Level 2 Wildland Fire Risk Assessment

Part of Lot 6, Concession 9; Franklin
Township of Lake of Bays
District of Muskoka

September 2020

Contents

Introduction

FRi Ecological Services was retained to complete a Level 2 Wildlands Fire Risk Assessment in support of a 6-lot consent application for a 6.1ha property located on Part of Lot 6, Concession 9 within the Township of Lake of Bays subsequent to the submission of an Environmental Impact Study (EIS) (September 2019)[1]. The property was identified by the District Municipality of Muskoka (DMM) as having potential for wildland fire risk (Figure 1).

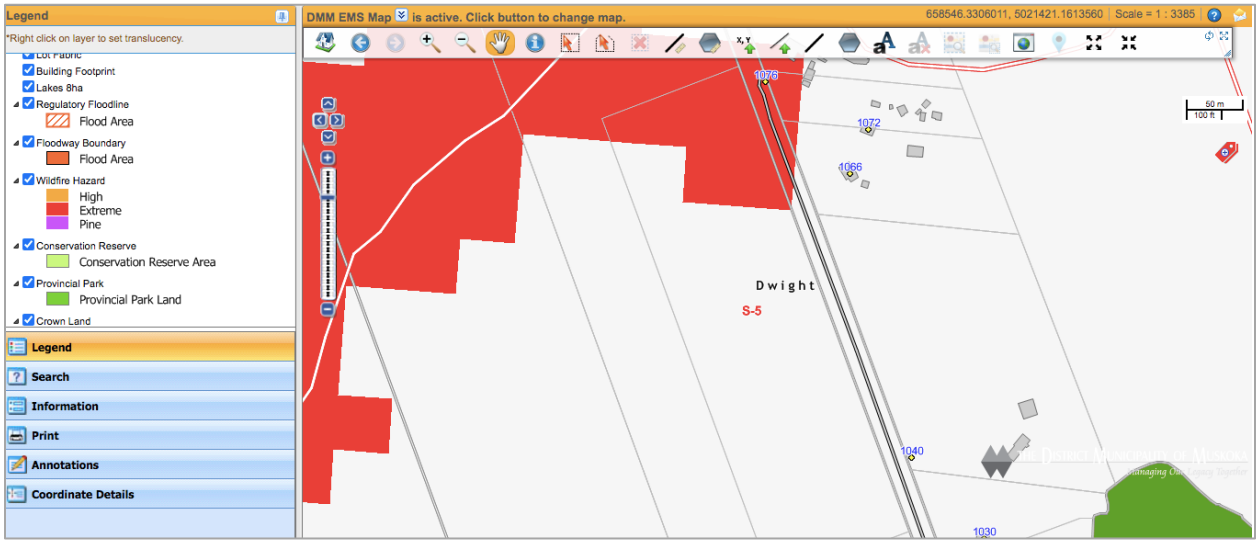


Figure 1: DMM Wildfire Hazard Mapping (DMM Planning Staff, August 19, 2020)

For developments in rural and semi-rural areas, the risk of wildland fires must be considered in planning applications. Section 3.1.8 of the 2020 Provincial Policy Statement[2] (PPS) requires that development shall generally be directed to areas outside of lands that are unsafe for development due to the presence of hazardous forest types for wildland fire or that any risks are mitigated in accordance with wildland fire assessment and mitigation standards.

A risk assessment is two-part; a Level 1 risk assessment involves determining if the proposed development falls within 100m of a forested habitat. If there are trees on or within 100m of the proposed development area, a Level 2 risk assessment is required.

As noted above, a review by the DMM of the generalized wildland fire hazard data revealed that a northern portion (0.7ha) of the subject lands are classified as "Extreme" risk. The most current wildland fire hazard mapping (May 27, 2020) from Lands Information Ontario (LIO) was also consulted and identified approximately 0.4ha of forested lands on the property with potential for Extreme (C1, C2, C4)* hazardous fuel types, 5.0ha of forested lands with potential for Moderate (M2 > 25%- <50%)* hazardous fuel types, and approximately 0.7ha of unevaluated land (Figure 2).

[1] FRi Ecological Services, 2019. Environmental Impact Study for Part of Lot 6 Concession 9; Township of Lake of Bays
[2] (MAH) Ministry of Municipal Affairs and Housing, 2020. 2020 Provincial Policy Statement.
* *See Table 1*

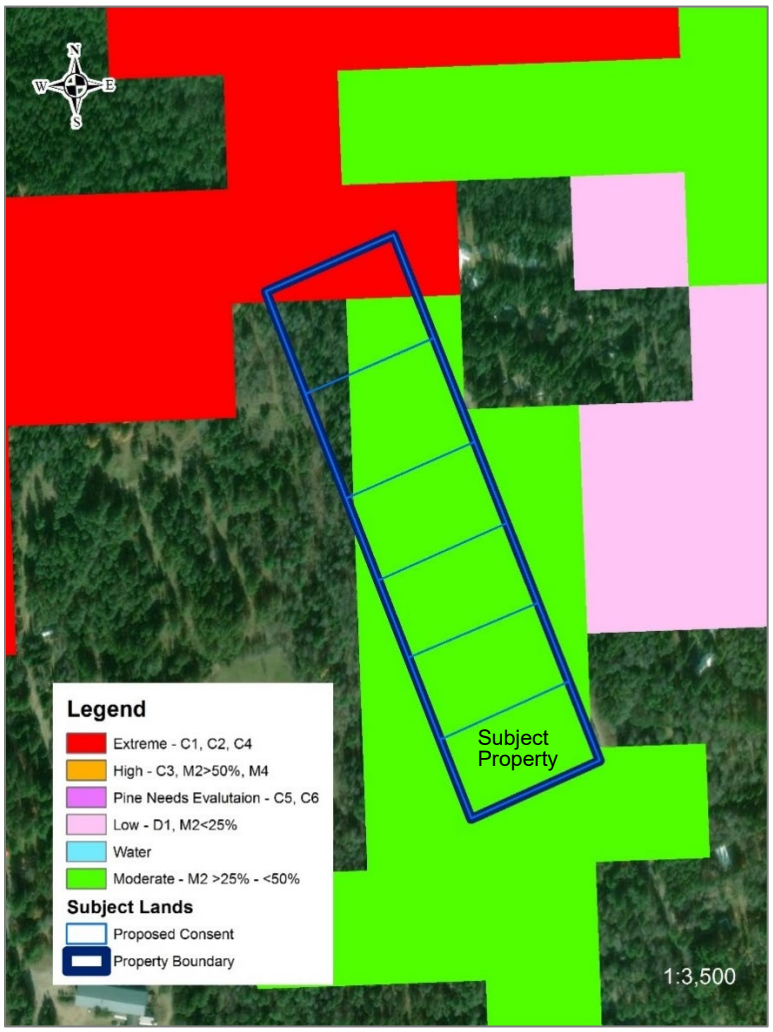


Figure 2: MNRF Wildland Fire Fuel Types Coarse Mapping (2020)

Table 1: Summary of Canadian Fire Behaviour Prediction System (FBP) forest types[†]

Code	Forest Type	MNRF Fuel Risk Level*	Present on site?
C1	Spruce–Lichen Woodland	Extreme	No
C2	Boreal Spruce	Extreme	No
C3	Mature Jack Pine	High	No
C4	Immature Jack Pine	Extreme	No
D1	Leafless Aspen	Low	No
S2	White Spruce–Balsam Slash	High	No
M2	Boreal Mixedwood–Green <25% conifer	Low	Yes
M2	Boreal Mixedwood–Green >25%-<50% conifer	Moderate	No
M2	Boreal Mixedwood–Green >50% conifer	High	No
M4	Dead Balsam Fir Mixedwood–Green	High	No

[†]*The fuel types listed are those associated with the risk of wildland fire and which are considered under forest types for wildland fire, as defined by the PPS and MNRF*

The coarse DMM and MNRF mapping was contrasted with vegetation community (ecosite) mapping carried out in the field on the subject lands. High hazard fuel types are forests that exhibit high wildland fire behaviour should a fire ignite under dry conditions. This assessment was conducted at the site level where mitigation standards address reducing the hazard level and associated risk from extreme and high to either moderate or low in order for the proposed development to be appropriate from a wildland fire perspective.

Ecological Setting

Ecoregion

The property being assessed is located within the Ontario Shield Zone, Georgian Bay Ecoregion (5E). The climate in this ecoregion is cool, temperate, and humid; with mean annual temperatures ranging from 2.8˚C to 6.2˚C and a growing season between 183 to 219 days in length. Mean precipitation ranges between 771mm and 1134mm annually.

Ecodistrict

The Huntsville Ecodistrict (5E-8) is situated on gently sloping plains of igneous and metamorphic rock with pockets of silty clay and sand. The vast majority of the ecodistrict remains as natural cover in the form of tolerant hardwood, upland hardwood, and mixed conifer stands.[3]

Ecosites

All vegetation found on the property was mapped according to the Great Lakes-St. Lawrence (GLSL) Ecosite Fact Sheets[4] which describes vegetation communities within Ecoregions 4 and 5. This land classification system defines ecosites based on soil and vegetation characteristics using a coding system of three components: a geographic range code followed by a 3-digit ecosite number and a vegetation cover modifier indicating whether the dominant vegetation is tall-treed (Tt), low-treed (Tl), shrub (S), etc.

The soils on the subject lands were found to be fresh, deep mineral soils that remain relatively consistent for the entirety of the subject lands. Two ecosites were determined to be present on the property: *G052Tt Dry to Fresh, Coarse: Spruce – Fir Conifer* and *G055 Dry to Fresh* (Photos 1 and 2)*, Coarse Apsen – Birch Hardwood* (Photo 3) (Figure 3)*.* The ecosite site descriptions can be found in the 2019 EIS and ecosite fact sheets are included in Appendix A.

[3] Crins, William J., Paul A. Gray, Peter W.C. Uhlig, and Monique C. Wester. 2009. The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions. Ontario Ministry of Natural Resources, Peterborough Ontario, Inventory, Monitoring and Assessment, SIB TER IMA TR-01, 71pp.
[4] Wester, M., P. Uhlig, W. Bakowsky, and E. Banton. 2015. Great Lakes-St. Lawrence Ecosite Fact sheets (third draft).

Photos 1-2: (Left) G052Tt ecosite community; (Right) Typical understory of G052 ecosite

Photo 3: Representative photo of the G055Tt ecosite and understory

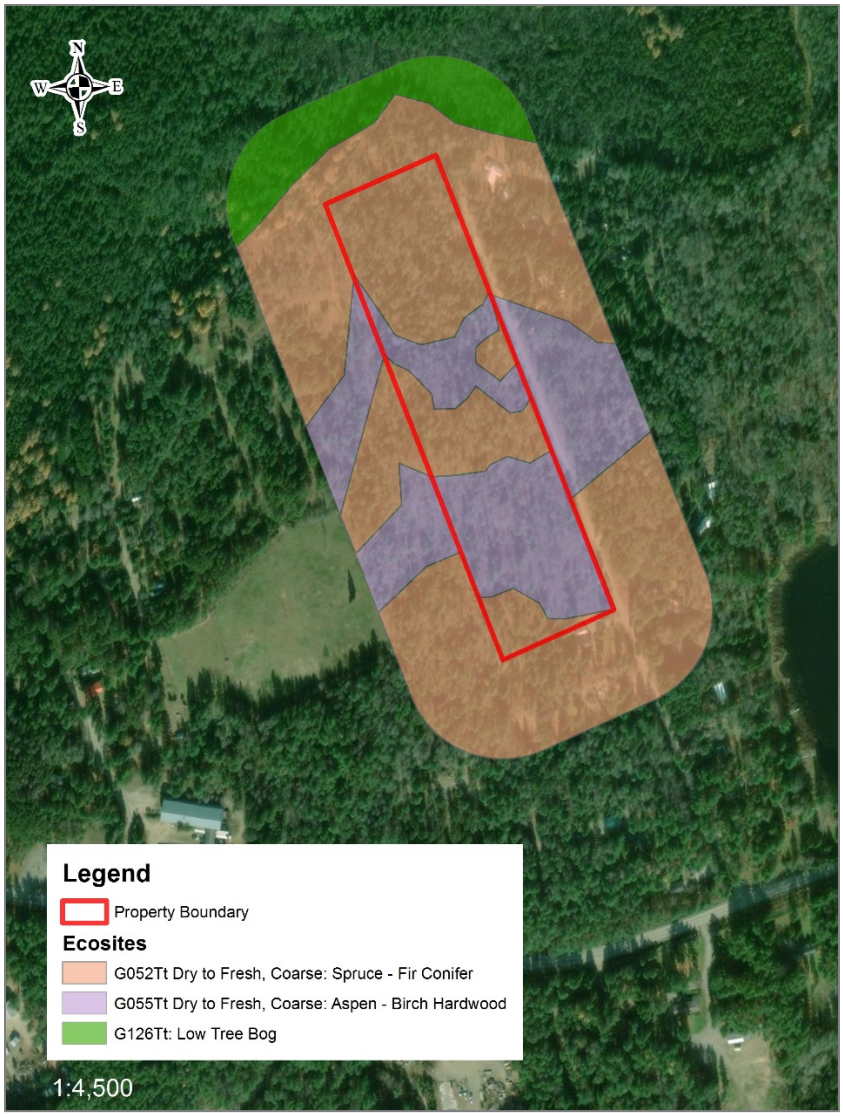


Figure 3: Ecosites mapped on and within 100m of the subject property

Level 2 Wildland Fire Risk Assessment

Vegetation and Topography

The provincial wildland fire risk mapping and Lands Information Ontario Wetland (Provincially Significant and other) layers have been contrasted in Figure 4. Note the overlap of provincial extreme and high-risk mapping with wetland ecosites. It appears that the coarse fuel mapping has delineated the 'Extreme' fire risk as an area also mapped by MNRF to be a Provincially Significant Wetland (Dwight Conifer Peat Forest Heritage Area) and has been mapped as hazardous in error as well as the wetland to the south of the property. Given the vegetation communities and forest types mapped on the subject lands, the Wildland Fire Risk would be considered Low to Moderate for the entire property.

The assessed risk is done at the landscape level, and the Level 2 assessment requires that the forest characteristics and associated criteria are assessed for proposed dwellings and immediate area (~100m) on the property.

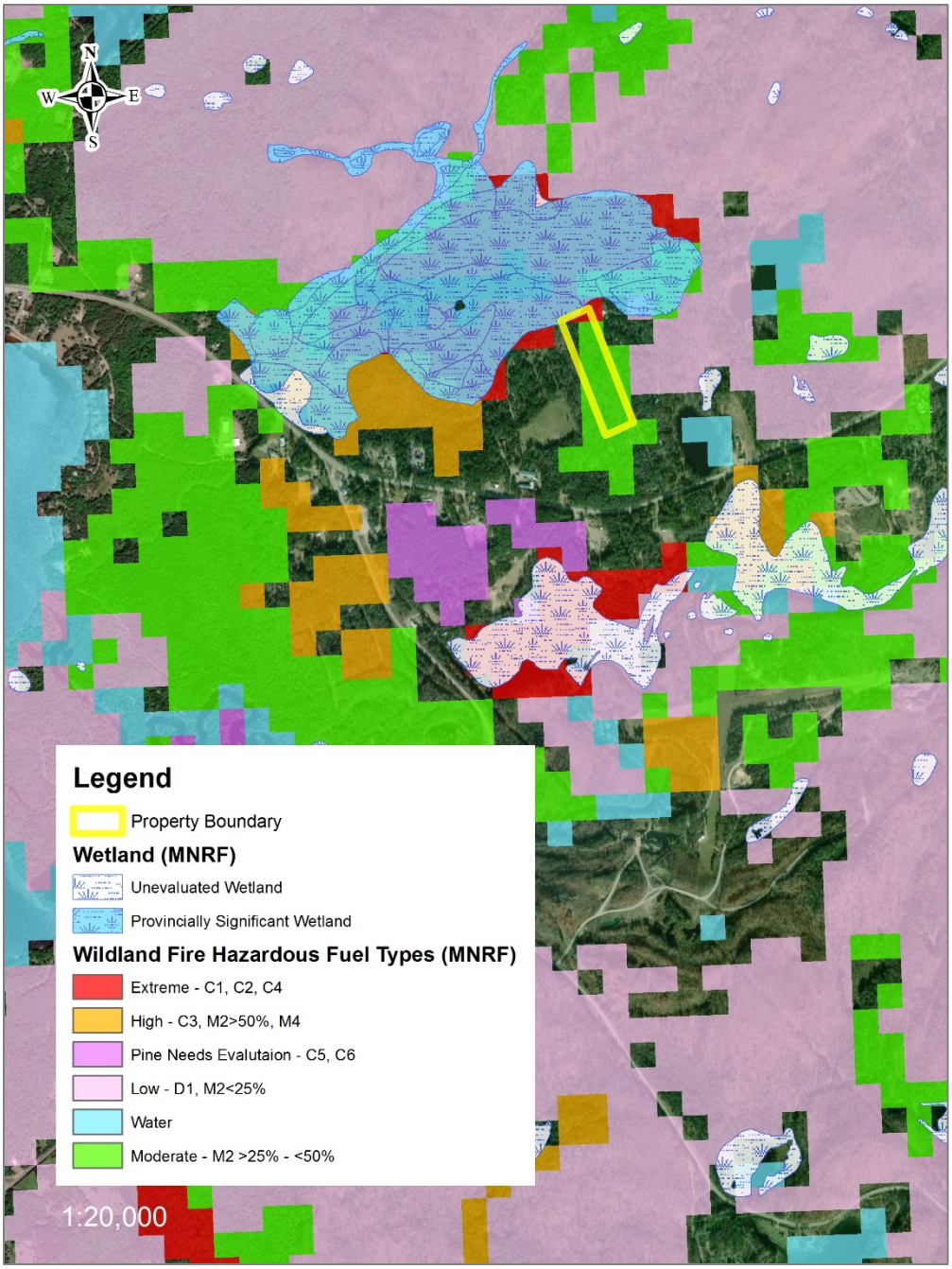


Figure 4: Wetland mapping contrasted with Wildland Fire Hazardous Fuel mapping

The presence of the conifer ecosite has a moderate risk so to further reduce this risk, maintaining a defensible space around any future structures, such as dwellings, on the site is the most effective approach to wildland fire risk mitigation at the site level. The zones for vegetation management, described below, identify where and how forest alteration and ongoing vegetation maintenance should be prioritized on the site (Table 2).

The three priority zones are known as FireSmart Priority Zones. Zone 1 is defined by the area within 10 meters of any structure while Zone 2 encompasses the area within a 30m radius of any structure. Together, these first two priority zones form the *Home Ignition Zone* (HIZ) where

vegetation management is critical. Actively minimizing hazardous vegetation within priority Zones 1 and 2 (30m out from a structure, inclusive) of buildings that incorporate FireSmart building principles (Appendix B) can reduce wildlands fire risk to a low to moderate level. The lowest priority zone extends out to capture the area between 30 and 100m of a dwelling. These distances and recommended mitigation measures apply to any site plan and final build-out on the lot.

Table 2: Vegetation clearing and maintenance guidelines for each FireSmart Priority Zone

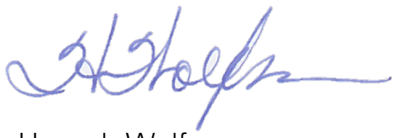
FireSmart Priority Zone	Distance from Dwelling (meters)	Vegetation Clearing & Maintenance Recommendations
1	0 - 10	• remove potential fuels, deadfall and all woodpiles • clear trees and thin/prune shrubs • keep any grass mowed and watered in dry season
2	10 - 30	• thin trees and remove debris, maintain this area free of any dead wood • crowns of retained trees should not touch or overlap • maintain natural look of forest by removing trees close to the structure and gradually removing fewer and fewer trees as you move away towards Zone 3 • Reduce the number of pine and spruce where possible; deciduous tree species with low flammability, such as aspen, poplar, and birch, should be retained • a staggered pattern of felling (rather than removing blocks of trees) will leave enough trees to maintain forest character • replacing some evergreen trees with deciduous trees within this zone will increase the visual and biological diversity of the stand and reduce the risk of wildfire danger (if/where desired) • low, dead branches on mature conifers that act as "ladder fuels" which allow a fire to climb into the tree crowns should be removed through this zone
3	30 - 100+	• maintain the area so fires will be of low intensity and can be more easily extinguished • removal of the downed wood material accumulating on the forest floor and the removal of any dead conifers within the stand

Conclusion

In conclusion, although the site had been identified as having areas with potential for hazardous fuel types, given the interspersion of deciduous tree growth and fresh, mossy understory, level terrain, and naturally deep soils, the site-specific vegetation and stand composition would be considered a low to moderate wildland fire risk. It is likely the extreme hazard identified to the north is a mapping error of the wetland ecosite. It is recommended that the moderate fire risk be managed at a site-level.

Where site-specific recommendations and suggested mitigation measures for vegetation management and design considerations are employed, the proposed consent will be in accordance with the PPS, the Township of Lake of Bays and the DMM OPs, and MNRF's Wildland Fire Assessment and Mitigation Reference Manual from a wildland fire risk perspective.

Respectfully submitted,



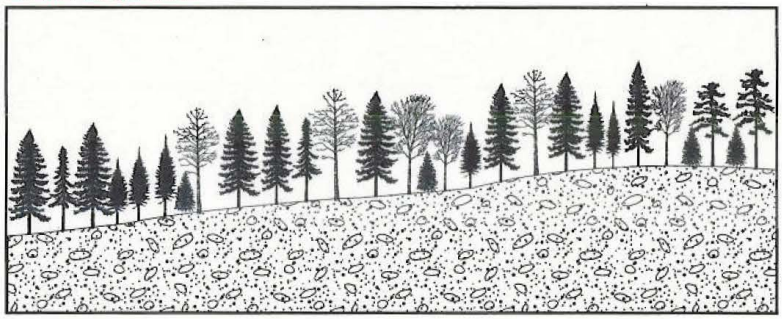
Hannah Wolfram
Biologist

APPENDIX A: ECOSITE FACT SHEETS

Dry to Fresh, Coarse: Spruce - Fir Conifer

G052Tt/Tl
L M H

Profile/Slope Sequence



approximately 250m

Ecosite Description

Conifer canopy consisting mostly of spruce species and/or balsam fir. White spruce and balsam fir typically present in the main canopy, but may include black spruce and red spruce. May contain other species including white birch, red maple, and trembling aspen. Understory tree species consisting of moderate levels of balsam fir. Shrub and herb moderately poor. Ground surface mostly conifer litter and variable stones. Substrate sandy to coarse loamy. Mostly > 15 cm deep and dry to fresh (MR = 2 or 3, if sandy; MR ≤ 3, if coarse loamy).

Substrate Description

Substrate Series	S1 M2 **M4** MD2 **MD4 D2 D4**													
Mode of Deposition	RO	CO	MO	GF	FL	LA	GL	EO	OR	GW	WA	CX	AN	
Family	Sandy		Coarse Loamy		Silty		Fine Loamy		Clayey		Peat		Folic	
Humus Form	Mull		Moder		Fibrimor		Humimor		Peatymor		Anmoor			
Moisture Regime	Θ	0	1	2	3	4	5	6	7	8	9	x	h	s
Moisture	d		f			m		v	w			x	h	s
Depth	R		VS		S		M		MD		D			
Chemistry	k				n				z					

Vegetation Description

Tall treed (> 10 m) and low treed (≤ 10 m) ecosites common. Canopy closure variable. Low treed condition often consisting of dense, younger trees. Spruce and balsam fir compose > 50% of the tree species in the main canopy. Common understory vegetation includes beaked hazel, low-sweet blueberry, fly honeysuckle, bluebead-lily, wild sarsaparilla, bunchberry, and powder horn lichen. Often contains Central v-types V37, V25, V11, V25, and V26; NE v-types V20, V17, V21, V18, and V8.

Trees	*Abies balsamea, Picea glauca, (P. rubens), Betula papyrifera, Acer rubrum, Populus tremuloides, Betula alleghaniensis, Thuja occidentalis, Picea mariana, Sorbus americana*
Shrubs	*Corylus cornuta* ssp. *cornuta, Vaccinium angustifolium, Lonicera canadensis, Diervilla lonicera, Vaccinium myrtilloides, Viburnum nudum var. cassinoides*
Vascular Herbaceous	*Clintonia borealis, Aralia nudicaulis, Cornus canadensis, Maianthemum canadense* ssp. *canadense, Lycopodium clavatum, Trientalis borealis* ssp. *borealis*
Non-vascular	*Cladonia coniocraea, Plagiothecium laetum, Pleurozium schreberi, Brachythecium reflexum* var. *reflexum*

Ecology

Substrate has a low nutrient and moisture holding capacity resulting in decreased growth rates and low vegetation diversity. Limitations to tree growth can also be the result of high coarse fragment concentrations in morainal deposits. Abundant feathermoss under closed canopy. Low shrubs or lichen abundant under open canopy. In young or dense plantations with significant site disturbance, the understory composition may vary. This ecosite generally represents a mid to late seral stage. Maintenance of structure and composition generally associated with low to moderate intensity fire, however in the absence of fire, the vegetation will not likely succeed to another ecosite.

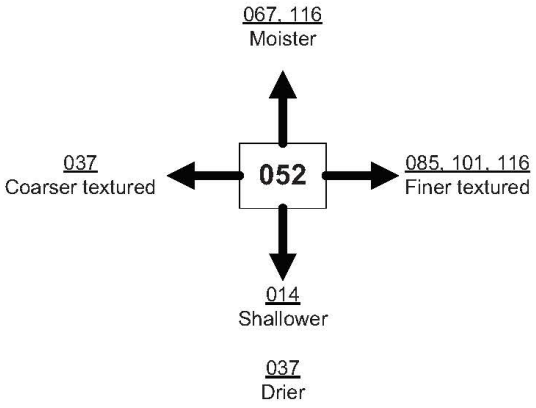
Ecoregional Variability

Widespread and common across Great Lakes-St. Lawrence range. More abundant on the landscape as you move further north. Generally flat to rolling morainal deposits with occurrences of glaciofluvial material found in large river valleys throughout the range. Rugged bedrock controlled topography occurs in 5E-1, 5E-3, 5E-5, and 5E-13. Typically non-calcareous. More commonly found in the Maritime provinces, red spruce reaches its westerly limit in Ontario. Red spruce can be found in rare instances as pure or mixed stands in 5E-5, 5E-6, 5E-9, and 5E-10. Common tree associates in 4E include white birch, eastern white pine, and trembling aspen. Yellow birch and sugar maple are more common tree associates in 5E and transitioning into 6E.

Edaphic Variability

Typically uniform in nutrient availability with variable moisture due to inconsistency of substrate depth over bedrock. Generally moderately deep to deep substrate. Depth of coarse morainal deposits variable which may result in bedrock controlled wetlands. Abundant stoniness in morainal deposits is common. Often on upper, middle, or lower slopes positions. Increased species diversity likely over base-rich bedrock or inclusions of fine textured or moister materials. Xeric vegetation such as lichens and serviceberries, as well as decreased shrub and herb diversity likely on exposed bedrock or very shallow substrates.

Related Ecosites

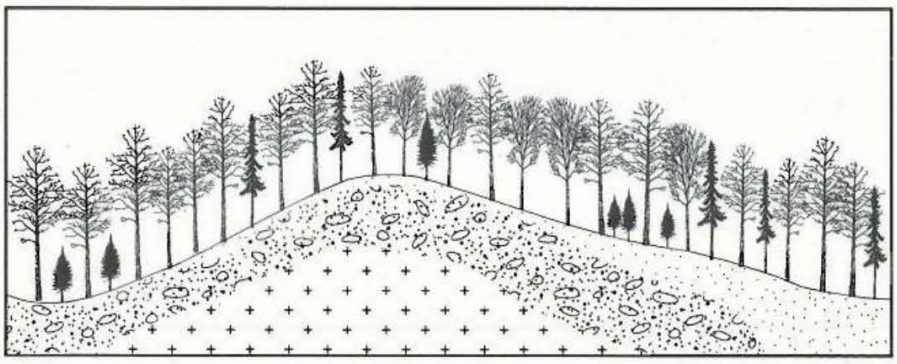


Dry to Fresh, Coarse: Aspen - Birch Hardwood

G055Tt/TI

L | M | H

Profile/Slope Sequence



approximately 250m

Ecosite Description

Hardwood canopy consisting mostly of aspen and/or birch species. White birch, trembling aspen, large-tooth aspen, and yellow birch likely in the main canopy. May contain sugar maple, balsam fir, and red maple. Understory tree species consisting of moderate to high levels of balsam fir, red maple, white birch, and trembling aspen. Shrub and herb moderately rich. Ground surface mostly broadleaf litter and variable stones. Substrate sandy to coarse loamy. Mostly > 15 cm deep and dry to fresh (MR = 2 or 3, if sandy; MR ≤ 3, if coarse loamy).

Substrate Description

Substrate Series	**S1** M2 **M4 MD2 MD4 D2 D4**												
Mode of Deposition	RO	CO	MO	GF	FL	LA	GL	EO	OR	GW	WA	CX	AN
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Moisture Regime	Θ	0	1	2	3	4	5	6	7	8	9	x	h	s
Moisture	d		f			m		v	w			x	h	s
Depth	R		VS		S		M		MD		D		
Chemistry	k				n				z				

Vegetation Description

Tall treed (> 10 m) and low treed (≤ 10 m) ecosites common. Canopy closure variable. Low treed condition often indicative of younger trees. Aspen and/or birch species compose > 50% of the hardwood tree species in the main canopy. Ecosite variable from dominant stands of aspen and/or birch or a mixture of both. Common understory vegetation includes beaked hazel, fly honeysuckle, mountain maple, bush honeysuckle, bluebead-lily, wild sarsaparilla, bracken fern, wild lily-of-the-valley, and Schreber's moss. May contain Central v-types V25, V28, V22, V12, V14, V23, V20, V21, V24, and V25; NE v-types V4, V8, V2, V12, V6, V5, V7, V10, V11, and V13.

Trees	*Betula papyrifera, (B. alleghaniensis), Populus tremuloides, P. grandidentata, Acer saccharum* var. *saccharum, Abies balsamea, Acer rubrum*
Shrubs	*Corylus cornuta* ssp. *cornuta, Lonicera canadensis, Acer spicatum, Diervilla lonicera, Vaccinium angustifolium, Viburnum nudum* var. *cassinoides*
Vascular Herbaceous	*Clintonia borealis, Aralia nudicaulis, Pteridium aquilinum, Maianthemum canadense* ssp. *canadense, Eurybia macrophyllus, Trientalis borealis* ssp. *borealis*
Non-vascular	*Pleurozium schreberi, Cladonia coniocraea*

Ecology

Substrate has a low nutrient and moisture holding capacity resulting in decreased growth rates and low vegetation diversity. Limitations to tree growth can also be the result of high coarse fragment concentrations in morainal deposits. Shrub and herb poor with a closed canopy. Species diversity increases as canopy becomes more open. A major disturbance (e.g., fire, partially harvesting, agriculture abandonment) is required to maintain this ecosite. Aspen and/or birch regeneration after disturbance is quick through root suckering or seeding from adjacent stands often resulting in an even-aged overstory. In the absence of disturbance, the ecosite will likely succeed to a mixedwood.

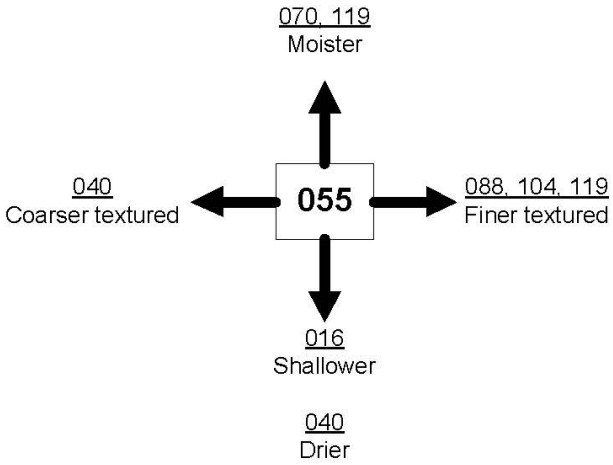
Ecoregional Variability

Widespread and common across Great Lakes-St. Lawrence range. Generally flat to rolling morainal deposits with occurrences of glaciofluvial material found in large river valleys throughout the range. Rugged bedrock controlled topography occurs in 5E-1, 5E-3, 5E-5, and 5E-13. Typically non-calcareous. The ecosite transitions from trembling aspen and white birch dominated stands in the northern portion (4E) of the Great Lakes-St. Lawrence range to yellow birch and large-tooth/trembling aspen stands in the south (5E).

Edaphic Variability

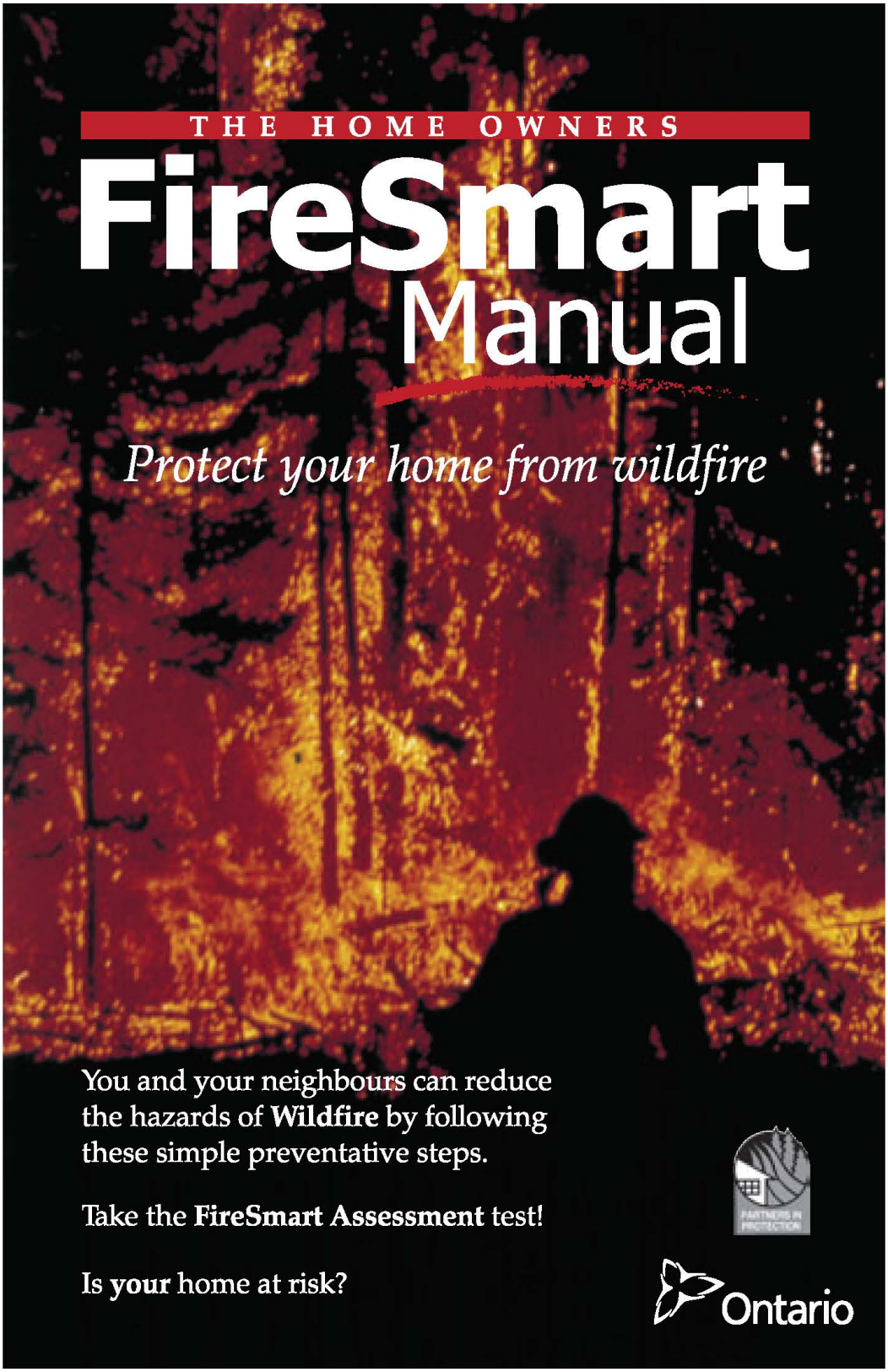
Typically uniform in nutrient availability with variable moisture due to inconsistency of substrate depth over bedrock. Generally moderately deep to deep substrate. Depth of coarse morainal deposits variable which may result in bedrock controlled wetlands. Abundant stoniness in morainal deposits is common. Often on upper, middle, or lower slopes positions. Increased species diversity likely over base-rich bedrock or inclusions of fine textured or moister materials. Xeric vegetation such as lichens and serviceberries, as well as decreased shrub and herb diversity likely on exposed bedrock or very shallow substrates.

Related Ecosites



APPENDIX B: FIRESMART BUILDING PRINCIPLES

(Excerpt from: The Home Owner's FireSmart Manual)


THE HOME OWNERS
FireSmart
Manual
Protect your home from wildfire
You and your neighbours can reduce the hazards of Wildfire by following these simple preventative steps.
Take the FireSmart Assessment test!
Is your home at risk?
Ontario

Home and business construction

Our second set of precautions deals with building materials and construction techniques. While it may not be practical or economical to apply all of them to an existing structure, many of these precautions are easily made. Others can be included in long-term maintenance or renovation plans or incorporated in new dwellings as they are designed and constructed.

Is your roof FireSmart?

The most fire resistant roofing materials are metal, asphalt, and ULC treated shakes. Untreated wooden shakes and shingles provide no resistance. They can easily ignite if sparks, embers or flames from a fire reach your house.

PHOTO: KELVIN HIRSCH

Metal, tile, asphalt, ULC-rated treated shakes or non-combustible material (0 pts) - *the most fire resistant and remain effective under severe fire exposure.*

Even if your plans for re-roofing are years away, it's still valuable to ensure that your existing roof is free of combustible debris and that no combustible materials such as overhanging trees or vegetation provide fuel for airborne sparks and embers.

PHOTO: KELVIN HIRSCH

Unrated wood shakes (30 pts) - *provide no fire protection.*

PHOTO: KELVIN HIRSCH

Non-combustible siding (0 pts)
Materials such as stucco, metal siding, brick cement shingles, concrete block, poured concrete, and rock offer superior fire resistance.

Are your exterior walls FireSmart?

Materials such as stucco, metal, brick and concrete offer superior fire resistance to wildfire. Logs and heavy timbers are a little less effective, and wood and vinyl siding offer very little protection.

Is your home free of fire accumulators?

If you are designing or renovationg your home, it's wise to reduce areas that offer protection or hiding places for airborne sparks and embers.

Closed-in eaves and screened soffits are better than those left open or unscreened. Decks and balconies that are not closed in and screened also pose potential hazards.

Fire suppression crews call all these openings "fire accumulators". These areas increase the vulnerability of a structure to wildfire.

Closed eaves, vents screened with 3-millime-tre mesh and accessible (0 pts)

Closed eaves, vents not screened with 3-millimetre mesh (1 pt)

Open eaves, vents not screened (6 pts)

PHOTOS: DON MORTIMER

Are your doors and windows FireSmart?

Tempered glass has good resistance to damage by fire. Double or thermal pane window construction provides moderate protection, but single pane glass provides virtually no protection.

PHOTO: KELVIN HIRSCH

Single pane (2 or 4 pts)

PHOTO: PELLA WINDOWS

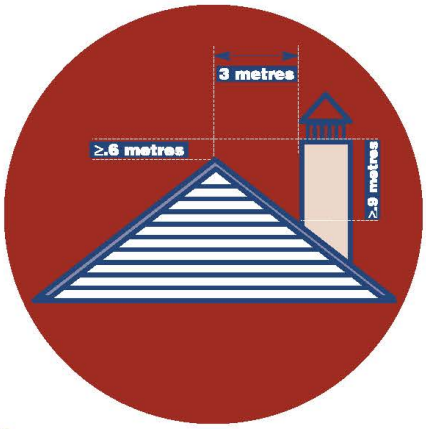
Tempered (0 pts) - *optimum protection is provided by tempered glass.*

PHOTO: PELLA WINDOWS

Double pane (1 or 2 pts) - *moderate protection is provided by double or thermal pane windows.*

Don't Be the Cause of a Wildfire

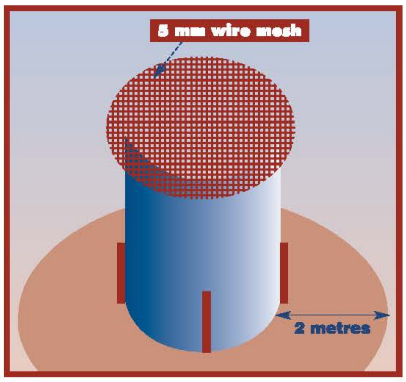
This set of objectives is aimed at not becoming the source of a fire.



FireSmart your chimney
Chimneys should be constructed to meet current Ontario building code requirements and should be screened-in with the appropriate approved spark arrestors.

Burn barrels and ash pits
For safe disposal of woody debris you should consider chipping and composting or bringing it to a landfill site.

If you must burn, ensure the burn barrel is at least 5 metres from the forest or woodlands, 2 metres from buildings or other combustible sources and that a 2 metre area around the barrel is cleared to mineral soil. Burn barrels should have proper ventilation and screens. and **must never be left unattended**!



Power lines and propane tanks
Vegetation should be cleared well back from power lines, propane tanks and other fuel supplies.

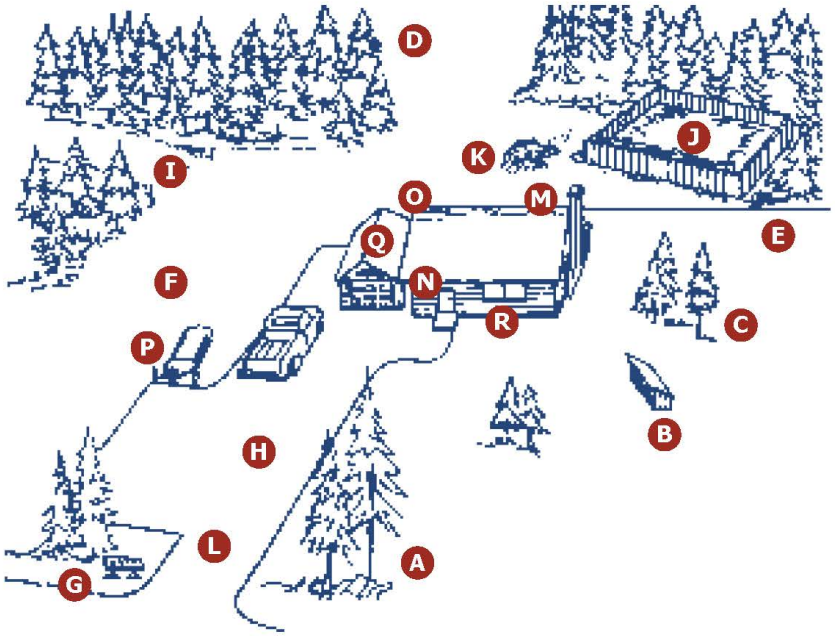
PHOTO: BRIAN MOTTUS

Contact utility companies for advice on the clearing of vegetation under overhead electrical installations.

Emergency facilities
FireSmart building sites have adequate emergency vehicle access, and a readily available water supply such as a pond or dugout nearby.

Shovels and rakes
Every home should have shovels, rakes, axes, garden hoses, sprinklers and roof ladders to assist in suppressing wildfires.

A Well Thought Out FireSmart Protection Plan



A Prune tree branches to a height of 1 or 2 metres
B Store fire wood well away from the house
C Remove trees within 10 metres of house
D Trees thinned (crowns don't touch) for at least 30 metres from the house
E Branches are clear of power lines (if possible bury power service)
F Remove brush, mow and water lawn
G Your name and lot number clearly visible for quick identification
H Driveway is wide enough to accommodate emergency vehicles
I Provide additional emergency exit
J Pond or cistern with emergency water supply
K A FireSmart ash pit or burning barrel
L Driveway clear of trees to a distance of at least 3 or 4 metres
M Chimney installed to code complete with spark arrestor screens
N All soffit vents and gutters should be screened
O Porches and balconies screened, crawl spaces enclosed
P Position propane tank with valve pointing away from house
Q Fire resistant exterior roof and walls
R Protective drapes and or shutters on windows to protect interior from radiant heat