



GUIDEBOOK FOR COMMUNITY PROTECTION

A Guidebook for Wildland/Urban
Interface Communities



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DEDICATION

On May 15, 2011, wildfire moved across Alberta in an unprecedented way. From May 11 to 15, 189 wildfires burned across Alberta, and 23 of those threatened communities. On May 15, 2011, two wildfires advanced on communities in the Lesser Slave Area and burned 484 single family homes, seven multi-family residences and 19 non-residential buildings. During the wildfire operations that followed, Jean-Luc Deba of Montreal, a helicopter pilot, lost his life while working on these wildfires.

This guidebook is dedicated to the committed wildfire professionals, emergency management professionals, community leaders and community members that take FireSmart actions.

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Executive Summary

Wildfire has helped shape Alberta's landscape for generations. As the province's population grows and communities become more intertwined with Alberta's forests, the risk of wildfire grows significantly. Many communities currently face a high to extreme wildfire risk. The FireSmart Guidebook for Community Protection outlines the proactive measures communities can take to reduce the risk.

This guide will walk your community through the following steps:

1. Assessing wildfire hazard and risk
2. Building your planning team
3. Bringing together affected stakeholders
4. Developing the FireSmart Community Plan

The FireSmart Community Plan contains two components:

1. **Wildfire Preparedness Guide** – an operational tool that is updated annually and used for immediate wildfire response.
2. **Wildfire Mitigation Strategy** – a strategy that outlines the FireSmart activities that, when implemented, will reduce the risk and impact of a wildfire. These plans are updated every five years.

A community's wildfire hazard and risk will determine if one or both components are required. Communities with a low or moderate wildfire risk need only complete the Wildfire Preparedness Guide. Communities with a high to extreme wildfire risk will complete both the Wildfire Preparedness Guide and Wildfire Mitigation Strategy.

Preparing for the threat of wildfire is a shared responsibility among many partners. The plans created from this guide will help your community contribute to a FireSmart Alberta.

Now, let's get started...

PREPARING A FIRESMART COMMUNITY PLAN



Preparing a FireSmart Community Plan doesn't have to be a complicated process. These plans can take a variety of forms, based on the needs of those involved in their development. The main goal is to address a community's wildfire protection needs by working through the four-step process.

STEP 1: Assessing Wildfire Hazard and Risk

- ▶ Determine your community's level of risk
 - ▶ Low risk = Development of a Wildfire Preparedness Guide
 - ▶ High risk = Development of a Wildfire Preparedness Guide and Wildfire Mitigation Strategy

STEP 2: Building Your Planning Team

- ▶ Assemble a team of specialists who can provide the technical components needed in your FireSmart Community Plan.

STEP 3: Bringing Together Affected Stakeholders

- ▶ Bring together key stakeholders, including residents, businesses, land owners, industry representatives or other individuals who should have input in the FireSmart planning and implementation process.

STEP 4: Developing the FireSmart Community Plan

- ▶ Develop a Wildfire Preparedness Guide
- ▶ Develop a Wildfire Mitigation Strategy (If Required)

STEP 1: ASSESSING WILDFIRE HAZARD AND RISK

Identifying the wildfire hazard and risk in and around your community will determine how much FireSmart planning is necessary.

Wildfire Hazard

Wildfire hazard refers to wildland fuel complexes that can support combustion. Wildland fuels are defined by kind, arrangement, volume, condition and location. When combined, these factors determine a hazard level in a given area.

Wildfire Risk

Wildfire risk refers to the likelihood of a wildfire starting, either by nature or human-caused sources of ignition. The probability and consequence of a wildfire will determine the level of wildfire risk.

Pages 27 to 32 outline the tools available for determining the wildfire hazard and risk in your community. Gathering input from a wildfire specialist is crucial at this stage for examining and analyzing hazard and risk levels. These professionals can provide valuable guidance on the level of planning that is necessary in your community.

Always consult a wildfire specialist when assessing your wildfire hazard and risk.

Table 1. Wildfire Hazard and Risk Matrix for Determining the Extent of FireSmart Community Planning Required.

	LOW	HIGH	PLANNING CONSIDERATIONS
Wildfire Hazard			FireSmart community planning may not be necessary
Wildfire Risk			
Wildfire Hazard			Wildfire Preparedness Guide
Wildfire Risk			
Wildfire Hazard			Wildfire Preparedness Guide Wildfire Hazard Assessment
Wildfire Risk			
Wildfire Hazard			Wildfire Preparedness Guide Wildfire Mitigation Strategy
Wildfire Risk			

STEP 2: BUILDING YOUR PLANNING TEAM

Strong partnerships help build the foundation for a successful FireSmart community. When putting together your planning team, remember that multiple agencies will have a role to play and should be represented appropriately on the team. The positions detailed below reflect the preferred makeup of a FireSmart planning team.

FireSmart Team Lead

This individual manages timelines and coordinates all activities associated with the planning process. While the team lead may not actually write the final plan, he or she seeks out the appropriate experts who will contribute to the final plan. The team lead should be able to provide a long-term commitment to the project, and is typically a municipal representative for the community.

Specialists

Wildfire Specialist

This individual will have advanced knowledge of how wildfires behave on the landscape. This person will analyze complex information, assist in computer modelling and help map predicted fire behaviour. Contact your local Alberta Environment and Sustainable Resource Development (ESRD) office to see how they can contribute to your team.

Structural Protection Specialist

This individual will have advanced knowledge of how to protect structures from the threat of wildfire and can assess municipal infrastructure and resources to identify any limitations or opportunities related to wildfire suppression. A structural protection specialist can also provide analysis on the impact a wildfire will have on the ability of emergency services staff to respond.

Municipal Planning Specialist/Liaison

This individual will provide a link to long term municipal planning and development. A municipal planning specialist is often more involved in the development of wildfire mitigation strategies but can assist with the Wildfire Preparedness Guide. This individual can also provide access to local approval authorities, such as Mayors, Reeves and Councils.

Mapping

Municipal Staff

Municipal planning staff have detailed information for all developments within a municipality (structures, roads, water systems, etc.) and can supply this information in a GIS format that is extremely beneficial in the development of accurate community maps.

Provincial Government

The Alberta Government has departments that specialize in emergency management and preparedness. ESRD has wildfire management professional and a detailed vegetation management inventory that can provide you with information about critical wildfire threats. Municipal Affairs has specialists in emergency preparedness and structural protection.

No Access to a Mapping Specialist?

If the planning team does not have access to a mapping specialist, you can access ESRD's online FireWeb application. FireWeb can provide all the necessary mapping information required for the development of a FireSmart Community Plan.

STEP 3: BRINGING TOGETHER AFFECTED STAKEHOLDERS

When developing a FireSmart Community Plan, communities should communicate with individuals and groups who may be affected by the decisions that are being made during the planning process. By engaging these stakeholders early in the process, your community can develop a more inclusive plan that is less likely to experience opposition in later stages.

Your stakeholder group can include a wide range of individuals from the following areas:

- ▶ **Provincial and Federal Governments**
 - ▶ Environment and Sustainable Resource Development
 - ▶ Tourism, Parks and Recreation
 - ▶ Parks Canada – National Parks
 - ▶ Municipal Affairs
 - ▶ Transportation
- ▶ **Municipal Government**
 - ▶ Administration/Elected Officials
 - ▶ Emergency Management
 - ▶ Fire Department
 - ▶ Development/Planning Department
- ▶ **First Nations**
- ▶ **Residents and Community Groups**
 - ▶ Local Residents and Community Leaders
 - ▶ Community Associations
- ▶ **Business and Industry**
 - ▶ Forestry Industry
 - ▶ Recreation/Tourism
 - ▶ Oil and Gas Industry
 - ▶ Power Industry
 - ▶ Rail Industry
- ▶ **Land Use Planning Teams**
- ▶ **Non-Governmental Organizations**
 - ▶ Environmental Groups
 - ▶ Watershed Organizations
 - ▶ Recreational Clubs (ski clubs, hiking, etc)

When developing a Wildfire Preparedness Guide, you may only need to engage representatives from the emergency response agencies, whereas the Wildfire Mitigation Strategy may involve representatives from a variety of stakeholder groups. Developing a FireSmart Committee is beneficial to the long term viability of FireSmart initiatives in your community. Consider inviting the above stakeholders into your FireSmart Committee.

STEP 4: DEVELOPING THE FIRESMART COMMUNITY PLAN

Developing the FireSmart Community Plan document is a critical step for protecting your community from wildfire. The FireSmart Community Plan contains two components:

- ▶ Wildfire Preparedness Guide
- ▶ Wildfire Mitigation Strategy

A Wildfire Preparedness Guide is an operational guide developed for all communities where wildfire protection is a concern. The guide assists emergency response personnel to protect identified values-at-risk during a wildfire.

A Wildfire Mitigation Strategy is developed for communities exposed to significant wildfire hazard and risk. The strategy details the FireSmart activities that can reduce the potential impact a wildfire will have on important values.

Notes

A series of horizontal dotted lines for writing notes, spanning the width of the page below the 'Notes' header.

An aerial photograph of a rural property. In the center, there is a house with a light-colored roof and a large barn. To the right, there are several trees, some of which are bare, suggesting a late autumn or winter setting. A road or driveway runs along the right side of the property, with a white car and a green truck visible. The background shows a vast, open field under a hazy sky. The title 'WILDFIRE PREPAREDNESS GUIDE' is overlaid in large, bold, white capital letters across the middle of the image.

WILDFIRE PREPAREDNESS GUIDE

I. DEVELOPING A WILDFIRE PREPAREDNESS GUIDE

Emergency responders use a Wildfire Preparedness Guide when a wildfire threatens a community. The guide's structure is based on the Incident Command System, which has become the standard structure for organizing emergency management in Alberta.

Your guide will support a unified command structure, which means more than one agency will share in the management of the wildfire response. A single, coordinated incident action plan, produced daily, will direct all activities. The Wildfire Preparedness Guide provides a foundation for the incident action plan.

By completing a Wildfire Preparedness Guide, you will do the following:

- ▶ Ensure the efficient use of resources
- ▶ Clearly define roles and responsibilities
- ▶ Engage stakeholders in community protection
- ▶ Support a consistent emergency response standard throughout Alberta
- ▶ Build capacity to mitigate the overall impact of a threatening wildfire (ecological, social and economic)

Your guide will support wildfire operations and allow emergency managers to carry out suppression activities in cooperation with regional stakeholders.

The Wildfire Preparedness Guide should complement any standard operating guidelines or policies that are already in place. Agencies must also adhere to legislation, Memorandum of Agreements and Mutual-aid Fire Control Agreements.

A well-thought-out Wildfire Preparedness Guide will help a community deal with a wide range of wildfire scenarios. In some cases, a wildfire may have to cover a great distance before threatening a community, allowing emergency responders ample time to prepare. In other instances, a fast-moving wildfire could be sparked close to a community and require an immediate response from all available resources. Consider multiple scenarios when preparing your guide.

1. GATHER DATA AND RESOURCES

Identify Inputs to the Plan

Team members and stakeholders who help develop the plan will likely bring a range of expertise and resources to the project. The FireSmart team leader should consider gathering input from the following:

- ▶ **Director of Emergency Management:** This individual will provide expertise in relation to the local Municipal Emergency Plan.
- ▶ **First Nations:** A representative from local First Nations will provide valuable input regarding important landscape values.
- ▶ **Forest Industry:** A representative from the local forest industry will be able to provide harvest plans and land access information.
- ▶ **Local Industry:** Consult with local industry representatives to determine their emergency response capabilities, camp locations, active sites and possible water locations. Representatives could be from the forestry, oil, gas, mining, tourism and utility companies.

- ▶ **Local Elected Officials:** These individuals have in-depth knowledge about the community and its priorities. They can identify important cultural or community features and provide a link to the local government and administration.
- ▶ **Provincial Government:** These individuals can provide knowledge and expertise on various topics, including emergency management, fish and wildlife, forestry, land management, public information, wildfire prevention, etc.
- ▶ **Other Applicable Stakeholders:** include any group not listed above who may have a vested interest in any aspect of FireSmart planning.

It is important to ensure all stakeholders have an opportunity to review and provide input to your Wildfire Preparedness Guide.

Review Existing Plans

Existing emergency response plans provide essential information for the Wildfire Preparedness Guide. When developing the guide, try to build upon the content of existing plans and ensure there is consistency between the documents.

The FireSmart team lead should review all previously developed plans, including Wildland/Urban Interface plans, detailed FireSmart Community Zone plans, sprinkler deployment plans, municipal evacuation plans, mutual-aid fire control agreements and municipal emergency plans.

Field Reconnaissance

Developing an effective plan requires validating maps and data through field reconnaissance. Planning team lead(s) should work with stakeholders to verify the information. Aerial reconnaissance will often provide valuable information.

The FireSmart team lead must review the planning area by vehicle and/or foot. Large-scale (1:100,000) aerial photography of the planning area will ensure the efficient and productive use of helicopter and ground reconnaissance time. Use field reconnaissance to identify landscape values and other attributes that could have an impact on fire operations.

2. DEVELOP THE PLAN

Use the Template as Your Guide

A template for developing your Wildfire Preparedness Guide is on page 66. This provincial standard provides a recognizable format for emergency responders to use. The following sections will walk you through the steps for completing the guide.

SECTION A: Local Area Description

A1 Planning Area

The FireSmart team lead, in cooperation with the identified stakeholders, begins by establishing the boundaries of the planning area. The area can include one community or a mixture of several communities and other values on the landscape.

Geographic features like rivers, drainages and mountain ranges often play a role in identifying the planning area. These geographical features often dictate the direction of fire spread. Jurisdictional and political boundaries can also influence planning boundaries.

Another method for determining your planning area is to use a defined radius that stretches around your community. Appendix II contains details on FireSmart Zones. These detail the standardized radiuses established for FireSmart activities; however, the planning area can be modified to meet local needs.

Remember to conduct a land titles search to determine jurisdiction and land rights.

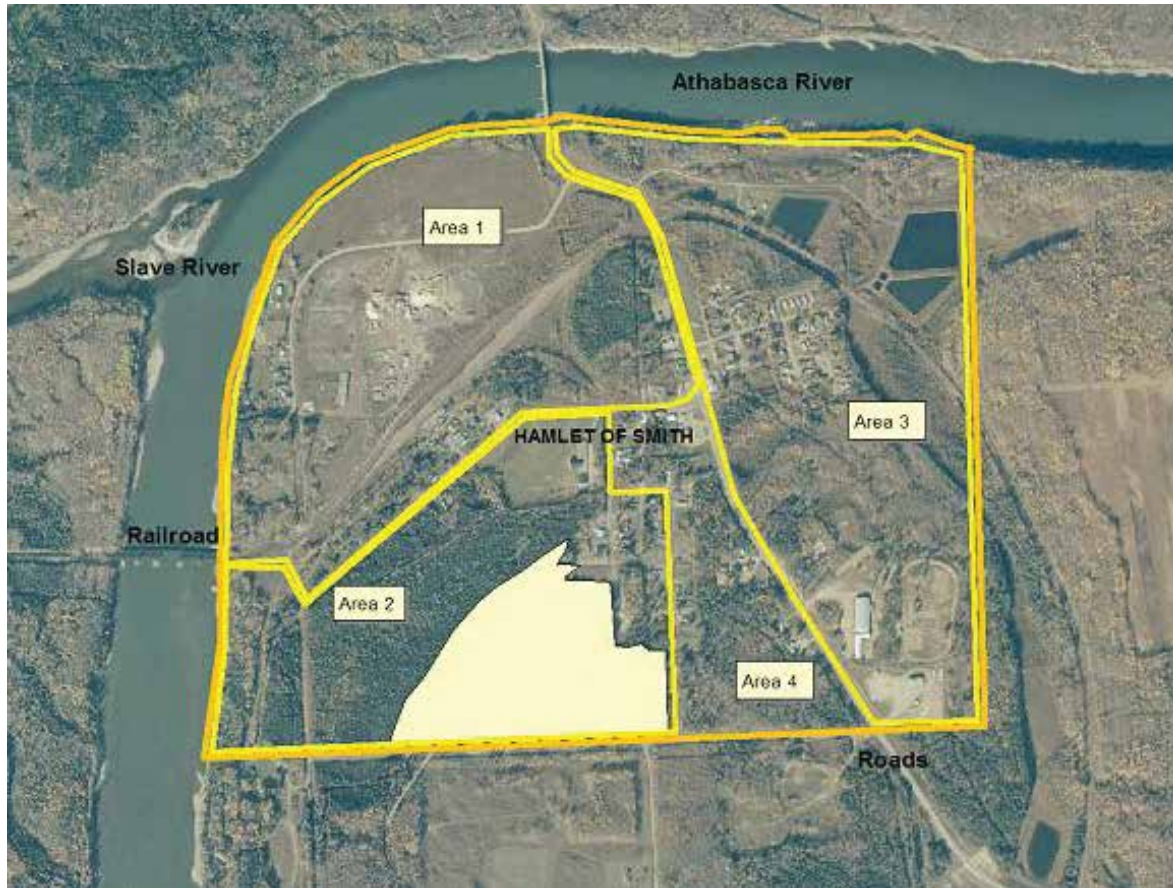


Figure 1. Planning Area - Smith FireSmart Community Plan.

A2 Fire Behaviour Description

It is critical to obtain fire behaviour potential information for your community and its surroundings. This information will detail the types of wildland fuels around your community and what type of fire behaviour can be expected during a wildfire. By analyzing the fire behaviour potential, values-at-risk, fire occurrence risk and suppression capability, a wildfire threat potential can be established.

Fire behaviour potential and wildfire threat grids are available from ESRD.

Wildfire threat potential maps are not included in the Wildfire Preparedness Guide document; however, they will be used for the Wildfire Mitigation Strategy and will provide context for this plan.

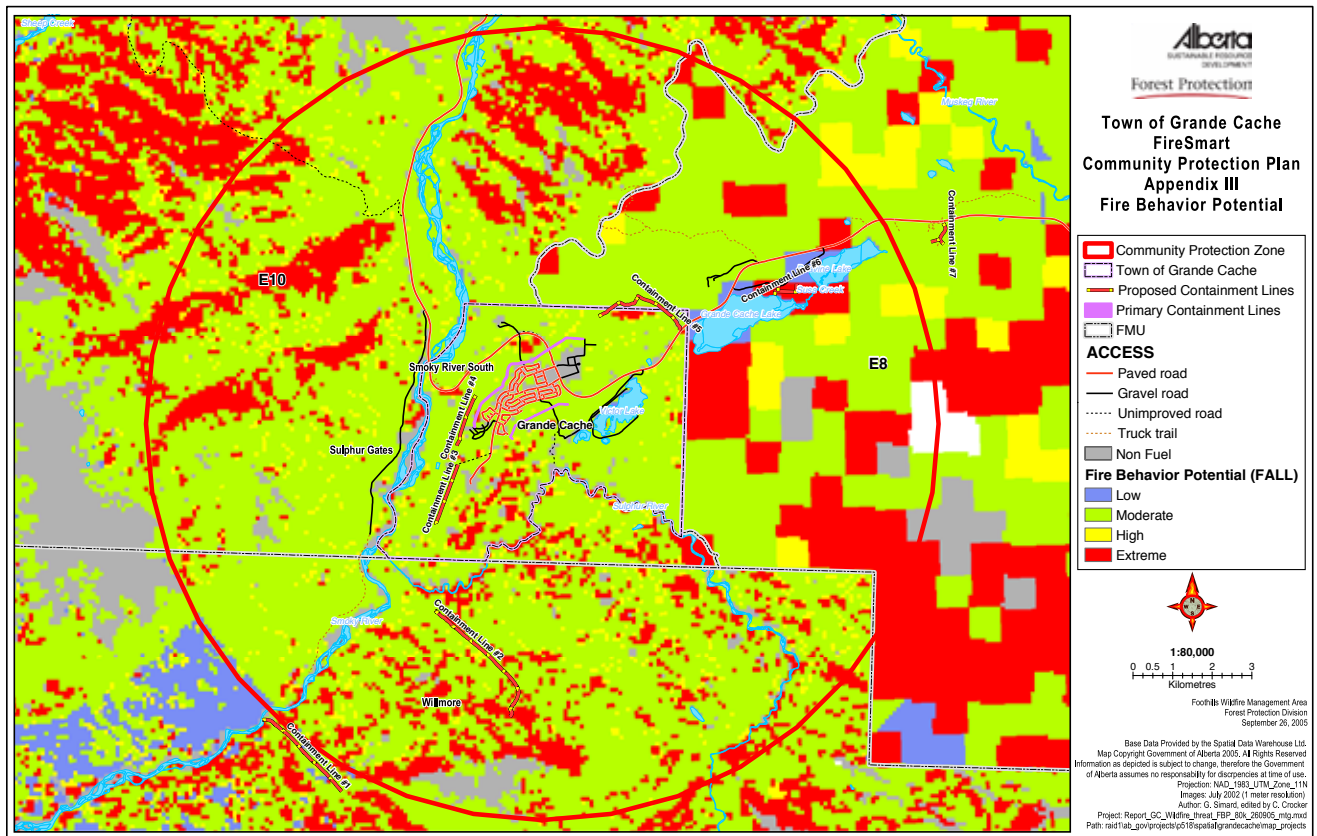


Figure 2. Fire Behaviour Potential - Town of Grande Cache FireSmart Community Plan.

SECTION B: Values-At-Risk

Values-at-risk are defined as manufactured improvements or developments and natural resources that have measurable or intrinsic worth and could be destroyed or damaged by wildfire. Identify the values-at-risk in your community by using GPS coordinates, legal land description or a municipal address.

Once a value-at-risk is identified, determine the number of people occupying the structure, the number of other buildings on site, the roofing types (combustible or non-combustible), the property owner and the contact information (if available). This information will help you classify values-at-risk as one of the following:

- ▶ Standard values-at-risk
- ▶ Critical infrastructure values-at-risk
- ▶ Special values-at-risk
- ▶ Hazardous values-at-risk

B1 Standard Values-At-Risk

Homes and other residential-type structures are the most common standard values-at-risk. The most efficient way of obtaining locations of these structures is through the planning department of your municipality. Standard values-at-risk classifications also include the following:

- ▶ Country residential subdivisions (determine number of houses and population)
- ▶ Cabins (i.e.: remote trapper cabins)
- ▶ Commercial facilities (hotels, restaurants, resorts, office buildings)
- ▶ Industrial facilities (industrial camps, maintenance shops, concrete plants)
- ▶ Mill sites
- ▶ Oil and gas facilities (batteries, satellites, compressor stations, gas plants), but note that individual well sites with a single pump jack are not included.
- ▶ Recreational facilities (campgrounds, ski hills, community halls)

B2 Critical Infrastructure Values-At-Risk

These values-at-risk provide services that are critical to the well being of the people who reside within the planning area. Emergency services managers will allocate fire suppression resources in an effort to maintain these critical services in a community. Critical values-at-risk include the following:

- ▶ Power generation facilities (major transmission lines, power substations, generating stations)
- ▶ Municipal buildings and facilities (hospitals, schools)
- ▶ Water treatment facilities (water treatment plants, water well sites, water intakes, pump houses, and tender fill stations)
- ▶ Communication towers (Cell sites, micro-waves, ESRD communications sites, emergency services' communications towers)

B3 Special Values-At-Risk

Communities typically have natural, cultural, spiritual or historical sites that are important for a variety of reasons. These places may not appear on maps or in GIS data. Information about these sites can be obtained from Alberta Culture and the stakeholders involved in developing the plan.

Special values-at-risk can include the following:

- ▶ Religious sites
- ▶ Cemeteries
- ▶ Historical buildings or historical sites
- ▶ Archaeological sites
- ▶ Wildlife zones
- ▶ Unique geographical features

The importance of these values-at-risk are determined by the community. Fire managers require flexibility to ensure these values receive the protection expected by a community.

B4 Dangerous Goods Values-At-Risk

Dangerous goods values-at-risk are identified to protect the safety of emergency responders. Facilities under this classification can include the following:

- ▶ Fuel stations
- ▶ Large propane facilities
- ▶ Landfills
- ▶ Rail yards
- ▶ Waste transfer stations
- ▶ Storage facilities containing explosives
- ▶ Some oil and gas facilities

Oil and gas facilities have hazards that may pose a risk to responders. Under most conditions these hazards are minimal.

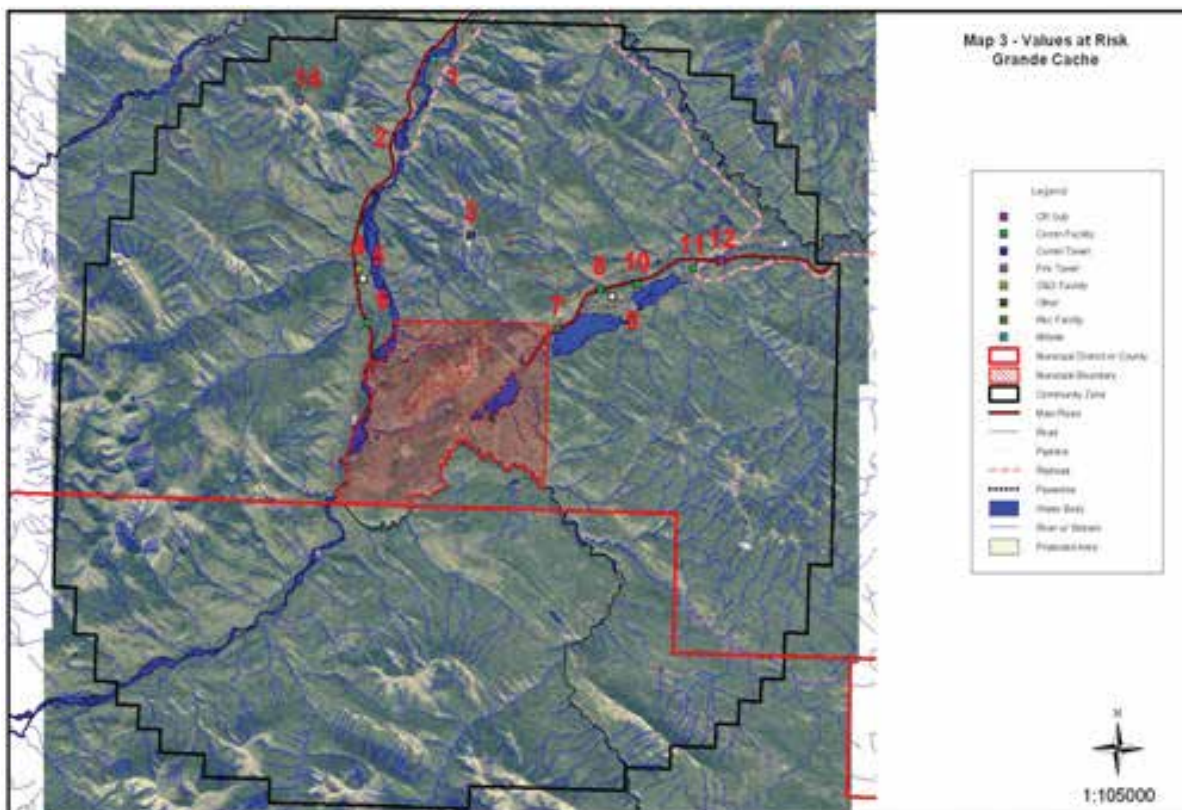


Figure 3. Values-at-Risk - Grande Cache FireSmart Community Plan.

SECTION C: Fire Operations

Designing fire operation maps will provide emergency responders with the necessary information they need to develop strategies and tactics to protect a community in the event of a wildfire. Wildfire behaviour and operations experts can help the planning team interpret current and expected fire behaviour.

C1 Functional Roles

The three main operational functions during an interface wildfire are evacuations, wildfire operations and structural protection. During a wildfire the agencies identified will play the lead role for their assigned portion of the operation, even though they may provide additional resources to other operational functions.

C2 Mutual-Aid Communications

Review any radio communication plans that exist between mutual-aid partners. These can include frequency designations, Memorandum of Agreements and sharing of radio systems.

C3 Minimum Auto-Order List

A minimum auto order list will provide an Incident Commander or dispatch centre with the minimum number of resources required to carry out strategies and tactics during the first operational period. The auto-order list can include the following:

- ▶ Responders
- ▶ Municipal fire fighting resources
- ▶ Provincial wildfire suppression resources
- ▶ Aircraft
- ▶ Sprinklers
- ▶ Engines and water tenders
- ▶ Heavy equipment

C4 Structure Protection Strategies and Tactics

This section outlines the strategies and tactics for structure protection and is developed by the planning team using fire behaviour knowledge.

Consult with your local fire operations experts when developing this section because their wildfire operations and structure protection experience are critical for developing successful strategies and tactics.

C5 Fire Suppression Water Supply

Identify water sources to use for protecting structures and suppressing wildfires. Water can be accessed from hydrant systems, underground tanks and improved or natural water sources. Identify available water sources, such as the following:

- ▶ Water systems in municipalities and industrial sites. Obtain and document reservoir capacity and hydrant flows. If possible, capture the location of individual hydrants.
- ▶ Static water supplies. Engines or tenders can use these sources to draft water when protecting specific facilities. These sites require all weather access and an unlimited water supply.
- ▶ Tender filling locations at water treatment or pumping stations.
- ▶ Alternate power sources that may be required to pump water during a wildfire. Communities with electrically supplied water pressure should consider investing in auxiliary gasoline-powered pumps to maintain water pressure during emergencies.

C6 Staging Areas

Resources on standby and not yet assigned to an incident should be placed in nearby staging areas. Staging areas should be located in areas that will not be threatened by a wildfire (areas with minimal surrounding wildland fuels). They should also be easy to access and have adequate lighting, a potable water supply and restroom facilities. Well-positioned staging areas will provide an Incident Commander with an operational advantage when deploying resources.

C7 Evacuation

If a wildfire threatens lives and property, a community may need to be evacuated. Your Municipal Emergency Plan (or Municipal Emergency Management Program Guide) details the evacuation procedures for your community. The Incident Commander recommends evacuation to the appropriate agency. There are two types of evacuations:

- ▶ Strategic Evacuation – If there is enough lead time, a strategic evacuation can be implemented by declaring a local state of emergency under the *Emergency Management Act* and the local Municipal Emergency Management Bylaw. As part of your plan, calculate the time required to evacuate an occupied development, and make note of any special assistance required at facilities like hospitals, nursing homes, schools, day cares, etc.
- ▶ Tactical Evacuation – If a wildfire develops or advances quickly, an Incident Commander may need to take immediate action to evacuate people in danger. When implementing a tactical evacuation, advise people to leave immediately to ensure their safety. Tactical evacuations are voluntary and cannot be enforced. Communications are critical during an evacuation. Be sure your local governments and emergency management professionals understand how evacuation recommendations and procedures will take place if a wildfire threatens the community.

C8 Safe Refuge Areas

Safe refuge areas may be required when an evacuation is not safe. These areas can be used by the public for a short period of time until it is safe to leave the area. Safe refuge areas are generally established in large cleared areas that will not be affected by flames or radiant heat from a wildfire, such as a large parking lot or a green football field.

C9 Emergency Contact List

An emergency contact list provides emergency responders with access to a wide variety of key stakeholders, such as municipal emergency management staff, the local fire department, provincial wildfire management staff, industry representatives and other important contacts.

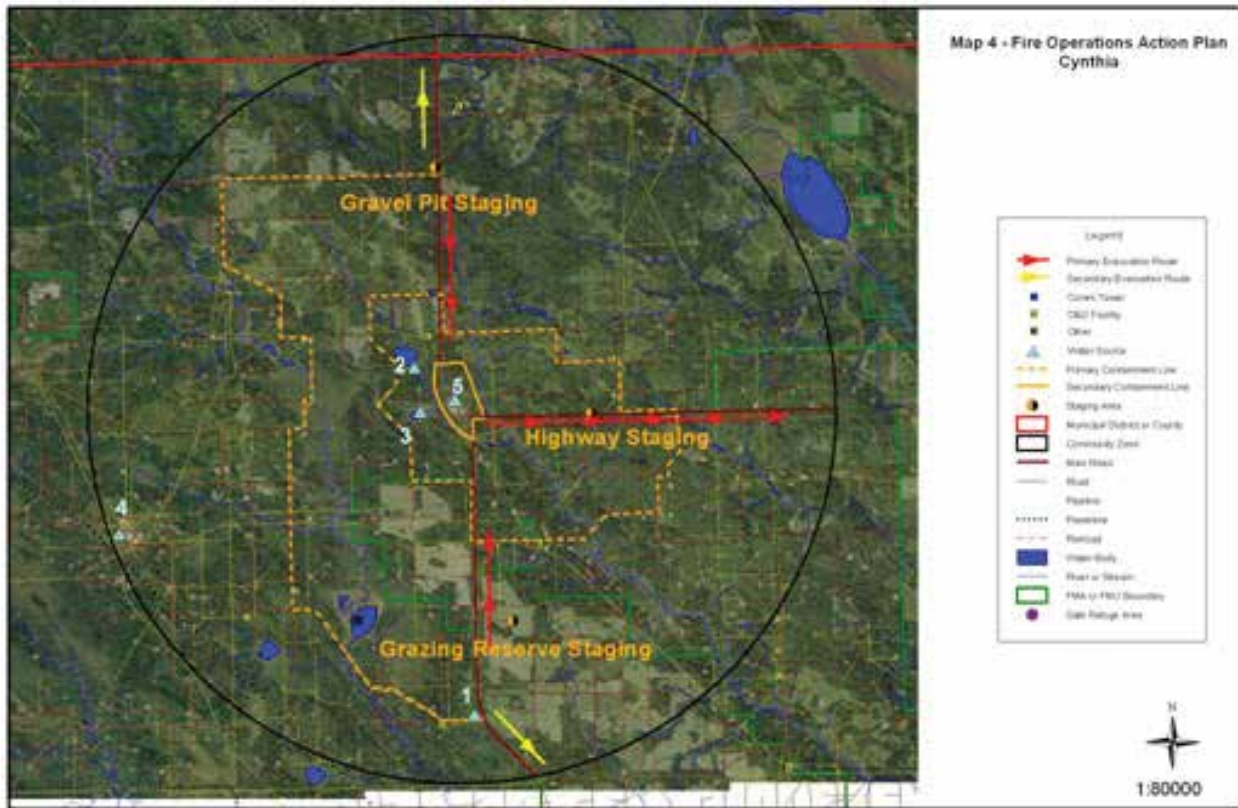


Figure 4. Fire Operations Action Plan - Cynthia FireSmart Community Plan.

Tactical Lines

To establish tactical lines that provide operational advantages for wildfire suppression efforts, use existing roads or linear clearings when possible. It may also be advantageous to consider natural or man-made clearings and fuel type changes (fire-resistant vegetation) as barriers to fire spread. These lines or clearings provide a fuel-free zone that can help stop a wildfire and can be used to deploy ignition operations or sprinkler systems. When identifying tactical lines, consider expected fire behaviour. Detail and map your tactical lines.

If the existing tactical lines within your community are inadequate, you can develop alternatives as part of the Wildfire Mitigation Strategy.

Sprinkler Deployment Plan (Optional)

A sprinkler deployment plan provides a series of maps that outline how sprinklers will be deployed to protect structures during a wildfire. Sprinklers reduce the flammability of a structure by wetting down the material in advance to make it more resilient to wildfire.

Your minimum auto-order list should reflect the specialized equipment needed to implement this plan. Keep in mind that sprinklers will also need to connect to water hydrants and municipal water sources.

A fire operations specialist with knowledge of water delivery systems should be consulted to develop this portion of the plan.

3. DISTRIBUTE THE PLAN AND ANNUAL UPDATES

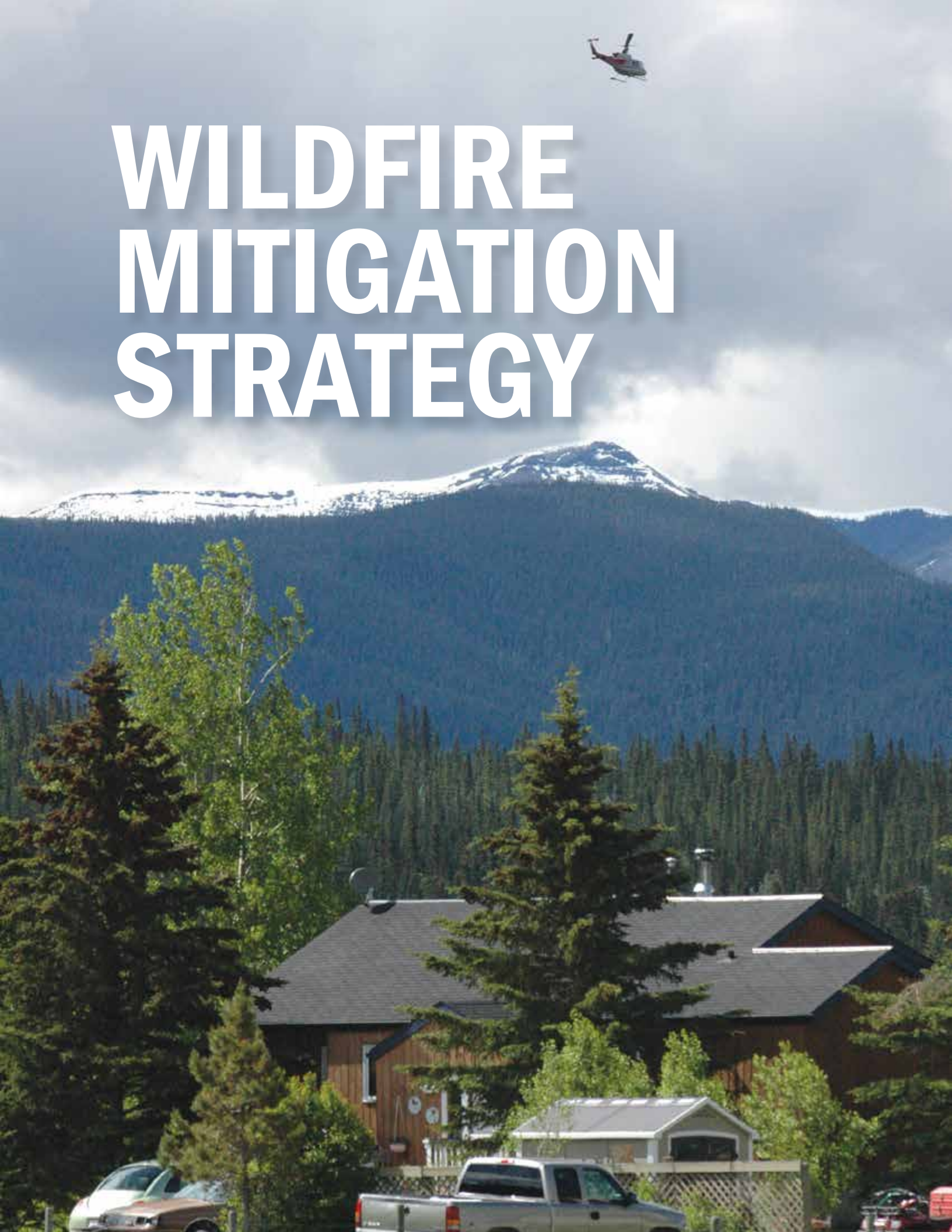
Your Wildfire Preparedness Guide is a critical tool that will be used by emergency service providers, including structural firefighters and wildland firefighters. Once the plan is complete, distribute a copy to each of the partners you worked closely with during its development. Take this opportunity to discuss how each group will use the guide and where it will be housed.

Your community's Wildfire Preparedness Guide should be reviewed and updated once each year. Identify who will be responsible for updating the document and the associated timelines.

If your community is developing a Wildfire Mitigation Strategy, be sure your Wildfire Preparedness Guide reflects any strategies completed in the last year.

Even if your community is not formally developing a Wildfire Mitigation Strategy, it is worth considering some of the options related to emergency response such as interagency cooperation (page 56), cross training (page 57), and emergency planning (page 58).

WILDFIRE MITIGATION STRATEGY



II. DEVELOPING A WILDFIRE MITIGATION STRATEGY

The Wildfire Mitigation Strategy outlines the FireSmart activities a municipality can put into practice to reduce the risk and impact of a wildfire. These strategies aim to do the following:

- ▶ Reduce wildfire hazard
 - ▶ Development policy
 - ▶ Legislation and planning
 - ▶ Vegetation management
- ▶ Improve wildfire response
 - ▶ Increased interagency cooperation
 - ▶ Cross training opportunities
 - ▶ Emergency planning
- ▶ Increase public buy-in and uptake of the FireSmart program
 - ▶ Education and communication

Your Wildfire Mitigation Strategy document should follow the basic outline below:

1. Introduction
2. Planning Area and Stakeholders
3. Hazard and Risk Assessment
4. FireSmart Activities
5. Implementation and Maintenance Plan

A template is provided on page 77 for developing your Wildfire Mitigation Strategy.

1. INTRODUCTION

The introduction should clearly and succinctly identify the reason for the plan, the goals it will try to achieve, the priority attached to each goal and who will implement the program.

2. PLANNING AREA AND STAKEHOLDERS

Planning Area

The planning area established in your community's Wildfire Preparedness Guide can also be used as the planning area for your Wildfire Mitigation Strategy document. In some cases, the planning area may be expanded in the Wildfire Mitigation Strategy to include areas where wildfires are likely to originate. The planning area may also be based on geographic features, jurisdictional boundaries and local knowledge of the area. When describing your planning area, include vegetation and topographical features.

Defining the Planning Area Boundary

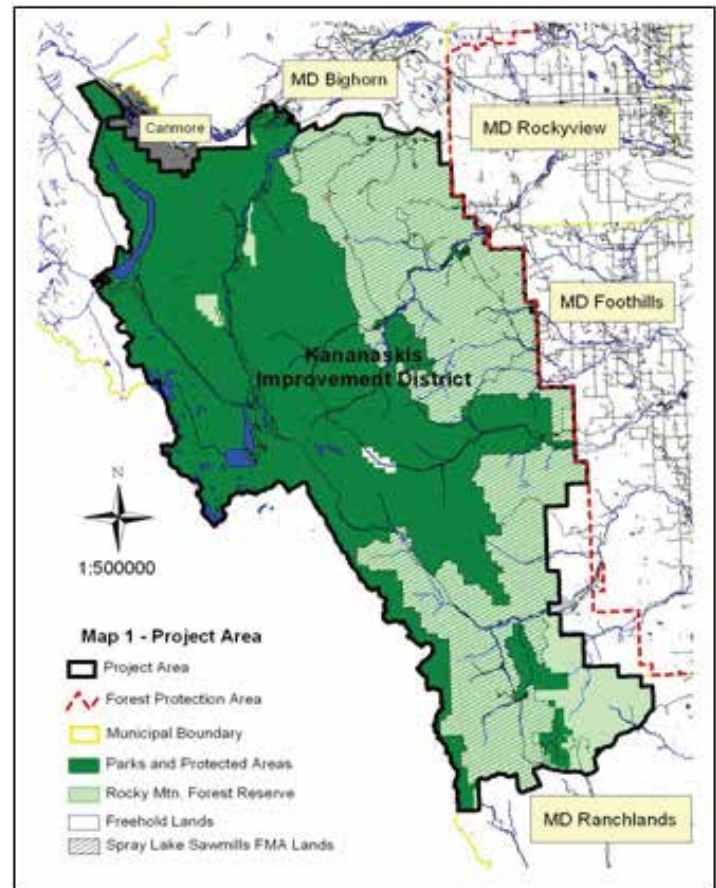
Using existing community scale and regional scale planning boundaries is acceptable. The planning region should reflect how your municipality is organized and how it approaches similar planning projects. Developing a community scale plan is appropriate when a municipality is not geographically aligned with other communities. A regional Wildfire Mitigation Strategy makes sense when municipalities are located close together and can be an effective way to consolidate resources and ensure consistency.

Ecological Boundaries

All communities have a complex mosaic of geographical features, forest cover and man-made developments. Consider using landscape features such as mountain ranges, rivers or open fields when identifying your planning area, because they can help limit the spread of wildfire.

Administrative Boundaries

Wildfires can easily spread between jurisdictional boundaries, which are often defined without consideration to the features that affect wildfire spread. If your community chooses to use its administrative boundary as its planning area, be sure to work with neighbouring jurisdictions to identify overlaps and potential partnerships.



Stakeholders

Connect With Your Stakeholders

Revisit the stakeholder list you identified in your Wildfire Preparedness Guide (pages 13 to 14). These groups will provide you with critical input to develop meaningful FireSmart strategies. Ensure the stakeholders reflect the various interests in your community and that stakeholder concerns are adequately addressed throughout the planning process.

Consider Integrated Planning

FireSmart community planning is just one of many programs that may be actively underway in a given area of forest. Integrating FireSmart practices with the various other frameworks and programs that are underway is critical to ensuring sustainable forest management. When developing FireSmart strategies, consider the following:

- ▶ Regional land use plans
- ▶ Access management plans
- ▶ Detailed forest management plans
- ▶ First Nations rights and traditional land use
- ▶ Historic and archaeological assessments

- ▶ Insect and disease control programs
- ▶ Integrated resource management plans
- ▶ Land entitlement and dispositions
- ▶ Parks and protected area management plans
- ▶ Range management plans
- ▶ Surface rights dispositions
- ▶ Watershed management plans
- ▶ Wildlife management plans
- ▶ Species-at-risk recovery plans

First Nations Consultation

It is the Government of Alberta's policy to consult with First Nations when a proposed project related to land management and resource development has the potential to adversely affect First Nations' rights and traditional uses. The First Nations' Consultation Procedures, The Government of Alberta's First Nations Consultation Policy and Guidelines on Land Management and Resource Development (the Guidelines) can be found on ESRD's website.

Remember that not all activities require the same level of consultation. Activities with a greater impact on traditional rights will require more consultation, while low impact activities will require less. Some forest management activities may not require any consultation if there are no potential adverse effects.

Wildlife Considerations in FireSmart Planning

Changes to the landscape that result from FireSmart initiatives have the potential to influence wildlife populations. Many wildlife species are attracted to new foliage that results from prescribed burns and vegetation management. Other wildlife species that require mature forests may temporarily be affected. Creating openings in the forest increases view sheds, which can lead to increased poaching, particularly near roads; however, this issue is not exclusive to FireSmart activities. Species such as bear and deer are attracted to many fire-resistant plants used in landscaping and the many shrub species that flourish after vegetation management. Communities engaged in FireSmart planning should consult with their local ESRD Wildlife Biologist early in the planning process to discuss wildlife concerns and options for mitigation.

3. HAZARD AND RISK ASSESSMENT

Before developing the Wildfire Mitigation Strategy, you should complete a detailed hazard and risk assessment. This will help identify your priority community protection areas. The FireSmart team can use this information to prioritize recommendations based on level of risk, available resources and budgets.

Values-At-Risk

Review the values-at-risk identified in your community's Wildfire Preparedness Guide. The locations you have identified are a good starting point that you can add to if you choose. Use field observations, provincial GIS data and municipal development data to identify and refine your list of values-at-risk.

Hazard Assessment

A hazard assessment determines the wildfire threat potential by evaluating building materials, landscaping, topography and fire behaviour potential (weather patterns and fuel types) for values-at-risk. Ground and aerial reconnaissance is essential to gain a clear understanding of the hazard in the area.

There are two hazard assessment tools:

STRUCTURE AND SITE HAZARD ASSESSMENT FORM

Factor	Page reference	Characteristics and point ratings	Score
1 Roofing material	2.6	Match the adjacent 30-metre zone of non-combustible material 0	0
2 Roof overhangs	2.6	No combustible material 0 Full or partial combustible material, 1.5 m or depth 5	0-5
3 Building exterior	2.6	Non-combustible material or metal siding 0 Log, heavy timbers 5 Mix of or large sections of wood shakes 10	0-10
4 Doors, walls and porches	2.6	Doors closed, walls covered with 3 cm masonry and windows 0 Doors closed, walls not covered with 3 cm masonry 5 Open doors, walls not covered, doors not closed 10	0-10
5 Windows look at point	2.6	None or fire-resistant material installed in 0 Combustible material, installed in 5 Combustible material, not installed in 10	0-10
6 Windows and door shading	2.6	None 0 Double Pane 5 Single Pane 10 Storm Windows 15 Large 20 4 5 4	0-20
7 Location of nearby combustibles	2.6	None or 4.5 metres from structure 0 4.5 metres from structure 5	0-5
8 Setback from edge of slope	2.6	Setback 0 No setback 5	0-5
9 Fuel vegetation (nearby)	2.6	Deciduous 0 Mixed wood 10 Coniferous 20 Deciduous / Coniferous 30 10-20 metres 0 20-30 metres 10 30-40 metres 20 40-50 metres 30 50-60 metres 40	0-40
10 Surface vegetation	2.6	Low or non-combustible material 0 Mix grass or shrubs 5 Shrub and dense woody material 10 Deciduous / Mixed 15 Coniferous / Mixed 20	0-20
11 Ladder fuels	2.6	None 0 Scattered 5 Moderate 10	0-10

Total Score for Structure 1 - 11
Structure and Site Hazard Level

Hazard Level: Low (0-10 points) Moderate (11-20 points) High (21-30 points) Extreme (31-40 points)

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AREA HAZARD ASSESSMENT FORM

Factor	Page reference	Characteristics and point ratings	Score
12 Forest vegetation (nearby)	2.6	Deciduous 0 Mixed wood 10 Coniferous 20 Deciduous / Coniferous 30	0-30
13 Surface vegetation	2.6	Low or non-combustible material 0 Mix grass or shrubs 5 Shrub and dense woody material 10 Deciduous / Mixed 15 Coniferous / Mixed 20	0-20
14 Ladder fuels	2.6	None 0 Scattered 5 Moderate 10	0-10
15 Slope	2.6	0-10% 0 10-20% 5 20-30% 10 30-40% 15 40-50% 20 50-60% 25 60-70% 30 70-80% 35 80-90% 40 90-100% 45	0-45
16 Proximity to edge	2.6	Within 10 metres of water edge 0 10-20 metres 5 20-30 metres 10 30-40 metres 15 40-50 metres 20 50-60 metres 25 60-70 metres 30 70-80 metres 35 80-90 metres 40 90-100 metres 45	0-45

Total Score for Factors 12 - 16
Area Hazard Level

Hazard Level: Low (0-10 points) Moderate (11-20 points) High (21-30 points) Extreme (31-40 points)

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- For individual sites use structure, site and area hazard assessments from *FireSmart – Protecting Your Community from Wildfire*, Partners in Protection, 2003.
 - FireSmart Structure and Site Hazard Assessments are used to evaluate structures and the 30 metre zone around structures.
 - FireSmart Area Hazard Assessments are used to evaluate the zone that is more than 30 metres away from a structure. The size of the zone is modified based on fuels and topography in the area.
- For the community, use the Wildfire Threat Assessment Model, which is used to rate the susceptibility of an area to wildfire. The model is an ArcGIS application that analyses and combines data layers into a single layer that represents the wildfire threat rating.

The model outputs a detailed map identifying the areas of low, moderate, high, very high and extreme wildfire threat. This information can be used to prioritize different FireSmart activities.

The model uses four main inputs:

- ▶ Fire behaviour potential
- ▶ Fire occurrence risk
- ▶ Values-at-risk
- ▶ Suppression capability

The wildfire specialist on your team will conduct the wildfire threat assessment and interpret the results. This individual's experience and training can help your community analyze the individual wildfire threat assessment component, develop meaningful objectives and identify on-the-ground FireSmart activities.

Table 2. Wildfire Threat Assessment and Mitigation Strategies.

THREAT ASSESSMENT COMPONENT	OBJECTIVE	WILDFIRE MITIGATION STRATEGIES
Fire Behaviour Potential	Reduce the wildfire threat	Vegetation management to deal with high risk areas
Fire Occurrence Risk	Reduce the likelihood of human-caused wildfires	Education and communication to address wildfires caused by humans
Suppression Capability	Enhance suppression capabilities	Cross training and interagency cooperation to enhance suppression

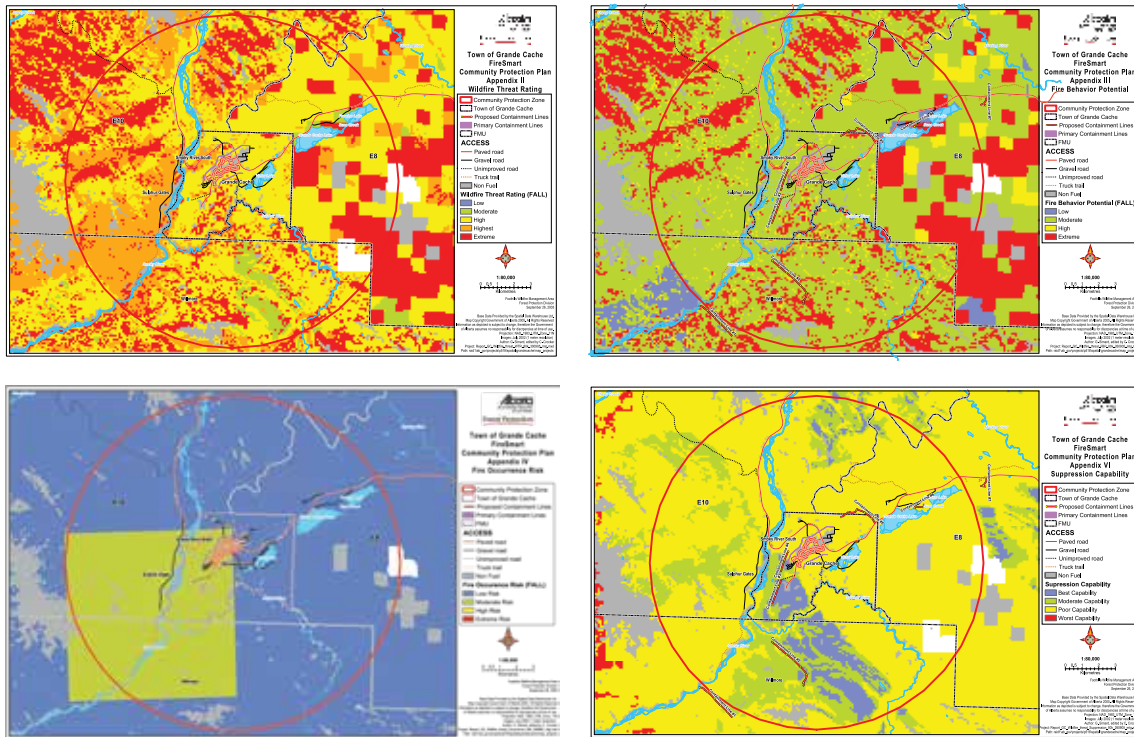


Figure 5. Town of Grande Cache Wildfire Threat Assessment 2005.

Additional Assessment Tools

Prometheus: Canadian Wildland Fire Growth Model

Prometheus is an effective modelling tool that visually displays the potential growth of a wildfire on the landscape and gives communities a chance to see what values would be threatened in the event of a wildfire.

Prometheus does the following:

- ▶ Predicts the real-time growth of wildfires.
- ▶ Displays the potential threat of wildfire to values-at-risk.
- ▶ Assesses the effectiveness of wildfire management strategies.
- ▶ Evaluates the potential for loss on landscapes that are altered by various management strategies and practices.

FireWeb Mapping Service

FireWeb provides near real-time information about Alberta's wildland fire situation, as well as resources to support wildland fire management, prevention, and operation activities.

You are required to fill in an External FireWeb Application Form. Once you have completed the appropriate form and sent it to the Forestry Division, you will be provided with an account and instructions to access FireWeb. The map services provide data viewing, query, and simple map editing and creating functions.

Important Data

Fire Weather Data – Weather stations managed by ESRD collect information on prevailing wind speed and localized weather trends. This information helps wildfire specialists predict how wildfires will be influenced by weather.

Windrose Data – This data will provide a graphical representation of wind direction and strength at a particular location over a specified period of time. Windrose software can be downloaded from several internet sites or be obtained from ESRD's fire weather section.

Historical Wildfire Data – The ESRD website has two historical wildfire databases that can be downloaded and used when conducting wildfire risk assessments:

- ▶ **Historical wildfire polygons** – a GIS database of all wildfires larger than 200 hectares dating back to 1931.
- ▶ **Historical wildfire database** – an electronic database of all wildfires in Alberta dating back to 1961.

Risk Assessment

The wildfire specialist on your team should evaluate the wildfire risk around your community. The assessment will take into consideration wildfire causes, frequency and overall threat to values-at-risk. Historical data can also be used to predict future wildfire activity in the area.

Risk assessment tools include the following:

- ▶ Municipal incident reports
- ▶ Fire ignition and prevention checklist
(*FireSmart – Protecting Your Community from Wildfire*, Partners in Protection, 2003)
- ▶ Fire suppression checklist
(*FireSmart – Protecting Your Community from Wildfire*, Partners in Protection, 2003)
- ▶ FireWeb mapping
- ▶ ESRD historical wildfire database

4. FIRESMART ACTIVITIES

Now that your team has identified the wildfire threat for your community, you can use the information to determine the FireSmart activities that, when put into action, will meet your community wildfire protection needs.

If your objective is to **increase public buy-in and uptake**

- ▶ Identify FireSmart activities that focus on education and communication

If your objective is to **reduce the wildfire threat**

- ▶ Identify FireSmart activities that deal with vegetation management, development and legislation, planning and policy.

If your objective is to **increase suppression capability**

- ▶ Focus on interagency cooperation, cross training and emergency planning

FireSmart – Protecting Your Community from Wildfire, Partners in Protection, 2003 is widely recognized as the preferred standard for community wildfire protection in Canada today. Alberta has combined that knowledge with its experience to further improve community wildfire protection in the FireSmart Community Plan.

FireSmart Action Items

FireSmart action items are highlighted throughout the following sections. Your community can start implementing these projects even before your Wildfire Mitigation Strategy is finalized. These items will help you start building a FireSmart community today!



COMMUNITY ENGAGEMENT

EDUCATION AND COMMUNICATION

FireSmart Action Items

1. Encourage stakeholders to identify opportunities for distributing FireSmart information.
2. Inform residents about the FireSmart program and let them know how they can reduce wildfire risk on their property.

Engaging your community in FireSmart activities requires strong partnerships. Elected officials, community planners, developers, government, industry and homeowners all have an important role to play. Ongoing education is critical to ensure all community members have the information they need to take action and make informed decisions.

Providing stakeholder groups with information that explains your Wildfire Mitigation Strategy will help build understanding and support for the program. Successful implementation of the program will depend upon the buy-in of stakeholders.

Engage The Public

Revisit the stakeholder list you identified in your Wildfire Preparedness Guide. These groups will provide a broad cross section of the audiences you will need to reach during you efforts to inform and educate the public.

Engaging your audience is necessary for the plan to be successful. First identify the stakeholders and then develop a communications plan. Your stakeholders list might include the following:

- ▶ **Local Residents** – Ensure the identified FireSmart initiatives meet the needs of the community.
- ▶ **Provincial Government Officials** – Staff from ESRD, Municipal Affairs and Tourism, Parks and Recreation can provide valuable input into the planning process.
- ▶ **Municipal Government Officials** – Local elected officials, municipal planners and emergency services personnel will take a lead role in promoting and implementing FireSmart activities in the community.
- ▶ **First Nations** – First Nations who practice traditional hunting and fishing in the area need to be informed and engaged in the FireSmart planning process.
- ▶ **Industry** – The forest industry plays a key role in managing vegetation and maintaining a healthy forest through their planning, harvesting and regeneration programs. The oil and gas industry and power line operators also play a key role in implementing FireSmart strategies in their infrastructure.

Public Education

Successfully implementing a Wildfire Mitigation Strategy requires that the public understand and support FireSmart principles. Public education can be the most challenging component of creating a FireSmart community. Many residents do not understand wildfire risk and assume emergency services personnel will be able to protect the community from wildfire.

Helping the public understand the risk and what proactive steps citizens can take to protect their property is achievable through a well-thought-out education program. Often, the best communication is creative and unconventional.

Public Education Options

The list below summarizes some of the more traditional methods of distributing FireSmart information.

- ▶ Using online resources
 - ▶ ESRD's website
 - ▶ Partners in Protection - FireSmart Canada website
- ▶ Completing residential fire hazard assessments through face-to-face communication with homeowners. These can be completed through the combined efforts of local firefighters and wildfire management staff.
- ▶ Distributing personal home assessment forms that residents can complete on their own.
- ▶ Making the *FireSmart – Protecting Your Community from Wildfire*, Partners in Protection, 2003 publication available at local libraries and other municipal information centres.
- ▶ Displaying FireSmart posters in public places and on trailheads.
- ▶ Distributing and displaying FireSmart materials at municipal offices.
- ▶ Hosting FireSmart neighbourhood work bees.
- ▶ Displaying and using FireSmart resources at community events. Consider booking ESRD's FireSmart trailer and having Bertie Beaver and Sparky the Fire Dog at the event.
- ▶ Broadcasting the FireSmart videos on the community television channel.
- ▶ Hosting an open house at the local fire station with FireSmart information.
- ▶ Using local television, newspapers and radio stations to get FireSmart messages to the public.
- ▶ Attending and participating in events like the FireSmart Community Series.

Refer to the publication *FireSmart – Protecting Your Community from Wildfire*, Partners in Protection, 2003 for several templates that can be used to build an effective public education program.

The Reference Materials section on page 65 indicates where to access many of these resources.

FireSmart Education Materials

To obtain a supply of FireSmart education materials, contact a Wildfire Information Officer at the local ESRD office or contact Partners in Protection.



Communication Plan

A communication plan is used to organize the strategies and initiatives that will comprise your public education program.

The key elements of a communication plan include the following:

- ▶ **Goals and Objectives** – This section outlines what you will try to achieve with the communication plan. Try to develop objectives that can easily be measured.
- ▶ **A Communications Team** – This section outlines who will be responsible for carrying out the initiatives identified in the plan. The communications team should be comprised of community representatives. These individuals will lend credibility to the initiatives and will provide continuity for future planning in the area. The communications team should also have representatives from the municipal and provincial government, residents, community groups, industry and First Nations groups.
- ▶ **Target Audiences** – This section identifies each of the groups you want to communicate with. Residents, government representatives, First Nations groups and non-governmental organizations might be some of the audiences you wish to target.
- ▶ **Key Messages** – This section identifies what messages you want to communicate to your audience. Try to keep your messages clear, short and consistent.
- ▶ **Tools** – This section outlines the various tools you will use to distribute your messages to target audiences. Newsletters, pamphlets, brochures, open houses, newspaper articles, presentations, radio ads and FireSmart home assessments are examples of communication tools you may use.
- ▶ **Timing** – This section identifies when the various components of the communication plan will occur.
- ▶ **A Budget** – This section outlines the total education budget and how money will be allocated to the various initiatives within the communication plan.

For more details on FireSmart communications and education, refer to Chapter 6 of *FireSmart – Protecting Your Community from Wildfire*, Partners in Protection, 2003.



**REDUCE
WILDFIRE
THREAT**

VEGETATION MANAGEMENT

FireSmart Action Items

1. Conduct regular maintenance or removal of fine fuels that present a wildfire risk in grassy areas.
2. Dispose of large accumulations of debris (brush piles, construction debris, etc.) that present a wildfire hazard in your community.
3. Implement vegetation management strategies when a new development is in the planning stages.

A wildfire specialist can help you analyze the hazard around your community. Alberta has a fire prone landscape, which, in the absence of fire, can accumulate a significant amount of burnable fuel. Areas with dense forest cover, low hanging branches, or an accumulation of woody debris provide an opportunity for wildfires to spread quickly.

A vegetation management strategy will address these areas of concern by decreasing the amount of volatile wildland fuel in and around your community. The following three strategies will be explained:

- ▶ Fuel removal
- ▶ Fuel reduction
- ▶ Species conversion

Before moving forward with vegetation management strategies, consult your stakeholders. Including your stakeholders early in the process will allow them to influence the decision making process to ensure the vegetation management strategies are acceptable and meaningful to the community. Be sure your industrial partners are part of the discussion as well, as they can coordinate their planning to compliment your vegetation management initiatives. Vegetation management can be complex and costly. By engaging stakeholders, you can be strategic with how you allocate your budget and resources.

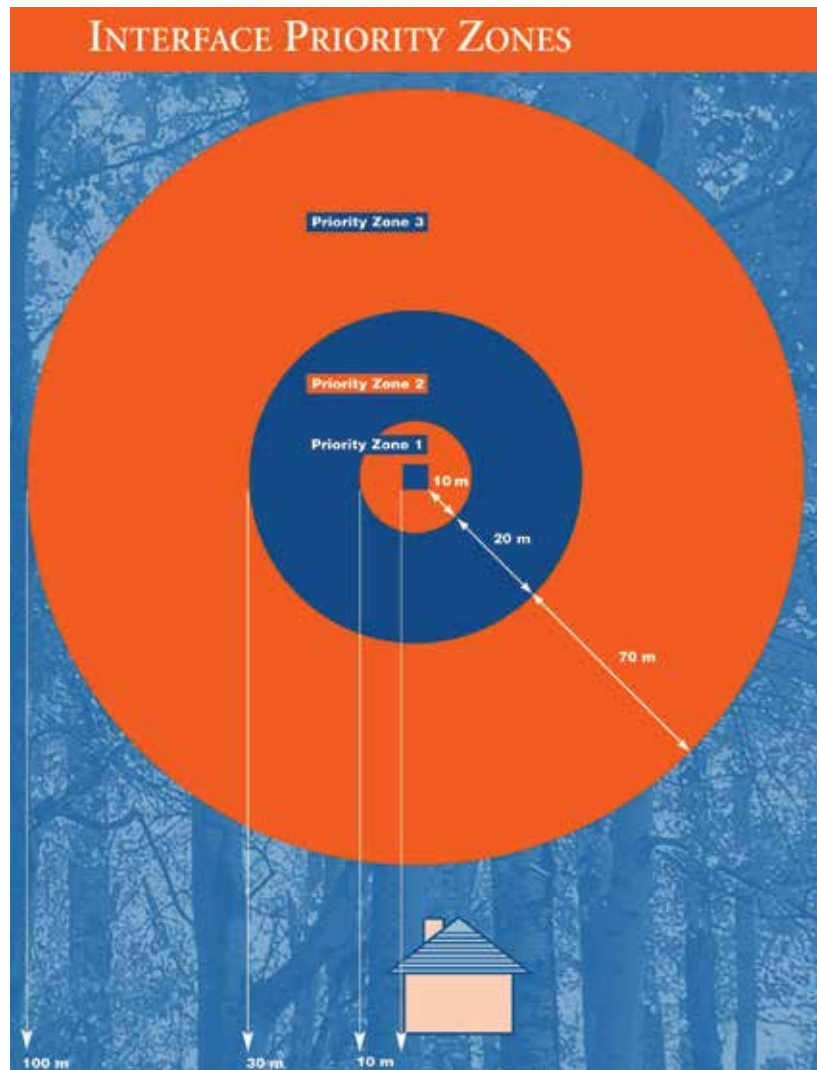
When developing vegetation management strategies, use the Wildfire Threat Assessment model to identify the areas of concern and the Prometheus model to see how your strategies will affect the spread of a wildfire.

During your planning, take into consideration who has the authority to operate on the land. A land titles search will determine ownership or jurisdiction of a piece of land. In some cases, a land disposition is required when working on public land. For vegetation management within the Forest Protection Area, you are encouraged to complete a vegetation monitoring assessment and a vegetation management prescription prior to initiating operations.

Vegetation Management Around Homes and Buildings

When applying vegetation management strategies around structures, focus your efforts based on the following priority zones:

- A. **Priority Zone 1** – This area extends 10 metres away from structures and is the most critical. The main objective of vegetation management within this zone is creating a barrier to fire spread. Removing and reducing vegetation in this area is the recommended approach.
- B. **Priority Zone 2** – This area extends from 10 to 30 metres away from a structure. The main objective of vegetation management within this zone is creating an environment that will not support high-intensity fire. Removing vegetation or converting vegetation to less flammable species in this area is the recommended approach.
- C. **Priority Zone 3** – This area extends beyond 30 metres from a structure. Vegetation management in this area may only be necessary when steep topography and dense coniferous forest are present. Removing vegetation or converting vegetation to less flammable species in this area is the recommended approach.



Vegetation management reduces the amount of fuel around structures, thereby reducing wildfire intensity and radiant heat. Detailed vegetation management strategies should be developed prior to initiating any on-the-ground work.

Vegetation Management in Forested Areas

Fire behaviour is influenced by three basic elements: wildland fuel, weather and topography. Both topography and weather cannot be modified, so vegetation management is the only way to reduce wildfire behaviour in forested areas. Wildfires burn the most intensely in continuous forests composed of lodgepole pine, black spruce, white spruce and balsam fir. The goal of vegetation management is to reduce wildfire threat. There are three ways of implementing vegetation management:

- ▶ Wildland fuel removal
- ▶ Wildland fuel reduction
- ▶ Species conversion

Wildland Fuel Removal

Objective

The objective is to remove all flammable species to create fire barriers and containment lines.

How It Is Achieved

Establish fireguards surrounding your community by harvesting, mulching, mowing or participating in prescribed burning programs. Features such as gravel or concrete pads can also be used as fuel breaks.

Where To Use Wildland Fuel Removal

Use wildland fuel removal immediately adjacent to high priority areas in the community like homes and buildings or other important infrastructure.



Wildland Fuel Reduction

Objective

The objective is to reduce flammable species to decrease fire behaviour potential.

How It Is Achieved

Selectively remove flammable tree species, prune low lying tree limbs, and reduce surface and ground fuels using mechanical harvesting, hand-crews, mowing, grazing, or mulching.

Where to Use Wildland Fuel Reduction

Use wildland fuel reduction in areas that have an abundance of high hazard vegetation as identified in your community's wildfire threat assessment.



Species Conversion

Objective

The objective is to reduce the flammability of surrounding vegetation.

How It Is Achieved

Remove all flammable vegetation species and replace them with less flammable species. Irrigate and maintain grassy areas and deciduous trees near structures. (See Appendix III for a list of fire resistant plants).

Where To Use Species Conversion

Use species conversion throughout your community by establishing parks, opens spaces, recreational fields, or golf courses. On the broader landscape, use species conversion through forest management and land disposition planning.

Vegetation Management Tools

Vegetation management strategies can be implemented through several different methods, including the following:

- ▶ Site treatments
- ▶ Timber harvest as a tool
- ▶ Fire as a tool
- ▶ Grazing as a tool

Site Treatments

Tactical lines, pruning and mulching can be implemented by your community or ESRD (depending on location and jurisdiction).



Constructing a tactical line with a hoe-mounted mulching head, Grande Cache, 2004.



Calling Lake dense black spruce stand after thinning. It would be easy to spot new starts and action with ground crews.

Tactical lines – Heavy equipment, bulldozers, or excavators are used to establish and maintain a fuel free corridor to base wildfire operations and slow down approaching wildfires.

Pruning – Trimming low-lying branches from trees and removing other burnable debris from the ground will reduce the likelihood of a fire climbing from the ground to tree crowns.

Thinning – Increasing the space between trees so that tree crowns are at least 3 metres apart will reduce the potential of a crown fire. When thinning trees, ensure the remaining trees are not susceptible to blowing over in strong winds. Thinning activities may need to be spaced over the course of several years.

Mulching – Mulching helps to reduce hazardous fuels. Mechanical mulchers and mowers grind standing vegetation, leaving mulch on the ground. Smaller mulchers are able to operate under the forest canopy to clear surface fuels. Larger equipment is able to clear fireguards or tactical lines.



Timber Harvest as a Tool

Industrial timber harvest is a useful tool for vegetation management where merchantable timber exists. The forest industry takes the lead with conventional harvesting and commercial thinning.

Conventional Harvesting – Includes the use of mechanical or hand falling with log processing and skidding. This process also includes the piling and burning or chipping of woody debris.



Fuels Removal through Detailed Forest Management Planning.



Fuels Removal through harvesting a Commercial Timber Permit, Grande Cache, 2004.

Commercial Thinning – Similar to the thinning previously described, but the wood is used for timber products.



Commercial thinning in a pine stand.



Selective harvest to reduce hazardous fuels.

Fire as a Tool

ESRD leads fire operations within the Forest Protection Area. If your municipality has experience with the use of prescribed fire, you may feel comfortable conducting burning operations within your municipal boundaries. Be sure to work with your wildfire specialist before using prescribed fire as a tool.

Prescribed Fire – Using controlled fire to reduce hazardous buildups of forest fuels that can develop in and around communities. Your wildfire specialist can provide prescribed fire planning and implementation recommendations.



Prescribed burn to create a fuel break and wildlife habitat improvement, Rock Creek Burn, 2003.



Prescribed burn to support mountain pine beetle control and to create a fuel break, Mt. Nestor Burn, 2008.

Hazard Reduction Burning – Using controlled fire on a regular basis to manage the buildup of fine fuels (such as grasses). Hazard reduction burns are commonly done in fields and open areas near communities.



By burning dry grasses annually, you can reduce the hazard and return nutrients back to the soil.

Wildfire Management – ESRD manages wildfire to achieve many different objectives on the landscape. While protecting the public and communities from wildfire remains the Ministry's top priority, there are detailed strategies in place to capitalize on the many benefits of naturally occurring wildfires. Your wildfire specialist can provide you with details on the wildfire management strategies that exist in your area.

Grazing as a Tool

Grazing dispositions administered by ESRD provide another option for managing accumulations of hazardous grass fuels.

Maintaining Vegetation Management Strategies

Vegetation management is an ongoing process. Grassy areas often need to be maintained annually. Forested areas, on the other hand, need thinning and pruning less frequently.

Be proactive and assess the following annually:

- ▶ The amount of grass present on tactical lines and in hazard reduction burn sites
- ▶ The growth of surface vegetation in areas where thinning or species conversion was completed
- ▶ The accumulation of burnable surface debris along fuel breaks and within forested areas that are identified for long-term species conversion

Make plans to annually assess and monitor how fast vegetation is re-establishing itself to ensure your vegetation management projects continue to provide long-term protection to your community.

When you revisit a site, your primary objective remains the same: to reduce the wildfire hazard. However, ongoing maintenance of a site will likely require different treatments. For example, the use of mechanical harvesting on a site will likely require ongoing maintenance through a mulching program, a mowing program, or annual prescribed fires.

LEGISLATION AND PLANNING

FireSmart Action Items

Revise municipal bylaws, plans and policies to do the following:

1. Recognize wildfire as a development constraint.
2. Integrate FireSmart principles (construction material, landscaping, etc.) in new developments that are located in high-hazard areas.

Legislation, bylaws, plans and policies all play a critical role in developing FireSmart communities. These documents guide municipal development and emergency management across Alberta. Adjusting these regulations to reflect FireSmart principles is a key step in protecting your community from wildfire.

1. Local Legislation, Policies and Plans

There are many ways to integrate FireSmart principles into municipal planning and development. Each community must determine what mechanisms are most appropriate for achieving their FireSmart goals. For example, integrating fire resistant roofing on all structures can be achieved through restrictive covenants or local land use bylaws. Determining which mechanism will be most effective is at the discretion of municipal staff. This section describes the various mechanisms available and how they can be implemented by municipal governments.

Municipal Government Act and the Subdivision and Development Regulation

Section 7(a) of the *Municipal Government Act* allows a municipal council to pass bylaws for municipal purposes with respect to the safety, health and welfare of people and the protection of people and property. This Section allows municipalities to pass bylaws related to fire suppression, emergency services, public safety and property protection.

The authority for municipal planning, subdivision and development control in Alberta is detailed in Part 17 of the *Municipal Government Act*. The Act allows for the formation of various types of municipalities and delegates authority to municipal officials to provide services, regulate development and pass bylaws for the protection of its citizens. The *Municipal Government Act* integrates wildfire considerations through the Land Use Policies section:

1. Through consultation with both ESRD and Municipal Affairs, municipalities are encouraged to identify areas that are prone to flooding, erosion, landslides, subsidence or wildfire and to establish appropriate land use patterns within and adjacent to those areas.
2. Municipalities are encouraged, within the scope of their jurisdiction, to use mitigation options to minimize the risk to health, safety and property damage.

1.1 Municipal Planning Bylaws

Municipal Development Plan / Municipal Management Program Guide

The *Municipal Government Act* requires municipalities with more than 3,500 people to adopt a Municipal Development Plan. A Municipal Development Plan outlines future land use within the municipality. This is generally a long-term document that is typically reviewed every five to ten years by a municipality. A Municipal Development Plan can integrate FireSmart principles and can be an effective tool for integrating wildfire hazard considerations during the development planning process. See pages 52 to 53.

Area Structure Plan or Area Redevelopment Plan

The area structure plan and area redevelopment plan both provide a detailed framework for subdivision development or redevelopment of an area of land. The plans generally describe the sequence of events for development, proposed land use, population density, and the location of major transportation routes and public utilities. These documents should integrate specific FireSmart guidelines tailored to the areas identified for development.

Concept Plans

Concept plans may be required by some municipalities prior to subdividing land. Concept plans provide details about how an area will be subdivided and serviced, along with any phasing considerations. Concept plans are sometimes adopted as a Council policy or bylaw. FireSmart principles can be integrated into a concept plan in the same manner as an area structure plan or area redevelopment plan.

Land Use Bylaws

All municipalities enact land use bylaws. These bylaws are developed in accordance with municipal development plans and regulate how municipal land is used and developed.

Land use bylaws divide municipalities into distinct land use districts. The bylaws outline standards for subdivision design and development within each type of district. Wildfire hazard assessments can be used by municipalities to establish zones of high wildfire danger and outline any associated development constraints within the land use bylaw. This approach is an effective way to implement and enforce FireSmart principles through the development permit process.

The *Municipal Government Act* and land use bylaws detail the process municipalities follow when issuing development permits. By integrating FireSmart principles in land use bylaws, municipalities are able to take wildfire hazard into consideration during the development permit process.

1.2 Other Plans and Policies

Subdivision, Engineering or Development Standards

These policies and bylaws cover a range of topics that can include the design and installation of roads, water systems, utilities, storm sewers and sanitation systems. These standards may also address the grading and landscaping of subdivisions. Integrating FireSmart principles into these standards ensures that new subdivisions will have the appropriate infrastructure on land that is owned, operated and serviced by a municipality. A municipality may want to allow for flexibility in these standards to allow for new and innovative design and technology in the future.

Architectural Guidelines

Architectural and landscape controls are becoming more common in new developments to control the overall appearance of a neighbourhood. Use architectural guidelines to limit the use of flammable exterior building materials, control the types of vegetation allowed near structures and outline storage standards for firewood and other combustible material.

Architectural guidelines can form part of a local bylaw or become a requirement in the development permit process. However, if a municipality has limited resources to enforce architectural guidelines, developers can be influenced to implement architectural controls during the subdivision or development process through methods like restrictive covenants.

Restrictive Covenants

These guidelines are similar to architectural guidelines; however, they are not implemented or enforced by a municipality. Restrictive covenants may be registered on a property's title, requiring the owner to adhere to specific requirements of a development (which can include FireSmart activities). Individuals who enter into the agreement are responsible for enforcing the restrictive covenants.

Community Standards Bylaw

A community standards bylaw regulates the safety and livability in a neighbourhood. This type of bylaw can regulate items like fire pits, general burning and accumulation and storage of material.

Safety Codes Act

Municipalities are responsible for establishing and interpreting the Fire Code Regulation and Building Code Regulation under the *Safety Codes Act*. These codes provide information to the fire industry, building owners and local authorities.

Building Code Regulation

This regulation protects public health and safety by outlining the minimum construction standards for buildings and structures.

Fire Code Regulation

The fire code aims to prevent fires and ensure training standards and equipment requirements are available without compromising the Building Code Regulation. This regulation also outlines the requirements for storing, handling and using dangerous materials to prevent fires and explosions.

2. FireSmart Approaches

Detailed below are a number of different FireSmart approaches that can be used to help protect your community from wildfire. Each approach is accompanied by a detailed description and recommendations on how municipalities can integrate these approaches into their bylaws and policies.

For more details, refer to the options provided in Chapter 3 of *FireSmart – Protecting Your Community from Wildfire*, Partners In Protection, 2003.

2.1 Wildfire Hazard Assessment

See pages 27 to 32 for a detailed description of the wildfire hazard and risk assessment. This assessment will provide clarity on where a municipality should focus its FireSmart efforts. A wildfire hazard assessment will be a useful component of a municipal development plan and land use bylaw to ensure FireSmart principles are incorporated in the planning, subdivision and development process. In the absence of a municipal wildfire hazard assessment, local planning bylaws can require that hazard assessments are submitted during the planning and development application process.

Municipalities can require proposed subdivisions or developments to complete a detailed hazard assessment if they are located in an area of high hazard, as identified in the municipal development plan. A detailed hazard assessment may also be required in conjunction with the preparation of an area structure plan.

Also consider integrating FireSmart principles into land use bylaws through development regulations. You can integrate specific development regulations that apply to areas identified as being at a higher risk from wildfire. Municipalities might require development applicants to provide a wildfire hazard and risk assessment and identify preventative measures as a prerequisite for approving development permits in high hazard locations.

2.2 FireSmart Infrastructure

Roads, water supplies, utility corridors, parks and open spaces all affect a community's resilience to wildfire. Protecting the safety of residents and emergency responders depends on strategically planned infrastructure. Review the infrastructure policies within the various municipal plans and bylaws (including the municipal development plan, subdivision regulations and engineering standards) for possible improvements.

Possible FireSmart infrastructure standards are detailed in Chapter 3 of *FireSmart – Protecting Your Community from Wildfire*, Partners In Protection, 2003.

Water Supply

An adequate water supply is critical for successful wildfire community protection.

Municipal Development Plan – Ensure proper water supply exists in new subdivision plans to support firefighting efforts.

Subdivision and Engineering Standards – The installation of water systems to support firefighting efforts is typically regulated by provincial fire codes and municipal subdivision and engineering standards.

Building Permits – If municipal water supply is not available, developments must include a water supply that meets the applicable provincial safety codes. Consider supplying backup power to water supply facilities to ensure ongoing operation in the event of a wildfire.

Roads

Roads provide access for emergency responders as well as an escape route for residents. Adopt access standards in municipal bylaws and policies that provide sufficient road width, turn around diameters and weight limits. Proper road signage for homes, properties and roads is critical to effective emergency response.

Municipal Development Plan – Specify that all subdivisions and developments provide access to support emergency vehicles, including suitable access to water and reservoir facilities. In certain situations, a municipality may allow reduced road standards in a bare land condominium subdivision because the municipality is not required to own or maintain the road. However, it is important to ensure that these roads can adequately provide access for emergency vehicles.

Subdivision and Engineering Standards – Specify that final road design and construction must simultaneously provide safe access for emergency equipment and evacuation routes for residents. Specifications should include right-of-way, travel surface, cul-de-sacs and alternate emergency access.

Land Use Bylaw – Specify what standard of road is required for developments in remote locations to support firefighting equipment. Specifics related to road construction should be detailed in the development permit and be determined on a site-by-site basis. If a municipality does not have specified road and access standards, the development permit should be reviewed internally by engineering staff and the fire chief.

Utilities

Ensure any trees near overhead power lines and above ground propane tanks are cleared away.

Subdivision and Engineering Standards – Require that the installation of utility infrastructure in new subdivisions be placed underground. Also, determine how each utility line is to be located within a utility or road right-of-way.

Parks and Open Spaces

Design parks and open spaces in your community so that they also serve the purpose of a fuelbreak. Use trail systems, ball diamonds, golf courses, soccer fields and parks to provide a separation between fire prone areas and structures.

Municipal Development Plan and Area Structure Plan – Identify strategic areas where parks and open spaces can support FireSmart principles. The design and layout of these areas is typically initiated at the subdivision stage.

2.3 Development and Building Construction Standards

Locating Buildings on Property

Require that structures be located a minimum distance away from forested areas (for example, 10 metres from a property line). These requirements can be specified in architectural guidelines, restrictive covenants or a development permit under regulations in a land use bylaw.

Storage of Flammable Materials

A land use bylaw can detail how far away from a structure flammable material must be stored. These requirements can also be included in architectural guidelines or a community standards bylaw.

Building Construction Materials

Restrict the use of flammable exterior finishing material and regulate a required minimum distance between structures. Require developments near forested areas to incorporate FireSmart building materials. Increasing the use of fire-resistant building materials may reduce the need for vegetation management.

Municipal Development Plan and Area Structure Plan – Specify the types of building material that are suitable for use in areas where the wildfire hazard is high.

Land Use Bylaw – Place any new restrictions in the bylaw.

Vegetation Management

Vegetation management strategies are outlined on pages 38 to 44.

Municipal Development Plan – For reference, see development standards from the *FireSmart – Protecting Your Community from Wildfire*, Partners in Protection, 2003, the *FireSmart Guidebook for the Oil and Gas Industry* and the *CAPP Best Management Practices for Wildfire Prevention*. Developers may be required, as a condition of subdivision or development approval, to modify fuels on proposed lots and the environmental or municipal reserve prior to commencing development.

Area Structure Plan and Area Redevelopment Plan – Outline any detailed requirements for vegetation management during the subdivision and development process.

Subdivision and Engineering Standards – Specify in detail any requirements for removing vegetation or planting different species during the initial phase of land preparation prior to subdivision. Municipalities may require developers to remove vegetation on vacant lots, developed lots, public road right-of-ways, trail systems and parks.

Land Use Bylaw – Specify that landscaping adjacent to structures must be fire resistant. (See Appendix III for a list of fire resistant plants). Municipalities should also require a minimum 10 metre setback from combustible vegetative cover for any developments.

Architectural Guidelines, Restrictive Covenants or Community Standards Bylaw – Require a minimum 10 metre fuel-reduced area around structures within the property boundary. Fuel-reduced means the area may contain natural tree cover in locations approved by the developer and municipal fire authority, and owners must landscape and maintain the area with the intent of eliminating any accumulation of combustible debris. Specific activities can include the following:

- ▶ Removing any trees or branches in contact with structures
- ▶ Thinning or removing coniferous trees within 10 metres of a structure
- ▶ Removing any limbs on coniferous trees within 2 metres of the ground
- ▶ Removing any deadfall and combustible debris annually

2.4 Interagency Cooperation

Interagency strategies are outlined on page 56.

Municipal Development Plan – State that your municipality will identify opportunities to partner and work with ESRD to protect against wildfire through better community design.

Land Use Bylaw – Provide the option for your municipality to seek comment or input from ESRD on new subdivision or development applications that include FireSmart components.

2.5 Individual Action

Effective education campaigns can move residents and neighbourhoods toward taking action to implement FireSmart strategies. Building a FireSmart community will only be achieved when audiences at all levels engage in FireSmart activities.

3. Other Legislation

Additional provincial legislation will affect the FireSmart planning process. The *Forest and Prairie Protection Act* and Regulations, *Forests Act* and associated Regulations and the *Public Lands Act* and associated Regulations are the key legislation to keep in mind during the FireSmart planning process. A registered forestry professional or environmental professional can help you to interpret the legislation applicable to your project.

Forest and Prairie Protection Act and Regulations

The *Forest and Prairie Protection Act* (FPPA) and Regulations are administered by ESRD. The Act provides ESRD with authority to do the following:

- ▶ Issue fire permits and orders to remove or reduce a fire hazard
- ▶ Levy fines for forest protection
- ▶ Recover costs for suppressing wildfire

- ▶ Compensate assisting agencies for providing firefighting services
- ▶ Declare fire bans or forest closures within the Forest Protection Area
- ▶ Enter into fire control agreements

Forest and Prairie Protection Regulations Part I – Details the fines and permits associated with the Act. Wildfire precautions for campfires, pipeline construction, incinerators, power saw operation and oil and gas activities are included.

Forest and Prairie Protection Regulations Part II – Addresses debris disposal requirements such as debris pile dimensions, windrow length and location, as well as the time frame for debris disposal.

Forest Protection Area Regulation – States the boundaries of the Forest Protection Area.

Forests Act and Timber Management Regulations

The *Forests Act* and Timber Management Regulations are administered by ESRD and regulate the disposition of timber on crown land in the province. Timber disposition licences are issued by Forest Management Agreement, quota or permit. The responsibility of forest management planning is transferred to the forest industry through Forest Management Agreements. Timber management planning and operations must follow the standards outlined in timber harvest planning and operating ground rules. Timber operators are responsible for managing their logging slash within established FireSmart Community Zones.

Working with a forestry professional will help you to integrate the following ESRD directives:

- ▶ Debris Management Standards for Timber Harvest Operations
- ▶ Debris Management on Agricultural Operations

Public Lands Act

The administration of public land in Alberta is governed by the *Public Lands Act*. ESRD administers the *Public Lands Act*, including all aspects of dispositions on crown land.

Approvals and work should always be developed in conjunction with industry stakeholders and local ESRD offices. Always look to engage the local ESRD office for advice on the latest legislation, policies and directives pertaining to industrial land use, FireSmart, and timber industry issues.

Note

Act and regulations are subject to regulatory reform. The Alberta Queen's Printer provides the latest updates to the legislation: <http://www.qp.alberta.ca/>

DEVELOPMENT CONSIDERATIONS

FireSmart Action Items

1. Integrate FireSmart principles into the approval process for all developments located in the Wildland/Urban Interface.
2. Align development standards with the *FireSmart – Protecting Your Community from Wildfire* publication.

Development standards play a significant role in reducing the potential impact a wildfire will have on a community. A building is more likely to be destroyed in a wildfire when it is located in a high-density area where fire is able to easily transfer from building to building. The potential for damage intensifies when flammable building materials like untreated wood siding are used.

Building guidelines that integrate FireSmart principles can help your community significantly reduce the potential of loss as a result of a wildfire. Below are notes on building components that you can consider adding to building guidelines:

- ▶ **Roofing Materials – The roof is the most vulnerable component of a building. Sparks and burning embers from a wildfire can travel long distances and quickly ignite flammable roofing material.**

Roofing material tested for flammability is assigned a classification:

- ▶ Class A – high resistance to fire
- ▶ Class B – moderate resistance to fire
- ▶ Class C – low resistance to fire

Examples of Class A roofing material include clay tile, concrete tile and asphalt shingles.

- ▶ **Exterior Siding – Exterior siding that has spaces where embers or combustible debris can collect increases the risk of loss. Stucco, metal siding, brick, cement shingles, concrete block, poured concrete and rock are all fire resistant and their use should be encouraged.**
- ▶ **Vents and Other Openings – Unscreened vents can allow heat and embers to enter a building and ignite. Decks and porches with exposed undersides can also allow combustible materials to accumulate and catch on fire in the presence of hot embers. Require all vents and other exposed openings on building to be properly screened or enclosed to reduce the risk.**
- ▶ **Landscaping – Encourage the use of fire resistant vegetation to reduce the wildfire hazard around homes. The vegetation management section of this guidebook has recommendations that can be used on any property. See Appendix III for a list of fire-resistant plants.**
- ▶ **High-Density Housing – If high-density housing is a priority for your community, be sure fire resistant housing materials are required in these developments. The National Fire Protection Agency (NFPA) recommends a minimum separation of 9 metres between structures.**

When developing your Wildfire Mitigation Strategy, maintain a balance between the various FireSmart activities your community implements. If there is a high density of combustible building materials in the planning area, you may need to implement more aggressive vegetation management, public education, legislation, and emergency planning options.

Additional Resources

The following documents provide specific recommendations for reducing wildfire hazard to structures:

- ▶ *NFPA 1141 – Standards for Fire Protection Infrastructure for Land Development in Wildland, Rural and Suburban Areas*
www.nfpa.org

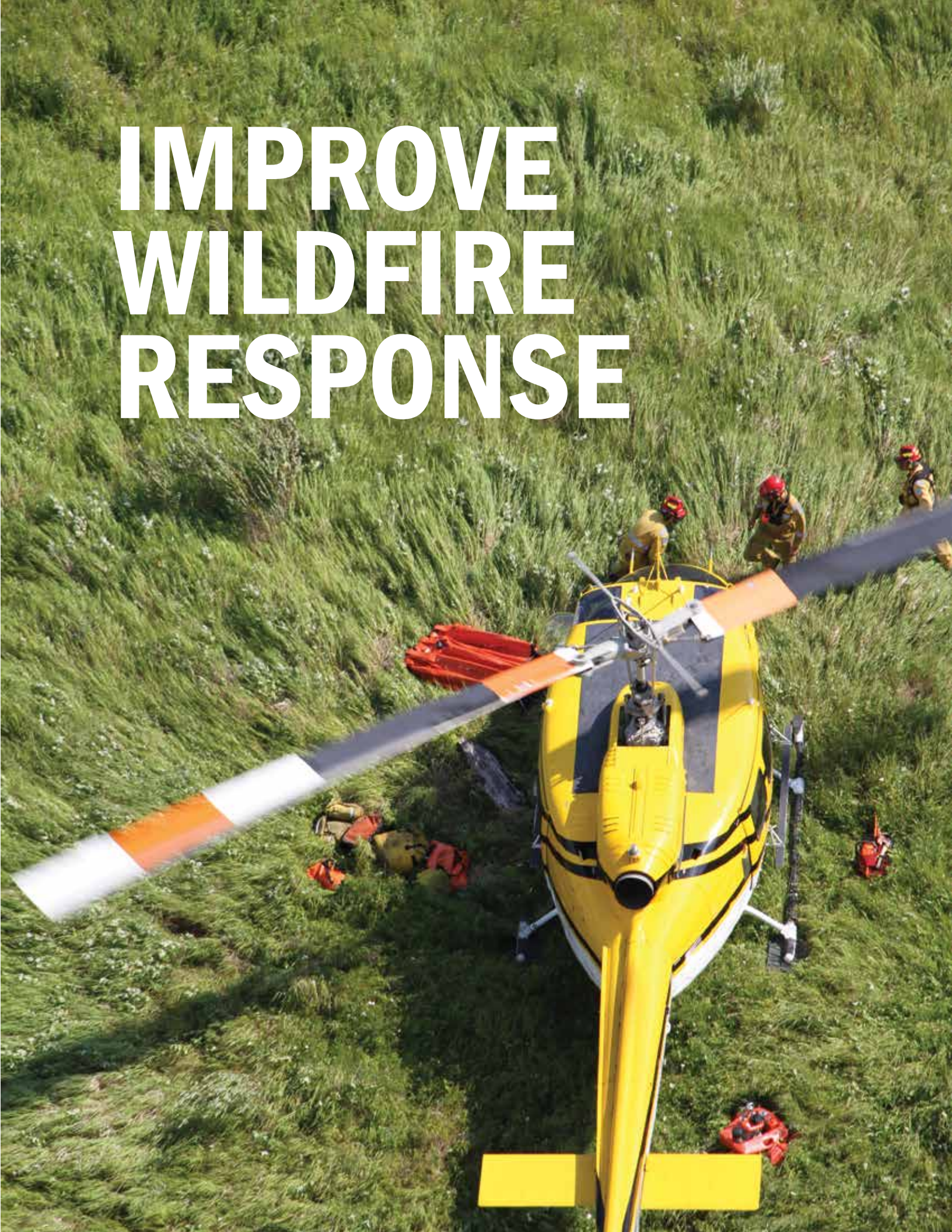
- ▶ *NFPA 1144 – Standards for Reducing Structure Ignition Hazards from Wildland Fire*
www.nfpa.org

- ▶ *FireSmart – Protecting Your Community from Wildfire, Partners in Protection, 2003.*
www.firesmartcanada.ca

Notes

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IMPROVE WILDFIRE RESPONSE



INTERAGENCY COOPERATION AND CROSS TRAINING

FireSmart Action Items

1. Identify stakeholders in your area and develop a FireSmart committee.
2. Test your Wildfire Preparedness Guide through a mock wildfire response exercise.
3. Work with your mutual-aid partners to deliver the following cross training courses:
 - ▶ Fire Operations in the Wildland/Urban Interface (S-215)
 - ▶ Sprinkler Deployment Workshop
 - ▶ Wildfire Orientation/Wildland Firefighter NFPA 1051 Level I
 - ▶ Incident Command System I-100 and I-200

Interagency Cooperation

Becoming a successful FireSmart community relies on strong partnerships. Interagency cooperation includes activities such as the following:

- ▶ Developing a FireSmart committee
- ▶ Coordinating reviews of new developments
- ▶ Committing to mutual-aid fire control agreements
- ▶ Hosting meetings at the start of wildfire season



When wildfire threatens a community, response efforts are often complex and involve multiple agencies. Working with these agencies before a wildfire strikes is important to ensure a smooth and coordinated response.

Regular communication is a key component of building interagency relationships. Plan to meet on a regular basis to discuss mutual interests.

Cross Training

Appropriate training will help emergency crews from all agencies to safely and effectively respond to wildfire. Training should focus on both structural and wildland fire disciplines. Cross training is not intended to make structural firefighters into wildland firefighters or vice versa. The purpose is to use resources and expertise in non-traditional roles in a cooperative manner.

Cross training administrative personnel is just as important as cross training emergency responders. Encourage staff from all levels who may be involved in wildfire response to obtain standardized training in the Incident Command System.

Use training as a team building opportunity. Staff at all levels can interact and become familiar with the challenges associated with wildfire response while working together to develop common solutions.

Assess current levels of training and encourage municipal staff to participate in the following:

- ▶ Incident Management
- ▶ Wildfire Prevention
- ▶ Practice Sessions and Exercises

Incident Management

Encourage municipal staff to participate in the following:

- ▶ Basic Emergency Management
- ▶ Incident Command System (I-100 to I-400)
- ▶ Fire Operations in the Wildland/Urban Interface (S-215)
- ▶ Wildland Firefighter (NFPA 1051 Level I)
- ▶ Wildfire Orientation
- ▶ Sprinkler Deployment Workshop

Wildfire Prevention (offered by ESRD)

Encourage municipal staff to participate in the following:

- ▶ Fire Permit Issuance training
- ▶ Wildfire Prevention course
- ▶ Wildfire Information Officer course

Practice Sessions and Exercises

Encourage municipal staff to participate in the following:

- ▶ Mutual-aid training and practice sessions
- ▶ Table-top exercises
- ▶ Mock disasters



Municipalities cannot plan for wildfires in isolation. Joint exercises are a great way to identify the strengths and challenges associated with different emergency response personnel working together under a single municipal emergency plan. Try to incorporate appropriate training to compliment emergency exercises.

Table-top exercises are usually conducted in boardrooms with various partner agencies in attendance. Staff review the various agencies' roles and responsibilities to gain a greater understanding of the emergency response process. Generally, the participants walk through a simulated emergency and react to a variety of challenges.

Mock disasters (or deployment exercises) present a complex situation in a realistic environment. These exercises allow for real-time evaluation of the operational capabilities of participating agencies. The events also present an exciting and visual public education opportunity. Successful mock disaster exercises require detailed planning and dedicated resources to implement.

FireSmart Action Items

1. Review municipal emergency management bylaws to ensure the appropriate authorities and procedures are in place to effectively respond to wildfire.
2. Review the risk management matrix in your municipal emergency plan or municipal emergency management program to ensure wildfire is a recognized risk, and that responders are aware of their roles and responsibilities during a wildfire.
3. Develop a Wildfire Preparedness Guide for your community.
4. Develop resource-sharing agreements with neighbouring jurisdictions.

EMERGENCY PLANNING

According to the *Municipal Government Act* and the *Emergency Management Act*, municipalities must develop and maintain safe and viable communities that can direct and control emergency response.

Municipalities need to be prepared to respond to wildfires that may affect their community. Developing a Wildfire Preparedness Guide is the first step in the process. This section reviews the various components that compliment your Wildfire Preparedness Guide.



Municipal Emergency Management Program Guide /

Municipal Emergency Plan

These documents outline how a municipality will respond to emergencies affecting a community. They integrate the existing policies and procedures used by various levels of emergency personnel into a coordinated response. Before the plans are implemented, emergency responders assess the situation and provide a recommendation to Alberta's Director of Emergency Management. If plans are implemented, a local state of emergency is declared and emergency operation centres are activated. Additional resources and support are also provided to the municipality in order to effectively deal with the emergency.

All stakeholders need to be familiar with their roles and responsibilities in these documents to ensure they will meet the needs of the community when responding to a wildfire.

Wildfire Preparedness Guide

A Wildfire Preparedness Guide identifies values-at-risk, fire behaviour conditions, available resources and strategies to respond to wildfires. See pages 13 to 22 for a detailed description of the Wildfire Preparedness Guide.

Mutual-Aid Fire Control Agreement

Developing effective mutual-aid fire control agreements allows municipalities to prepare for emergency events that exceed their local resource capabilities. A mutual-aid fire control agreement is supported by a mutual-aid fire control plan.

A mutual-aid fire control plan includes the following:

- ▶ A map of the mutual-aid zone
- ▶ Who to contact if an emergency occurs (mobilization directory)
- ▶ Instructions on how to request assistance
- ▶ Details on how costs will be managed
- ▶ Information on how fire permits will be administered
- ▶ Protocols and procedures to deal with emergencies

Municipalities should update mutual-aid agreements and plans annually. Templates for these plans can be obtained from ESRD.

While cities, towns, villages and summer villages are responsible for wildfire protection within their corporate limits, ESRD is responsible for suppressing wildfires on land outside municipal boundaries within the Forest Protection Area. Entering into a mutual-aid agreement with ESRD will help you clarify roles and responsibilities related to wildfire suppression in and around your community.

Also consider entering into mutual-aid agreements with neighbouring municipalities and government agencies. Sharing resources in a coordinated way is the most effective way of managing emergencies.

Incident Command Planning

When multiple agencies join forces to respond to an emergency, a unified command structure increases efficiency and clarifies roles and responsibilities. This structure allows specialized personnel from different agencies to manage various aspects of the emergency response.

The Fire Operations in Wildland/Urban Interface course (S-215) states the following considerations when implementing a unified command structure:

- ▶ Start early. Use unified command when two or more agencies have jurisdictional responsibility at an incident. Do not wait for the incident to become a crisis before implementing unified command.
- ▶ Locate the Incident Commanders at one command post. This avoids the confusion created by multiple command, planning and logistic sections.
- ▶ Operate without compromising the authority of other agencies.
- ▶ Develop one set of objectives for the entire incident.

The Incident Command System has become the standard for managing emergencies in many agencies including ESRD.

5. IMPLEMENTATION AND MAINTENANCE PLAN

When you are implementing and maintaining the Wildfire Mitigation Strategy, outline priority initiatives, expected completion dates, and the responsible stakeholder(s).

Develop a project plan that sets targets and deadlines. Identify the team members who will be responsible for implementing each task. As the project unfolds, revisit your goals and adjust targets if necessary. Completed projects need to be monitored and maintained to ensure long-term hazard reduction.

When developing your timelines, identify the unique needs of participating agencies. Each will have a different fiscal calendar that can affect timelines. Environmental factors may also affect the implementation of your projects. Wildfire season can limit the availability of resources, and the winter months will affect the implementation of vegetation management.

Depending on the strategies you identify, you may need to collect approvals from various municipal or provincial departments. Having the endorsement of your local council will help ensure long-term commitment to and consideration for the strategies.

For initiatives that extend over multiple years, check back regularly with your community. Vegetation management strategies developed three or four years ago may hold a different priority for you community.

Successfully implementing your Wildfire Mitigation Strategy depends on stakeholder commitment, sufficient resources, communication and education. Your FireSmart team will be the key stewards of the initiative.

A formal review of your Wildfire Mitigation Strategy should occur every five years.

THE ROAD TO FIRESMART

Regularly review and update your Wildfire Mitigation Strategy and Wildfire Preparedness Guide. Any updates should reflect changes within the planning area, including the successful implementation of any strategies. Budget commitments should reflect the short and long-term maintenance needs of each project.

Take the opportunity to connect with other community leaders working towards advancing FireSmart in Alberta. By linking with Partners in Protection, your community can become part of an organization working to build a FireSmart Alberta. By attending Alberta's FireSmart Community Series, you can gather with your peers and address the challenges and successes you have experienced.

Remember to celebrate with your team along the way and share successful initiatives with your community. Welcome to a community of people working towards a FireSmart Alberta!

GLOSSARY OF TERMS

A

Annual Operating Plan (AOP)

A plan detailing harvest locations that is prepared and submitted by forest operators each year. An approved AOP provides the authority to harvest.

Area Structure Plan

An Area Structure Plan specifies the direction provided in a Municipal Development Plan and provides a framework for subsequent subdivision and development of a particular area of land. An Area Structure Plan provides an opportunity to examine several factors that would affect Wildland/Urban Interface hazard and mitigation, including land use and density, access and public utilities development.

Alberta Vegetation Inventory (AVI)

Orthophoto-rectified digital data of vegetation types on Crown lands within Alberta.

AVI2FBP

A computer-based program that converts Alberta Vegetation Inventory (AVI) data into FBP fuel types.

C

Canadian Forest Fire Behaviour Prediction System

A subsystem of the Canadian Forest Fire Danger Rating System. The Canadian Forest Fire Behaviour Prediction System provides quantitative outputs of selected fire behaviour characteristics for major Canadian forest fuel types and topography.

D

Detailed Forest Management Plan (DFMP)

A long-term plan (10 years) used to outline higher-level management objectives, sustainability and timber production assumptions for a Forest Management Agreement (FMA).

F

Fire Behaviour

The manner in which fuel ignites, flame develops, fire spreads and exhibits other related phenomena as determined by the interaction of fuels, weather and topography.

Fire Control Plan

A document containing the essential elements of actions necessary to protect human life and property and minimize fire damages. A Fire Control Plan may apply to an overall fire suppression program for a broad area, but most often it is for site specific situations.

Fire Occurrence

The number of fires started in a given area over a given period of time.

Fire Hazard

A hazard based on physical fuel characteristics, such as fuel arrangement, fuel load, condition of herbaceous vegetation and presence of elevated fuels.

FireSmart

Actions taken to minimize the unwanted effects of wildfire, while recognizing the important role it has in maintaining healthy landscapes.

FireSmart Landscape

A landscape designed to reduce the likelihood of large, uncontrollable wildfires. FireSmart Landscapes are designed to recognize the interaction between the ecological, economic and social effects of wildfire.

Fuelbreak

An existing barrier or change in vegetation type (to one that is less flammable than what which is surrounding it), or a wide strip of land on which the vegetation has been modified or cleared to act as a buffer to fire spread. Often selected or constructed to protect a high value area from fire, a Fuelbreak may, in the event of fire, serve as a control line from which to carry out tactical operations.

G

Geographic Information System (GIS)

Computer software in which spatial information may be captured, stored, analyzed, displayed and manipulated.

H

Hazard Reduction

Treatment of living or dead forest fuels to diminish the likelihood of a fire starting and to lessen the potential rate of spread.

I

Incident

An occurrence, either human caused or by natural phenomena, that requires action by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources.

Incident Commander

The individual responsible for the management of all incident operations at the incident site.

Incident Command System (ICS)

A standardized, on-scene emergency management system specifically designed to allow its users to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

L

Land Use Bylaw

Regulates the use and development of land within a municipality's boundaries. Land Use Bylaws divide a municipality into land use districts and specify the permitted and discretionary uses within each district. A Land Use Bylaw establishes general subdivision development and design standards for each land use district as well as the process for issuing development permits.

M

Mitigation

Strategies or actions taken to moderate the severity of a fire hazard or risk.

Municipal Development Plan

Establishes policies for land use throughout a municipality. It can address environmental matters and development constraints as well as incorporate the results of studies or impacts analyses, including Wildland/Urban Interface hazard assessments.

Municipal Emergency Plan

Provides a prompt and coordinated response to emergencies that affect a municipality. Municipal Emergency Plans provide emergency response procedures and information for all risks that may occur within the municipality.

Mutual-Aid Fire Control Agreement

An agreement with the council of a municipal district or urban municipality to ensure the prevention and control of wildfires on land within its boundaries or under its control.

P

Prometheus

A deterministic, process-based model used as the primary "engine" for operational and strategic wildfire applications.

R

Risk from Wildfire

The potential of loss due to wildfire. For example, there is a 25 percent risk a particular value will be destroyed by a wildfire sometime in the next 50 years. Risk can also be calculated by multiplying damage (or loss) by uncertainty.

S

Staging Area

Locations at an incident where resources can be placed while awaiting a tactical assignment.

Stakeholders

Individuals or groups who have an interest in the outcome of a project. Projects normally have both internal and external stakeholders.

State of Local Emergency

The declaration of a state of local emergency enables local authorities to exercise emergency powers such as ordering the evacuation of residents from their homes, prohibiting travel and accessing private property when an emergency threatens lives, property or the environment within their jurisdiction.

Strategic Evacuation

When sufficient lead time exists, a strategic evacuation can be arranged through the declaration of a State of Local Emergency under the authority of the *Emergency Management Act* or applicable bylaw.

Suppression Capability

Suppression Capability includes the factors and limitations that are related to the ability to contain a wildfire upon detection in order to protect values-at-risk.

T

Tactics, Fire Suppression

Determining where to establish control lines, what to do along these lines and how best to utilize each fire fighting resource group to cope with site-specific conditions and fire behaviour.

Tactical Evacuation

Without sufficient lead time, the Incident Commander at the scene may have to initiate a tactical (immediate) evacuation. The evacuation under this situation is voluntary.

U

Unified Command

Under the Incident Command System, Unified Command is a joint team effort which allows all agencies with responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies. This is accomplished without losing or abdicating agency authority, responsibility, or accountability.

V

Values-At-Risk

The specific or collective set of natural resources and man-made improvements/developments that have measurable or intrinsic worth that could be destroyed or otherwise altered by fire.

W

Wildfire Management

Managing fire requires balancing its natural role with the protection of human life, property and economic values. This demands a comprehensive risk management approach that includes an appropriate mix of mitigation, preparedness, response and recovery.

Wildland/Urban Interface

A popular term used to describe an area where structures meet or are intermingled with forest vegetation.

Windrose Data

A graphical representation that summarizes information about the wind at a particular location over a specified time period, providing percentage of time the wind blows from each direction during the observation period and the strength of the winds. Windrose software may be downloaded from several internet sites.

REFERENCE MATERIALS

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Note: To obtain the most up-to-date material, search the ESRD website or the FireSmart Canada website. A search engine can also be used by entering key terms.

WILDFIRE PREPAREDNESS GUIDE TEMPLATE OPTION #1

COMMUNITY NAME

WILDFIRE PREPAREDNESS GUIDE

INSERT COMMUNITY IMAGE

PREPARED BY

DATE

The intent of this document is to provide an Incident Management Team with an overview of the planning area, fire behaviour potential, values-at-risk, and fire operations that can be utilized in the event that a wildfire threatens wildland/urban interface values-at-risk.

SECTION A: LOCAL AREA DISCRPTION

A1. PLANNING AREA

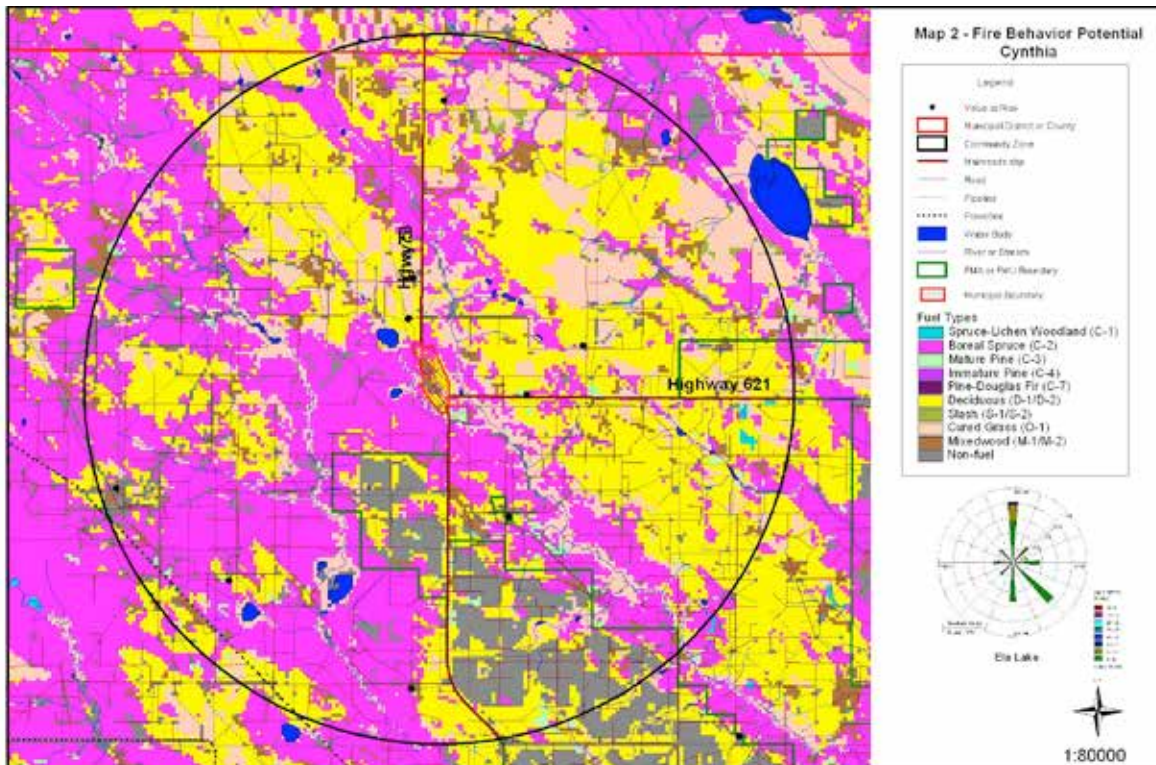
FEATURE	JURISDICTIONAL AUTHORITY
ESRD Forest Area	
Municipality(s)	
First Nations	
Forest Management Agreement Area(s)	
Timber Quota Areas	
Provincial Park	



MAP 1: PLANNING AREA MAP (INSERT FOLDED 11 X 17 MAP)

A2. FIRE BEHAVIOUR POTENTIAL DESCRIPTION

FACTOR	DESCRIPTION
Fuels Influence	
Weather Influence	
Topographic Influence	
Anticipated Fire Spread	



MAP 2: FIRE BEHAVIOUR POTENTIAL MAP (INSERT FOLDED 11 X 17 MAP)

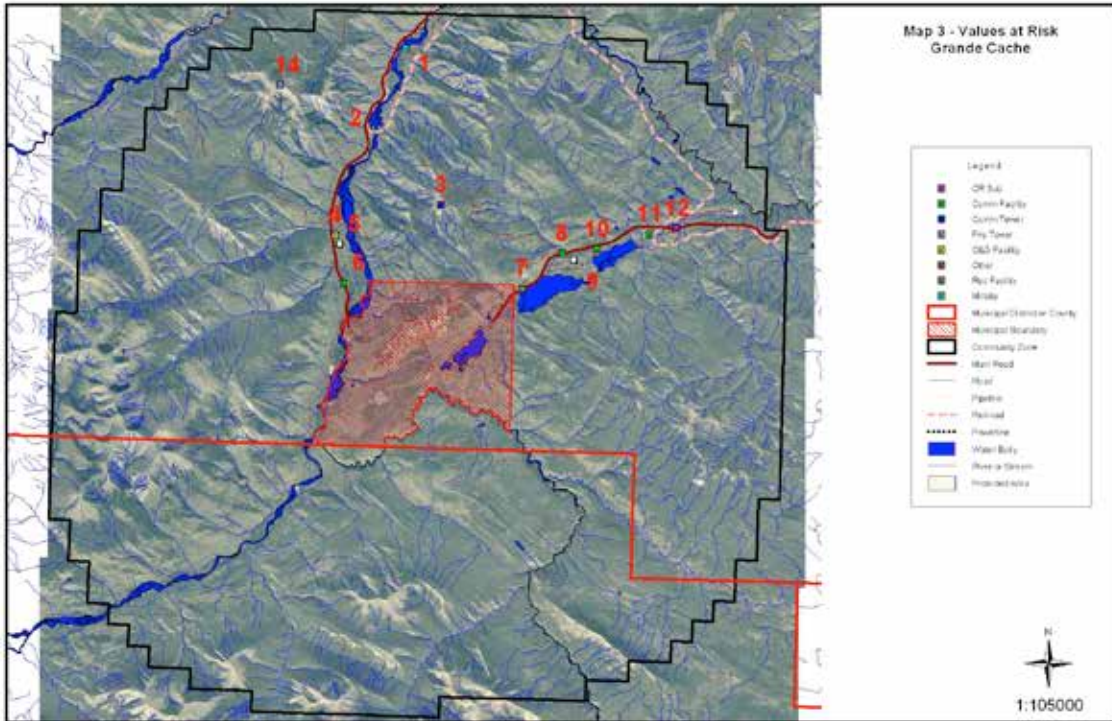
SECTION B: VALUES-AT-RISK

B1 - STANDARD VALUES-AT-RISK				
ID#	Value Name	Value Type	Lat/Long	No. of Structures - Roof Material
1				
2				
3				
4				
5				

B2 - CRITICAL VALUES-AT-RISK				
ID#	Value Name	Value Type	Lat/Long	No. of Structures - Roof Material
1				
2				
3				
4				
5				

B3 - SPECIAL VALUES-AT-RISK				
ID#	Value Name	Value Type	Lat/Long	No. of Structures - Roof Material
1				
2				
3				
4				
5				

B4 - HAZARDOUS VALUES-AT-RISK				
ID#	Value Name	Value Type	Lat/Long	Concern
1				
2				
3				
4				
5				



MAP 3: VALUES-AT-RISK MAP (INSERT FOLDED 11 X 17 MAP)

SECTION C: FIRE OPERATIONS

C1 - FUNCTIONAL ROLES	
JURISDICTION	AGENCY RESPONSIBLE
WILDFIRE	
EVACUATION	
VALUES PROTECTION	

C2 - MUTUAL-AID COMMUNICATIONS	
TYPE	FREQUENCY
COMMAND	
TACTICAL	

C3 - MINIMUM AUTO ORDER LIST

ZONE/MAP #	APPARATUS	HEAVY EQUIPMENT	OTHER EQUIPMENT/MANPOWER

C4 - STRUCTURE PROTECTION STRATEGIES & TACTICS

ZONE/MAP #	STRATEGIES	TACTICS	COMMENTS

C5 - FIRE SUPPRESSION WATER SUPPLY

ZONE/MAP #	FACILITY NAME	TYPE	LOCATION	CAPACITY/PRESSURE/FLOW

C6 - STAGING AREAS

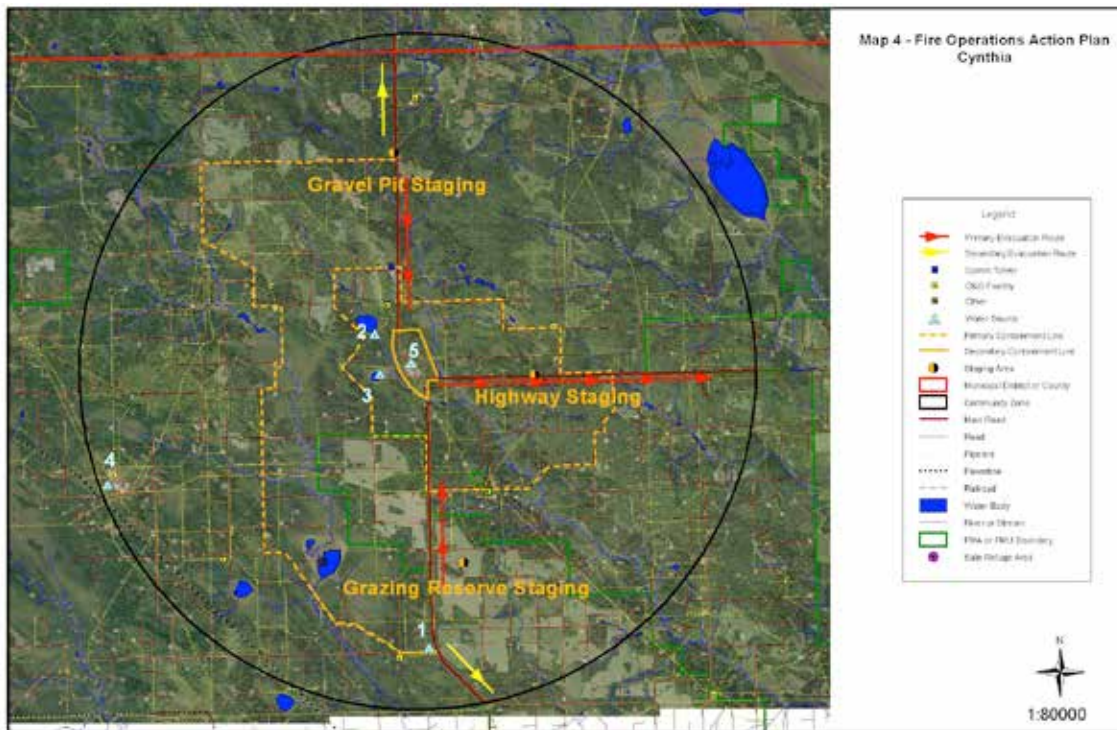
MAP #	NAME	LOCATION (LAT-LONG/ATS)	DESCRIPTION
1			
2			
3			
4			
5			

C7 - EVACUATION

MAP #	VALUE NAME	PEOPLE (NO.)	EVAC TIME	SAFE REFUGE AREA	SPECIAL EVACUATION CONCERNS
	LOCATION		(MINS)		
1					
2					
3					
4					
5					

C8 - SAFE REFUGE AREAS

MAP #	NAME	LOCATION (LAT-LONG/ATS)	DESCRIPTION
1			
2			
3			
4			
5			



MAP 4: FIRE OPERATIONS MAP (INSERT FOLDED 11 X 17 MAP)



















C9. EMERGENCY CONTACT LIST

EMERGENCY SERVICES				
POSITION	NAME	WORK	CELL/PAGER	FAX
FIRE & RESCUE SERVICES				
R.C.M.P				
ESRD - WILDFIRE OPERATIONS				
FORESTRY MANAGER				
WILDFIRE OPERATIONS OFFICER				
WILDFIRE PREVENTION OFFICER				
PFFC DUTY OFFICER				
AREA DUTY OFFICER				
AREA DISPATCH				
OTHER				

SPRINKLER DEPLOYMENT PLAN

THE FOLLOWING SAMPLE CAN BE USED AS A GUIDE.

SCALE: 1:15,000

LEGEND	
	400 barrel tanks
	Pump Site
	Residential Pump Site
	Water Tender
	Safety Zone
	Fire Hydrant
Hose Size	
	1 ½" hose (small diameter hose)
	2 ½" hose (medium diameter hose)
	4 - 5" hose (large diameter hose)
	Fire Guard
	Railway
	Powerline
	Pipeline
	Vacant Lots
	First Nation Reserve
	Provincial Park
	Thinned/Pruned
	Prescribed Burn

Sprinkler Deployment Plan Calling Lake

Division 1	
Equipment Required	
1	840 GPM pump (fire truck or trailer pump)
224	sprinklers
6500'	min 4" hose
6000'	1 1/2" hose
6	Mark III pump
3	4" water thieves



WILDFIRE PREPAREDNESS GUIDE TEMPLATE OPTION #2

Wildfire Preparedness Guide
 Year/Month Updated Updated by
 Change color of all colored text boxes as
 last step of updating plan and delete this
 statement.

Community Name

Key Contacts

Municipality

Chief Administrative Officer:
 Name # (Type of Phone)
 # (Type of Phone)

Public Works:
 Name # (Type of Phone)
 # (Type of Phone)

Fire Chief
 Name # (Type of Phone)

SRD Fire Center Name #
 Duty Officer #

Utilities

Company Name Emergency #
 Company Name Emergency #
 Company Name Emergency #

RCMP

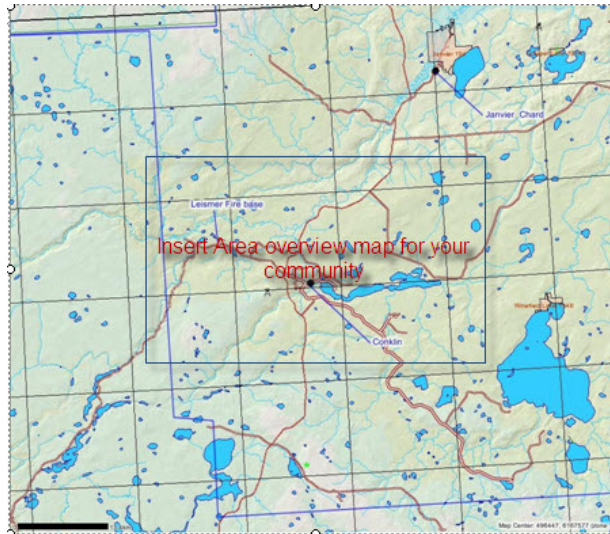
Emergency/Search and Rescue 911
 Detachment Location #

Alberta Emergency Management Agency

Agency Response Readiness Centre
 1-866-618-2362

Area Description

Brief text describing where the area is in the general region of Alberta. ie 150km north west of Edmonton on highway 28



Fire Behavior Factors

Fuel: General Description of the Fuel type
Topography: General description of the topography

Values at Risk

Critical Infrastructure: List values by category

Special: List values at risk by category

Hazardous: List values at risk by category

Water Supply

List of general locations that water for fire suppression is located. Specific sites will be on operations map

Staging Areas

Name and GPS coordinates of Staging Areas.

Communications

Command (Mutual Aid Channel)
 156.855 MHz Wide Band

Tactical (Wildfire)
 Channel identifier and frequency and Tone

Tactical (Structure Protection)
 Channel identifier and frequency and Tone

Aircraft Monitoring
 Channel identifier and frequency and Tone as well as Call sign of Fire Center

Air Advisory
 Frequency

Fire Department Resources

Fire Department Name
 Number and type of Resources available

Fire Department Name
 Number and type of Resources

Fire Department Name
 Number and type of Resources

Evacuation Protocol

Incident Commander IC will advise the DO when a fire is threatening the Community; DO will advise the Municipal Disaster Services Authority. Alert status will be determined by the Evacuation Trigger Points.

- When a wildfire is discovered and initial attack has failed to contain the fire start within the Primary Containment Lines, then the Incident Commander (IC) will give a strategic evacuation notification.
- If a wildfire occurs within the Secondary Containment Lines, or is immediately threatening the community, the IC may be required to do a tactical evacuation and give immediate notification.
- If a wildfire approaches the town from a distance of greater than 10 kilometers, the Evacuation Alert will be based on local weather conditions and fire behavior.

This evacuation protocol can be modified as needed. This general statement could work for communities within the forest protection area but would be quite different for communities outside the forest protection area. Delete red text from final plan.

- Evacuation Routes**
- specific and general evacuation routes for the planning area
- Emergency Assembly/ Safe Refuge Areas**
- Designate Safe refuge area as well as Evacuation centers that the residents will go to if evacuated. This should be the same information that is in the Municipal emergency plan
- Responder Evacuation**
- Responder evacuation will be determined by the Incident Commander
- Escape Routes/Safety Zones**
- Potential locations are identified on the attached map

Wildfire Operations

Primary Strategy

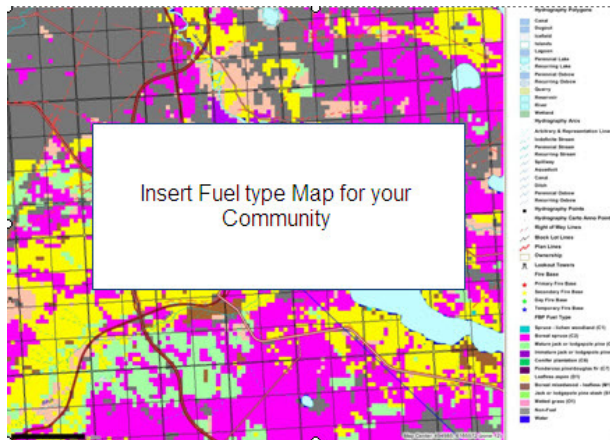
- Two or three sentences describing the primary strategy to protect the community. This should also reference the Primary containment lines and the trigger points for changing tactics

Secondary Strategy

- Two or three sentences describing the secondary plan to protect the community if the primary containment lines are breached.

Functional Roles

- Evacuation:** name of organization with Jurisdiction
- Wildfire Suppression:** name of organization with Jurisdiction
- Structure/Non Structure Fire:** name of Organization with Jurisdiction



WILDFIRE MITIGATION STRATEGY FORMAT

FireSmart committees and planning teams should be aware that this is a suggested format only. The FireSmart Community Plan may change based on the complexity of the planning area, the wildfire protection objectives and the needs and wants of the community.

1.0 Introduction

2.0 Planning Area and Stakeholders

- 2.1. Planning Area Boundary
 - 2.1.1. Planning Area Boundary
 - 2.1.2. Stakeholders and Jurisdictional Authorities
 - 2.1.3. Biophysical Description
- 2.2. Planning Strategies and Integrated Planning
- 2.3. First Nations Consultation

3.0 Hazard and Risk Assessment

- 3.1. Values-At-Risk
- 3.2. Hazard Assessment
- 3.3. Risk Assessment

4.0 Firesmart Activities

- 4.1. Education and Communication Options
 - 4.1.1. Present Initiatives
 - 4.1.2. Communication Plan
 - 4.1.3. Recommendations
- 4.2. Vegetation Management Options
 - 4.2.1. Existing Fuel Management Activities
 - 4.2.2. Proposed Fuel Management Prescriptions
 - 4.2.3. Recommendations
- 4.3. Legislation Options
 - 4.3.1. Local Legislation, Policies and Plans
 - 4.3.2. Municipal Planning Bylaws
 - 4.3.3. Other Plans and Policies
 - 4.3.4. Recommendations
- 4.4. Development Options
 - 4.4.1. Structural Options
 - 4.4.2. Infrastructure Options
 - 4.4.3. Recommendations
- 4.5. Interagency Cooperation and Cross Training Options
 - 4.5.1. Present Initiatives
 - 4.5.2. Recommendations
- 4.6. Emergency Planning Options
 - 4.6.1. Present Initiatives
 - 4.6.2. Recommendations

5.0 Implementation and Maintenance Plan

Appendices

APPENDIX I - FIRE BEHAVIOUR INFORMATION

FIRE BEHAVIOUR INFORMATION

Canadian Forest Fire Danger Rating System (CFFDRS)

Daily Canadian Forest Fire Danger Rating System (CCFDRS FWI)

The daily Fire Weather Index (FWI) can be obtained from ESRD's Wildfire Website at <http://www.esrd.alberta.ca/Wildfire/FireWeather>. If this link is not active, complete an internet search for "ESRD fire weather".

Use provincial daily fire danger information to monitor the current situation. The daily fire danger rating is generated from the daily weather data collected from all weather stations in the Forest Protection Area.

Fire Weather Index (FWI) values over 30 are associated with extreme burning conditions in Alberta.

Fire Weather Indices

Hazard Rating	FFMC Fine Fuel Moisture Code	DMC Duff Moisture Code	DC Drought Code	ISI Initial Spread Index	BUI Build Up Index	FWI Fire Weather Index	HFI Head Fire Intensity
Low	0-76	0-21	0-79	0-1.5	0-24	0-4.5	1-2
Moderate	77-84	22-27	80-189	2-4	25-40	4.5-10.5	3
High	85-88	28-40	190-299	5-8	41-60	10.5-18.5	4
Very High	89-91	41-60	300-424	9-15	61-89	18.5-29.5	5
Extreme	92+	61+	425+	16+	90+	29.5+	6

Fire Intensity Class Examples



Intensity Class 1 <10kW/m

Smouldering ground or creeping surface fire.

These fires have no open flame and produce white smoke. Self-extinguishing unless high drought code and/or build-up index values prevail, in which case extensive mop-up is generally required.



Intensity Class 2 10-500kW/m

Low vigour surface fire.

Rate of Spread: < 1.5m/min.

These fires produce visible open flame, have little or no spread and have an unorganized flame front. Direct attack by firefighters with hand tools and water is possible. Constructed fireguard should hold.



Intensity Class 3 500-2,000kW/m

Moderately vigorous surface fire.

Rate of Spread: 1.5 - 3.0 m/min.

This is a vigorous surface fire with an organized front and may display candling. Hand-constructed fireguards are likely to be challenged. Heavy equipment is generally successful in controlling such fires.



Intensity Class 4 2,000-4,000kW/m

Highly vigorous surface fire, torching or passive crown fire.

Rate of Spread: 3.0 - 6.0 m/min.

This type of fire produces grey to black smoke, has an organized surface flame front and has a moderate to fast rate of spread along the ground. Short aerial bursts and short range spotting will occur with these fires. Control efforts at the fire's head may fail.



Intensity Class 5 4,000-10,000kW/m

Extremely vigorous surface fire or active crown fire.

Rate of Spread: 6.0 - 18.0 m/min.

This type of fire produces black to copper smoke, has an organized crown fire front, moderate to long-range spotting and independent spot fire growth. Very difficult to control. Suppression action must be restricted to the fire's flanks. Indirect attack with aerial ignition may be effective.



Intensity Class 6 >10,000kW/m

Blow-up or large disastrous fire.

Rate of Spread: > 18.0 m/min.

Violent fire behaviour, an organized crown fire front and moderate to long-range spotting are characteristic of this fire type. There may be fireballs and whirls. Suppression actions should not be attempted until burning conditions improve.

Fire Weather Indices Examples

Source: Alexander, M.E.; de Groot, W.J. 1988. Fire Behavior in Jack Pine Stands as Related to the Canadian Forest Fire Weather Index (FWI) System. Canadian Forest Service, Northwest Region, Edmonton, Alberta. Poster with text. Reproduced with permission.



Type of fire: Creeping surface fire

Description of fire behavior: Fire spread readily across litter and *Cladonia* when pushed by small gusts of wind. Flames exceeded a few centimeters in height only in the occasional small concentrations of woody fuels and in the lowest, lichen-covered dead branches of a few young trees.

Weather Observations		Fuel Moisture Codes	
Dry bulb temperature	26.5°C	Fine Fuel Moisture Code	88.7
Relative humidity	48%	Duff Moisture Code	15
10 m open wind	6.3 km/h	Drought Code	143
Days since rain	2		
Fire Behavior Indices		Fire Behavior Characteristics	
Initial Spread Index	4.9	Head fire rate of spread	0.6 m/min
Buildup Index	24	Fuel consumption	1.0 kg/m ²
Fire Weather Index	8.5	Frontal fire intensity	190 kW/m



Type of fire: Low vigor surface fire

Description of fire behavior: Spread was slow. Flames were generally less than 0.6 m high, but brief flare-ups occurred in occasional patches of fine dead fuels, low shrubs, and small pines. Some very short-range spotting occurred just ahead of the fire front. Fire frequently ran to the tops of the pines in the abundant tree lichens and bark flakes, but almost never involved other aerial fuels.

Weather Observations		Fuel Moisture Codes	
Dry bulb temperature	24.5°C	Fine Fuel Moisture Code	89.0
Relative humidity	45%	Duff Moisture Code	18
10 m open wind	14.8 km/h	Drought Code	151
Days since rain	3		
Fire Behavior Indices		Fire Behavior Characteristics	
Initial Spread Index	7.8	Head fire rate of spread	1.0 m/min
Buildup Index	28	Fuel consumption	2.0 kg/m ²
Fire Weather Index	13.7	Frontal fire intensity	620 kW/m



Type of fire: Low vigor surface fire

Description of fire behavior: Fire spread was slow but steady. Flames were generally less than 0.6 m high. A few trees torched, and one spot fire occurred within the unit.

Weather Observations		Fuel Moisture Codes	
Dry bulb temperature	27.0°C	Fine Fuel Moisture Code	90.3
Relative humidity	39%	Duff Moisture Code	28
10 m open wind	8.5 km/h	Drought Code	214
Days since rain	6		
Fire Behavior Indices		Fire Behavior Characteristics	
Initial Spread Index	6.9	Head fire rate of spread	0.9 m/min
Buildup Index	42	Fuel consumption	2.39 kg/m ²
Fire Weather Index	15.3	Frontal fire intensity	670 kW/m



Type of fire: Moderately vigorous surface fire

Description of fire behavior: Fire spread was steady. Fire frequently burned into the crowns, using tree lichens and bark flakes as ladder fuels. Occasionally, enough heat was generated to torch out the green foliage. Short-range spotting occurred around hot spots.

Weather Observations		Fuel Moisture Codes	
Dry bulb temperature	29.0°C	Fine Fuel Moisture Code	90.6
Relative humidity	40%	Duff Moisture Code	31
10 m open wind	8.5 km/h	Drought Code	222
Days since rain	7		
Fire Behavior Indices		Fire Behavior Characteristics	
Initial Spread Index	7.2	Head fire rate of spread	2.0 m/min
Buildup Index	46	Fuel consumption	1.54 kg/m ²
Fire Weather Index	16.8	Frontal fire intensity	950 kW/m

Fire Weather Indices Examples



Type of fire: Moderately vigorous surface fire

Description of fire behavior: Spread was moderately fast where exposure to wind was greatest. Limited crowning occurred in one quarter of the unit, but elsewhere steady surface fire prevailed. Numerous small spot fires developed just outside the downwind side of the unit, and there was one long-range spot fire 140 m away.

Weather Observations

Dry bulb temperature 23.0°C
Relative humidity 46%
10 m open wind 8.5 km/h
Days since rain 10

Fuel Moisture Codes

Fine Fuel Moisture Code 90.9
Duff Moisture Code 43
Drought Code 246

Fire Behavior Indices

Initial Spread Index 7.5
Buildup Index 60
Fire Weather Index 19.9

Fire Behavior Characteristics

Head fire rate of spread 2.0 m/min
Fuel consumption 2.02 kg/m²
Frontal fire intensity 1230 kW/m



Type of fire: Very intense surface fire

Description of fire behavior: Greater fire intensity was apparent from taller flames and faster spread immediately upon ignition. Torching of crowns was common. Every case of torching resulted in abundant spot fires, which considerably increased the spread rate over that attained through continuous spread in surface fuel.

Weather Observations

Dry bulb temperature 31.0°C
Relative humidity 26%
10 m open wind 8.5 km/h
Days since rain 8

Fuel Moisture Codes

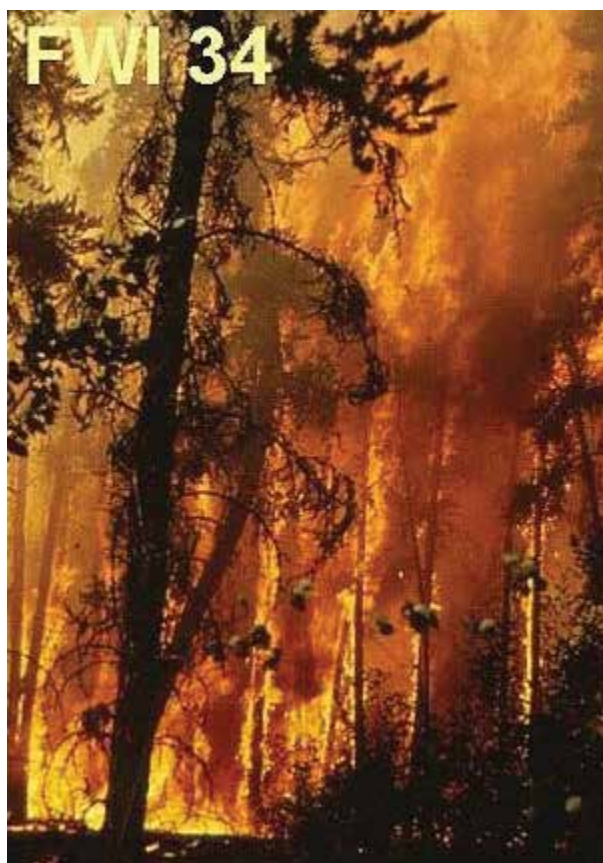
Fine Fuel Moisture Code 93.6
Duff Moisture Code 36
Drought Code 231

Fire Behavior Indices

Initial Spread Index 10.9
Buildup Index 52
Fire Weather Index 24.1

Fire Behavior Characteristics

Head fire rate of spread 3.4 m/min
Fuel consumption 1.86 kg/m²
Frontal fire intensity 1900 kW/m



Type of fire: Developing active crown fire

Description of fire behavior: A crown fire developed almost immediately. Flames were about 30 m high, 10 m higher than the trees. Spotting and high fire intensity resulted in a small, quickly controlled escape.

Weather Observations

Dry bulb temperature 30.5°C
Relative humidity 33%
10 m open wind 16.9 km/h
Days since rain 9

Fuel Moisture Codes

Fine Fuel Moisture Code 93.7
Duff Moisture Code 41
Drought Code 239

Fire Behavior Indices

Initial Spread Index 16.9
Buildup Index 57
Fire Weather Index 34.0

Fire Behavior Characteristics

Head fire rate of spread 6.1 m/min
Fuel consumption 3.92 kg/m²
Frontal fire intensity 7460 kW/m

Fire Behaviour Associated with Forest Fuel Types and Fuel Type Description

Examples of FBP System Fuel Types – Standard Photographs and Descriptions

The Canadian Forest Fire Behaviour Prediction (FBP) System models the rate of spread, fuel consumption, fire intensity, and fire growth for 16 national benchmark fuel types. Detailed descriptions of the FBP System fuel types can be found in Forestry Canada Information Report ST-X-3, Development and Structure of the Canadian Forest Fire Behaviour Prediction System, Forestry Canada Fire Danger Group 1992.

About the Photos

The pole-mounted logo of the Canadian Forest Fire Danger Rating System (CFFDRS) found in most of the photos was used for scale. The sign is 30 cm x 30 cm and the alternate markings on the pole are 30 cm in length. The quadrant used in the Open Fuel Type Group close-up photos are 1 m x 1 m with alternate markings 30 cm in length. Photos were supplied by B.J. Stocks, B.D. Lawson, C.E. Van Wagner, K.G. Hirsch, and W.J. De Groot.

FBP System Fuel Typical Fuel Complex

Coniferous

C-1	Spruce Lichen Woodland
C-2	Boreal Spruce
C-3	Mature Jack or Lodgepole Pine
C-4	Immature Jack or Lodgepole Pine
C-5	Red and White Pine
C-6	Conifer Plantation
C-7	Ponderosa Pine - Douglas Fir

Deciduous

D-1	Leafless Aspen
-----	----------------

Mixedwood

M-1	Boreal Mixedwood - Leafless
M-2	Boreal Mixedwood - Green
M-3	Dead Balsam Fir Mixedwood - Leafless
M-4	Dead Balsam Fir Mixedwood - Green

Slash

S-1	Jack or Lodgepole Pine Slash
S-2	White Spruce/Balsam Fir Slash
S-3	Coastal Cedar/Hemlock/Douglas Fir Slash

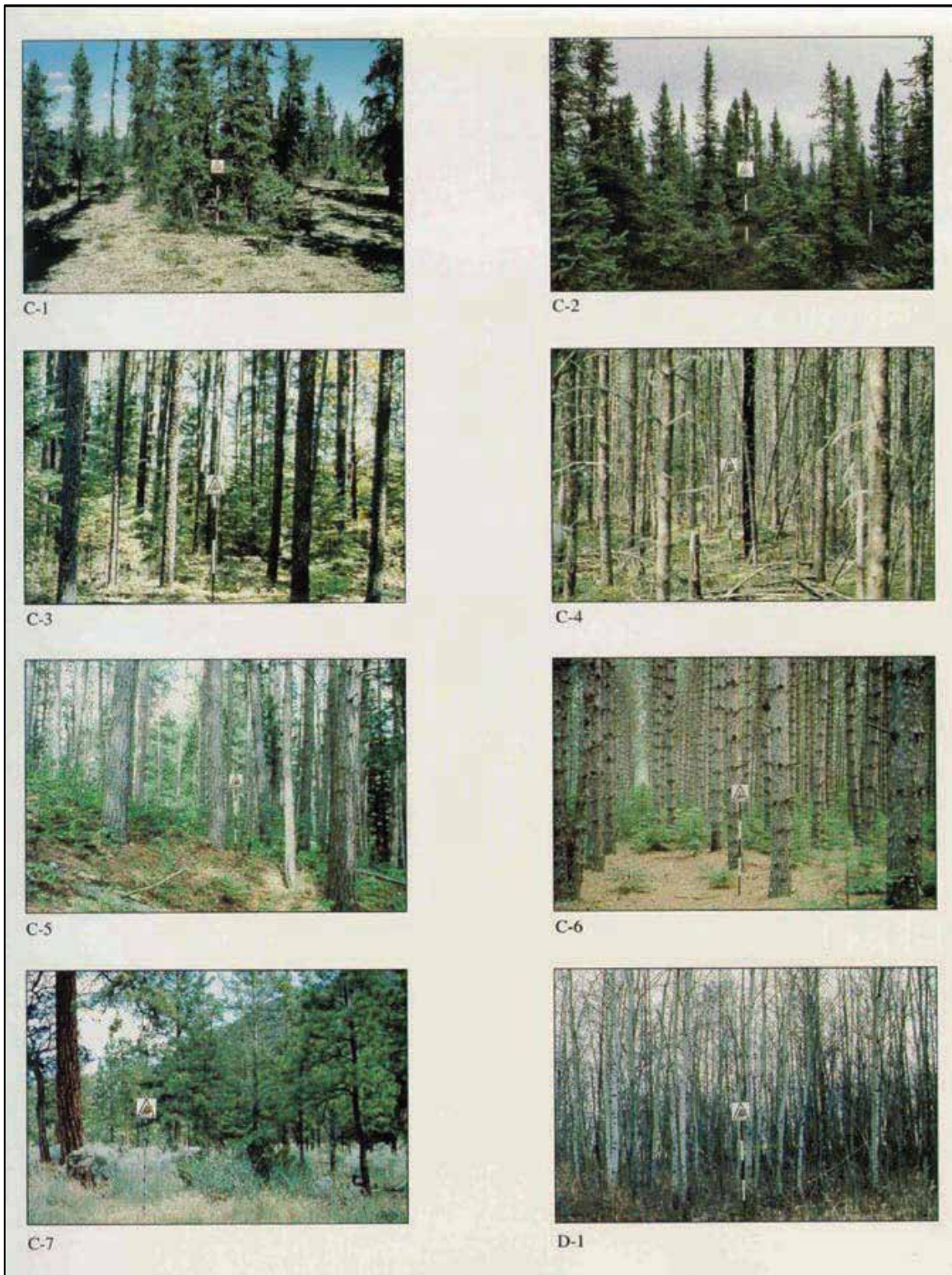
Open

O-1a	Matted Grass
O-1b	Standing Grass

Adapted From: Forestry Canada Fire Danger Group. 1992. Development and structure of the Canadian Forest Fire Behaviour Prediction System. Forestry Canada, Science and Sustainable Development Directorate, Ottawa, ON. Information Report ST-X-3.

Standard Photographs of CFFDRS FBP System Fuel Types

Source: Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System. Science and Sustainable Development Directorate, Forestry Canada, Ottawa, Ontario. Information Report ST-X-3. Reproduced with permission.



Description of CFFDRS FBP System Fuel Types

Source: Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System. Science and Sustainable Development Directorate, Forestry Canada, Ottawa, Ontario. Information Report ST-X-3. Reproduced with permission.

Summary of Canadian Forest Fire Behavior Prediction (FBP) System fuel type characteristics.		
Forest floor and organic layer	Surface and ladder fuels	Stand structure and composition
Fuel Type C-1 (Spruce-Lichen Woodland)		
Continuous reindeer lichen; organic layer absent or shallow, uncompacted.	Very sparse herb/shrub cover and down woody fuels; tree crowns extend to ground.	Open black spruce with dense clumps; assoc. sp. jack pine, white birch; well-drained upland sites.
Fuel Type C-2 (Boreal Spruce)		
Continuous feather moss and/or <i>Cladonia</i> ; deep, compacted organic layer.	Continuous shrub (e.g., Labrador tea); low to moderate down woody fuels; tree crowns extend nearly to ground; arboreal lichens, flaky bark.	Moderately well-stocked black spruce stands on both upland and lowland sites; <i>Sphagnum</i> bogs excluded.
Fuel Type C-3 (Mature Jack or Lodgepole Pine)		
Continuous feather moss; moderately deep, compacted organic layer.	Sparse conifer understory may be present; sparse down woody fuels; tree crowns separated from ground.	Fully stocked jack or lodgepole pine stands; mature.
Fuel Type C-4 (Immature Jack or Lodgepole Pine)		
Continuous needle litter; moderately compacted organic layer.	Moderate shrub/herb cover; continuous vertical crown fuel continuity; heavy standing dead and down, dead woody fuel.	Dense jack or lodgepole pine stands; immature.
Fuel Type C-5 (Red and White Pine)		
Continuous needle litter; moderately shallow organic layer.	Moderate herb and shrub (e.g., hazel); moderate dense understory (e.g., red maple, balsam fir); tree crowns separated from ground.	Moderately well-stocked red and white pine stands; mature; assoc. sp. white spruce, white birch, and aspen.
Fuel Type C-6 (Conifer Plantation)		
Continuous needle litter; moderately shallow organic layer.	Absent herb/shrub cover; absent understory; tree crowns separated from ground.	Fully stocked conifer plantations; complete crown closure regardless of mean stand height; mean stand crown base height controls ROS and crowning.
Fuel Type C-7 (Ponderosa Pine-Douglas fir)		
Continuous needle litter; absent to shallow organic layer.	Discontinuous grasses, herbs, except in conifer thickets, where absent; light woody fuels; tree crowns separated from ground except in thickets.	Open ponderosa pine and Douglas fir stands; mature uneven-aged; assoc. sp. western larch, lodgepole pine; understory conifer thickets.
Fuel Type D-1 (Leafless Aspen)		
Continuous leaf litter; shallow, uncompacted organic layer.	Moderate medium to tall shrubs and herb layers; absent conifer understory; sparse, dead, down woody fuels.	Moderately well-stocked trembling aspen stands; semi-mature; leafless (i.e., spring, fall or diseased).

Standard photographs of CFFDRS FBP System Fuel Types

Source: Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System. Science and Sustainable Development Directorate, Forestry Canada, Ottawa, Ontario. Information Report ST-X-3. Reproduced with permission.



M-1



M-2



M-3



M-4



S-1



S-2



S-3



O-1

Description of CFFDRS FBP System Fuel Types

Source: Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System. Science and Sustainable Development Directorate, Forestry Canada, Ottawa, Ontario. Information Report ST-X-3. Reproduced with permission.

Summary of Canadian Forest Fire Behavior Prediction (FBP) System fuel type characteristics.		
Forest floor and organic layer	Surface and ladder fuels	Stand structure and composition
Fuel Types M-1 and M-2 (Boreal Mixedwood)		
Continuous leaf litter in deciduous portions of stands; discontinuous feather moss and needle litter in conifer portions of stands; organic layers shallow, uncompacted to moderately compacted.	Moderate shrub and continuous herb layers; low to moderate dead, down woody fuels; conifer crowns extend nearly to ground; scattered to moderate conifer understory.	Moderately well stocked mixed stand of boreal conifers (e.g., black/white spruce, balsam/subalpine fir) and deciduous species (e.g., trembling aspen, white birch). Fuel types are differentiated by season and percent conifer/deciduous sp. composition.
Fuel Types M-3 and M-4 (Dead Balsam Fir Mixedwood)		
Continuous leaf litter in deciduous portions of stands; discontinuous feather moss, needle litter and hardwood leaves in mixed portions of stands; organic layers moderately compacted, 8-10 cm.	Dense continuous herbaceous cover after green up; down woody fuels low initially, but becoming heavy several years after balsam mortality; ladder fuels dominated by dead balsam understory.	Moderately well stocked mixed stand of spruce, pine and birch with dead balsam fir, often as an understory. Fuel types differentiated by season and age since balsam mortality.
Fuel Type S-1 (Jack or Lodgepole Pine Slash)		
Continuous feather moss and needle litter; moderately deep, compacted organic layer.	Continuous slash, moderate loading and depth; high foliage retention; absent to sparse shrub and herb cover.	Slash from clearcut logging; mature jack or lodgepole pine stands.
Fuel Type S-2 (White Spruce-Balsam Slash)		
Continuous feather moss and needle litter; moderately deep, compacted organic layer.	Continuous to discontinuous slash (due to skidder trails); moderate foliage retention; moderate loading and depth; moderate shrub and herb cover.	Slash from clearcut logging; mature or overmature white spruce, subalpine fir or balsam fir stands.
Fuel Type S-3 (Coastal Cedar-Hemlock-Douglas-fir Slash)		
Continuous feather moss or compacted old needle litter below fresh needle litter from slash; moderately deep to deep, compacted organic layer.	Continuous slash, high foliage retention (cedar), moderate for other species; heavy loading, deep slash; sparse to moderate shrub and herb cover.	Slash from clearcut logging; mature to overmature cedar, hemlock, or Douglas-fir stands.
Fuel Type 0-1 (Grass) Subtypes: O-1a – matted grass, O-1b – standing grass		
Continuous dead grass litter; organic layer absent to shallow and moderately compacted.	Continuous standing grass (current year crop). Standard loading is 0.3 kg/m ² , but other loading can be accommodated; percent cured or dead must be estimated. Sparse or scattered shrubs and down woody fuel. Subtypes for both early spring matted grass (O-1a) and late summer standing cured grass (O-1b) are included.	Scattered trees, if present, do not appreciably affect fire behavior.

Wildfire Behaviour in FBP System Fuel Types Under High Wildfire Danger Level

FBP FUEL TYPE		EXPECTED WILDFIRE BEHAVIOUR UNDER HIGH WILDFIRE DANGER LEVEL
C-1	Spruce-Lichen Woodland	Surface, Torching and Crowning
C-2	Boreal Spruce	Almost Always a Crown Fire
C-3	Mature Jack or Lodgepole Pine	Surface and Crown Fire
C-4	Immature Jack or Lodgepole Pine	Almost Always a Crown Fire
C-6	Conifer Plantation	Surface, Torching and Crowning
D-1	Leafless Deciduous	Always a Surface Fire
M-1	Boreal Mixedwood – Leafless	Surface, Torching and Crowning
M-2	Boreal Mixedwood – Green	Surface, Torching and Crowning
S-1	Jack or Lodgepole Pine Slash	Intense Surface Fire
S-2	White Spruce - Balsam Fir Slash	Intense Surface Fire
O-1a	Matted Grass	Intense Surface Fire
O-1b	Standing Grass	Rapid Spreading Intense Surface Fire

APPENDIX II - FIRESMART ZONES

Wildland/Urban Interface Zone

The Wildland/Urban Interface Zone is described as the area where various structures and other human developments meet or are intermingled with undeveloped wildland or vegetative fuel types. In the case of an incorporated community as defined by the *Municipal Government Act* (city, town, village, summer village and specialized municipalities), the planning area aligns with the municipalities' geo-administrative boundary. In the case of an unincorporated community (hamlet, locality and rural residential subdivision), provincial cadastral data can be used to assist with determining the planning boundary by using the block and lot development data.

FireSmart Community Zone

The FireSmart Community Zone encompasses the lands outside cities, towns, villages, summer villages, hamlets, rural county subdivision boundaries and recreational resorts or private lands within or directly adjacent to the Forest Protection Area (FPA). It extends out from the Wildland/Urban Interface Zone. Generally, the FireSmart Community Zone is a 10 kilometre buffer around the community's development centre, but can be amended to capture significant geographic land features that support wildfire protection objectives.

In areas where the wildfire threat potential extends beyond the Wildland/Urban Interface, it is critical that the FireSmart Community Zone boundary be identified because there are government policies, directives and standard operating procedures attached to this FireSmart Community Zone.

For more information, refer to the following directives:

- ▶ FireSmart Consultative Notation (CNT's) Directive
- ▶ Debris Management on Agricultural Dispositions
- ▶ Debris Management Standards for Timber Harvest Operations

Landscape Zone

This zone extends beyond the FireSmart Community Zone and overlaps multiple jurisdictions at a broad landscape level. This zone focuses on mitigating the likelihood of large, uncontrollable wildfires. Landscape management objectives are integrated and designed to reduce the negative ecological, economic and social impacts of wildfire while maximizing the positive attributes of wildfire.

APPENDIX III - FIRE-RESISTANT PLANTS

Groundcovers and Herbaceous Perennial Plants

Common Name	Genus and Species	Comments
Bergenia	<i>Bergenia</i> spp.	Very hardy
Blanket Flower	<i>Gaillardia</i> spp.	Very hardy
Bluegrass, Kentucky	<i>Poa pratensis</i>	Very hardy
Buffalograss	<i>Buchloe dactyloides</i>	Very hardy
Candytuft, Evergreen	<i>Iberis sempervirens</i>	Very hardy
Carpet Bugle	<i>Ajuga reptans</i>	Very hardy
Cinquefoil, Spring	<i>Potentilla tabernaemontani</i>	Very hardy
Columbine	<i>Aquilegia</i> spp.	Very hardy
Coral Bells	<i>Heuchera sanguinea</i>	Very hardy
Coreopsis	<i>Coreopsis</i> spp.	Hardy
Cotoneaster	<i>Cotoneaster</i> spp.	Hardy
Cotoneaster, Rock	<i>Cotoneaster horizontalis</i>	Marginally hardy
Cotoneaster, Bearberry	<i>Cotoneaster dammerii</i>	Hardy
Daisy, Shasta	<i>Leucanthemum x superbum</i>	Hardy
Daylily	<i>Hemerocallis</i> spp.	Very hardy
Dusty Miller	<i>Artemisa stelleriana</i>	Very hardy
Fescue	<i>Festuca</i> spp.	Very hardy
Fescue, Blue	<i>Festuca cinerea</i>	Very hardy
Fescue, Tall	<i>Festuca arundinacea</i>	Very hardy
Fescue, Creeping Red	<i>Festuca rubra</i>	Very hardy
Flax	<i>Linum</i> spp.	Very hardy
Fleabane	<i>Erigeron</i> spp.	Very hardy
Geranium, Hardy	<i>Geranium cinereum</i>	Very hardy
Geranium, Bloodred	<i>Geranium sanguineum</i>	Very hardy
Geranium	<i>Geranium</i> spp.	Hardy
Ginger, Wild	<i>Asarum caudatum</i>	Very hardy
Hen and Chicks	<i>Sempervivum tectorum</i>	Very hardy
Iris	<i>Iris</i> spp.	Hardy
Kinnickinnick	<i>Arctostaphylos uva-ursi</i>	Very hardy
Lambs Ear	<i>Stachys byzantina</i>	Very hardy
Lupine	<i>Lupinus</i> spp.	Hardy
Mahonia, Creeping	<i>Mahonia repens</i>	Hardy
Mock Strawberry	<i>Duchesnea indica</i>	Very hardy
Myrtle, Dwarf Periwinkle	<i>Vinca minor</i>	Very hardy
Penstemon, Rocky Mountain	<i>Penstemon strictus</i>	Very hardy
Pinks	<i>Dianthus plumarius</i>	Very hardy
Poppy	<i>Papaver</i> spp.	Very hardy
Potentilla	<i>Potentilla</i> spp.	Hardy
Primrose, Mexican Evening	<i>Oenothera berlandieri</i>	Hardy
Primrose	<i>Oenothera</i> spp.	Hardy
Pussytoes	<i>Antennaria</i> spp.	Very hardy
Ryegrass	<i>Lolium</i> spp.	Very hardy
Sage	<i>Salvia</i> spp.	Very hardy to hardy
Sedum, Goldmoss	<i>Sedum acre</i>	Very hardy
Snow-in-Summer	<i>Cerastium tomentosum</i>	Very hardy
Stonecrop	<i>Sedum spathulifolium</i>	Hardy
Stonecrop, Green	<i>Sedum album</i>	Very hardy
Strawberry, Wild	<i>Fragaria chiloensis</i>	Very hardy
Thrift, Common	<i>America maritima</i>	Very hardy
Thyme, Wooly	<i>Thymus pseudolanuginosus</i>	Very hardy

Thyme, Creeping	<i>Thymus praecox arcticus</i>	Very hardy
Valerian, Red	<i>Centranthus ruber</i>	Hardy
Violet, Canadian	<i>Viola canadensis</i>	Hardy
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	Very hardy
Wheatgrass, Western	<i>Pascopyrum smithii</i>	Very hardy
Wheatgrass, Crested (low-growing)	<i>Agropyron cristatum</i>	Very hardy
Winterfat	<i>Eurotia</i> spp.	Very hardy
Yarrow	<i>Achillea</i> spp.	Very hardy
Yarrow, White	<i>Achillea millefolium</i>	Very hardy
Yarrow, Fernleaf	<i>Achillea filipendulina</i>	Very hardy
Yarrow, Wooly	<i>Achillea tomentosa</i>	Very hardy
Yucca	<i>Yucca filamentosa</i>	Hardy

Trees

Common Name

Alder, White
Ash
Ash, Green
Aspen
Birch
Cottonwood
Hackberry
Rose family
Maple
Maple, Big-toothed
Maple, Box Elder
Maple, Rocky Mountain
Olive, Russian
Poplar
Narrowleaf Cottonwood

Genus and Species

Alnus rhombifolia
Fraxinus spp.
Fraxinus pennsylvanica
Populus tremuloides
Betula spp.
Populus spp.
Celtis occidentalis
Rosa spp.
Acer spp.
Acer grandidentatum
Acer negundo
Acer glabrum
Eleagnus angustifolia
Populus spp.
Populus angustifolia

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Shrubs

Common Name

Blueberry
Buckthorn
Buffaloberry
Buffaloberry, Russett
Buffaloberry, Silver
Cherry
Cherry, Sand
Cherry, Nanking
Chokecherry
Cinquefoil, Shrubby
Deerbrush (Buckbrush)
Dogwood, Red-osier
Gooseberries and Currants
Honeysuckle
Lilac, Common
Mockorange
Plum, Native
Raspberry
Roses
Saltbush
Sumac, Skunkbush

Genus and Species

Vaccinium spp.
Rhamnus spp.
Shepherdia spp.
Shepherdia canadensis
Shepherdia argentea
Prunus spp.
Prunus besseyi
Prunus tomentosa
Prunus virginiana
Potentilla fruticosa
Ceanothus spp.
Cornus sericea (*C. stolonifera*)
Ribes spp.
Lonicera spp.
Syringa vulgaris
Philadelphus spp.
Prunus americana
Rubus spp.
Rosa spp.
Atriplex spp.
Rhus trilobata

Comments

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Notes

A series of horizontal dotted lines for taking notes.



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