

Enterprise Community Wildfire Protection Plan

Part 2: Wildfire Risk Analysis & Fuel Management Plan



15 January 2010

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.

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.

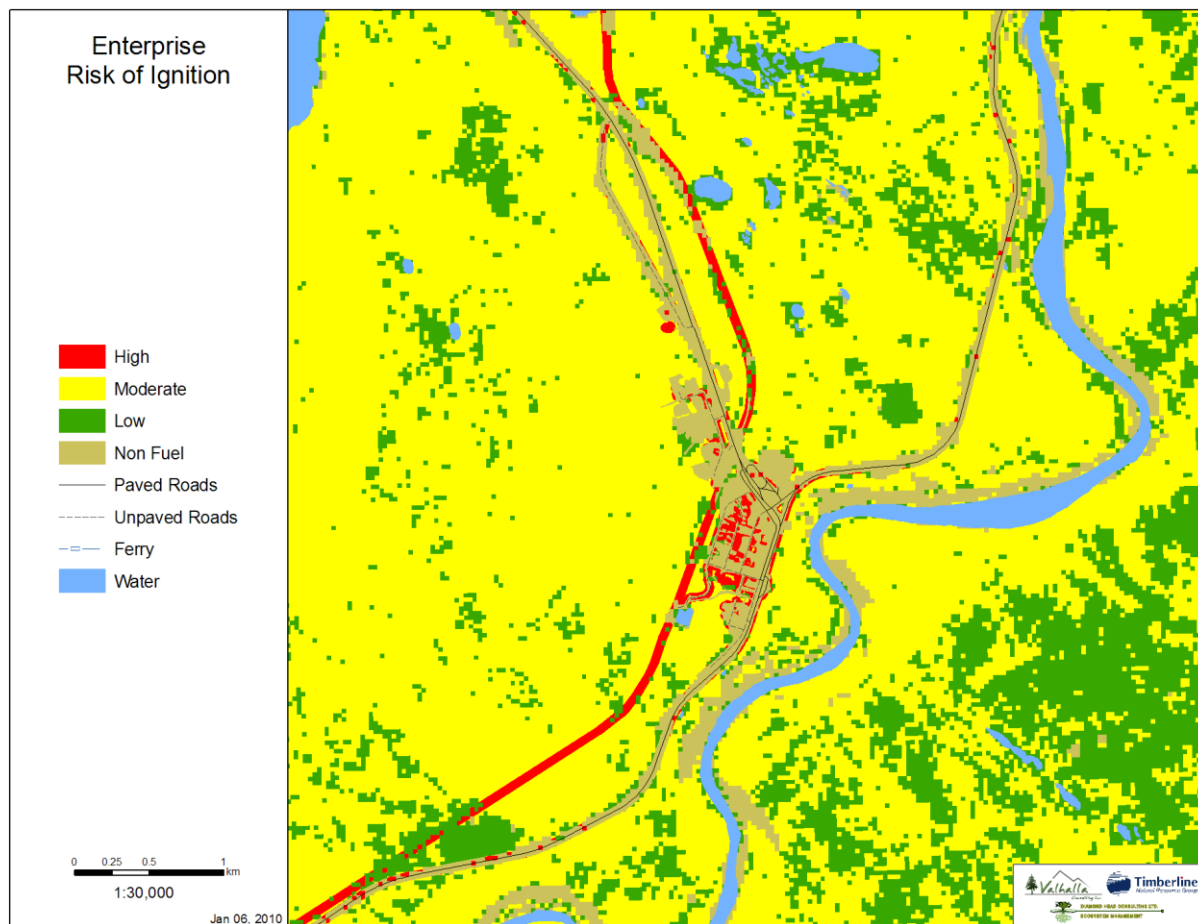


Figure 1: Risk of ignition map.

The analysis shows that the predominant risk of ignition is associated with the roadways in the community and the railway line. 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 sparks from work on the railway or a railcar braking.

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.

The same is true for the right-of-way adjacent to the railway. The community should ensure that the railway operator is regularly mitigating the light fuels (grasses) adjacent to the rail line in a low ignition state. Slag from brake shoes is able to fly some distance from the railroad centre line and this should be considered when monitoring railway maintenance.

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 along the highway showing the fire danger rating and signs posted within the community itself to inform the residents. All residents within the community should be reminded through literature, such as information sheets or signage, 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 is a long distance to a water source.

The following figure illustrates the suppression constraints for the community.

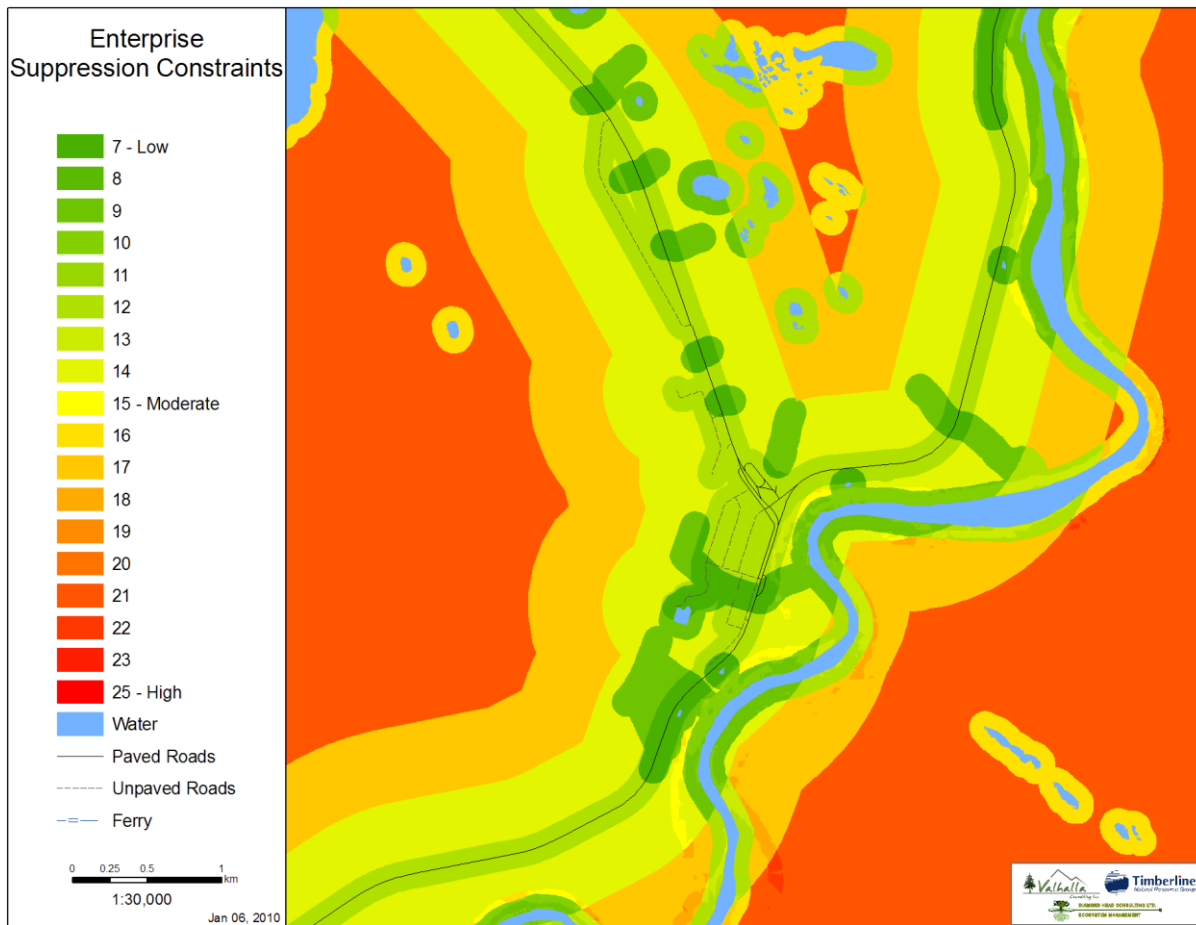


Figure 2: Suppression constraints map.

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.

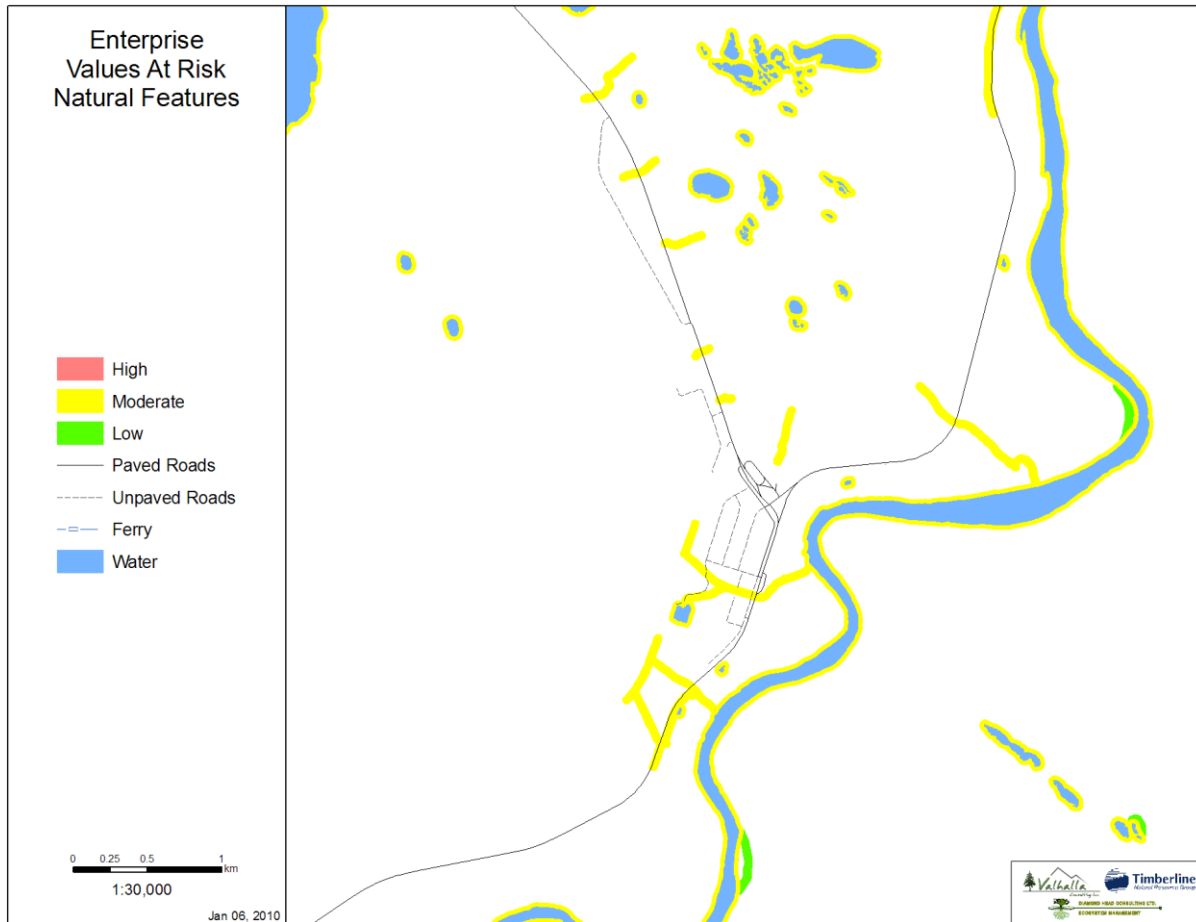


Figure 3: Natural features at risk map

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.

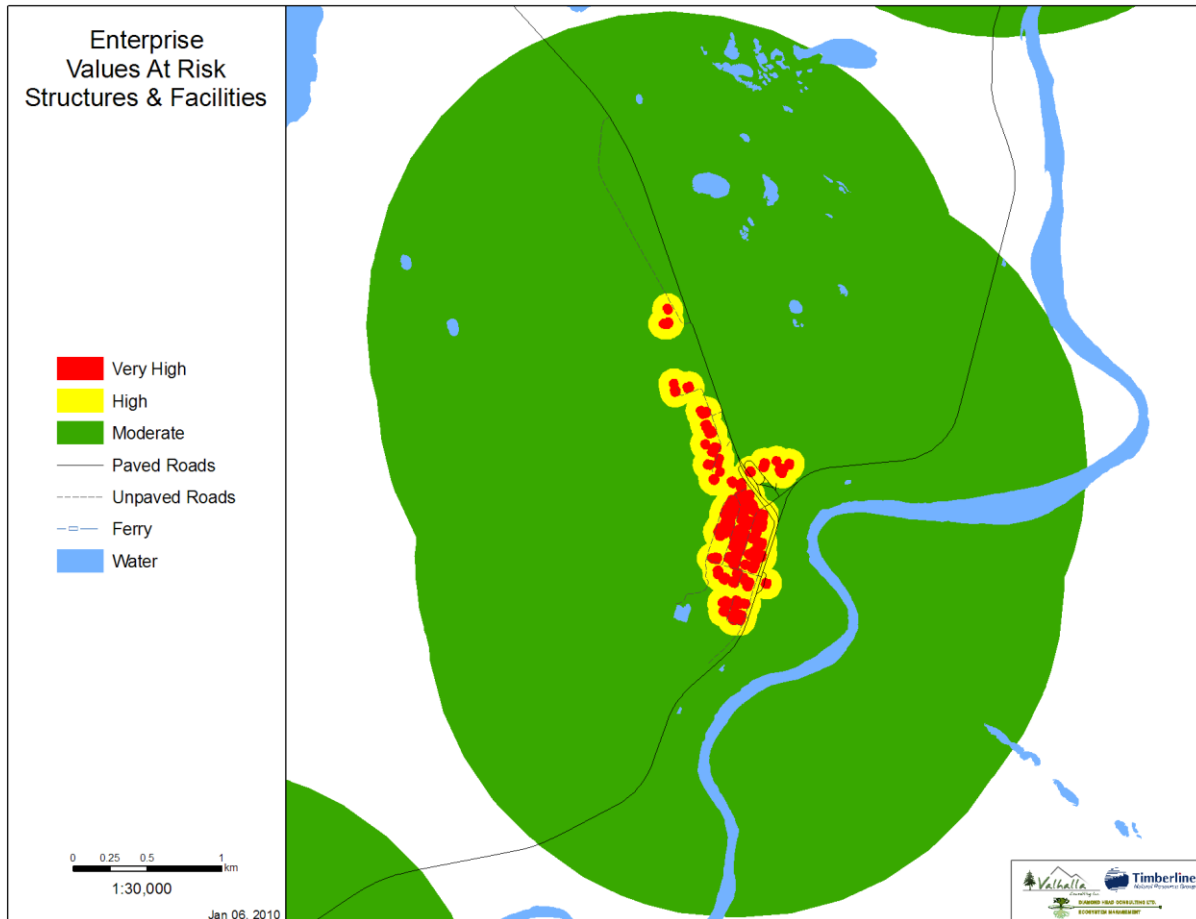


Figure 4: Structures at risk map.

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 very few areas within the community where there are isolated, individual buildings.

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 community should engage in an aggressive fuel management program to mitigate fuel hazards within and adjacent to the wildland urban interface of the community.

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.

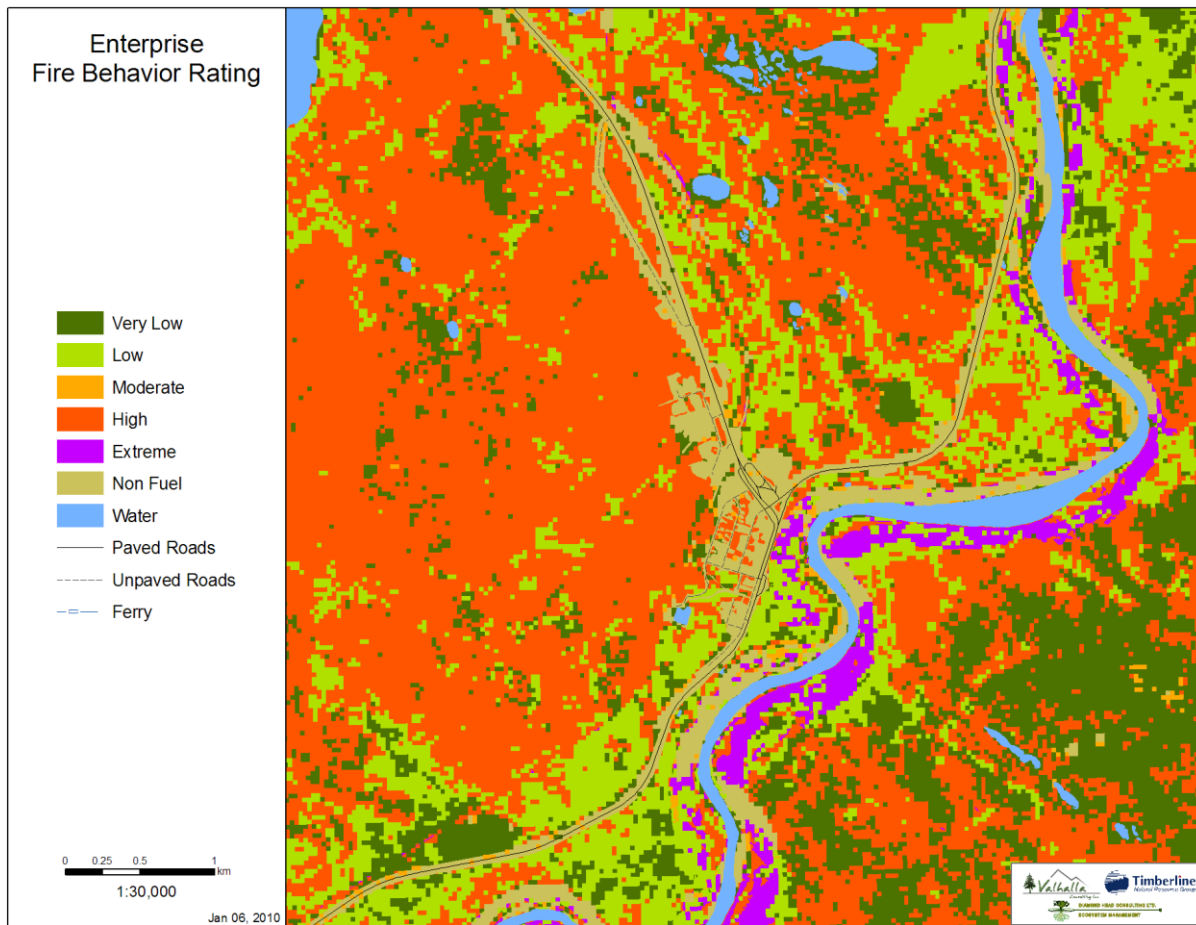


Figure 5: Potential fire behavior map.

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 high fire behaviour potential to the west of the community that extend into the community from the wildland. This surrounding forested area to the west forms a continuous fuel supply into the village or presents a spotting potential to the village. By undertaking the recommended interface fuel treatments the community can reduce the fuel hazard adjacent to the community and provide a safe location from where fire professionals can attempt to protect the homes.

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.

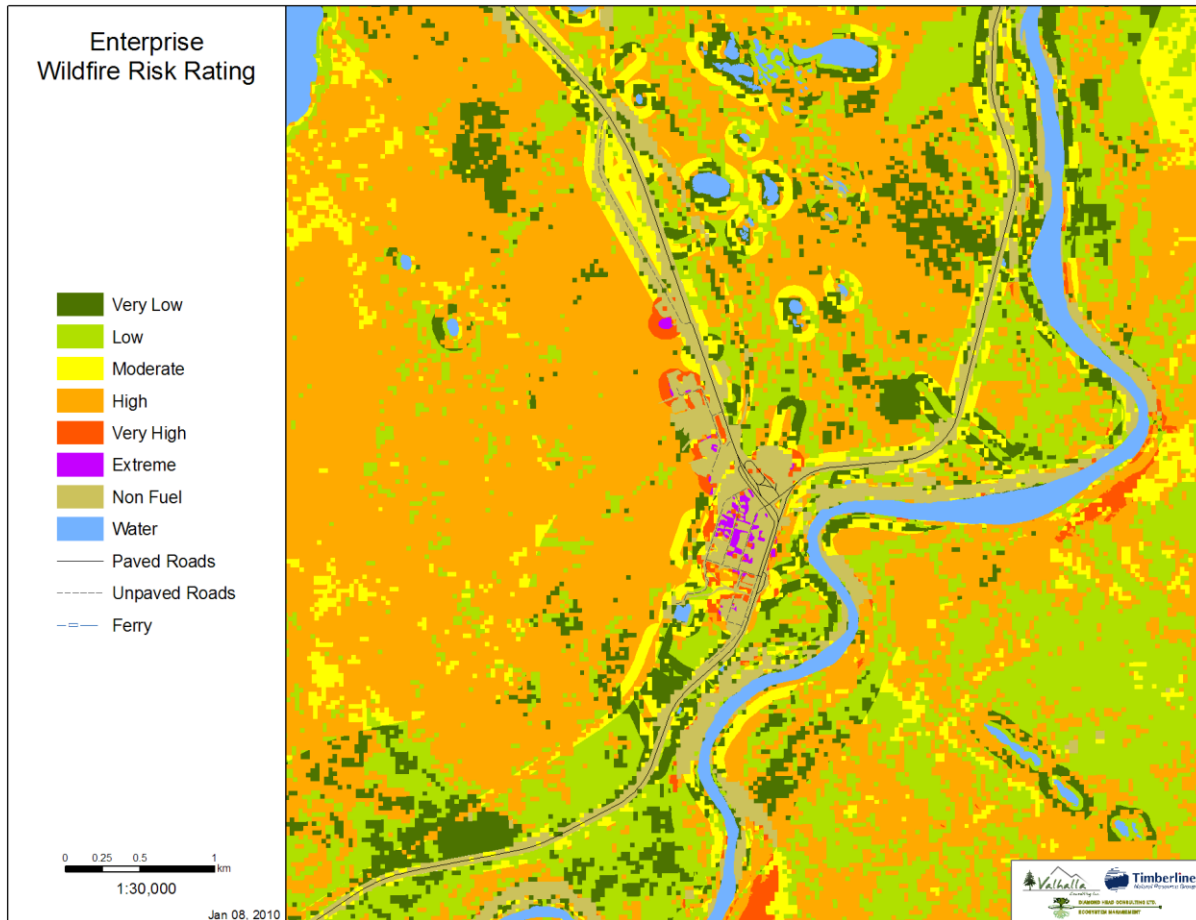


Figure 6: Final wildfire risk.

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 within and immediately adjacent to the village. Some of this area coincides with the interface polygons that were recommended for treatment. The greatest contributing factors to the high risk adjacent to the village is the high fire behavior potential exhibited by the stands in the interface. Therefore, it is strongly recommended that an aggressive and effectively implemented fuel management program be undertaken as a means of significantly reducing this wildfire threat.

Another contributing factor is the risk of ignition (proximity to roads) but this can be considered balanced by the low suppression constraints in the same area. For example, roadsides are prone to ignition but they are also easily accessed due to their roadside nature.

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.

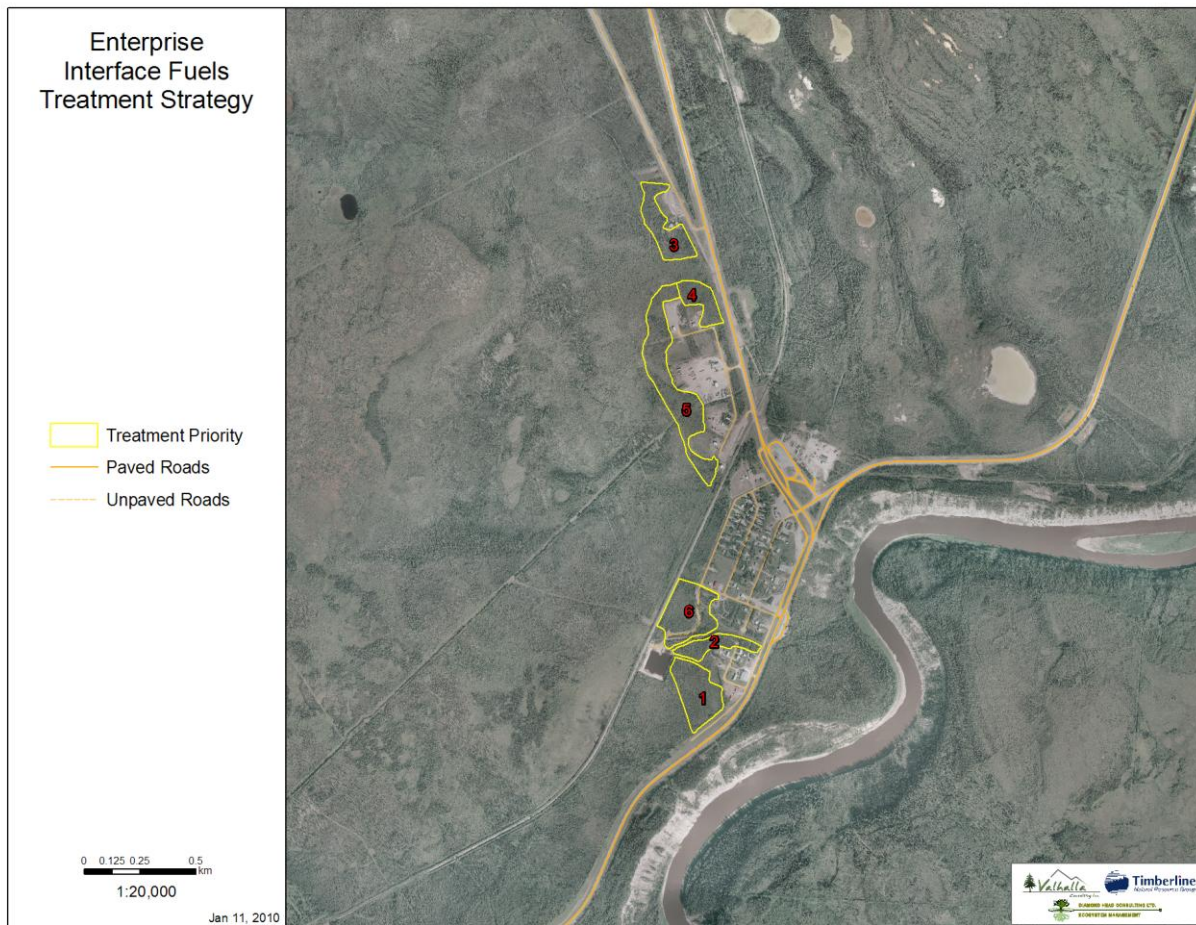


Figure 7: Priority interface treatment polygons.

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 a stand 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.

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	Pre-treatment DENSITY (approx. stems/ha)	0 0	0 1000	200 500	200 100	400 1600	Pine Spruce
1	Prescription	<ul style="list-style-type: none"> Thin all trees <10cm dbh and 80% of those trees 10-20cm dbh (target a residual of ~400 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	Pre-treatment DENSITY (approx. stems/ha)	0 800	0 800	400 100	500 0	900 1700	Pine Spruce
2	Prescription	<ul style="list-style-type: none"> Thin all trees <10cm dbh and 70% of those trees 10-20cm dbh (target a residual of ~500 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. 					
3	Pre-treatment DENSITY (approx. stems/ha)	0 1300	0 700	0 100	0 0	0 2100	Pine Spruce
3	Prescription	<ul style="list-style-type: none"> Thin all trees <5cm dbh and 50% of those trees 10-20cm dbh (target a residual of ~450 sph in the overstory). Leave ~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. 					
4	Pre-treatment DENSITY (approx. stems/ha)	0 3000	0 0	0 400	0 300	0 3700	Pine Spruce
4	Prescription	<ul style="list-style-type: none"> Thin all trees <10cm dbh and 75% of those trees 10-20cm dbh (target a residual of ~400 sph in the overstory). Leave ~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. 					

5	<i>Pre-treatment DENSITY</i> (approx. stems/ha)	0 2000+	100 300	200 100	200 0	500 2400	Pine Spruce
5	<i>Desired Post-treatment DENSITY</i> (approx. stems/ha)	<ul style="list-style-type: none"> Thin all trees <10cm dbh and 25% of those trees 10-20cm dbh (target a residual of ~400 sph in the overstory). Leave ~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. 					
6	<i>Pre-treatment DENSITY</i> (approx. stems/ha)	0 3000+	0 600	0 200	400 0	400 3800+	Pine Spruce
6	<i>Desired Post-treatment DENSITY</i> (approx. stems/ha)	<ul style="list-style-type: none"> Thin all trees <10cm dbh and 25% of those trees 10-20cm dbh (target a residual of ~400 sph in the overstory). Leave ~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. 					
Polygon	State	<5 (cm)	5-10 (cm)	10-20 (cm)	20+ (cm)	Totals	Species

9.0 Landscape Level Fuel 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.

Using the results from the GIS analysis, location of structures, existing breaks, and professional judgment based on past experience with operational wildland fire suppression and prescribed burning, the following map shows the location of fuel break(s) being recommended for consideration as landscape level fuel breaks.

There are several existing trails and cut lines well west of the town that upon which landscape level fuel breaks could be anchored. These lines could have their width extended to serve as pre-attack fuel breaks. Additionally, the railway line presents another opportunity as a fuel break within close proximity to the community.

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.

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.