to water sources must be considered.

In rural areas without community piped water, year-round rural drafting sites are encouraged to provide additional fire protection. Such sites should be capable of supplying 1 000 L/min for 2 hours (i.e., >120 000 L capacity) at all times of the year, including under extreme dry weather conditions.

Supplementary water supply for fire fighting

Supplementary water supply for fire fighting purposes is recommended at individual residences in high interface hazard areas (NFPA, MoFR Protection, FireSmart 2003). The minimum recommended supply is 7 570 L. Supplementary water for fire fighting purposes

should be installed uphill as a gravity-feed system. Vented, steel bolted, upright tanks on concrete slab provide suitable water storage vessels. Storage vessels should have 37-mm hose connections, and be within 15 m of the structure.

Recommendations:

- ***Construct year-round drafting sites at strategic locations in Extension.***
- ***Encourage existing property owners in high to extreme interface areas to install on-site water supply for firefighting purposes.***
- ***Encourage residents of existing interface properties lacking a pressurized water system to have at least one large water barrel and a 10-L fire pail.***

Fire Fighting Services

The Extension volunteer fire department is a small dedicated force. It is difficult to recruit and retain younger fire fighters. Providing incentives to recruits could encourage new members.

Recommendation:

- ***Consider funding Emergency First Aid training for new volunteer fire fighters, with the proviso that fire fighters who receive specific training must provide service for at least one year.***

PLANNING TOOLS

Various planning tools available to local government are preventative measures to reduce the risk of lives and structures in the interface. These tools, used at the time of subdivision, planning, and building and servicing, are generally applicable to new development, not existing lots and structures.

Development Permits

Section 919.1 of the Local Government Act provides authority to designate specific areas as Development Permit Areas. In such cases a development permit would be required prior to the development or redevelopment of a site or area. Development Permit Areas are designated for specific purposes, including protection of development from hazardous conditions (i.e., wildfire). A development permit may include requirements respecting the character of the development, including landscaping, and the siting, form,

exterior design and finish of buildings and structures. Under the Local Government Act, Development Permit areas must be designated in an Official Community Plan (OCP).

Recommendation:

- ***Designate Development Permit Areas for wildfire in applicable areas of Extension in applicable areas of Official Community Plan.***

Wildland-Urban Interface Assessment

Prior to the issuance of a development permit, the applicant should be required to submit a Wildland-Urban Interface Assessment, conducted by a qualified RPF with relevant applicable experience.

Recommendation:

- ***A Wildland-Urban Interface Assessment, conducted by a qualified RPF with relevant applicable experience, should be conducted (at the applicant's expense) in high to extreme interface hazard areas, prior to issuance of a development permit.***

Covenants

Section 219 of the Land Title Act permits local governments to request Section 219 covenants. The covenants can be utilised to address interface fire protection measures (i.e., Fuel-Free Zones around structures, on-going vegetation maintenance, building materials and design, and installation of sprinklers).

Limitations to the use of covenants include difficulty in enforcing over time, and existing properties and structure are not subject to the covenants.

Recommendation:

- ***Register a Section 219 Covenant against the title of lot(s) in DP Areas for wildfire in order to address ongoing interface fire protection measures.***

Local Building Bylaws

Under the Local Government Act, local governments may include in their own building bylaws specific to areas at high risk for interface fires. Section 694 (1) allows local governments to mandate fire resistant building construction.

Recommendation:

- ***Use local building bylaws to ensure fire retardant construction materials are used in high hazard interface areas.***

Forestry Lands

Cooperation with neighbouring land users is an important factor in interface management. Recent restructuring of many forestry companies on southeastern Vancouver Island could result in confusion as to who to contact in an emergency.

Recommendations:

- ***Identify tenure holders bordering Extension.***

- ***Collaborate with MoFR Protection and forestry companies operating in the vicinity of Extension to produce an emergency fire plan, to be updated annually.***

Patrols

Increasing numbers of outdoor enthusiasts are using the Extension Trail, Trans Canada Trail, and "backwoods" areas of Extension.

Recommendations:

- ***Encourage NRD to provide regular patrols of Trans Canada Trail during fire season.***

- ***Encourage residents in high-risk interface neighbourhoods to institute "Forest Watch" patrols during fire season.***

SECTION 7: EXECUTIVE SUMMARY: ACTION PLAN

Extension is a small community with large interface concerns. Of the total land area in Extension, 85% is rated at high hazard from interface fire.

Mitigative action is primarily a responsibility of the community. Local government, in concert with provincial fire protection agencies, can take the lead in development and implementation of risk reduction strategies and policies.

Effective public education and community involvement can encourage home and property owners to take their own preventative measures in interface fire risk areas. Government planning tools can be used to ensure preventative measures are taken in new development.

The following recommendations are aimed at reducing the risk of interface fire:

Education and Public Awareness:

- **Strive to involve the public in interface issues through an effective education and public awareness program.**

- **Engage elders of Snuneymuxw First Nations in meaningful dialogue to address interface protection and prevention.**

- **Identify forestry tenure holders bordering Extension.**

- **Collaborate with local forestry operations to produce an emergency fire plan, to be updated annually.**

Vegetation Management:

- **Encourage property owners to establish and maintain Fuel Modification Zones around structures in high to extreme interface areas.**

- **Investigate the feasibility of establishing community firebreaks along edges of neighbourhoods bordering areas with significant long-term fuel loading (through UBCM Fuel Treatment Pilot Projects, i.e., lands bordering forest tenures).**

- **Encourage residents in high hazard areas to landscape with fire resistive vegetation.**
  ***See FireSmart Landscaping on Southeastern Vancouver Island* (brochure), Strathcona Forestry Consulting, 2004**
  http://www.district.langford.bc.ca/document/brochures/FireSmartLandscaping.pdf

- **Encourage area nurseries to produce fire-resistive vegetation.**

- **Develop a community composting program.**

- **Experiment with mechanical chippers and other machinery to process slash.**

- **Utilise non-merchantable material – i.e., firewood- from fuel reduction programs for community fundraisers.**

- **Use prescribed burning as a viable tool for reducing on-site fuel loading (under careful supervision, and under optimum weather conditions).**

Infrastructure-

- **Designate DP areas for wildfires (in Extension) in Area C OCP.**

- **Prior to the issuance of a development permit, require the applicant to a Wildland-Urban Interface Assessment, conducted by a qualified RPF with relevant applicable experience.**

- **Utilise Sec. 219 covenants to address interface fire protection measures (i.e., Fuel-Free Zones around structures, on-going vegetation maintenance, building materials and design, and installation of sprinklers.**

- **Use local Building Bylaws to provide preventative measures at new structures in high risk areas.**

- **In view of the expansion of Extension's Fire Response Area boundaries, encourage the fire department to utilise and /or acquire equipment with bush capabilities.**

- **Provide consistent standards for water storage for firefighting purposes in new subdivisions (i.e., South Fork).**

- **Provide incentives to encourage and retain new volunteer fire fighters (i.e., funding for certain types of applicable training not currently paid for by fire departments).**

- **Encourage existing property owners in high to extreme interface areas to install on-site water supply for firefighting purposes.**

- **Investigate the feasibility of implementing FUS Superior Tanker Shuttle rating.**

- **Develop consistent, scientifically-based burning bylaws in NRD.**

SECTION 6: IMPLEMENTATION

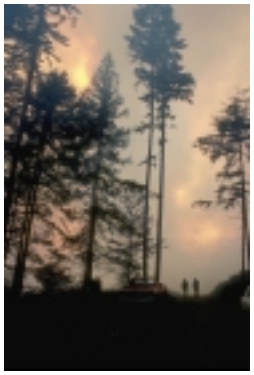
No plan is complete until it is implemented.

The recommendations contained in this Community Wildfire Protection Plan should be reviewed within three months of formal adoption of the plan. Maintenance of the CWPP should include an annual schedule for monitoring and evaluating the programmatic outcomes established in the Plan. A thorough review should also take place every five years.

Regular evaluations of the CWPP should 1) assess the effectiveness of programs, and 2) identify any changes in hazard-risk assessments.

Coordinating agencies responsible for various implementation processes should report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised or removed. Organizations participating in the Plan evaluation should be clearly identified in the evaluation.

Fire protection and prevention in the interface is an ongoing process.



Appendix 1. Interface Hazard Mapping - Extension