

Norman Wells Community Wildfire Protection Plan

Part 2: Wildfire Risk Analysis & Fuel Management Plan



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Submitted to

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1.0 Introduction

This Wildfire Risk Analysis & Fuel Management Plan is the second part of the Community Wildfire Protection Plan for the community. This second part contains both the results of the GIS analysis for the Wildfire Risk to the community and recommendations for mitigating this risk. Additionally, it also addresses the fuel hazard to the community with treatment prescriptions for interface fuel hazards, as well as providing locations for pre-attack fuel breaks.

Maps of a smaller scale have been included in Appendix A to provide a more detailed view of the community.

2.0 Risk of Ignition

Risk of ignition involves analysing the potential locations where a human caused ignition could occur. It is based on the location and distance from such features as roadways, trails, recreation sites, camping areas, industrial sites, rail lines and other locations where human caused ignitions may be prevalent. The further away from these locations the lower the risk of a human caused fire due to lack of access.

The following figure shows the risk of ignition for the community.

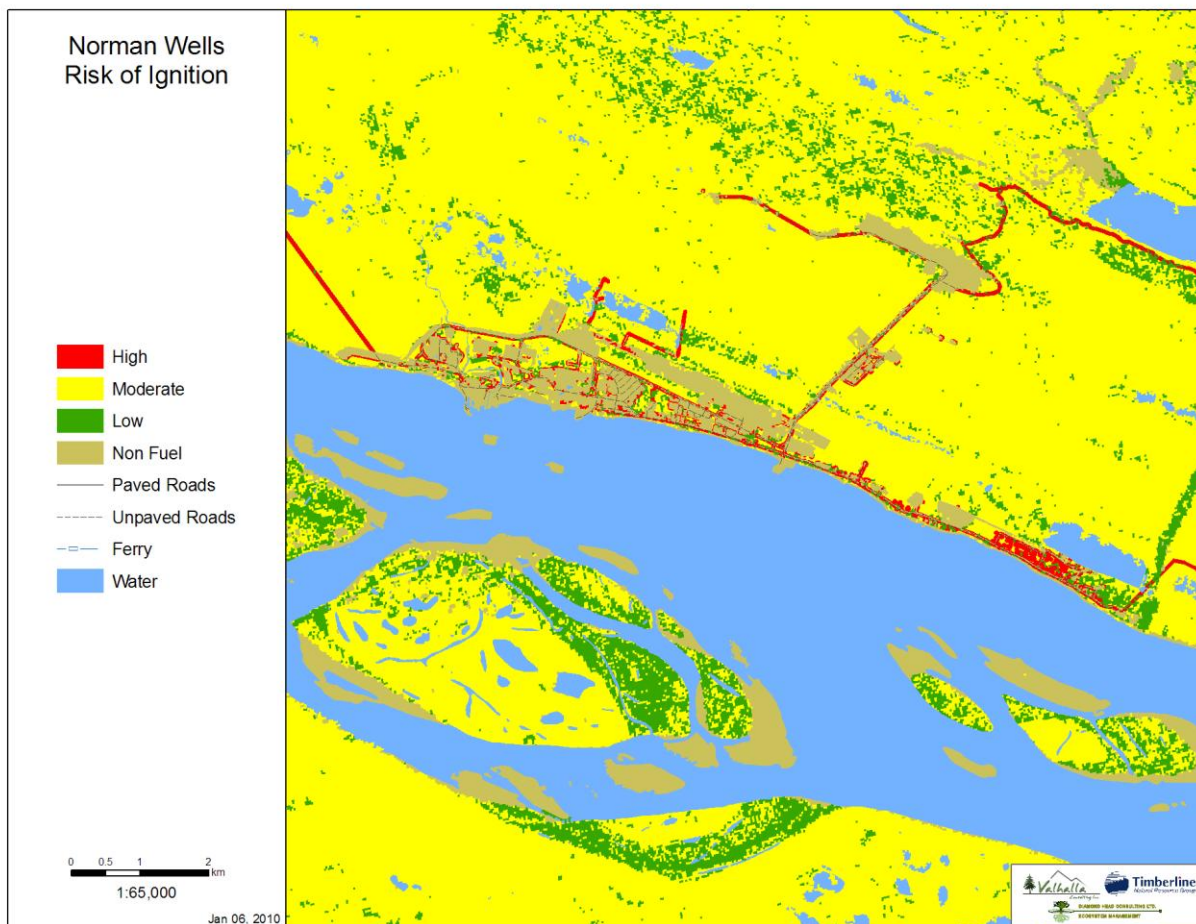


Figure 1: Risk of ignition map.

The analysis shows that the predominant risk of ignition is associated with the roadways in the community. The types of ignition within the community are likely to be from a house fire, a vehicle or equipment accident on the roadways, discarded cigarettes from recreation users or an industrial accident.

To reduce the risk associated with roadways, road side ditches that contain cured grasses in the summer should be mowed prior the fire season and then not again until the fire season has passed. This will reduce the easily ignitable fuel loading typical of roadside ditches (standing

cured grass) and reduce the ignition potential associated with mowing equipment during the dry fire season. Community or government employees or contractors operating mowing or brushing equipment should be aware of the existing daily fire danger. Plans for mitigating ignition risk and for dealing with an ignition should be understood by the operators or contractors undertaking these operations.

Dead and dying trees located within striking distance of distribution lines should be removed prior to each fire season so as to mitigate the risk they pose to both the power lines and the ignition risk. It is important that the whole tree is removed (not just the branches), particularly where large quantities may be felled and where these locations are within close proximity of significant surface fuel loading.

The above recommendations are of particular importance where they exist within 100m of the community interface.

During the summer, signs should be posted at key locations in the community showing the fire danger rating. Efforts should be made to remind residents as to the common risks of ignition around the community and the appropriate emergency numbers to contact in the event they detect a wildfire.

The local Fire Rescue Department should be aware of potential high risk areas and monitor them closely during the fire season.

Fuel management treatment areas and landscape fuel breaks recommended later in this report will assist with lowering the interface risk.

3.0 Suppression Constraints

Suppression constraints indicate areas for which there will be difficulty undertaking suppression activities. These are areas with poor access, steep slopes or where there is either a lack of water or a long distance to a water source.

The following figure illustrates the suppression constraints for the community.

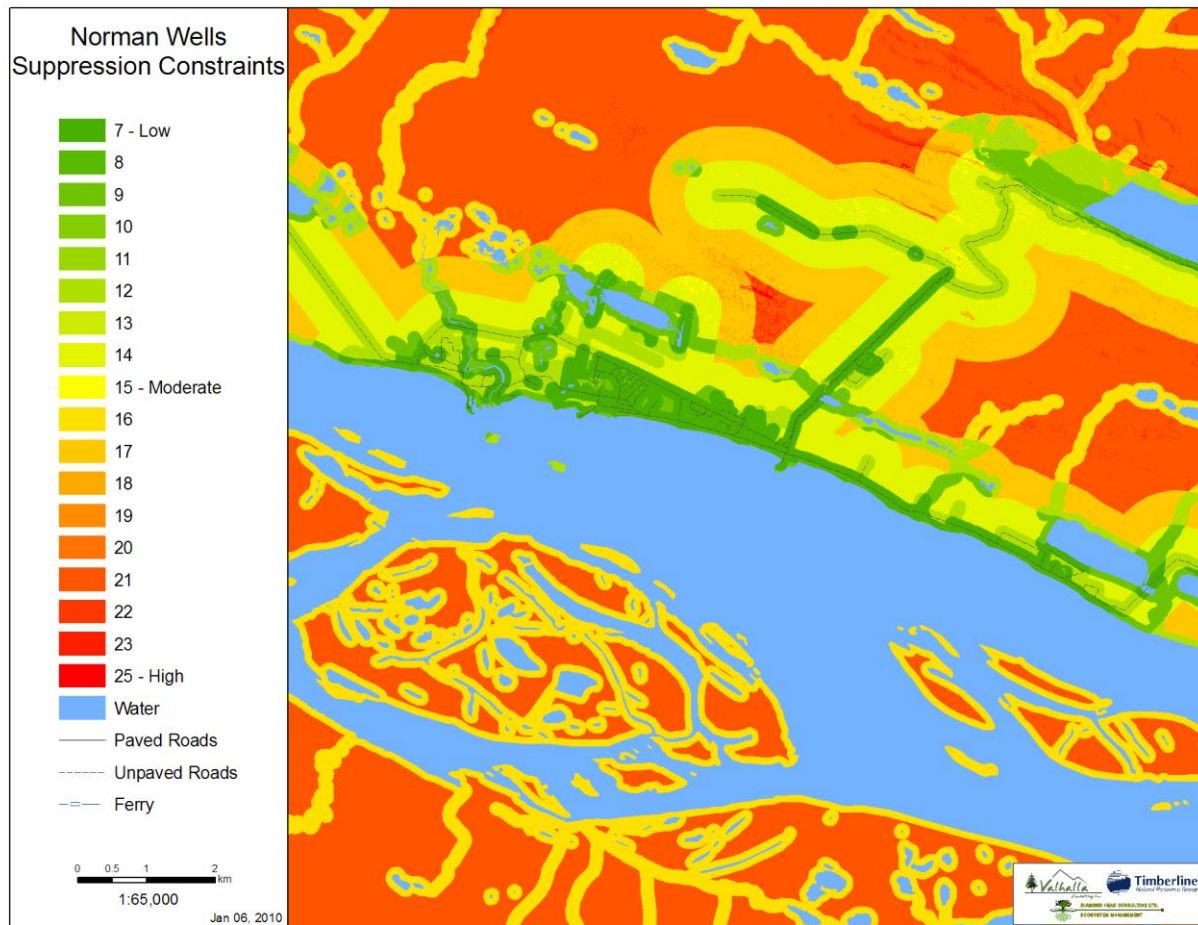


Figure 2: Suppression constraints map.

For the most part, suppression constraints in the community are minimal. The areas indicated as high are associated with the more remote locations further from water sources and roadways.

There is not much that can be done, or should be done, with the current suppression constraint condition to reduce this constraint any further. However, if development moves into areas where the mapping indicates there is a higher level of constraint (orange/red areas on the map), consideration should be given to ensure that the new development in this area has good access (roadways).

For any new developments, constraints associated with water availability can be reduced by installing a local hydrant system, by improving access to natural water bodies or by constructing strategically located water bodies within the development area. Access to these water bodies should be such that fire suppression crews can use them to fill their trucks or set up pumps in the water body to directly action a fire.

Constraints associated with access can generally be reduced by creating or improving roads or trails that can allow suppression crews to reach areas with poor access (those indicated in red on the map) or through the construction of additional roads for suppression vehicles. Alternatively, these high rated areas could be separated from the community by creating fuel breaks in tactical locations from which suppression crews can anchor their suppression tactics.

It should be noted that while improving access can reduce suppression constraints, it can increase the recreational use of an area, thereby increasing the potential for human ignition from recreational users.

It is not recommended that trails or roads be constructed into the constrained areas adjacent to the community at this time. This is due to the fact that most of these areas are well clear of the interface and improved access would have little utility to interface protection. Conversely, it is more likely that improved access would result in increased risk of ignition in these areas.

4.0 Natural Features at Risk

The natural features at risk layer illustrates where special natural features are located within the community. Natural features at risk were ranked according to their rarity and sensitivity to human impacts. These features could be negatively impacted by a wildfire or associated fuel hazard abatement treatments.

It should be noted that First Nation values are not available through the government data bases. Similarly, due to the sensitive nature of the information we do not pursue this information for inclusions in our analysis. In the event fuel treatments are planned and implemented the local First Nations should be contacted to ensure that known local cultural heritage features are considered in the prescription development phase.

The following legend corresponds to the map colours and their associated natural features at risk:

- Green – ephemeral streams
- Yellow – Ungulate winter range, old growth, perennial streams and riparian areas, blue listed species, critical wildlife habitat
- Red – Red listed species

The following map shows the location of these features.

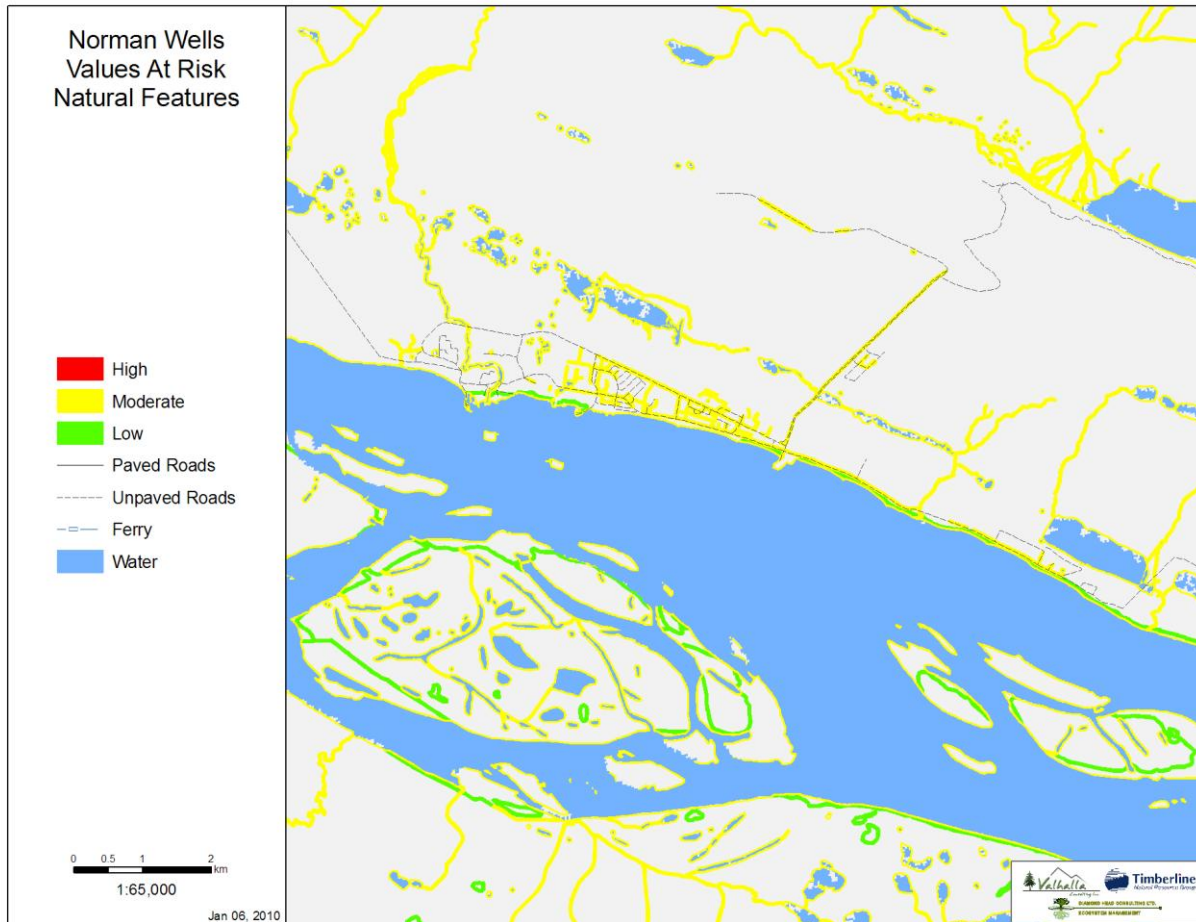


Figure 3: Natural features at risk map

The protection of natural features must be considered when planning any fuel mitigation or ecosystem restoration works. If planned works may negatively impact the natural features at risk, minimal-impact treatment alternatives should be considered such as creating a fuel break around the area to protect it from an adjacent fire, reducing suppression constraints by improving access and increasing water availability or by mitigating the risk of ignition by reducing causes of ignition within and adjacent to the area.

As part of the development of treatment prescriptions, the forest/fire professional should ensure that any treatment recommendation recognizes these values and accommodates them in the prescription or, if this is not feasible, removes them from the treatment area with an appropriate 'no treatment' buffer.

The only natural features that exist are of a low to moderate ranking and are associated with water features. The prescriptions provided for the community should not have any impact on the natural features at risk as stated. If other natural features are discovered by the contractor or operator, then operations should cease and these features reviewed by a forestry professional.

5.0 Structures and Features at Risk

Developments at risk from a wildfire are indicated in the map below by the red (30M), yellow (100m) and green (2km) buffered circles. The risk level increases with the proximity to these structures.

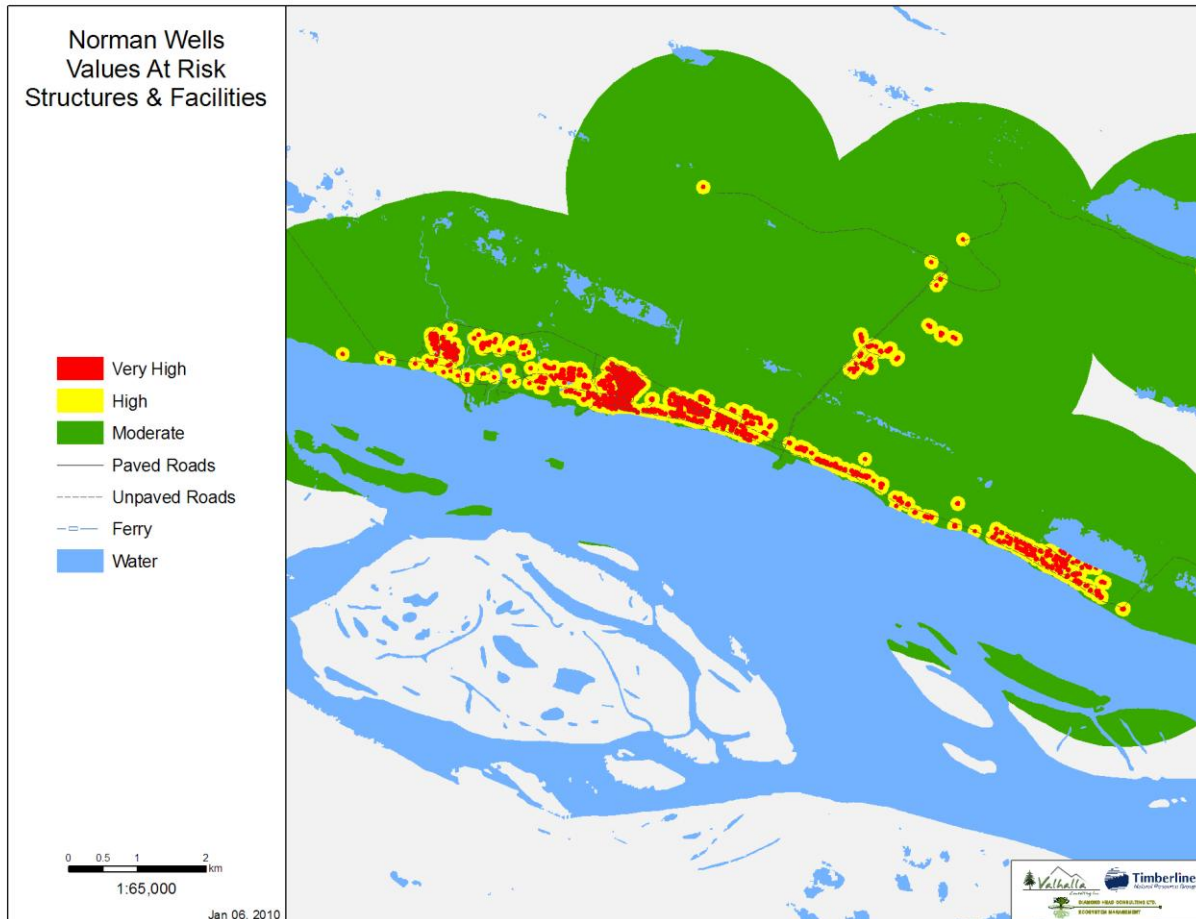


Figure 4: Structures at risk map.

Generally, the structures are clustered into closely packed groups within close proximity of the community core. Grouped structures, by their characteristic of being in close proximity to each other, increase the likelihood that the ignition of one home could contribute to the ignition of another. Protecting such grouped structures may pose a challenge for the fire department. However, protecting grouped structures through fuel abatement treatments is more cost effective compared with homes that are spread out and surrounded by extensive stands of trees on more than one side of the structures.

While isolated, individual structures decrease the opportunity for fire to move directly from one home to the next, the cost per home of reducing wildfire risk through fuel treatments of such individual structures is greater than that of grouped structures. There are several occurrences

within the community where there are isolated, individual buildings, generally located out into the wildland region.

Structures are best protected by treating fuels around them to a distance ranging from 10-100m or more depending on the fuel characteristics and slope. The FireSmart manual contains a number of guidelines for treating fuels around homes and provides a good baseline of information for homeowners. However, it should be noted that FireSmart guidelines do not consider ecology and may not be ecologically accurate for the area being treated. As such, a qualified professional with experience in wildfire management and an understanding of ecosystem dynamics and attributes should be retained to develop appropriate treatment prescriptions.

FireSmart also contains numerous suggestions for altering the characteristics of structures in order to improve their survivability. The FireSmart manual should be referred to for these guidelines. Some of these recommendations are summarised in Appendix E from Part 1 of this CWPP.

The ENR should recommend to homeowners that they reduce the fuels on their property as per FireSmart guidelines, particularly for the aforementioned individual structures away from the community core.

6.0 Potential Fire Behavior

Fire behavior is a function of fuel, weather, and topography. It can be calculated using a model that predicts potential fire behaviour potential on fuel classification, slope, aspect and weather conditions that are both historical and site specific.

The following map shows the fire behavior rating for the community.

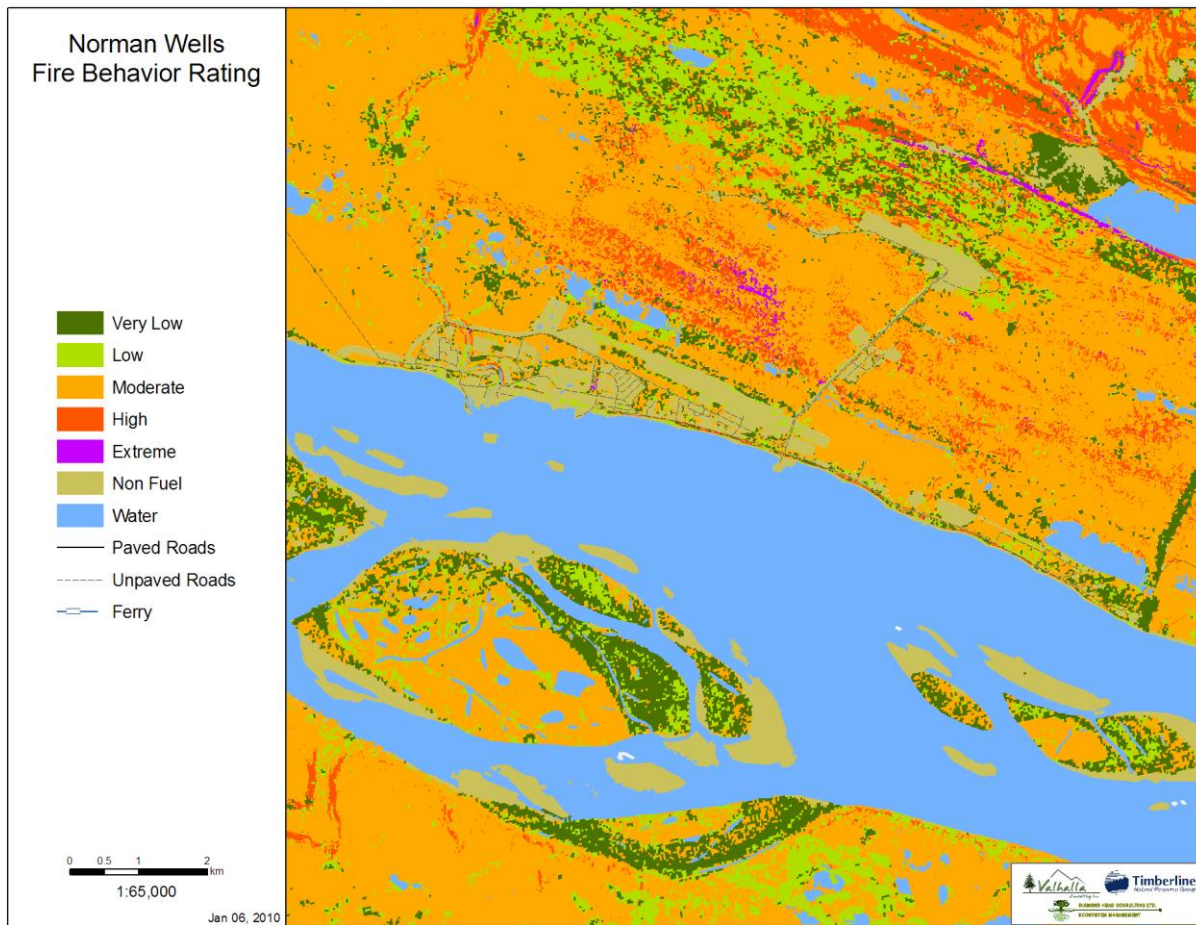


Figure 5: Potential fire behavior map.

The fire behaviour map can be used in two ways: to determine where high fire behavior areas are that require treatment and to assist in the safe development of future neighbourhoods.

There are two options for addressing areas with high fire behaviour potential. The first is to isolate the risk by treating around the high hazard fuel type. This may be done by treating the area surrounding the hazard to reduce the opportunity that a fire within the unit will spread, or to reduce the chance that a fire will move into the high risk fuel hazard.

The second option is to directly treat the high fire behavior fuel type itself. The treatment prescription should be ecologically appropriate and reduce the fire behavior to moderate or less. It should be oriented towards ecosystem restoration (returning ecosystems to a historical and healthy condition) with fuel management and fire behavior reduction being by-products of the ecosystem restoration objectives.

It would not be economically feasible to treat the whole area adjacent to the community that had high fire behaviour potential. The most feasible means of providing protection to the community is through interface fuel treatments and the development of landscape level fuel breaks.

The impact of treatments on natural values at risk must be considered. Professionals should be consulted to ensure fire behavior reduction can be achieved without negatively impacting sensitive natural features. Treatments should be addressed as per the findings and recommendations within this report.

The second way to use the fire behavior map is to illustrate the potential risk to proposed future developments in certain areas. When a development is being considered, the development footprint can be overlaid with the fire behavior potential map to show the potential fire behavior adjacent to the development site. This is important for two reasons: it shows the community the potential future risk to the proposed neighbourhood or development and the need to address this risk as part of the development. Secondly, it demonstrates the potential risk of a fire during the construction phase.

From the above, the community should ensure that the adjacent risk to any proposed development is abated concurrent with construction and as part of the terms of the development permitting. Secondly, the permitting body or the Fire Rescue Department should require all construction contractors for developments in high risk areas be aware of their high risk construction activities and have a construction fire management plan in place prior to the fire season.

As seen on the map, there are vast areas with a moderate fire behaviour potential immediately adjacent to the community that extend into the community from the wildland. This surrounding forested area forms a continuous fuel supply into the community or presents a spotting potential to the community.

The stands adjacent to the community are difficult to treat further as they are already fairly low in density with the highest fuel hazard being the surface organic layer and its ease of ignition. While further thinning of the meagre overstory would reduce some fuel loading, and subsequently lower the fire behaviour potential, the real hazard to the community is the spotting hazard into the community from an adjacent fire. This risk is easier mitigated by working with landowners to undertake FireSmart work on their property.

7.0 Final Wildfire Risk

The final threat is a summation of the five subcomponents previously discussed. The following map shows the final wildfire threat for the community.

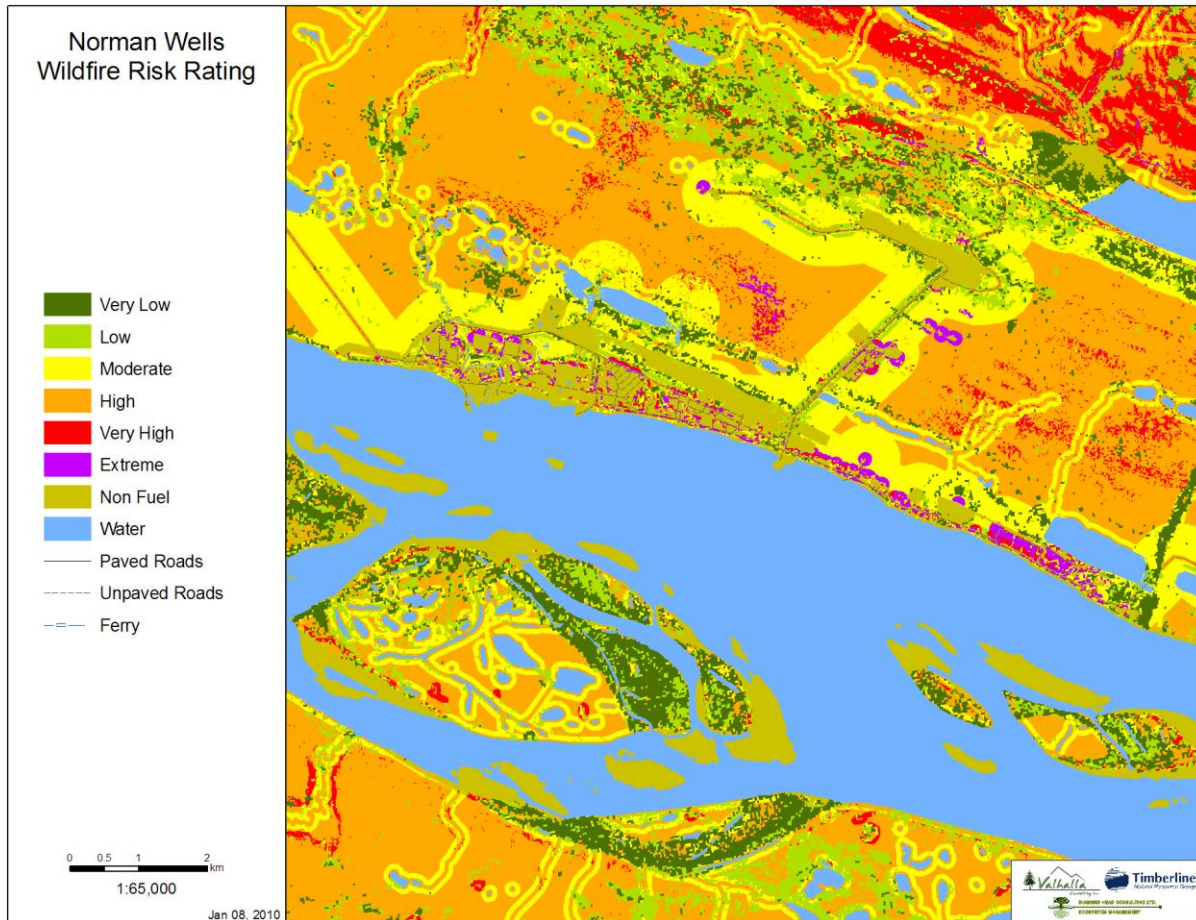


Figure 6: Final wildfire risk.

Since each sub layer contributes to the final risk, one can determine why a specific area has the threat value it does by examining the sub layer maps for the community. Therefore, to reduce the risk, one can target actions toward the most significantly contributing sub layer (improve water/road access, reduce the ignition potential, abate fuel hazards, etc).

Of particular interest, and concern, are the extreme ratings that exist on private property within the community. The greatest contributing factors to the high risk adjacent to the village is the high fire behavior potential exhibited by these interface stands and their proximity to homes. Therefore, it is strongly recommended that an aggressive public information program be undertaken as a means of stressing the importance of private landowners to reduce the fuel hazard on their property.

8.0 Interface Fuel Hazard Treatment Prescriptions

An interface fuel hazard review was completed for the community. This review examined interface stands for the hazard they presented to the community and provided recommendations on how they should be treated.

The following map illustrates those interface polygons for which we are recommending fuel treatment operations be undertaken.



Figure 7: Priority interface treatment polygons.

It should be noted that polygon boundaries are based on a 100 m distance from structures. The actual boundaries may be extended or decreased to coincide with existing fuel breaks (roads, trails, canopy gaps, etc) and the treatment distance from structures should be extended on steeper slopes. As such, the actual area being treated may be more or less than that shown on the map.

Treatment for these polygons is generally going to consist of thinning, pruning and some type of debris management. Management of debris, depending on access and budgets may range from whole stem removal, pile and burn or chip and remove. Rather than piling and burning merchantable timber, there may be the option for removal of timber to a mill.

When these areas are treated they should provide an area of reduced fuel loading within which, when a wildfire enters it, the wildfire should be limited to movement on the ground (i.e. change from a crown fire to a surface fire) and be of less intensity. The more open canopy within the fuel break should improve the effectiveness of aerial suppression tactics and allow for easier construction of fire breaks by heavy equipment thereby easing and quickening the construction of machine fuel guards. The above factors should all contribute to a higher success for suppression tactics.

It should be noted that opening up these stands will increase wind speed within the stand and thus increase the surface rate of spread. While the likely fuel types of grass and shrubs can contribute to rapid rates of spread, the improved aerial suppression abilities associated with the more open canopy should offset this. Additionally, if large woody surface fuel is reduced significantly, then fire intensity should be low.

Wood that is felled using government funding with the intention of sending the wood to the mill may need to be auctioned as a 'deck sale' to avoid conflict with the Softwood Lumber Agreement (if applicable to the NWT). To meet the definition of fuel management, and achieve fuel reduction objectives, the fuel hazard associated with tops, branches and non merchantable wood should be mitigated through appropriate debris management techniques.

Polygon 1 is already a moderately open stand with a heavy organic layer. While reducing the overstory component will reduce some fire behavior, there will still exist a high rate of spread potential due to the heavy organic layer as well as the increased wind speeds that can be expected in the more open stand.

Polygon 2 is a park and a campground. The stand density in the campground is very high (>5,000 sph). However, this high density provides a visual screen for both campers and the adjacent private residence. While reducing this density to <500 sph would greatly reduce the potential fire behavior associated with the fuels, it would also reduce the visual buffer provided by the stand. The prescription for this polygon has been included below but ENR should confer with the park operator/manager and the local resident as to the above effects that will be realized from the reduction in stand density.

The following prescriptions should be implemented within the interface stands as delineated on the map.

Polygon	State	<5 (cm)	5-10 (cm)	10-20 (cm)	20+ (cm)	Totals	Species
1	<i>Pre-treatment DENSITY (approx. stems/ha)</i>	0 700	0 900	0 600	0 0	0 2000	Pine Spruce
1	<i>Prescription</i>	<ul style="list-style-type: none"> Thin all trees <10cm dbh and 50% of those trees 10-20cm dbh (target a residual of ~300 sph in the overstory). Leave 200-300 sph of the evenly distributed pine/spruce (~50% of each species) of regeneration <1.3m tall. Leave all deciduous that are safe to do so Create gaps where they exist or crown breaks between evenly distributed overstory stems. Pile and burn debris in gaps and well clear of residuals trees (> 5 away) <u>or</u> chip and remove. Some removed stems may be suitable as firewood. 					
2	<i>Pre-treatment DENSITY (approx. stems/ha)</i>	0 3500+	0 1300+	0 900	0 400	0 5100+	Pine Spruce
2	<i>Prescription</i>	<ul style="list-style-type: none"> Thin all trees <10cm dbh and 50% of those trees 10-20cm dbh (target a residual of ~800 sph in the overstory). Leave 400 sph of the evenly distributed pine/spruce (~50% of each species) of regeneration <1.3m tall. Leave all deciduous that are safe to do so Create gaps where they exist or crown breaks between evenly distributed overstory stems. Pile and burn debris in gaps and well clear of residuals trees (> 5 away) <u>or</u> chip and remove. Some removed stems may be suitable as firewood. 					
Polygon	State	<5 (cm)	5-10 (cm)	10-20 (cm)	20+ (cm)	Totals	Species

9.0 Landscape Level Fuel and Fire Breaks

Landscape level fuel breaks are large areas within which fuel treatment operations are implemented to provide an area of reduced fire behavior potential. When developed, these breaks can serve to slow down a fire that enters the fuel break. Additionally, due to the lower fuel loading, these breaks can also provide an anchor point from which professional suppression crews can safely anchor their suppression tactics and operations.

Fire breaks are areas containing no fuel intended to stop the spread of a fire or from which suppression tactics, such as back burning, can be anchored.

There are two existing fire breaks up river (southeast) of the community that provide an anchor point for suppression tactics. Additionally, the river provides a buffer to the community as does the old fire immediately northwest (up river) of the community. The only remaining continuous fuel source leading into the community is from the mountains to the north. There are several roads, trails, and cut lines between the community and these wildlands from which fire suppression crews could anchor their operations. However, these features have limited utility for burning off as there are scattered individual structures on the wildland side of these anchor points. Obviously, should these structures be engulfed by a wildfire, these fire breaks could be used as burning off locations.

Local knowledge should be sought to determine the necessity for a landscape level fuel break or additional fire breaks upslope of the furthest structures from town.

While the community should initially concentrate on the treatment of interface fuels, future consideration should be given to establishing fuel breaks on the wildland side of pre-existing fire breaks or those natural and human made features that act as firebreaks.

10.0 Maintenance of Treatments and Fuel Breaks

Forested stands are dynamic ecosystems and, over time, they will grow in or otherwise change in age, structure and composition. The impacts of humans and forest pests and pathogens may also have an influence on the stand attributes. As such, in time, there will likely be a need for maintenance in the treated areas.

Section 4.1 - Part 1 of this CWPP states a recommendation for the community to develop some form of a FireSmart Committee, whether it's a group of stakeholders or a single, dedicated community member.

An important responsibility of this committee is to develop a Maintenance Plan to ensure that significant dollars spent on the prescribed fuel treatments/fuel breaks is not wasted as the areas become overgrown with vegetation over the course of time. Leaf bearing (deciduous) trees with their higher moisture content, provide less of a fire threat than needle bearing (coniferous) trees and should be retained. Excessive regeneration of deciduous shrubbery however, can inhibit access by fire personnel, and should be brushed-out at regular intervals.

In regards to landscape level fuel breaks, deciduous vegetation should be permitted, but a 2-3m strip on the "fire side" of the break should be maintained in a "fuel free" status. Without this bare strip, ENR Fire Management personnel may not be able to safely utilize the fuel break for anchoring back-burn operations in the event of a large scale fire burning towards the community.

In the development of these treated areas, the removal of merchantable timber may result in positive revenues being realized (depending on current market conditions, harvesting costs, volume, etc). It may be possible to have this money retained in a 'Fuel Management Trust Fund' where it can accrue interest and be used as a future funding source to perform maintenance treatments.

Alternatively, the suppression crews may be able to provide personnel, fire season permitting, for maintenance on these fuel breaks and within interface polygons as a means of training personnel in chain saw use or faller training. Such arrangements with the local fire region would likely need to be dealt with on an annual basis.

11.0 Conclusion

There are some aspects of the wildfire risk analysis for which there is a low rating for the community. However, there are several results from the analysis that indicate the community is at a high risk to wildfire.

Specifically, the main issue is the high potential fire behavior within the community interface and the vast areas of similar fire behavior immediately west of the community.

The implementation of fuel treatment operations within the recommended interface polygons and the development of landscape level fuel breaks should help mitigate the risks. Additionally, undertaking a seasonal public information program with regards to fire danger should help mitigate the potential for human caused ignitions.

Appendix A: Additional Maps

Norman Wells
(West)
Risk of Ignition

- High
- Moderate
- Low
- Non Fuel
- Paved Roads
- - - Unpaved Roads
- - - Ferry
- Water

0 0.375 0.75 1.5 km
1:40,000

Mar 23, 2010

