

Nahanni Butte

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	9
	4.1 Existing Vegetation Management	
	4.2 Proposed Vegetation Management	
	4.3 Vegetation Management Maintenance	
5	Development Options	14
	5.1 Structural Options	
	5.2 Infrastructure Options	
6	Public Education Options	16
7	Interagency Cooperation and Cross-Training Options	17
8	Emergency Planning Options	18
9	Implementation Plan	19

1 Introduction

The Nahanni Butte 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 Nahanni Butte.

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 Nahanni Butte 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 in Nahanni Butte (Map 1).

Stakeholders consulted with in the planning process included:

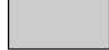



- Daniel Allaire, Forest Officer GNWT ENR Fort Simpson

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 Nahanni Butte

Land Status Authority

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

South Nahanni River



1:15,000

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 the planning area boundary indicates that wildfire incidence is low. Fire incidence data indicates that 4 wildfires occurred in the planning area (Map 2), three were lightning-caused and one was human-caused.

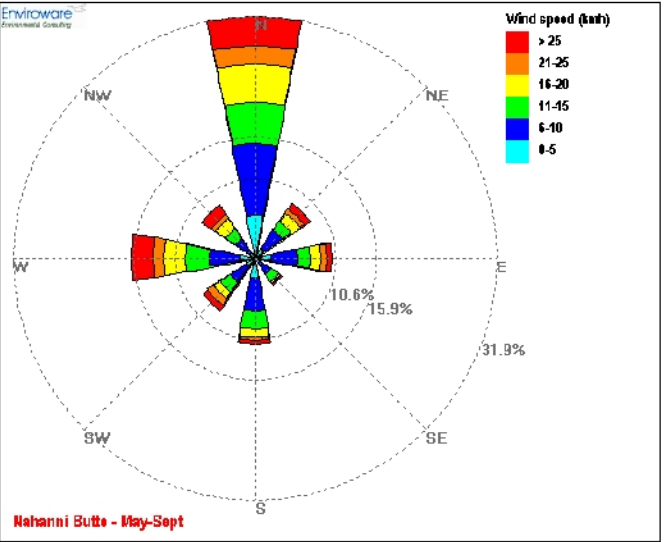
Table 1: Fire Incidence by Cause (1988 – 2009)

General Cause	Number of Fires	Percent of Total
Human-Caused	1	25
Lightning-Caused	3	75
Totals	4	100

Wildfire incidence in the planning area is Low and is predominantly lightning-caused.

Map 2 - Wildfire Incidence
Nahanni Butte

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



1:80,000

MONTANE
Forest Management Ltd.

March 2011

10 KM Buffer Zone

South Nahanni River

Liard River

2004JF-003
135 ha

1984JF-004
86 ha

1994JF-002
125 ha

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 Nahanni Butte.

The planning area is dominated with deciduous (D-1) overstory with a moderately dense spruce understory with pockets of scattered mixedwood (M-1) and spruce-lichen woodland (C-1) fuel types. Fuel types within the townsite area include mainly cured-grass (O1), non-fuel (NF), and deciduous (D-1) with spruce understory. The spruce understory could present wildfire hazard to structures on High and Extreme hazard days.

3.2.2 Fire Weather Analysis

Fire weather data from Nahanni Butte weather station was used to determine the predominant wind directions during the fire season. Data indicates that the predominant and strongest wind directions are from the north and west (Figure 1).

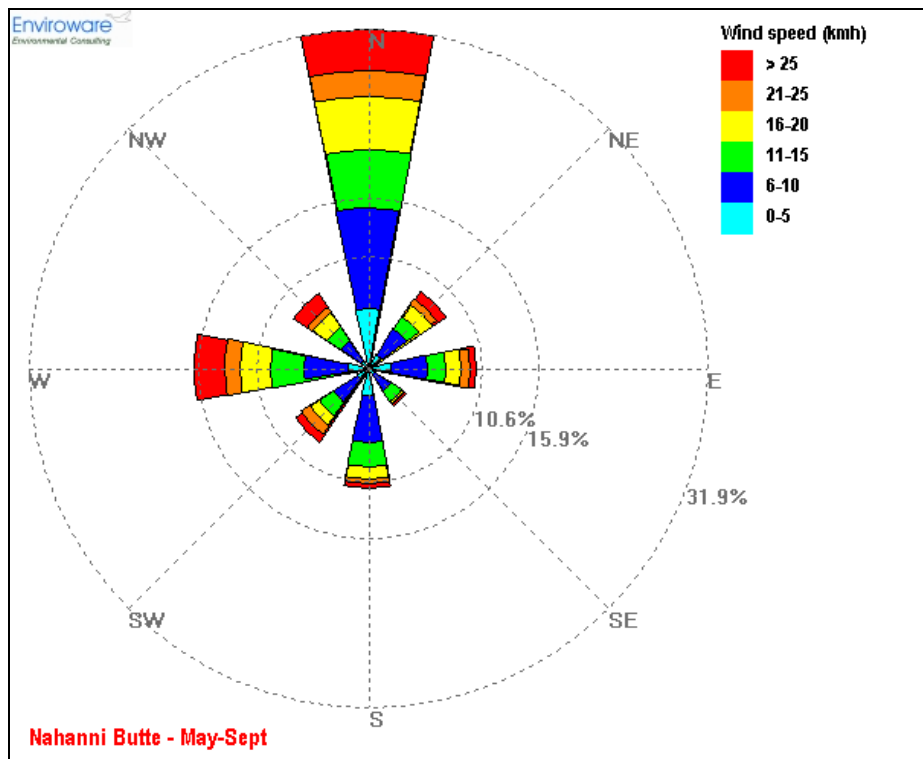
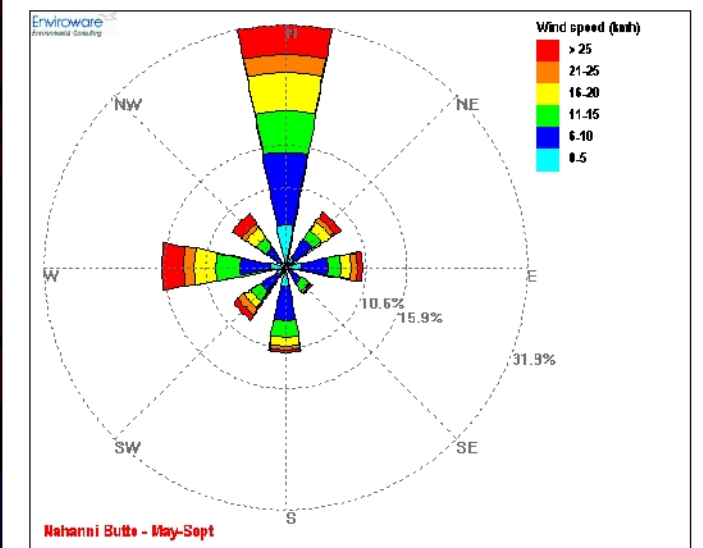
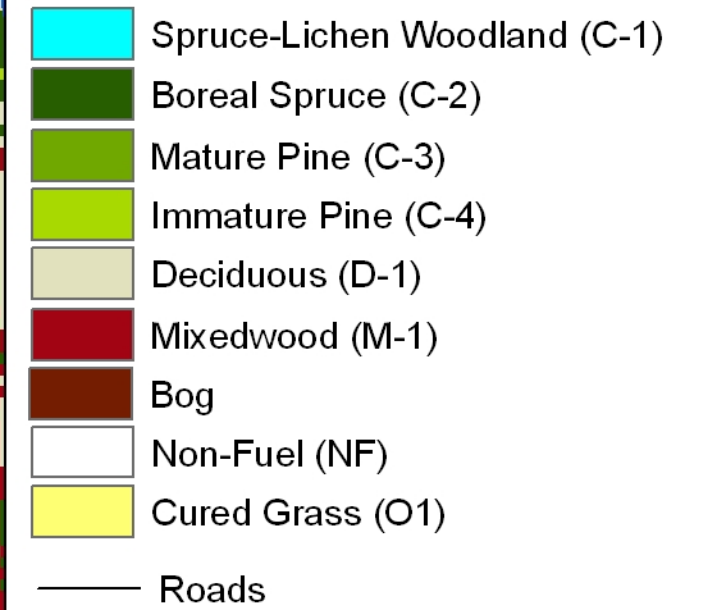


Figure 1 – Nahanni Butte Windrose

Wildland fuel types and fire weather data indicates a Low potential for intense landscape-level wildfire exists in D-1 and M-1 fuels surrounding Nahanni Butte.

Map 3 - Fuel Types Nahanni Butte

FBP Fuel Type



1:20,000

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.

Section 3.2 identified a Low potential for intense landscape-level wildfire in the lands surrounding Nahanni Butte.

FireSmart hazard for Nahanni Butte is predominantly Low to Moderate. Fuel types include non-fuel (NF), cured-grass O1), deciduous (D-1) with a moderately dense spruce understory, mixedwood (M-1) and isolated patches of boreal spruce (C-2). Exterior structure materials are primarily asphalt shingle or metal roofing and wood, log, metal or hardi-plank siding. Access roads are all-weather loop design. The highest wildfire threat is to dwellings in the new development on the east perimeter of town.



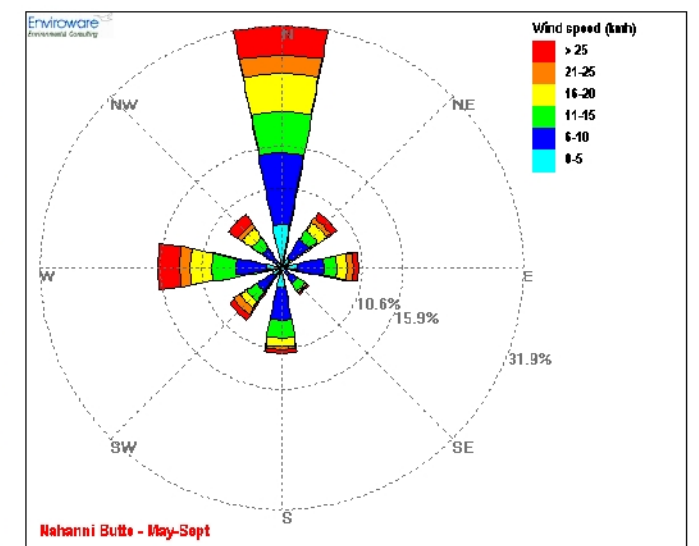
The threat of significant structure loss from wildfire in Nahanni Butte is predominantly Low to Moderate.

Map 4 - FireSmart Hazard Nahanni Butte

FireSmart Hazard

- Low
- Moderate
- High
- Extreme

— Roads



1:20,000

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.

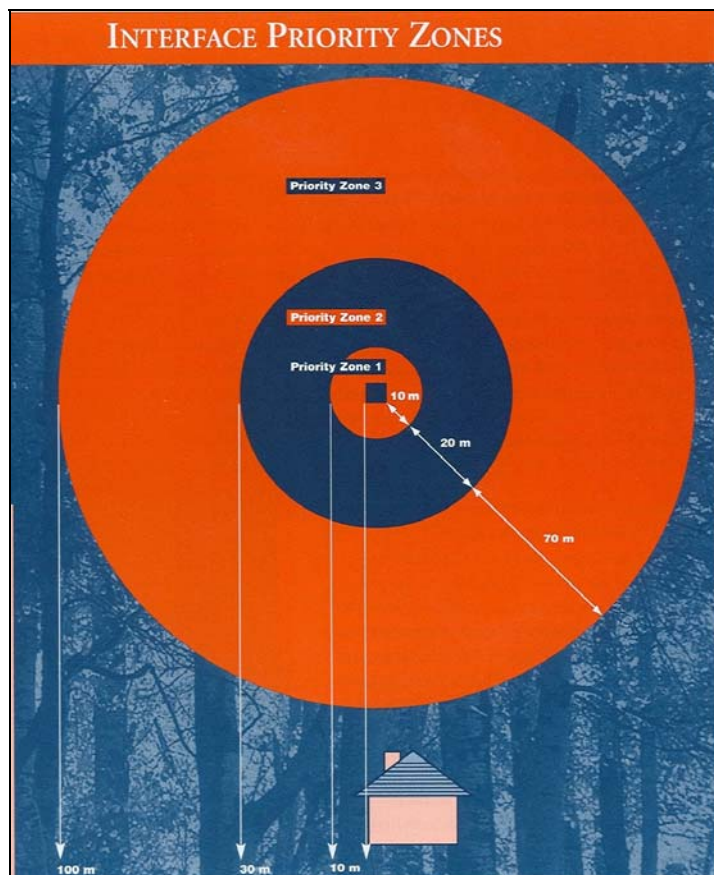


Figure 3 – Interface Priority Zones (PIP, 2003)

4.1 Existing Vegetation Management

Fuels removal projects have been completed in the planning area by the GNWT ENR Department (Map 5 & Table 3).

Table 3: Existing Vegetation Management Areas

Name	Area (ha)	Year	Agency	Comments
West-Side Fireguard	3.8	1990's	GNWT ENR	
East-Side Fireguard	2.7	2010	GNWT ENR	Requires completion work

Fireguards were constructed in the 1990's on the west-side and in 2010 on the east-side of Nahanni Butte. The 1990's west-side fireguard was cleared to a minimum width of 30 metres and is still effective. The 2010 east-side fireguard was constructed to approximately 20 metres in width and requires widening to a minimum of 30 metres, organics removal, and debris disposal.



West-Side Fireguard



East-Side Fireguard

4.2 Proposed Vegetation Management

4.2.1 Zone 1

Zone 1 vegetation management is predominantly adequate throughout the area except for scattered structures with lack of adequate Zone 1 defensible space from native grass fuels (O1).

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 on the east and south perimeters of the community to reduce the threat of wildfire in D-1/M-1 fuels inside the fireguard 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	3.8	<ul style="list-style-type: none"> Fuels removal to <u>complete and widen</u> 2010 fireguard to minimum 30 m width along east-perimeter of town Remove organic layer with heavy-equipment Dispose of all debris from past and present fuels removal by burning 	<ul style="list-style-type: none"> Commissioner GNWT ENR
2	9.2	<ul style="list-style-type: none"> Fuels reduction to space understory spruce to minimum of 2 metre crown spacing for a minimum of 75 metres width behind homes Remove all dead standing and down coniferous and deciduous (willow) stems and brush Retain overstory spruce and deciduous stems Prune residual spruce limbs to 2 metres Dispose of all debris by burning 	<ul style="list-style-type: none"> GNWT ENR Indian Affairs
3	3.3	<ul style="list-style-type: none"> Fuels reduction to space understory spruce to minimum of 2 metre crown spacing Remove all dead standing and down coniferous and deciduous (willow) stems and brush Retain overstory spruce and deciduous stems Prune residual spruce limbs to 2 metres Dispose of all debris by burning 	<ul style="list-style-type: none"> GNWT ENR Indian Affairs
Total	16.3		






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.

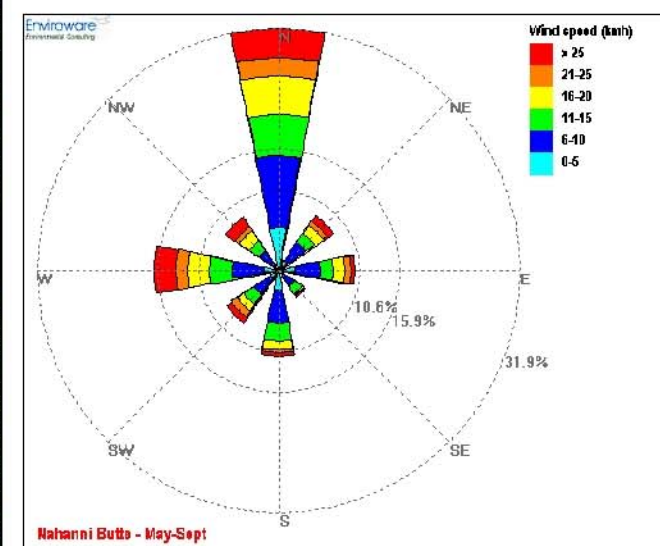
4.3 Vegetation Management Maintenance

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 Nahanni Butte

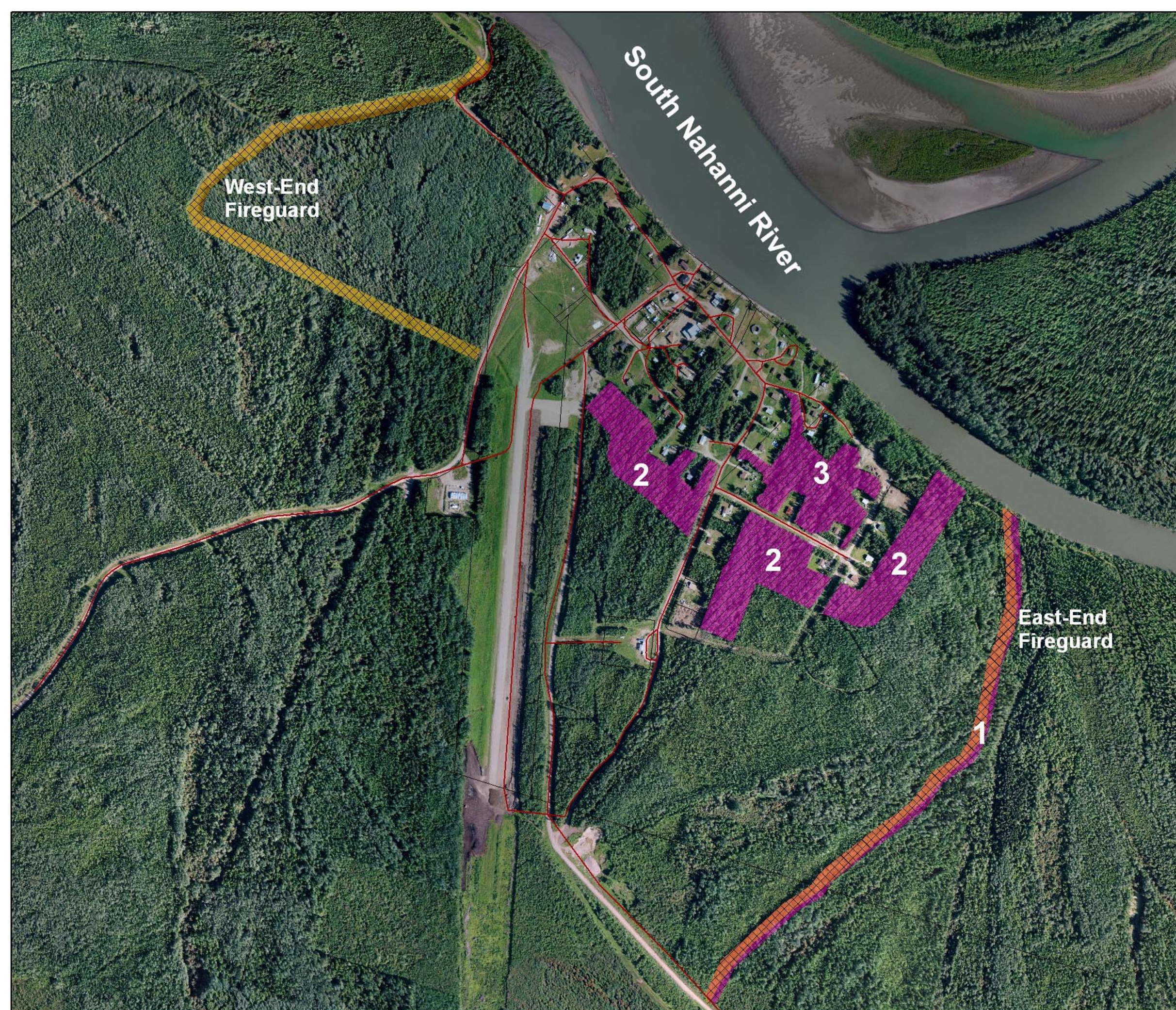
-  Existing Fuel Modification
-  Proposed Fuel Modification
-  Fuel Removal/Clear
-  Fuel Reduce/Thin
-  Roads



1:7,500

MONTANE
Forest Management Ltd.

March 2011



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 and metal and common siding materials are wood, log, metal with hardi-plank on the newer structures.



Several newer structures are elevated above ground on pilings with open undersides, increasing the threat of wildfire entry underneath the structure.

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 adequate for an interface community with primarily all-weather loop road access. Nahanni Butte only has winter-road access at this time requiring the need for early consideration of evacuation.

5.2.2 Water Supply

Nahanni Butte does not have municipal hydrant water-supply. All development areas rely on water-tender supply from the local fire department for structure protection activities. Individual dwellings have cisterns that are tender-supplied from the central water plant.

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 a diesel-powered generator station with above-ground distribution lines.

Gas

Heating fuel is provided by heating oil.

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
- Skirting of structure undersides to reduce the threat of wildfire entry underneath structures

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

- Development and maintenance of FireSmart defensible space surrounding the home
- Skirting of structure undersides to reduce the threat of wildfire entry underneath structures

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:

- Nahanni Butte First Nation
- 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 Nahanni Butte 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: Nahanni Butte 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 Nahanni Butte 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 Nahanni Butte 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 Nahanni Butte First Nation
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 Indian Affairs Branch
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 Indian Affairs Branch

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 Nahanni Butte First Nation

Public Education

Issue	Recommendation	Responsible Agency
Public Education Priorities	Recommendation 5: Public education on acceptable FireSmart Zone 1 standards is recommended for all Nahanni Butte residents. Priority items include: <ul style="list-style-type: none"> ▪ Development and maintenance of FireSmart defensible space surrounding the home ▪ Skirting of structure undersides to reduce the threat of wildfire entry underneath structures 	GNWT ENR Nahanni Butte First Nation

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 MACA & ENR Nahanni Butte First Nation
Cross-Training	Recommendation 7: Nahanni Butte 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 Nahanni Butte First Nation

Emergency Planning

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