

Hamlet of Fort Resolution

Community Wildfire Protection Plan



Prepared for:
Government of the Northwest Territories
Environment and Natural Resources - Forest Management Division



March 2011

Stew Walkinshaw, R.P.F.

MONTANE
Forest Management Ltd.

Canmore, AB.

Phone: (403) 678-7054 Email: montane@shaw.ca

Table of Contents

1	Introduction	1
2	Planning Area	1
3	Hazard & Risk Assessment	3
	3.1 Wildfire Ignition Potential	
	3.2 Wildfire Behaviour Potential	
	3.3 FireSmart Hazard Assessments	
4	Vegetation Management Options	10
	4.1 Existing Vegetation Management	
	4.2 Proposed Vegetation Management	
	4.3 Vegetation Management Maintenance	
5	Development Options	16
	5.1 Structural Options	
	5.2 Infrastructure Options	
6	Public Education Options	18
7	Interagency Cooperation and Cross-Training Options	19
8	Emergency Planning Options	20
9	Implementation Plan	21

1 Introduction

The Hamlet of Fort Resolution Community Wildfire Protection Plan was developed to provide practical and operational wildland/urban interface risk mitigation strategies to reduce the threat of wildfire to development within Fort Resolution.

The project objectives include:

- Assess and quantify community wildland/urban interface hazard and risk
- Based on interface hazard and risk:
 - Develop and prioritize fuel management and maintenance recommendations and prescriptions
 - Develop a summary of significant factors within the community that would enhance its exposure to wildfire and offer recommendations to reduce that threat.

The Hamlet of Fort Resolution Community Wildfire Protection Plan was developed using standardized FireSmart hazard assessment protocols and mitigative measures were developed based on the seven disciplines of wildland/urban interface approach and current research and knowledge in interface community protection.

An implementation plan is included in this Plan to assist agencies to budget and complete projects based on the priorities identified.

This plan should be reviewed and updated at **five year intervals** to ensure it is based on current conditions.

2 Planning Area and Stakeholders

The planning area includes all lands within two kilometres of the developed areas within Fort Resolution including the main townsite and Little Buffalo River village (Map 1).

Stakeholders consulted with in the planning process included:

- | | |
|---|--------------------------|
| ▪ Eric Beck, Fire Tech | GNWT ENR Fort Resolution |
| ▪ Gord Beaulieu, Renewable Resource Officer | GNWT ENR Fort Resolution |
| ▪ Lou Balsillie, Asst. Band Chief | Deninu Kue First Nation |

Land status authority is varied and is represented by the following (Map 1):

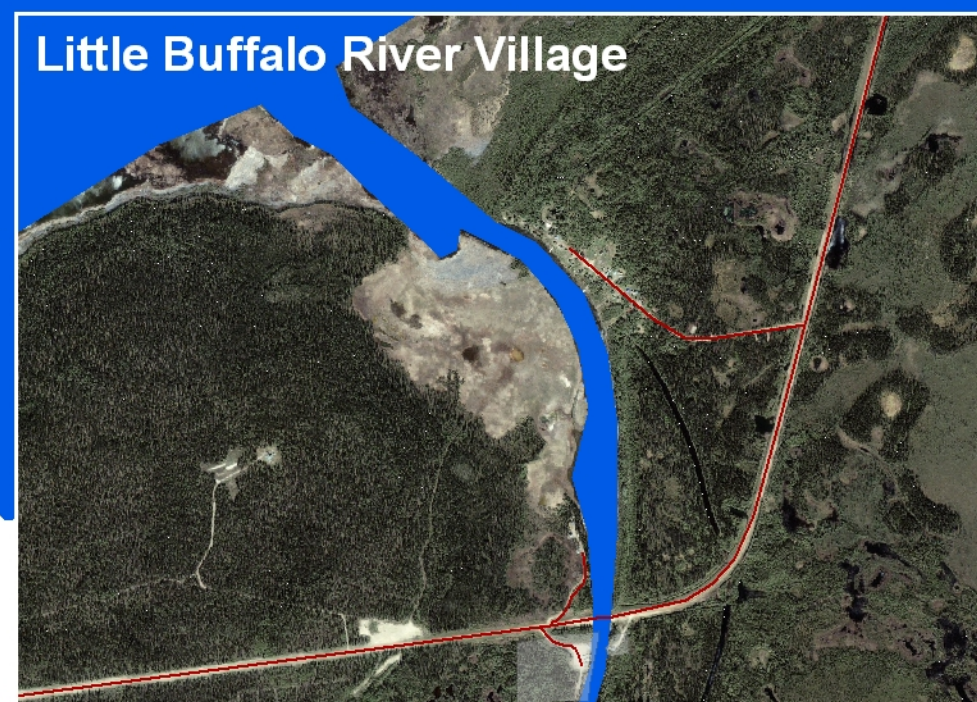
- Commissioner (GNWT MACA)
- Federal
- Indian Affairs Branch
- Mixed
- Private
- GNWT Crown lands (GNWT ENR)

Map 1 - Planning Area Hamlet of Fort Resolution

Land Status Authority

- Commissioner
- Federal
- Indian Affairs Branch
- Mixed
- Municipal
- Private

- Community Boundary
- Roads



1:140,000

MONTANE
Forest Management Ltd.

March 2011

3 Hazard & Risk Assessment

The hazard and risk assessment process analyses the risk of wildfire ignition through analysis of fire incidence, the wildfire behaviour potential through analysis of fuels and weather data, and the values at risk to wildfire through FireSmart hazard assessments.

3.1 Wildfire Ignition Potential

The assessment of recent fire incidence was completed using historical fire data from GNWT Environment and Natural Resources (ENR) for the twenty two-year period from 1988 to 2009.

Data within a 10 kilometre radius of Fort Resolution indicates that wildfire incidence is high. Fire incidence data shows a total of 41 wildfires in the planning area (Map 2). Predominant fire causes are recreation and residents near the settled areas and lightning outside the settled areas. Several large wildfires greater than 10,000 ha have occurred over the past twenty years just outside the 10 kilometre buffer zone indicating the potential for landscape-level wildfire exists.

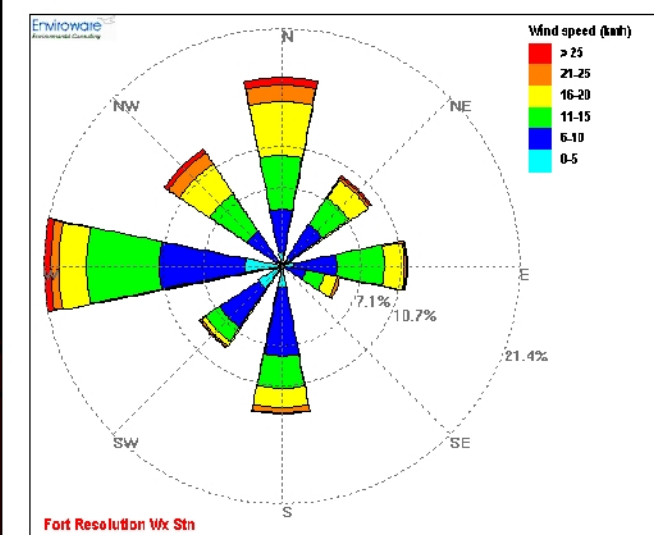
Table 1: Fire Incidence by Cause (1988 – 2009)

General Cause	Number of Fires	Percent of Total
Human-Caused	27	66
Lightning-Caused	14	34
Totals	41	100

Wildfire incidence in the planning area is high and is predominantly recreation and resident-caused in settled areas and lighting in unsettled areas.

Map 2 - Wildfire Incidence Hamlet of Fort Resolution

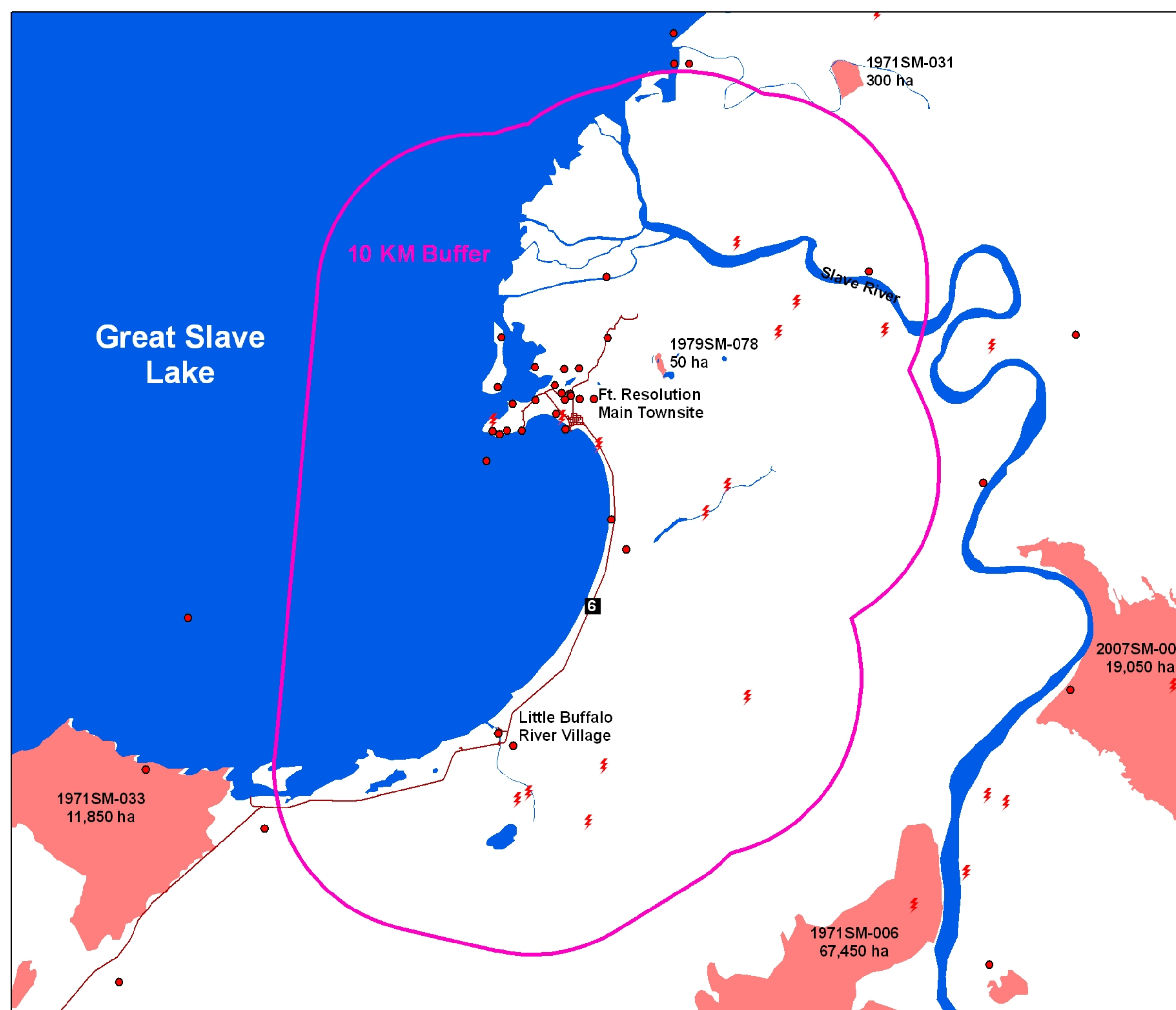
- Human-Caused Wildfire
- ⚡ Lightning-Caused Wildfire
- Wildfire > 4 hectares
- Community Boundary
- Roads



1:225,000

MONTANE
Forest Management Ltd.

March 2011



3.2 Wildfire Behaviour Potential

3.2.1 Wildland Fuel Types

Fire Behaviour Prediction (FBP) fuel types (Taylor, 1997) were used to analyze the fuel types and fire behaviour potential within and adjacent to Fort Resolution (Map 3).

The overall area is dominated with boreal spruce (C-2) and deciduous fuel types while the Fort Resolution townsite area is mainly non-fuel (NF) and cured-grass (O1), and deciduous fuel types with boreal spruce (C-2) fuels along the east perimeter of town. The Little Buffalo River Village area consists of boreal spruce (C-2), deciduous (D-1), and cured-grass (O1) fuel types. Each of these fuel types can present hazard to interface structures based on fuel moisture conditions and time of year.

3.2.2 Fire Weather Analysis

Fire weather data from the Fort Resolution weather station was used to determine the predominant wind directions during the fire season. Data indicates that the predominant and strongest wind directions are off Great Slave Lake from the west and north however winds are common from all quadrants (Figure 1).

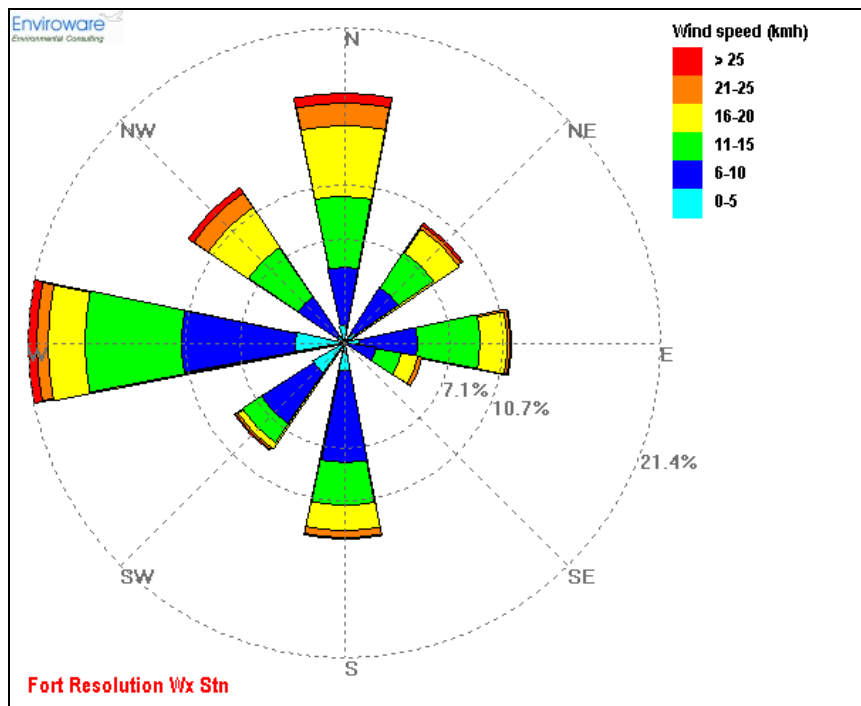
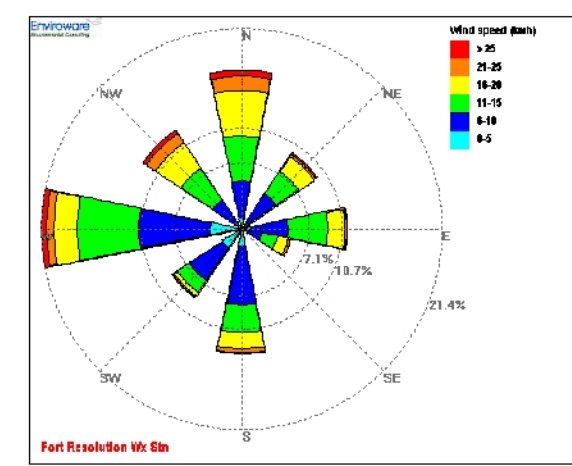


Figure 1 – Fort Resolution Windrose

Wildland fuel types and fire weather data indicates a High potential for intense landscape-level wildfire exists in the areas surrounding Fort Resolution with the highest potential along the east perimeter of the townsite in C-2 fuel types.

Map 3 - Fuel Types Hamlet of Fort Resolution

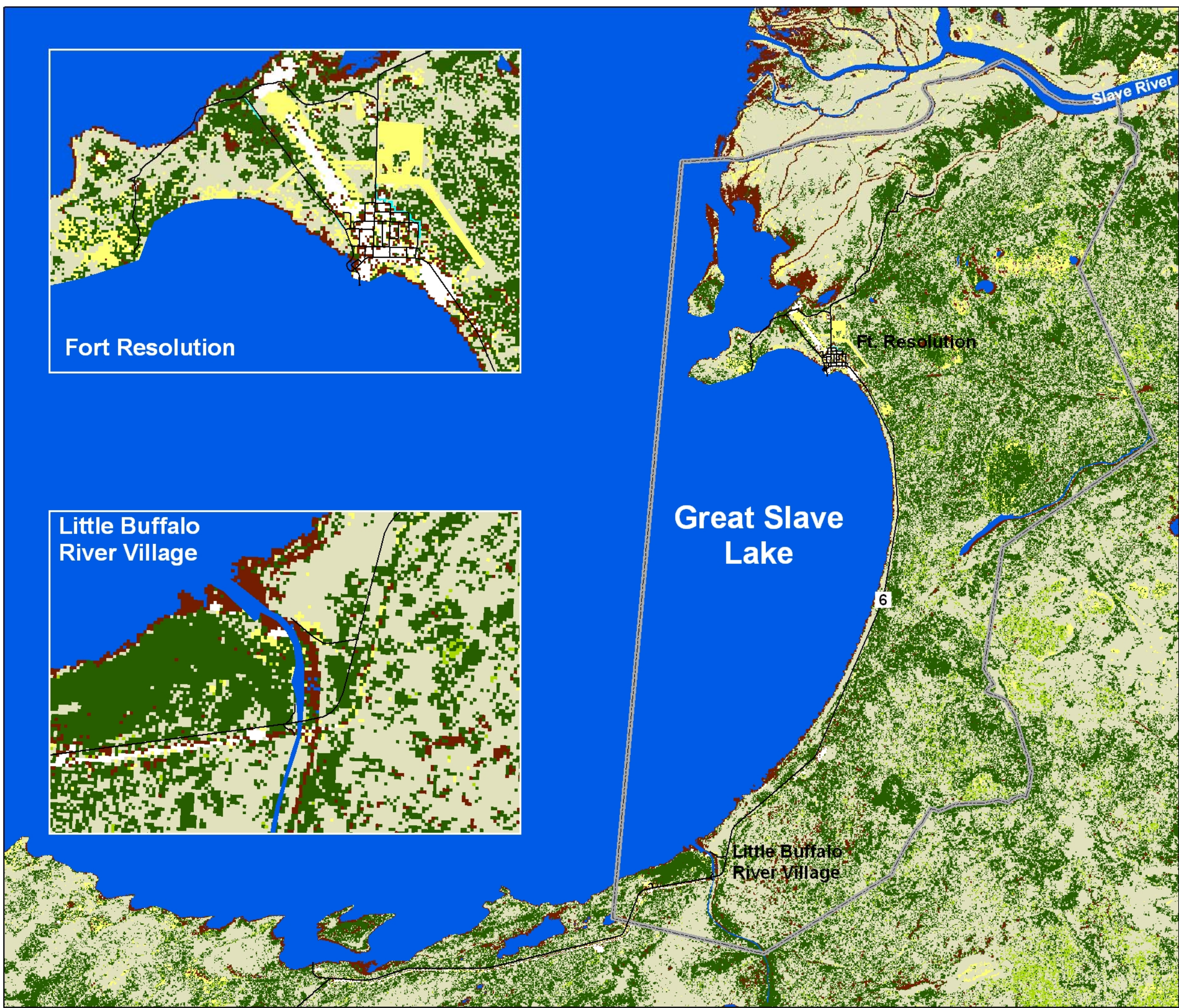
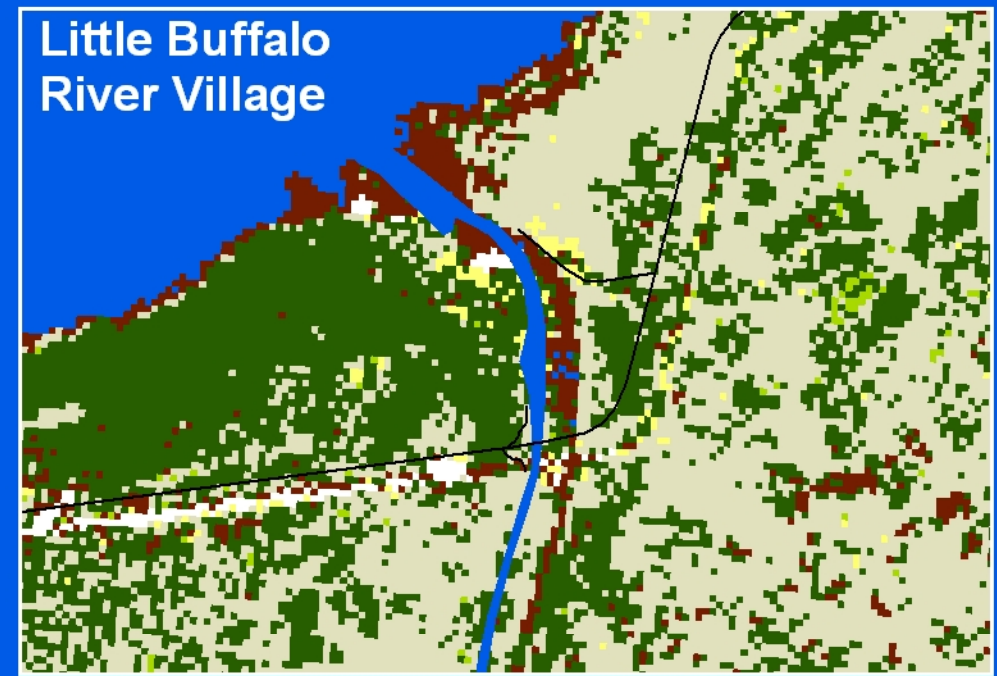
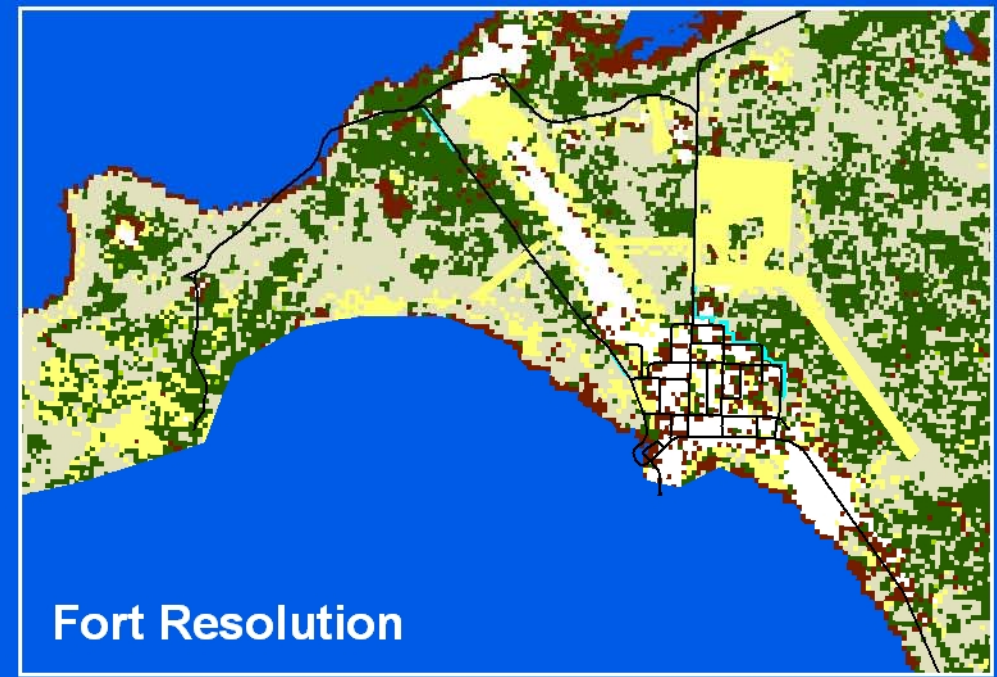
- FBP Fuel Type**
- Spruce-Lichen Woodland (C-1)
 - Boreal Spruce (C-2)
 - Mature Pine (C-3)
 - Immature Pine (C-4)
 - Deciduous (D-1)
 - Mixedwood (M-1)
 - Bog
 - Non-Fuel (NF)
 - Cured Grass (O1)
- Community Boundary
- Roads



1:140,000

MONTANE
Forest Management Ltd.

March 2011



3.3 FireSmart Hazard Assessments

FireSmart hazard assessments (P.I.P., 2003) were conducted on developments and adjacent wildland fuel types within the planning area. The FireSmart hazard assessment process evaluates wildland and structural fuel types, structural features, and topography within and adjacent to the development area to consistently quantify the wildland/urban interface hazards within the planning area and to help set priorities for mitigative options.

FireSmart hazard for each of the development areas is discussed below.

Table 2: FireSmart Hazard Assessments

Development Area	Structure/Site Hazard (0 – 30m)
Ft. Resolution Townsite Area	
North-End	Low-Moderate
South-End	High-Extreme
Little Buffalo River Village Area	
West-End	Low-Moderate
East-End	High-Extreme
Det'an Cho (Eagle) Tourist Camp	High
Cabin Sites	Moderate

Ft. Resolution Townsite Area

FireSmart hazard for the Ft. Resolution townsite area is Low-Moderate with some east perimeter areas and south rural structures at High-Extreme hazard based on proximity to C-2 fuels. Exterior structure materials are primarily asphalt shingle or metal roofing and wood or vinyl siding. Access roads are all-weather loop and dead-end. The highest wildfire threat is to structures backing onto C-2/M-1 fuels on the east perimeter of the townsite area and south of the townsite on the west-side of Highway 6.



Little Buffalo River Village Area

Development consists of the main village area, the Det'an Cho Tourist Camp, and two cabin sites. FireSmart hazard for the main village is Low-Moderate on the west-end and High-Extreme on the east-end due to C-2 fuel types. FireSmart hazard for the Det'an Cho Tourist Camp is High due to surrounding C-2/M-1 fuels. FireSmart hazard for the two cabin sites is Moderate due to inadequate Zone 1 defensible space from cured-grass fuels. Exterior structure materials are primarily asphalt shingle or roll-roof roofing and wood or log siding.



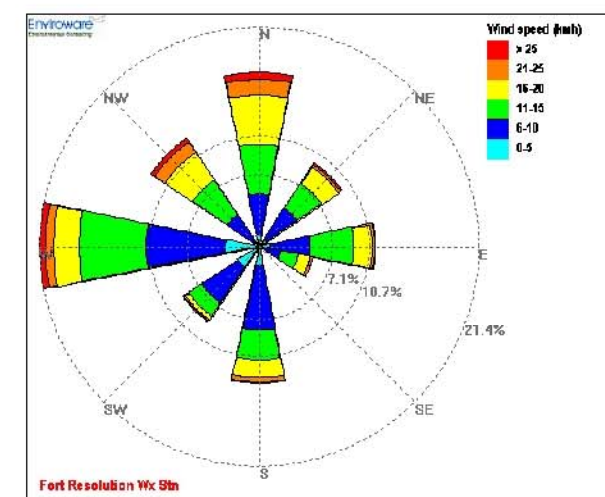
FireSmart hazard is High to Extreme on the east-perimeter of the main townsite and around rural structures south of the townsite, west of Highway 6. FireSmart hazard for Little Buffalo River Village is Extreme for the east-end of the village and High for the Det'an Cho Tourist Camp.

Map 4 - FireSmart Hazard Hamlet of Fort Resolution

FireSmart Hazard

- Low
- Moderate
- High
- Extreme

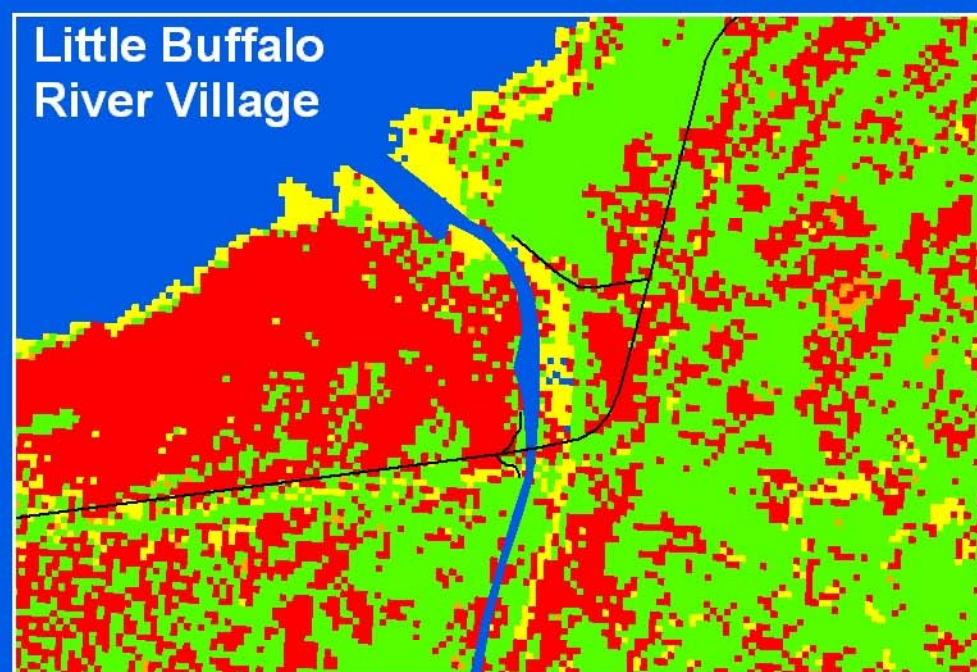
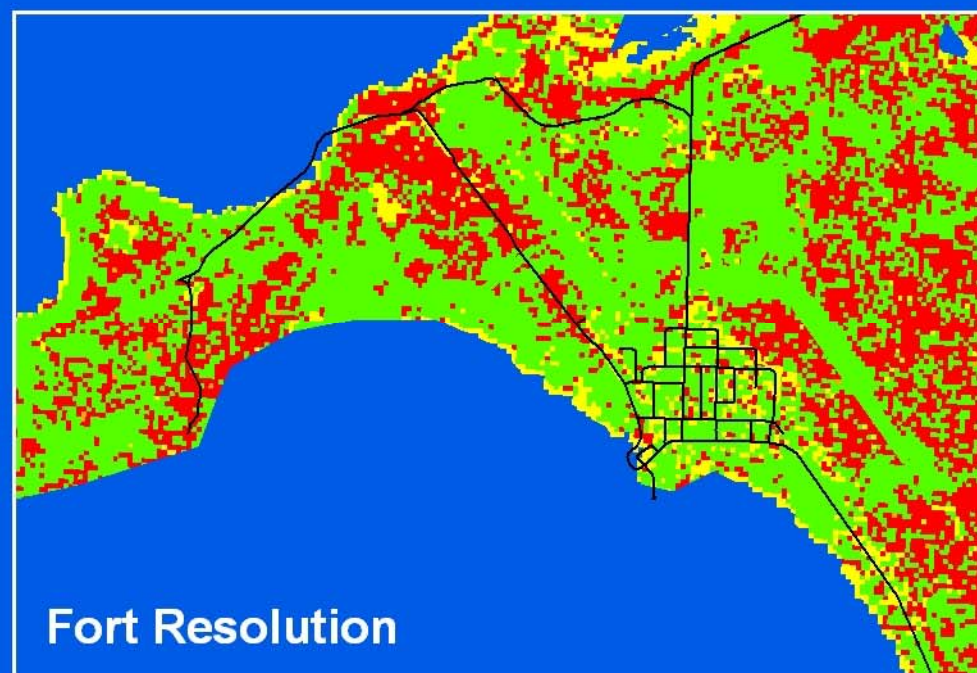
- Community Boundary
- Roads



1:140,000

MONTANE
Forest Management Ltd.

March 2011



4 Vegetation Management Options

The goal of vegetation management is to create a fuel-reduced buffer between structures and flammable wildland vegetation to reduce the intensity and rate of spread of wildfire approaching or leaving the development. Vegetation management options are proposed at the appropriate scale, based on hazard and risk, to reduce the threat of wildfire to developed areas. While fuel modification projects reduce the threat of wildfire to developments, they do not ensure structure survival under all hazard conditions.

Vegetation management consists of one or any combination of the following options:

- Fuel removal
- Fuel reduction
- Species conversion

Complete descriptions of the methods included in each of the above options are included in “*Fire-Smart Protecting Your Community from Wildfire*” (PIP 2003).

FireSmart standards refer to three interface priority zones with vegetation management for interface structures recommended in Zones 1 and 2 at a minimum and in Zone 3 based on hazard and risk.

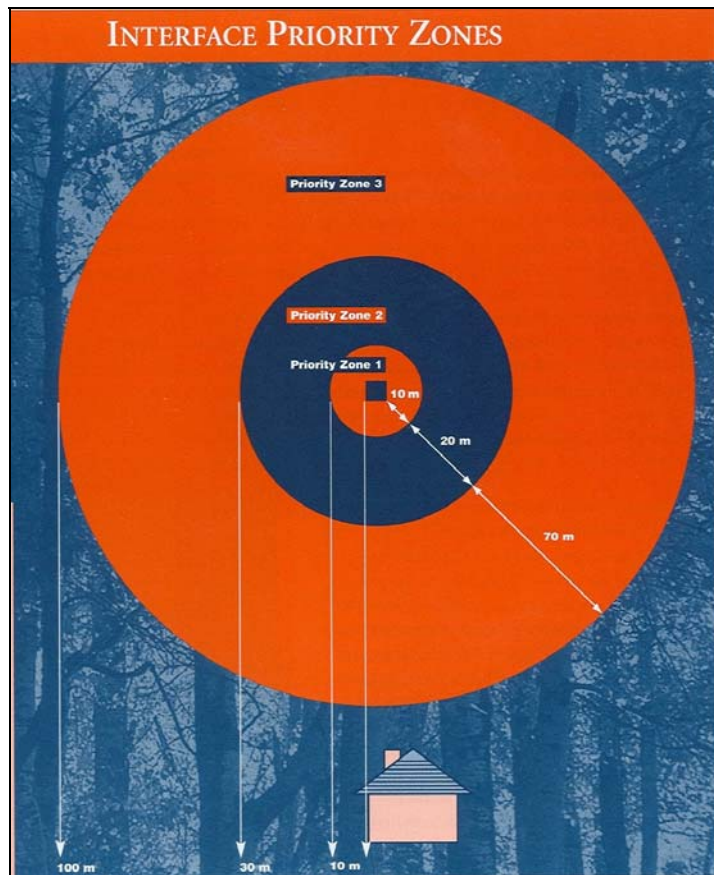


Figure 3 – Interface Priority Zones (PIP, 2003)

4.1 Existing Vegetation Management

Vegetation management has occurred in the form of fuels removal on fireguards and fuels reduction immediately adjacent to structures (Map 5 & Table 3).

Table 3: Existing Vegetation Management Areas

Name	Area (ha)	Year	Agency	Comments
North & East Fireguards	18.2	1990's	GNWT ENR	Old fireguards need maintenance to ensure effectiveness
East-Perimeter Fuels Reduction	2.5	2009/10	GNWT ENR	Requires debris disposal from 2010 ops and widening to minimum 75 metres width
ENR Firebase	0.4	Ongoing	GNWT ENR	



Fireguards were completed along the east and north perimeters of the Hamlet in the 1990's by the GNWT ENR Department (Map 5 & Table 3). These guards are overgrown and require maintenance to restore their effectiveness.

Fuels reduction was conducted during the winter of 2009/10 along the east-perimeter of the main townsite to thin black spruce and remove willow for a 15-20 metre wide strip. These areas should be widened to a minimum of 75 metres in width and require final brush disposal from the 2009/10 work.





GNWT ENR has completed fuels reduction work around the Fort Resolution firebase and is maintaining as necessary.

4.2 Proposed Vegetation Management

4.2.1 Zone 1

Zone 1 vegetation management is predominantly adequate throughout the main townsite area except for structures with lack of adequate Zone 1 defensible space along the east-perimeter and south of the Hamlet along Highway 6. Several structures in Little Buffalo River Village area require additional Zone 1 defensible space.



FireSmart Zone 1 vegetation management options include:

- Removal of flammable forest vegetation within 10 metres of structures.
- Removal of all coniferous ladder fuels (limbs) to a minimum height of 2 metres from ground level on residual overstory trees.
- Removal of all dead and down forest vegetation from the forest floor.
- Increased maintenance to ensure that all combustible needles, leaves, and native grass are removed from on and around structures.
- Establishment and maintenance of a non-combustible surface cover around the structure including the use of FireSmart landscaping species.
- Removal of all combustible material piles (firewood, lumber, etc) within 10 metres of the structure.

For more information on FireSmart Zone 1 standards refer to *FireSmart – Protecting Your Community from Wildfire* (PIP 2003).

Recommendation 1: Encourage residents to establish adequate Zone 1 defensible space around their structures.

4.2.2 Zone 2-3

Zone 2-3 fuels management is recommended for areas surrounding and along the north and east perimeters of the Hamlet to reduce the threat of wildfire in C-2 fuels to perimeter structures (Table 4 & Map 5). Proposed fuels management areas are conceptual at this time and will require detailed fuels reduction planning to identify fuels management prescription, unit boundaries, and operational constraints.

Table 4: Priority Fuel Modification Areas

Priority	Area (Ha)	Proposed Fuel Modification Standards	Land Status Authority
1	3.4	<ul style="list-style-type: none"> Fuels reduction to space Black spruce to 2-3 m crown spacing for a minimum 75m wide including existing fuel modification Remove all dead standing and dead & down coniferous and willow Retain deciduous overstory stems Prune limbs to 2 metres Dispose of all debris from new and past fuels reduction by burning 	<ul style="list-style-type: none"> Commissioner
2	4.8	<ul style="list-style-type: none"> Fuels reduction to space Black spruce to 2-3 m crown spacing for a minimum 75m wide behind homes Remove all dead standing and dead & down coniferous and willow Retain deciduous overstory stems Prune limbs to 2 metres Dispose of all debris from fuels reduction by burning 	<ul style="list-style-type: none"> Commissioner GNWT ENR
3	2.9	<ul style="list-style-type: none"> Fuels reduction to space Black spruce to 2-3 m crown spacing for a minimum 75m wide behind homes Remove all dead standing and dead & down coniferous and willow Retain deciduous overstory stems Prune limbs to 2 metres Dispose of all debris from fuels reduction by burning 	<ul style="list-style-type: none"> Federal GNWT ENR
4	18.3	<ul style="list-style-type: none"> Fuels removal to <u>maintain</u> existing fireguard to minimum 60 m width. <i>Note: Buffers may be required on edge of Airport runway to avoid cross-winds for aircraft</i> Dispose of all debris from fuels removal by burning 	<ul style="list-style-type: none"> GNWT ENR Federal
5	12.9	<ul style="list-style-type: none"> Fuels removal to <u>create</u> new fireguard to minimum 60 m width along east perimeter of town south to tower site Dispose of all debris from fuels removal by burning 	<ul style="list-style-type: none"> GNWT ENR Federal
Total	42.3		






Recommendation 2: Zone 2-3 fuels reduction and maintenance is the responsibility of the Land Status Authority holder(s) and should be implemented based on the priorities identified in this plan.

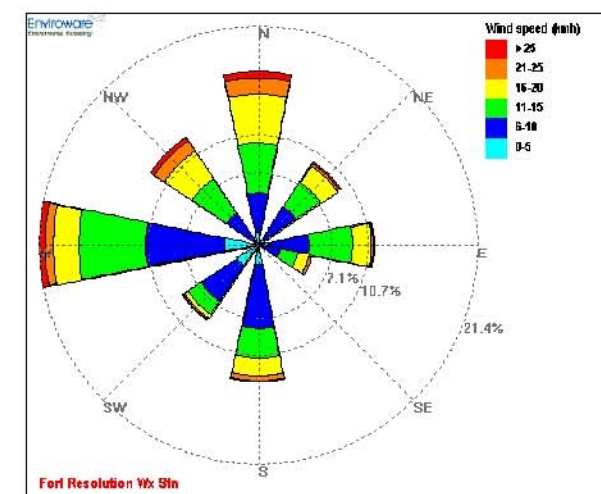
4.3 Vegetation Management Maintenance

Fuel modification area maintenance schedules depend on many factors including fuel type, soil and moisture conditions, and specific weather events. It is suggested that land managers provide periodic inspections of their fuel modification project areas and complete maintenance as required. It is projected that fuel modification maintenance will be required at least each five-year period.

Recommendation 3: Ensure that all existing fuel modification projects are inspected on a regular basis and maintained as necessary to ensure effectiveness. Maintenance should be the responsibility of the land manager or landowner.

Map 5 - Fuel Modification Hamlet of Fort Resolution

-  Existing Fuel Modification
-  Proposed Fuel Modification
-  Fuel Removal/Clear
-  Fuel Reduce/Thin
-  Roads



1:15,000

MONTANE
Forest Management Ltd.

March 2011

Great Slave
Lake

5. Development Options

Consideration of wildfire at the planning stage of new development is encouraged to ensure that wildfire hazard and appropriate mitigation measures are developed and implemented prior to development.

New developments may overlap or conflict with existing fuel modification resulting in a reduction in fuelbreak effectiveness and an increase in wildfire threat to the new or existing development in the area.

Recommendation 4: If a new development removes or reduces the effectiveness of any existing or proposed FireSmart mitigation measures or introduces new wildfire hazards, the area must be assessed and measures implemented to maintain the community protection standards.

5.1 Structural Options

Structural characteristics that contribute to a structure's ability to withstand wildfire ignition include type of roofing and siding material, structure siting with respect to steeper forested slopes, and proper construction and maintenance of eaves, vents, and openings that can accumulate flammable debris and allow wildfire to gain entry to the structure.



The most common roofing materials in the planning area are asphalt shingle, metal, and roll-roof asphalt with scattered wood-shake roofs and the most common siding materials are wood/vinyl with scattered log and hardi-plank.

Structures are typically elevated above-ground on pilings and many are not skirted allowing wildfire access to the underside of structures.

5.2 Infrastructure Options

Infrastructure options include provision of adequate access standards to ensure quick and safe ingress and egress for residents and emergency responders during a wildfire, adequate and accessible water supply for structure protection and suppression, and utility installation standards that do not increase risk to emergency responders during a wildfire emergency.

5.2.1 Access

Access road standards throughout the planning area are mainly adequate for an interface community with primarily all-weather loop road and dead-end access.

5.2.2 Water Supply

Fort Resolution does not have municipal hydrant water-supply. All development areas rely on water-tender supply from the local fire department for structure protection activities.

5.2.3 Franchised Utilities

Franchised utilities affected by an interface fire include electrical power and gas. Proper installation and maintenance of these services can minimize the risk to residents and emergency services personnel.

Electrical Power

Power distribution and residential service is provided through above-ground lines.

Gas

Heating fuel is primarily provided by heating oil with scattered propane tanks.

6. Public Education Options

Public education is a large part of the solution to success. Residents, landowners, municipal administration, and elected officials all need to be aware of the issues related to *FireSmart* development and the solutions to minimizing the risk and need to become a partner in implementation of the solutions in their communities. If stakeholders understand the issues relating to wildland/urban interface hazard they will be more likely to take action on their own property or to support actions taken by other authorities.

Residents and stakeholders can refer to the GNWT ENR, Forest Management Division website at www.nwtfire.com for further information on the GNWT FireSmart program, current wildfire updates, and other wildfire management related information.

Key Messages

FireSmart hazard assessments identified the need for the following key messages to target audiences in the planning area.

- Development and maintenance of FireSmart Zone 1 defensible space surrounding the home, including:
 - Grass maintenance
 - Firewood and combustibles storage

Recommendation 5: Public education on acceptable FireSmart Zone 1 standards is recommended for all Fort Resolution residents. Priority items include:

- Development and maintenance of FireSmart defensible space surrounding the home

7. Inter-Agency Cooperation and Cross-Training Options

Interagency cooperation and cross-training between all stakeholders is necessary to ensure cooperative and effective implementation of wildland/urban interface mitigation options and to coordinate an effective response to a wildland/urban interface fire.

Interagency stakeholders within the planning area include:

- Deninu Kue First Nation
- Metis Association
- GNWT Environment and Natural Resources (ENR)
- GNWT Municipal and Community Affairs (MACA)

Recommendation 6: Develop a FireSmart Committee, consisting of all relevant stakeholders, to coordinate and lead the FireSmart program for the area.

Cross-training for Fort Resolution Fire Department members and ENR wildfire suppression personnel should include basic wildfire, wildland/urban interface fire, and incident command system training courses.

The following cross-training courses are available.

Wildland Fire

- Wildland Firefighter (NFPA 1051 Level I, S-100, or equivalent)

Wildland/Urban Interface Fire

- Structure and Site Preparation Workshop (S-115)
- Fire Operations in the Wildland/Urban Interface (S-215)

Incident Command System

- ICS Orientation (I-100)
- Basic ICS (I-200)
- Intermediate ICS (I-300)
- Advanced ICS (I-400)

Recommendation 7: Fort Resolution Fire Department and GNWT MACA & ENR should partner on cross-training initiatives to ensure emergency responders are cross-trained to the following minimum standards:

- Wildland Firefighter
- Structure and Site Preparation Workshop (S-115)
- Fire Operations in the Wildland/Urban Interface (S-215)
- Incident Command System (I-100 to I-400) as applicable

8. Emergency Planning Options

Emergency preparedness is an important part of any disaster planning. The need for organization, clear chain of command, and an understanding of job responsibilities during an interface fire are of paramount importance.

At present Fort Resolution does not have a wildfire pre-plan to provide emergency responders with detailed tactical information with respect to values at risk and operational strategies and tactics to minimize losses during a wildland/urban interface fire. A suggested outline is as follows:

- Planning Area Jurisdictional Authority
- Values at risk (life, structures, infrastructure)
- Fire operations plan (strategies/tactics, water sources, equipment, communications plan)

Recommendation 8: Develop a Community Wildfire Pre-Plan for Fort Resolution to provide greater operational detail to emergency responders during a wildland/urban interface incident.

9 Implementation Plan

The goal of the implementation plan is to identify the responsible stakeholders for each of the recommendations and set timelines for commencement and completion based on priorities and funding availability.

Vegetation Management

Issue	Recommendation	Responsible Agency
Zone 1	Recommendation 1: Encourage residents to establish adequate Zone 1 defensible space around their structures.	GNWT MACA Hamlet of Fort Resolution
Zone 2-3	Recommendation 2: Zone 2-3 fuels reduction and maintenance is the responsibility of the Land Status Authority holder(s) and should be implemented based on the priorities identified in this plan.	GNWT ENR & MACA Federal Govt.
Maintenance	Recommendation 3: Ensure that all existing fuel modification projects are inspected on a regular basis and maintained as necessary to ensure effectiveness. Maintenance should be the responsibility of the land manager or landowner.	GNWT ENR & MACA Federal Govt.

Development

Issue	Recommendation	Responsible Agency
FireSmart Development Planning	Recommendation 4: If a new development removes or reduces the effectiveness of any existing or proposed FireSmart mitigation measures or introduces new wildfire hazards, the area must be assessed and measures implemented to maintain the community protection standards.	GNWT MACA Hamlet of Fort Resolution

Public Education

Issue	Recommendation	Responsible Agency
Public Education Priorities	Recommendation 5: Public education on acceptable FireSmart Zone 1 standards is recommended for all Fort Resolution residents. Priority items include: <ul style="list-style-type: none"> Development and maintenance of FireSmart defensible space surrounding the home 	GNWT ENR & Hamlet of Fort Resolution

Interagency Cooperation & Cross-Training

Issue	Recommendation	Responsible Agency
FireSmart Committee	Recommendation 6: Develop a FireSmart Committee, consisting of all relevant stakeholders, to coordinate and lead the FireSmart program for the area.	GNWT ENR & MACA Hamlet of Fort Resolution Deninu Kue First Nation Metis Association
Cross-Training	Recommendation 7: Fort Resolution Fire Department members and GNWT MACA & ENR should partner on cross-training initiatives to ensure emergency responders are cross-trained to the following minimum standards: <ul style="list-style-type: none"> ▪ Wildland Firefighter ▪ Structure and Site Preparation Workshop (S-115) ▪ Fire Operations in the Wildland/Urban Interface (S-215) ▪ Incident Command System (I-100 to I-400) as applicable 	GNWT MACA & ENR Hamlet of Fort Resolution

Emergency Planning

Issue	Recommendation	Responsible Agency
Community Wildfire Pre- Planning	Recommendation 8: Develop a Community Wildfire Pre-Plan for Fort Resolution to provide greater operational detail to emergency responders during a wildland/urban interface incident.	GNWT ENR & MACA Fort Resolution Fire Dept