

URBAN FOREST MANAGEMENT PLAN

Village of Harrison Hot Springs



May 23, 2023

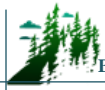
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EXECUTIVE SUMMARY

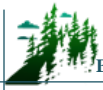
For both tourists and residents, trees comprising the urban forest in the Village of Harrison Hot Springs ('Village' or 'Municipality') are an important aspect of its appeal. The Village has a unique mix of specimen trees and natural forested areas, which should be protected to secure this legacy for future generations of residents and visitors. This report provides specific, actionable recommendations for the implementation of an Urban Forest Management Plan ('the Plan') that will increase the protection of the existing urban forest, as well as enhance initiatives to expand the urban tree canopy. Survey results and feedback from public and stakeholder consultation show that residents of Harrison Hot Springs care deeply for the trees in the Village and are concerned regarding transparency and increased protection of trees during development. Community education will be needed to clarify street tree maintenance responsibilities and to promote planting of new trees on private land. Communication with the Fraser Valley Regional District (FVRd) regarding issues of the urban forest should be continuous.

Forty-nine recommendations have been developed to assist the Village in its progress towards the implementation and ongoing refinement of the Plan within the Study Area. These recommendations are provided in Table 1.

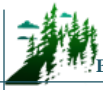
Table 1: Summary of recommendations to develop an Urban Forest Management Plan for the Village.

Priority Rating	A	B	C
	Higher	Moderate	Lower
	Within 1 year	Within 3 years	Within five years

Urban Forest Management Plan for Harrison Hot Springs			
Item	Priority	Recommendation	Level of Effort
4.2 Canopy Cover			
Objectives: Determine achievable and reasonable canopy cover goal for the urban portion of the Village.			
1	Lower	Consider pooling resources with other municipalities in the FVRD to obtain aerial imagery and LiDAR. The Village should consider hiring a consultant to use this data to conduct a canopy cover analysis of the urbanized area of the Village.	10-15 in-house hours, approx. \$20,000 (consultant)
6.1 Recommendations from the 2017 CWPP			
Objectives: Incorporate recommendations from the CWPP that are relevant to the urban forest.			
2	Moderate	Incorporate FireSmart recommendations as outlined in the 2017 FVRD CWPP. To address the wildfire risk to properties, wildland urban interface areas mapped in the CWPP should be incorporated into the FVRD GIS database in order to identify the properties that would benefit from FireSmart measures.	10-20 in-house, dependent on task sharing with the FVRD
3	Lower	Develop a Parks and Trails emergency response plan to deal with the risks of fire within parks, trail corridors, and fire spread from adjacent forested private and Crown lands into the Village.	Approximately \$50,000-\$100,000 (consultant)
4	Moderate	Review <i>Tree Management and Preservation Bylaw No. 1015</i> and revise to allow for homeowners to address wildfire hazards on	UBCM CRI Funding/20-50 in-



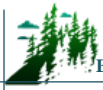
		their property associated with trees immediately adjacent to homes, as determined by a qualified professional.	house hours (local government funding)
5	Moderate	Consider promoting FireSmart approaches for wildfire risk reduction to Village residents through workshops and presentations. Aim to conduct the engagement/promotion campaign prior to and during the fire season. Consider supplying FireSmart materials to homeowners in the interface during these engagement campaigns. Make this information available to tourists and visitors to increase awareness of wildfire risk.	10 hours. May be eligible for UBCM CRI grant.
6	Lower	Develop a Total Access Plan for the Village to create, map, and inventory trail and road networks in natural areas for suppression planning and identification of areas with insufficient access. Develop georeferenced maps with locations of potential firebreaks and share with fire suppression personnel and BCWS to support emergency response in the event of a wildfire.	\$8,000-\$10,000 to build plan, map, populate attributes, and update (consultant)
7.1 Managing Trees on Public Property			
Objectives: Protect existing trees, ensure health of new plantings, and manage risk on municipal land.			
7	Higher	Create an interdepartmental working group of selected staff members whose work relates to the protection or management of trees and tree parts. Core working group members may include staff from Planning & Development and Public Works & Utilities. Since the FVRD will be managing the Village's mapping and GIS, a representative from this agency should be included.	5 in-house hours to set-up group / flexible meeting schedule for group
8	Moderate	Since the Village does not have the jurisdiction to manage a significant portion of Crown forested land within the municipal boundary, discussions should be initiated with FLNRO. Ideally, a 200m management zone on Crown land should be agreed upon that the Village could proactively manage in order to limit the burden of liability from wildfire and tree risks.	10-15 in-house hours, dependent on task sharing with FLNRO
9	Moderate	A number of small communities in the FVRD (including the Village) lack resourcing to manage their urban forest. Explore options for pooling resources (<i>i.e.</i> , pay a 1% fee to the FVRD), to increase resourcing capacity. The fee could go towards retaining a Forester and/or arborist. Fuel treatments, FireSmart assessments, tree risk assessments, and operational tree work could be coordinated across multiple jurisdictions.	20-30 in-house hours, dependent on task sharing with other municipalities and the FVRD
10	Higher	Identify aging trees that are a value to the community (<i>i.e.</i> , the beach-front willows along Esplanade). Retain a certified arborist and a qualified tree risk assessor to determine expected lifespan, defects that may impact the safety of people and property damage, and propose mitigation measures. Produce a phased re-planting schedule, map suitable tree planting sites, and coordinate replacement plantings between Public Works & Utilities and Planning & Development.	10-15 in-house hours to identify valuable, aging trees
11	Lower	Establish planting stock procurement agreements with local tree nurseries to improve the Village's control over planted stock quality and to enable pre-planting inspection of delivered stock.	5 in-house hours



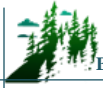
12	Moderate	Develop routine procedures for pre-installation planting stock inspections consistent with recognized best practices, ^{1,2} which contribute to the establishment of higher-quality trees and less tree mortality.	10 in-house hours
13	Moderate	Institute a schedule of care and maintenance for newly planted trees, including pruning cycles for both newly established and mature trees.	10-15 in-house hours
14	Higher	Recognize the street tree inventory is a living document and requires constant revisions to remain relevant to Village staff. Work with the FVRD to regularly update records with tree removals and new tree plantings. In order for this to be successful, develop a standardized spreadsheet to track the inventory and incorporate spatially into the GIS system.	2 in-house hours/month
15	Higher	Conduct a feasibility study to decide whether the Village should be responsible for tree risk assessments by hiring qualified staff, or whether contracts with qualified tree risk assessors is a more viable approach for the Village given staffing and budget resources.	20 in-house hours
16	Higher	Develop a formalized and proactive tree risk assessment schedule conducted by a qualified tree risk assessor. Identify priority areas for tree risk assessment and prepare set of base maps for use by contractors and Village staff. Finance the cost of tree risk assessments by building it into annual operating budgets.	40-50 in-house hours
17	Higher	Document all tree risk assessments of Village-owned trees and make this documentation available to all staff. Ensure that tree risk mitigation is conducted as soon as possible. Trees that have been assessed and marked in the field but not mitigated, may create an unwanted exposure to liability for the Village.	2 in-house hours/month
18	Lower	Remove some cottonwood trees fringing the north lagoon area. Small in stature now, they often drop large limbs when mature and are not suitable in high-use recreational areas. Replace with tree species tolerant to wind and a fluctuating water table.	\$40,000 (contractor estimate)
19	Moderate	Identify biotic and abiotic forest health risks of concern. Develop a forest health and storm response strategy. Prioritize which of the known and potential urban forest health agents are of the most concern. The Village should develop appropriate management techniques for each agent and outline cost implications.	2 internal staff meetings, \$10,000 consultant fee to write strategy
20	Lower	Increase the ease with which residents can communicate with the Village regarding the care of publicly owned and maintained trees. Create an online form specific for tree care requests and include an option to upload photos.	2 in-house hours
21	Higher	Conduct a cost / benefit analysis to compare street tree care and maintenance performed by residents (for the trees in front of their property) versus all street tree care work performed solely by the Village. Once completed, clearly communicate Village expectations regarding the care of publicly managed street trees to residents.	40 in-house hours

¹ International Society of Arboriculture (2018). [ANSI A300 – Best Management Practices Planting Combo](#).

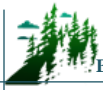
² Master Municipal Construction Document (2022).



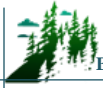
7.2 Regulating Tree Removal & Replacement on Private Land			
Objectives: Clarify and simplify regulations for trees on private land.			
22	Higher	<p>Amend <i>Tree Management and Preservation Bylaw No. 1015</i>:</p> <ul style="list-style-type: none"> Remove the height requirement from the protected tree definition; Include replacement trees in the ‘protected tree’ classification; Clarify the difference between a ‘tree’ and a ‘protected tree’. ‘Tree’ to be >20cm DBH and ‘protected tree’ to be >30cm DBH; Specify at what height DBH is measured; Change the diameter measurement of multi-stem trees to 100% of the largest stem plus 60% of the additional stems; Define the size of a protected stump; Require legal topographic surveys be the primary means for determining tree ownership, including ‘shared’ status; Define arborist reporting standards, including the format for inventory tables, maps, and recommendations; and Outline the credentials an accepted ‘Qualified Person’ must hold for different areas of expertise. 	60 in-house hours, Council approval required
23	Moderate	<p>Update the Village’s Licenses & Permits webpage to include:</p> <ul style="list-style-type: none"> a step-by-step process for residents and developers when applying for a Tree Management Permit; and guidance on managing a tree on their property that is actively failing. 	10 in-house hours
24	Moderate	<p>Define when an arborist report is required under different re-development, land development, or subdivision scenarios. When a tree has shared ownership status, as shown on a legal topographic map prepared by a licensed BC land surveyor, require both property owners to place their signatures on the application form.</p>	40 in-house hours, Council approval
25	Moderate	<p>Consider requiring Tree Management Permits for riparian areas, steep slopes, and lands with protective covenants or that are ecologically sensitive. Specify the qualifications and expertise a Qualified Person must hold in order to successfully complete these reports to a professional level.</p>	10 in-house hours, Council approval
26	Higher	<p>Require that replacement tree plantings are a condition of securing an approved Tree Management Permit. If suitable planting space and soil volumes are not available, direct that compensation on other parcels be a necessary alternative.</p>	40 in-house hours, Council approval
27	Lower	<p>Implement tree planting incentives for private property owners with the assistance of local community and environmental stewardship groups, and participation from local tree nurseries.</p>	10 in-house hours
7.3 Tree Protection, Removal, and Replacement Standards			
Objectives: Describe best practices for tree protection, removal, and replacement.			
28	Higher	<p>Amend the <i>Tree Management and Preservation Bylaw No. 1015</i> with tree protection specifications inclusive of the critical root zone (CRZ), tree protection barrier standards and inspections, arborist site supervision requirements, bylaw enforcement, and the release of securities.</p>	2 in-house hours, Council approval



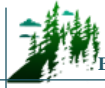
29	Moderate	Implement infraction penalties in the <i>Tree Management and Preservation Bylaw No. 1015</i> for excessive pruning or damaging trees on private property.	20 in-house hours, Council approval
30	Lower	Outline the tree protection process steps on the Village website, beginning with criteria for determining if a tree is protected, tree protection standards, and specifications for tree replacements.	50 in-house hours
31	Lower	Include on website a timeline of the process: tree barrier inspections, tree bonding, landscape and replacement tree securities, and frequency of inspections and final sign-off.	20 in-house hours
32	Moderate	Provide credit to developers for retaining and/or transplanting mature trees in new subdivision plans only if an agreed upon 3-year maintenance plan between the developer and the Village is approved. The maintenance work cost is borne by the developer.	15 in-house hours, Council approval
33	Moderate	Integrate mature trees into new developments by allowing variable front yard setbacks, minimizing grade changes, and preserving permeable surfaces. Include tree protection requirements.	20 in-house hours, Council approval
34	Moderate	Provide incentives to land developers for retaining mature trees, by reducing permit fees or tree replacement requirements in new plans for subdivisions.	20 in-house hours, Council approval
35	Higher	Recommended updates pertinent to the <i>Subdivision Development Servicing Bylaw No. 578</i> : <ul style="list-style-type: none"> Require replacement trees as a condition of tree cutting in the Village for all Protected trees as defined in the <i>Tree Management and Preservation Bylaw No. 1015</i>; Develop a recommend replacement tree list with separations for different categories: small trees, mid-sized trees, large trees, drought tolerant trees, and those suitable for natural areas; Provide minimum boulevard widths and spacing for landscaping and tree planting, and continuous planting pits, as applicable; Provide minimum soil volume requirements for street tree planting. Recommended range is 15-30 m³ for a small tree, 20-70 m³ for a medium tree, and 45-150 m³ for a large tree; Implement replacement tree securities, with 50% released upon successful inspection by Village or FVRD staff and the balance return upon a successful second inspection at 1-year; and Implement maintenance warranty securities for three years to include watering, structural pruning, and any other nutrient or health mitigation requirement. 	40 in-house hours, Council approval
36	Moderate	Develop tree compensation guidelines for trees removed from private land. Guidelines to include clear description of the compensation method, how compensation securities are calculated potential species list, and directions on the process for residents and developers.	10 in-house hours, Council approval



37	Higher	<p>Define replacement planting ratios to mitigate the loss of canopy cover due to land and infrastructure development:</p> <ul style="list-style-type: none"> • Implement replacement ratio of 1:1 for street trees and specimen park trees on public land; • Implement replacement ratio of 2:1 for trees >30cm removed on private parcels <420m²; • Implement replacement ratio of 3:1 for trees >30cm removed on private parcels >420m²; and • Implement replacement ratio of 2:1 and a monetary fine for non-compliance for trees removed without a permit on private land. 	20 in-house hours, Council approval
38	Moderate	Require reforestation prescriptions by a registered professional forester for large areas of tree removal on public or private land.	10 in-house hours, Council approval
7.4 Recommendations for Improvements to Policies			
Objectives: Create policy recommendations that increase tree protection for the urban forest of Harrison Hot Springs.			
39	Higher	Within the forthcoming OCP update, amend the vision statement to support the protection, establishment, and enhancement of the Village's urban forests.	15 in-house hours
40	Higher	Develop an OCP goal that directs an approach to how development in the Village is managed into the future with regards to protection of the existing urban forest. This approach may include a revised development cost charge schedule that would be in support of the protection and enhancement of the existing urban forest.	10 in-house hours
41	Lower	Consider conducting a feasibility study in conjunction with the FVRD to determine what resources are available to increase bylaw enforcement of the <i>Tree Management and Preservation Bylaw No. 1015</i> and <i>Park Regulation Bylaw No. 1150</i> . The study should define assigned areas of responsibility for staff of both local governments, and potential sources of operating budget increases.	4 in-house meetings; \$10,000-\$15,000 (consultant)
42	Lower	Include landscaping and minimum tree planting requirements for the development of above- and below-ground infrastructure such that development does not create a net loss and can instead, if feasible, expand the population of the urban forest.	15 in-house hours
43	Higher	Recommend minimum buffers or provide specific direction for determining Critical Root Zones (CRZ) for individual tree protection based on species and size.	5 in-house hours
44	Moderate	Provide guidance related to minimum boulevard widths and spacing for tree planting, and minimum widths for landscape strips and distances for tree spacing in order to provide adequate root and crown space for the healthy growth and development of new trees.	5 in-house hours
45	Lower	Extend the Village's current list of landscaping species for multi-family developments, so that homeowners and single-family home developers may make use of these resources to plan species selection for both new and existing homes.	5 in-house hours
46	Higher	Require developers to plant trees on the subject property with a portion of amenity contributions going towards the Village's urban forest program.	20 in-house hours, Council approval



47	Moderate	Strengthen the current building inspection process to include inspections of landscaping and tree planting on the newly developed properties. The current building inspection process only applies to the interior of buildings without consideration of the surrounding land – this will require collaboration with the FVRD.	10-15 in-house hours, dependent on task sharing with the FVRD
48	Higher	Transfer requirements related to tree protection measures from the <i>Subdivision and Development Servicing Bylaw No. 578</i> to the <i>Tree Management and Preservation Bylaw No. 1015</i> .	8 in-house hours, Council approval

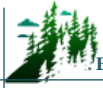


ACKNOWLEDGEMENTS

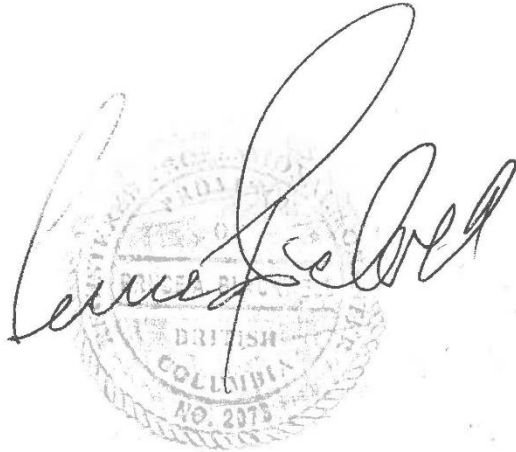
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Finally, the authors would like to thank all the residents, stakeholders, and business owners for their feedback, time, and interest in the two public open houses and the business workshop.



REGISTERED PROFESSIONAL SIGN AND SEAL



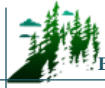
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May 23, 2023



COMMONLY USED ACRONYMS

CRZ	Critical Root Zone
CWPP	Community Wildfire Protection Plan
DBH	Diameter at Breast Height
DP	Development Permit
FLNRO	Ministry of Forests, Lands, and Natural Resource Operations
FVRD	Fraser Valley Regional District
ISA	International Society of Arborists
OCP	Official Community Plan
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TPZ	Tree Protection Zone
TRAQ	Tree Risk Assessment Qualification
UBCM	Union of British Columbian Municipalities
UFMP	Urban Forest Management Plan

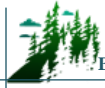
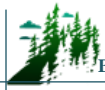


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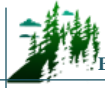


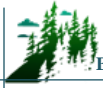
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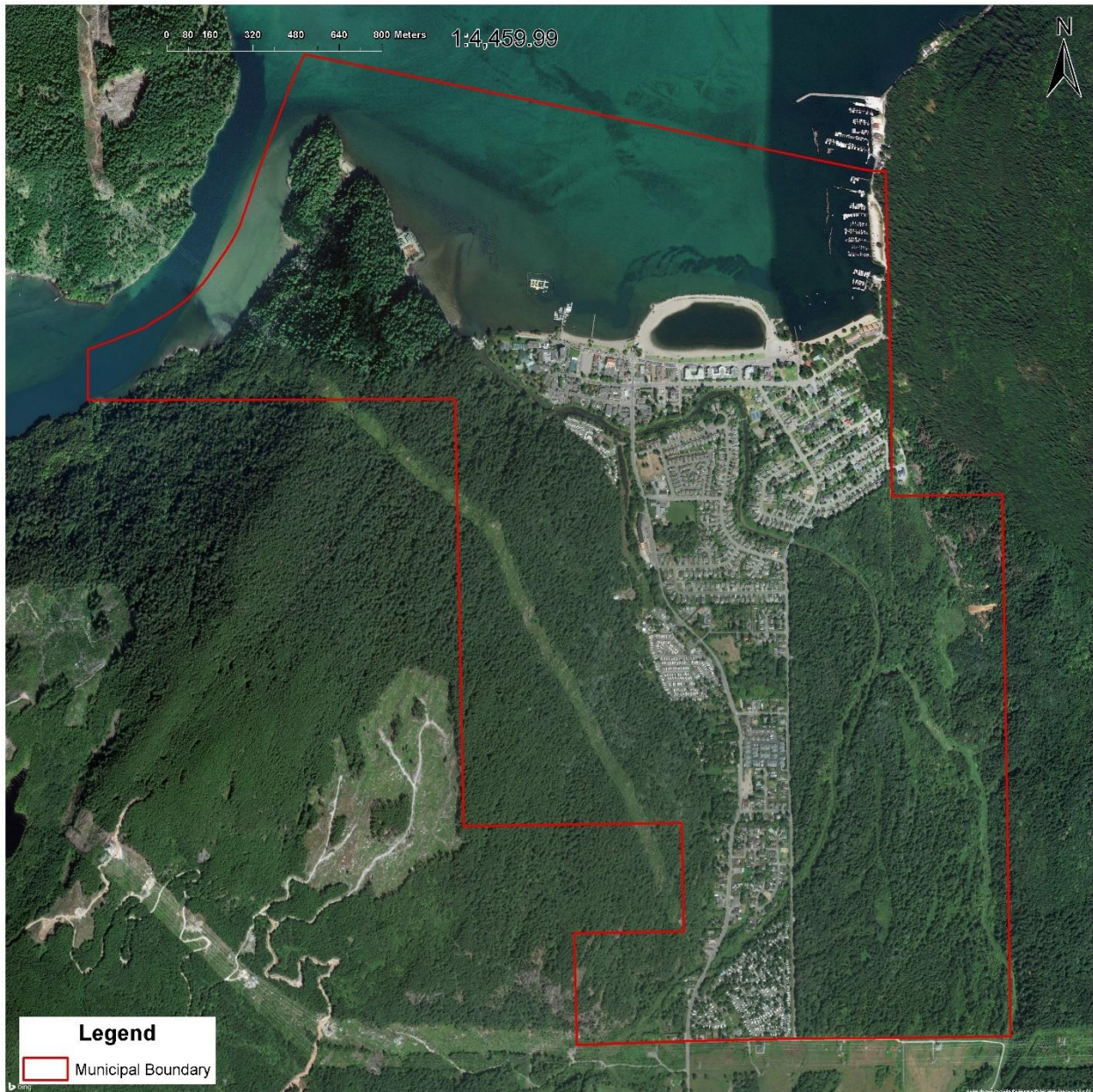
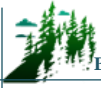
1.0 INTRODUCTION

The scope of this Plan includes all public and private lands within the Village of Harrison Hot Springs's municipal boundary (the 'Study Area' - Map 1). The East Sector lands owned by the Crown, and those parcels owned and managed by other levels of government are not within the scope of this project.

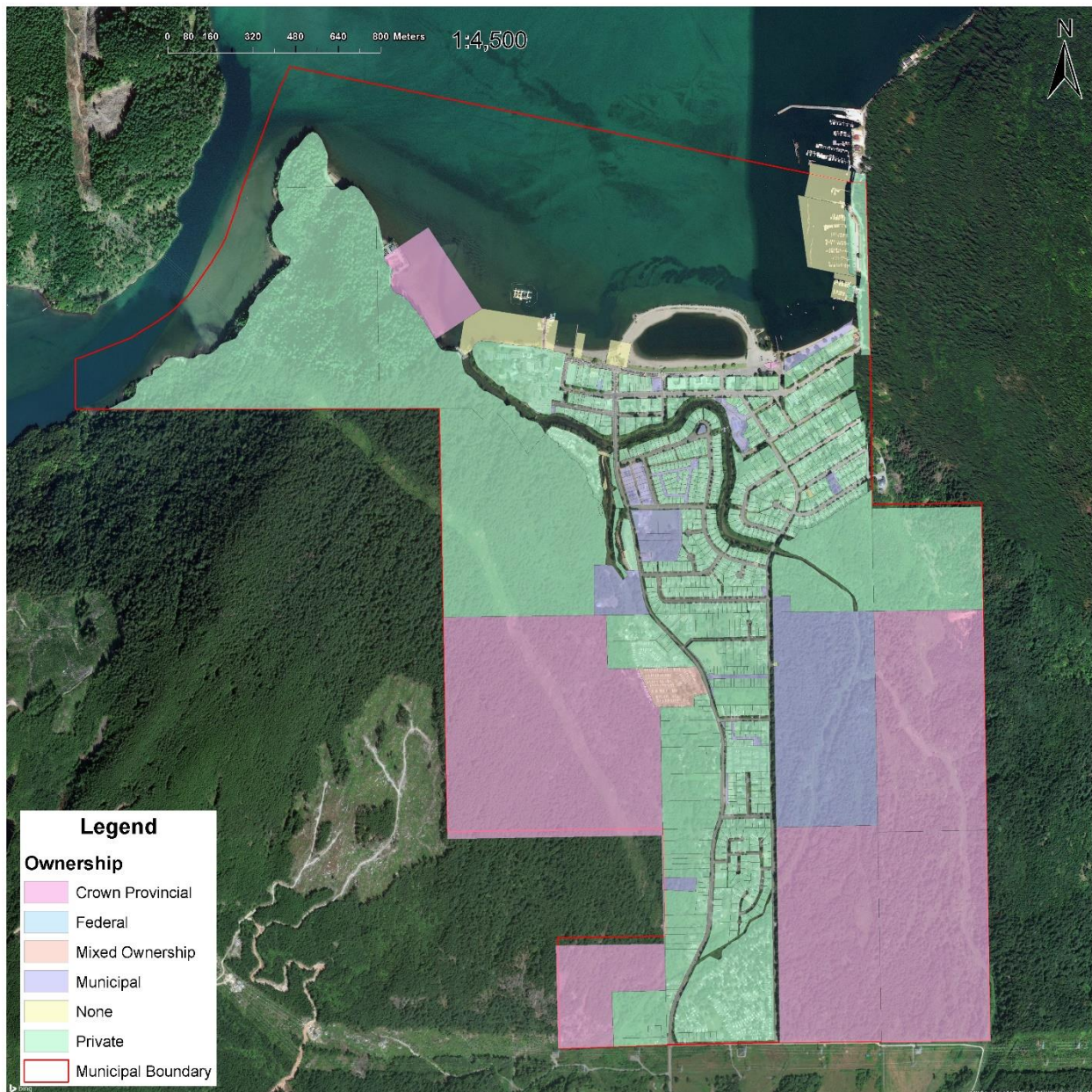
1.1 DESCRIPTION OF PROJECT AREA

The Village of Harrison Hot Springs is located in the eastern section of the Fraser Valley, on the south shore of scenic Harrison Lake. The Village is located on the traditional territory of the Sts'ailes. The Village is currently home to around 1,900 residents and covers 5.47 km² (547 hectares) of both urban and natural forested areas. The hot springs in the area have been a popular tourist destination since the 19th century, and today the town receives 750,000 visitors per year. Most tourism takes place in the summer months in order to enjoy outdoor recreation such as hiking, rock climbing, bird watching, the beaches of Harrison Lake, and the famous hot springs.

The urban areas of the village are organized in a long strip running north-south along Hot Springs Road (Highway 9) and expanding outwards as the road approaches Harrison Lake (see Map 1). Along the lakefront is Esplanade Avenue and the Harrison Lagoon, which is especially popular with summer tourists for lake views and swimming. To the west of the town centre along the lakeshore is the iconic Harrison Hot Springs Resort, which has been in operation since 1886. The resort also owns a large tract of natural forested land in the western side of the village. Within the municipal boundaries, there are also several areas of forested Crown resource land, which are not currently being maintained or managed by any provincial authority. These areas abut onto urban areas and are crossed or bordered by recreational trails.



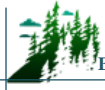
Map 1. The Village of Harrison Hot Springs, imagery from Bing Images.



Map 2. Property ownership within the Village's municipal boundary.

1.2 PROJECT OBJECTIVES

The overall goal of this Urban Forest Management Plan is to provide direction for the Village of Harrison Hot Springs to manage its urban forest into the future. The Village recognizes that the urban forest can be considered utility infrastructure like roads or water conveyance and drainage systems. Because the urban forest is a dynamic, living utility (green infrastructure) that grows and changes over time, it therefore requires similar management planning and budgeting afforded to grey infrastructure. The current system



of management and regulation for Harrison Hot Springs is in need of updates; one of the main objectives of this report is to provide recommendations on policy changes and additions in order to create an effective urban forestry program. This report will also seek to improve the preservation and protection of the Village's existing trees in order to enhance their health, resilience, and the community's enjoyment of them. Finally, this report will support planning for the enhancement of the urban forest throughout the Village through recommendations for operations and areas to focus new plantings.

2.0 METHODOLOGY

2.1 DOCUMENTARY REVIEW

A thorough background review of the following bylaws and policies was conducted in order to determine the existing tree protection and urban forest management guidelines:

- Bylaw Notice Enforcement Bylaw No. 855
- Development Procedures Bylaw No. 1090
- Park Regulation Bylaw No. 1150
- Property Maintenance Bylaw No. 1072
- Subdivision and Development Servicing Bylaw No. 578
- Tree Management and Preservation Bylaw No. 1015
- Zoning Bylaw No. 1115
- Official Community Plan Bylaw No. 864
- Tree Replacement on Public Lands Policy 1.35
- Tree Management and Preservation Permit Application

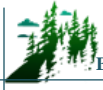
The Village's bylaws and policies were also compared to existing policies in similar municipalities (Appendix C: Bylaw Comparison Table) during the course of the SWOT analysis.

Harrison's Official Community Plan

Harrison Hot Spring's Official Community Plan (OCP)³ was created in 2007 with the purpose of guiding the development of the Village as a high quality residential and resort community. As of 2022, it is currently in the process of being updated. The OCP has the following goals for the Village of Harrison Hot Springs:

1. Provide efficient, equitable, and affordable public services;
2. Establish a distinct, pedestrian-oriented Village centre with a range of commercial services;
3. Develop tourism and recreation features and activities for the benefit of residents and visitors;
4. Protect views of the lake and surrounding mountains;
5. Protect and maintain air and water quality and biodiversity;
6. Promote compatible residential and tourism development and community relationships;

³ Harrison Hot Springs (2007). *Official Community Plan Bylaw No. 864*.



7. Manage traffic and parking and promote transportation alternatives;
8. Provide for a mix of housing types for all ages and incomes;
9. Restore and protect the Miami River and related aquatic ecosystems; and
10. Reduce community greenhouse gas emissions.

Of these goals, Goals 3-5 and 9-10 are the most relevant to the urban forest. A vibrant and aesthetically pleasing urban forest provides recreational and visual value which can be enjoyed by both visitors and residents. Managing the forested areas around Harrison Hot Springs also enhances the views from town. Some of the many benefits of the urban forest include stormwater attenuation and air quality improvement, as well as providing habitat for wildlife.⁴ Management of the trees surrounding the Miami River greenway improves the overall health of the area by limiting erosion, shading the river to prevent rising stream temperatures, and providing wildlife habitat. Finally, trees are a valuable method of sequestering carbon dioxide, thereby reducing the greenhouse gas emissions of the community.

Fraser Valley Regional District's Regional Growth Strategy

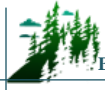
The Regional Growth Strategy⁵ for the Fraser Valley Regional District also has the following eight goals:

1. Increase transportation choice and efficiency;
2. Support and enhance the agriculture sector;
3. Manage urban land responsibly;
4. Develop a network of sustainable communities;
5. Protect the natural environment and promote environmental stewardship;
6. Protect and manage rural and recreational lands;
7. Achieve sustainable economic growth; and
8. Manage water, energy resources, and waste responsibly.

Goals 3-6 are most relevant to the urban forest and a management plan would help the Village contribute to the regional goals. One of Harrison Hot Springs' proposals to meet Goal 3 is to increase residential density, allowing increased greenspace within urban areas of the town. Part of a sustainable community is supporting green infrastructure; an urban forest management plan would, by definition, promote the protection of the natural environment as well as rural and recreational lands. Creating an urban forest management plan that protects and supports both the trees and the community of Harrison Hot Springs is a critical step towards the culmination of the Official Community Plan and the FVRD's Regional Growth Strategy.

⁴ Wolf, K.L. *et al.* (2020). Urban Trees and Human Health: A Scoping Review. *International Journal of Environmental Research and Public Health*, 17 (12), 4371. <https://doi.org/10.3390/ijerph17124371>

⁵ Fraser Valley Regional District (2018). *Regional Growth Strategy Monitoring Report*.



2017 Community Wildfire Protection Plan

A Community Wildfire Protection Plan (CWPP)⁶ was created in 2017 by B.A. Blackwell & Associates for the Village of Harrison Hot Springs. The CWPP's purpose was to identify the wildfire risks within and surrounding the Village, describe the potential consequences of a wildfire in the community, and examine options to reduce wildfire risk. Relevant recommendations for the urban forest were pulled from the CWPP and can be found in Section 6.1.

Consultation

On March 23, 2022, a council workshop was held to identify objectives and priorities for the Plan. Issues of concern identified during that workshop include: tree protection during development, planting of new trees, and a preferred tree species list.

There were several consultations with staff both in-person and online, especially with the Horticultural Technician, Operations Manager, and Deputy Chief Administrative Officer/Corporate Officer. A questionnaire about the urban forest was sent to the aforementioned as well as to Chief Administrative Officer. The public consultation process is described in Section 2.4.

2.2 STAFF CONSULTATION

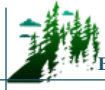
The Village was motivated to undertake an Urban Forest Management Plan in order to protect trees and promote the urban canopy. Councilors see their responsibility to lead the way environmentally and act proactively in tree management. Public safety is also of great importance and tree management should reflect the risk that trees could pose to residents and tourists.

Staff has pointed out that regulating trees on private property will also impact existing residents and that there are three jurisdictions for the purpose of regulation and policy: public areas such as boulevards and parks, undeveloped private property, and developed private property. Specific areas of interest were as follows:

- Stronger policies and requirements for tree replacement on private land;
- Inventory of public trees;
- Hazard tree policy/risk management program;
- Watering and pruning management;
- Stronger regulation for the removal of trees during development; and
- Clear policies relating to when and how to remove trees.

A project initiation meeting took place on January 31, 2022 with Blackwell staff and administration to discuss overall goals and objectives for the UFMP. A Council workshop was held on March 23, 2022 in

⁶ B.A. Blackwell & Associates Ltd. (2017). *Village of Harrison Hot Springs Community Wildfire Protection Plan*.



order to consult on the proposed scope of the plan. A site visit and meeting with field staff took place on May 19, 2022 for details on existing tree management operations. Staff were consulted throughout the report writing process for additional clarification on operations.

2.3 FIELD

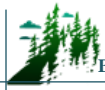
Field work was conducted on June 28-29, 2022. The goal of this field work was to create an inventory of all municipal and private trees along streets and in pocket parks in order to capture the following characteristics: location, species, height class, and general health of the tree. Overall observations of the urban forest, including municipally-managed forested natural areas, were also taken during the field shift. Data was collected by two forest technicians over the two-day period, using an Esri Collector schema for tree data and Avenza for overall observations on iPad mini. Data was then analyzed in the office to assess overall trends. The foresters inventoried 1,982 trees in total: 1,593 street trees and 389 in pocket parks (Table 2). A brief survey of the East Sector Lands (Appendix B: East Sector Lands) was also conducted in order to ascertain forest health issues within that area, although this is not in the scope of work for developing Harrison's Urban Forest Management Plan (UFMP). Tree inventory data was not collected in the East Sector and only forest health observations were made using Avenza.

2.4 PUBLIC CONSULTATION

Public consultation forums were conducted on three occasions:

1. Public Open House #1, date: July 28, 2022;
2. Public Open House #2, date: December 7, 2022;
3. Business workshop, date: December 7, 2022.

Both public open houses and the Business Workshop took place at Memorial Hall in downtown Harrison Hot Springs. Posterboards describing Blackwell's preliminary findings from the documentary background review, tree inventory fieldwork, and preliminary recommendations, were set up around the hall. Blackwell staff were available to speak with residents and answer any questions. Both Open Houses were accompanied by online surveys on the Get Into It Harrison website and paper copies were made available at the event. The Business workshop consisted of a short presentation by Blackwell staff and a group discussion with attendees. Village staff were not present at any of the events. Open House #1 was intended to share the results of the baseline urban forest analysis and field work in order to gather feedback to inform the development of the recommendations. Open House #2 and the Business Workshop were intended to share and receive feedback on the proposed recommendations. Summaries of these consultations can be found in Section 5.0.



2.5 A VISION FOR HARRISON'S URBAN FOREST

The vision for the Village's urban forest is one in which the existing tree resource of Harrison Hot Springs is well-protected and maintained by the Village in a way that is both sustainable over time and provides an opportunity for the forest to grow and flourish. Therefore, the most important and critical goal for the Village is to protect and care for the trees that are already there. By building a strong urban forestry program with the power of enforcement behind it, Harrison Hot Springs can transform and revitalize their urban forest into one that better serves the needs and desires of the community over time.

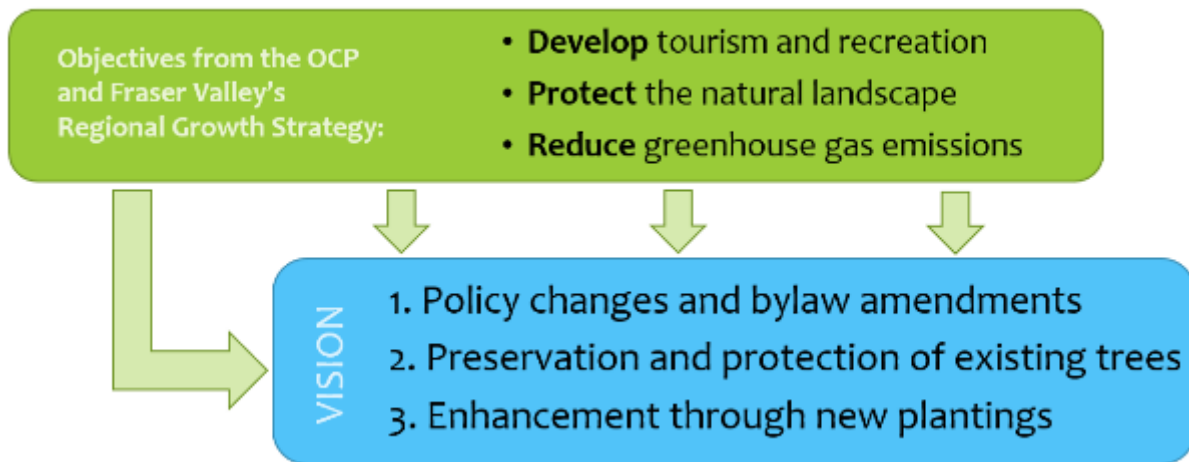
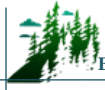


Figure 1. A Vision for the Urban Forest Management Plan.



3.0 URBAN FOREST MANAGEMENT

3.1 BENEFITS OF THE URBAN FOREST

Like any other resource, urban forests provide significant benefits to the community while also presenting some drawbacks. Numerous studies have shown that trees within urban areas improve mental and physical health, as well as providing an aesthetic improvement to urban areas and increasing property values.⁷ The shade these trees provide is not only welcome for its own value in the summer, but it can also reduce energy costs for shaded buildings. Urban forests provide other environmental benefits, such as decreasing soil erosion, air pollution, and flood risks throughout the community. Tree cover also provides wildlife habitat and ecosystem connectivity. As previously mentioned, their shade reduces energy costs⁸ and growing trees sequester carbon and reduce emissions – valuable tools for climate change mitigation and adaptation. Trees are also known to reduce the urban heat island effect – a phenomenon in which the increased presence of concrete, asphalt, and other impenetrable and highly reflective surfaces of urban areas increases the overall temperature compared to rural areas.⁹

With all of these benefits, there are also drawbacks of urban forests to consider.¹⁰ If not properly maintained and managed, trees can be a hazard for human safety, properties, and electrical infrastructure. There can also be additional street cleanup needed for falling fruits and nuts, and roots and suckers can cause damage to sidewalks and underground infrastructure. Urban trees also release pollen in the spring, which is unfortunate for those suffering from allergies. Finally, maintaining an active urban forestry program is expensive, especially for a small municipality. However, despite these costs, urban forests remain a strong asset for any community, especially one that is already as well-treed as Harrison Hot Springs.

3.2 IMPORTANCE OF AN URBAN FOREST MANAGEMENT PLAN

In order to be most beneficial for the community, the urban forest needs to be actively managed. A management plan maximizes the efficacy of the urban forest to meet community goals while minimizing potential drawbacks. Potential hazards such as danger trees, fire risk, and forest health issues can be mitigated with strategic management and maintenance. A management plan would also provide a unified document for species selection, standards of tree care, and clearly define jurisdictional boundaries and power for tree management. This document allows for the identification of priorities and gaps which can then help Village staff in their management of the urban forest.

⁷ Wolf, K.L.(2007). City Trees and Property Values. *Arborist News*, 16 (4), 34-36.

⁸ Heisler, G.M. (1986). Energy savings with trees. *Journal of Arboriculture*, 12, 113-125.

⁹ [Heat Island Effect](#). *United States Environmental Protection Agency*. Accessed October 14, 2022.

¹⁰ The Benefits (and Disadvantages) of Trees in *Master Gardener Program: Tree Steward Manual* (2021). Virginia Cooperative Extension, *Virginia Tech Publishing*(Blacksburg, VA).



4.0 BASELINE URBAN FOREST CONDITIONS

4.1 DESCRIPTION OF THE EXISTING URBAN FOREST

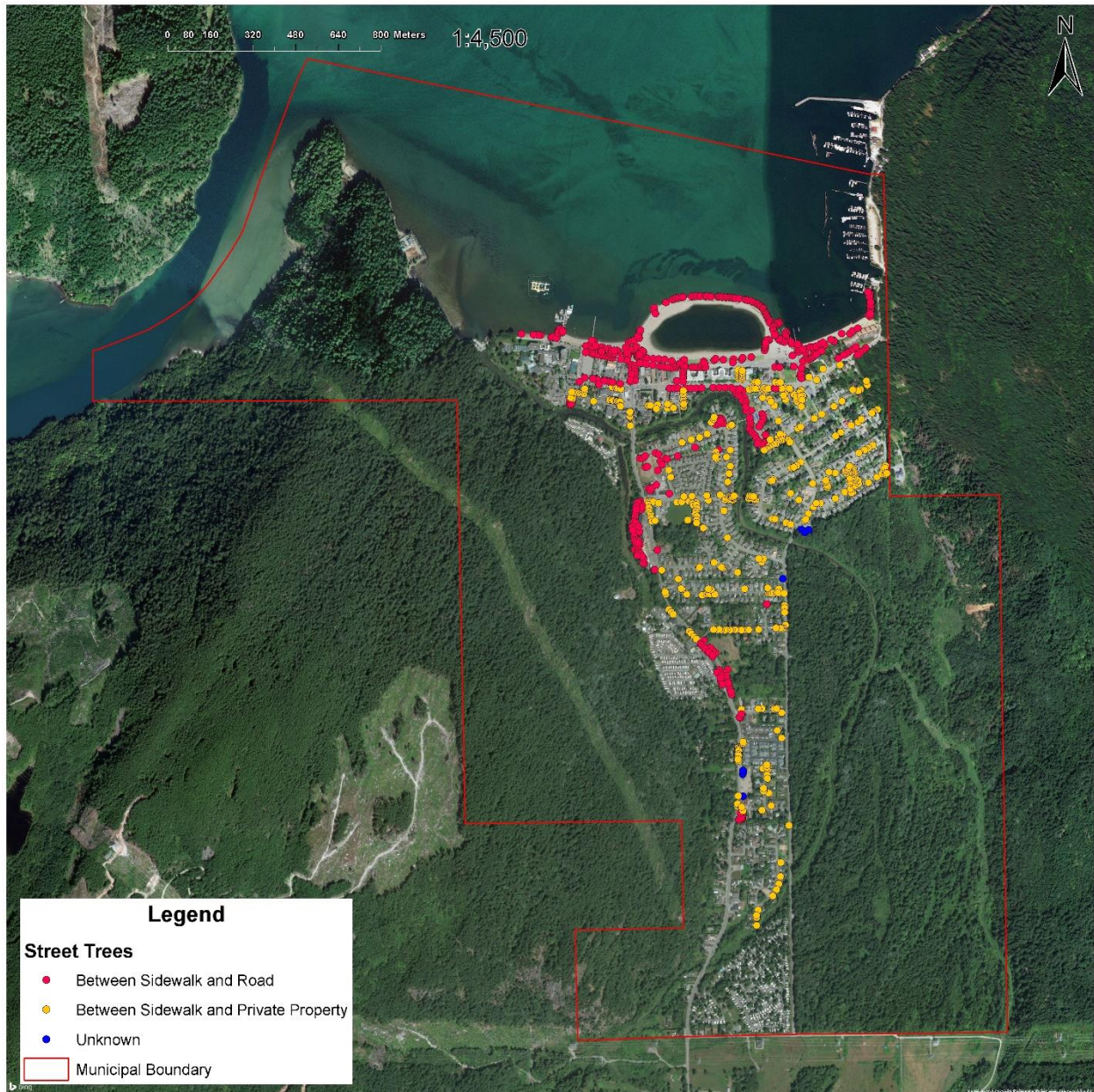
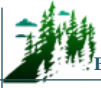
There are 1,593 street trees in the Village (Table 2), of which 1,476 belong to the municipality and 117 are private (Map 3). Trees along Hot Springs Road and Lillooet Road (with minimal exceptions) are owned and managed by BC Highways. Ninety-six species were inventoried during fieldwork but the largest proportions were found of the following: black cottonwood (*Populus trichocarpa*), western redcedar (*Thuja plicata*), bigleaf maple (*Acer macrophyllum*), dogwood (*Cornus* spp.), paper birch (*Betula papyrifera*), Douglas-fir (*Pseudotsuga menziesii*), English yew (*Taxus baccata*), red alder (*Alnus rubra*), Arborvitae (*Thuja occidentalis*), and honey locust (*Gleditsia triacanthos v. iner.*) (For a complete species list see Appendix D: Tree Inventory Species Composition). The coverage of street trees within the Village is fair, but could be improved. Many existing street trees are suffering from the effects of previous droughts, ice storms, and poor pruning practices (see Figure 2). There are also a group of iconic, older weeping willow trees (*Salix 'Chrysocoma'*) along Esplanade Avenue (see Figure 3), which will need to be monitored for hazards as they age. Generally, the oldest street trees are in older developments on the east side while younger trees are in new developments located elsewhere.

There are also several pocket parks in the Village, each of which contain a varying number of trees for a total of 389. These trees are managed by the Village, with the standards of care further described in Section 7.1.5. Some of the Village’s oldest known trees, primarily bigleaf maple and Douglas-fir, are located in Rendall Park; this has also been identified as an area where new plantings might be desirable.

Table 2. Harrison Hot Springs Tree Count

Tree Location	Tree Count
Bareland Strata	12
Boulevard	241
Interior of the Sidewalk	117
Mini Park	389
Exterior of the Sidewalk	257
Trail	966
TOTAL	1982

Finally, there are large swaths of natural areas within Village boundaries. Two of these parcels on the north side of town are privately owned, while the parcels on the south side are Crown land under the responsibility of the FVRD. The Crown land is not currently managed proactively, presenting a fire risk for the town with inadequate evacuation routes. Additionally, there are recreational trails intersecting the natural areas surrounded by aging deciduous trees with a high probability of failure. These trails are used frequently by both tourists and residents (see Figure 4). A walkthrough of the East Sector lands by forest technicians (Map 5) found that the aging birch by the road present a significant hazard to the road, the trail, hydro lines, and the cell tower present in the area.



Map 3. Street Tree Management Responsibility in Harrison Hot Springs.

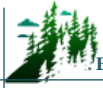


Figure 2. Poor pruning practice on maples along Lillooet Road.



Figure 3. Aging willows along Esplanade Ave.

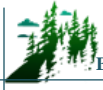
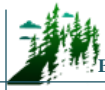


Figure 4. Stem breakage along the road near hydro lines along McCombs Ave and adjacent to the East Sector lands.



4.2 CANOPY COVER

A canopy cover analysis was outside the scope of this Plan, however other municipalities across the Lower Mainland were surveyed for examples of canopy cover target goals (Table 3). Ten municipalities were surveyed, as well as the Fraser Valley Regional District. A canopy cover analysis would use aerial imagery and LiDAR, if available, to classify pixels by their land cover type.¹¹ Once the data has been classified, the percentage of area taken up by the urban canopy can be determined. A canopy cover analysis can also provide information on the amount of deciduous or coniferous trees in the urban forest. This information can then inform municipal decision making on the placement and quantity of new plantings. The database can also be used as a management tool to compare the impacts of development projects on the urban forest.

Table 3. Canopy Cover Targets in Lower Mainland.

City	Canopy Cover Target
Abbotsford ¹²	40%
Coquitlam	In Progress
Fraser Valley Regional District	None
Hope	None
Langley	In Progress
Maple Ridge	None
Mission	None
New Westminster ¹³	32%
Richmond ¹⁴	30%
Surrey	In Progress
Vancouver ¹⁵	30%

The Village of Harrison Hot Springs is unique in that a large portion of the municipality is natural, forested land. If canopy cover was calculated over the unstratified municipal area, the Village would have a very high canopy cover. However, when the municipal area is stratified into forested land and urban land, there is a significant difference in canopy cover. For this reason, for canopy cover targets to be meaningful, the Village of Harrison Hot Springs should only analyze the urbanized area of the Village. The urbanized area (Map 4) accounts for 20.98% of the total area within the municipal boundary. Across other municipalities in the Lower Mainland, 30% seems to be the standard canopy cover target that municipalities aim for. Blackwell recommends that the Village undertake a canopy cover analysis of the urban portion of the

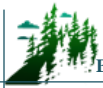
¹¹ Regional Tree Canopy Cover and Impervious Surfaces (2019). Metro Vancouver.

¹² Urban Forest Strategy: 2020-2045 DRAFT (2021). City of Abbotsford, Parks, Recreation, & Culture.

¹³ Urban Forest Management Strategy (2015). City of New Westminster, Parks, Recreation, & Culture.

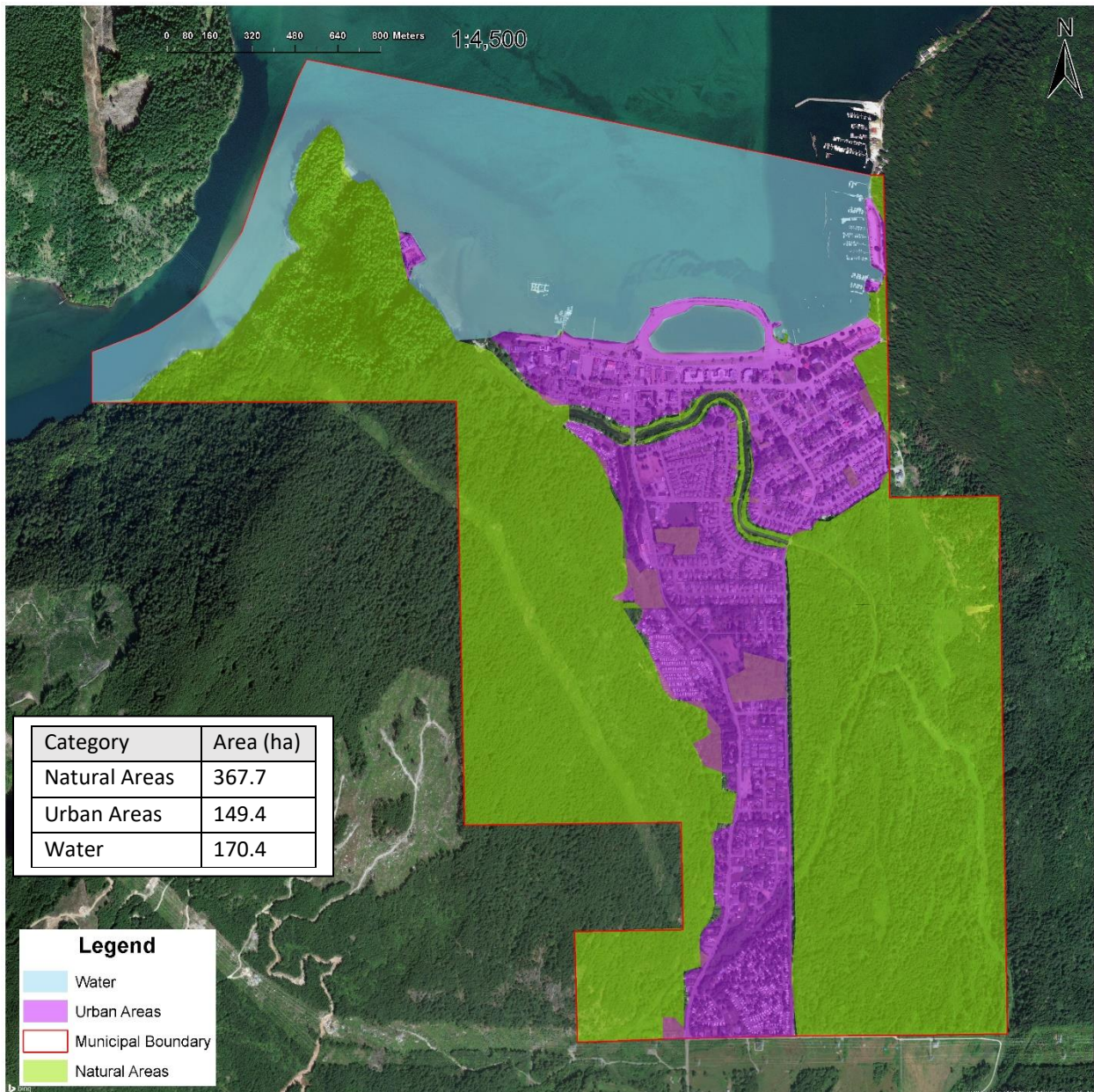
¹⁴ The Public Tree Management Strategy 2045: A Plan for Managing Richmond's Public Urban Forest (2019). City of Richmond, Parks Services.

¹⁵ Urban Forest Strategy Update (2020). City of Vancouver, Board of Parks and Recreation.

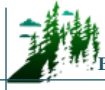


Village to determine the canopy cover baseline conditions in order to calculate the desired canopy cover target for the future.

RECOMMENDATION 1: Consider pooling resources with other municipalities in the FVRD to obtain aerial imagery and LiDAR. The Village should consider hiring a consultant to use this data to conduct a canopy cover analysis of the urban area of the Village.



Map 4. The Urban Area within Harrison Hot Springs.



4.3 SWOT ANALYSIS

A SWOT analysis is a planning tool used to help assess the effectiveness of existing urban forest management policies and practices. As part of background review, Blackwell conducted a SWOT analysis of the current urban forest management policies and practices in the Village. This SWOT analysis is a decision-support tool which examines the existing strengths and weaknesses of the Village’s urban forest resource. In addition, current and future threats to the urban forest are explored in order to identify those opportunities for current future management decisions. Essentially, the SWOT analysis can assist the Village of Harrison Hot Springs to match the strengths with opportunities, and help convert threats and weaknesses into neutral or positive attributes.

Strengths

Strengths are the Village’s policies, bylaws, planning documents, and operational practices that contribute to the urban forest’s protection, establishment, and resilience.

The Village has goals within the Official Community Plan that value the protection and preservation of the natural environment. The Village also has private and public tree management bylaws to regulate tree removal on private and municipally managed land. The Tree Management and Preservation Bylaw clearly defines heritage trees with ‘distinct’ tree status. Damage to trees on municipal property is not permitted. Finally, the Village is generally in favour of tree planting initiatives.

Weaknesses

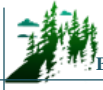
Weaknesses are internal features of the Village’s urban forest that present barriers to success.

However, the program also has several weaknesses. The bylaws generally provide insufficient requirements for tree protection and tree replacement, compounded by a significant lack in enforcement. While ‘distinct’ trees are clearly defined, the definition of a ‘protected’ tree is lacking. There is no hazard tree management strategy to routinely assess priority areas and arborist reporting standards are not available to private property owners. A specific resource management policy to respond to current and future insect pests, disease, and climate change issues does not exist. The system of emergency response and communication with residents after storm or other tree mortality events requires improvement. Prior to this report, a tree inventory of publicly managed trees did not exist. The Village does not have a tree recruitment strategy with desired tree species and age distributions. Overall, the current practices are reactive rather than proactive and staff have very limited capacity.

Opportunities

Opportunities are attributes in the external environment the Village could pursue in meeting the established vision, goals and objectives for the urban forest.

There are many opportunities for improvement arising from the external environment. Using the tree inventory created during this report, the Village could coordinate a system with the FVRD to update and



maintain the database. The district and the Village could also align their inter-departmental procedures and boost communication for the management of the resource lands and building inspections within the municipal boundary. The Village could implement a hazard tree assessment for priority areas. They could also require a portion of developer's amenity contributions to fund urban forest management programs. There is a horticultural technician on staff at the Village who could be supported to become an ISA certified arborist and TRAQ qualified. Canopy cover targets could be set for the urbanized area. Practices for site-appropriate tree species selection, pruning cycles, and watering could be improved. The Village could also develop a disaster-driven management protocol for tree management to reactively respond to extreme events such as: drought, floods, windstorms, insect/disease outbreaks, ice storms, etc. They could also consider a long-term tree replacement strategy to maintain – or ideally increase – the tree population in the urbanized areas. Finally, the Village could encourage tree planting by private residents as a way to increase tree species diversity and canopy cover.

Threats

Threats are external features that limit or could prevent the Village from achieving the objectives from management and operational decisions. Examples of threats can be biotic, abiotic, or governance decisions.

The SWOT analysis also identified external threats to the urban forest. The lack of established and enforceable standards for private and public tree care decreases the tree population. The Village does not have the authority to manage risk and liability for some of the resource area within municipal boundaries, creating a hazard. Western hemlock regenerates abundantly and is prone to failure, posing a risk to public safety and property damage. Limited tree species diversity can make the urban forest more vulnerable to pests and pathogens. Bark beetles, wood boring insects, needle casts, and root rots are ongoing concerns. Predicted trends for the region include warmer, longer summers with dramatic swings in precipitation resulting in more drought and flooding events. There are also rare plant communities at risk of degradation in wetland areas of the East Sector. Finally, changing public expectations around the management of trees and forest stands can make operations more challenging.

Conclusion

The Village of Harrison has described in its Official Community Plan that the natural environment holds great value to the community. This becomes the basis for all future resource management, stewardship, and public engagement initiatives to ensure the structure and function of the urban forest is maintained and enhanced into the future. At this time, as the Village begins its journey along the trajectory of urban forest management, amendments to the *Tree Management and Preservation* and *Subdivision and Development Servicing* bylaws are the most effective tools to set standards for tree protection and tree replacement. Implementation of a process to routinely assess hazard trees in priority areas will reduce the legal risk and liability that the Village holds in the absence of such a strategy. The establishment of canopy cover targets for the urbanized portion of the Village, improved tree genus and species diversity, and enhanced care for the existing tree population will build resilience in the face of unknown and future threats to forest health and changing environmental conditions related to climate change.

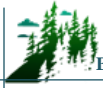
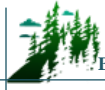


Table 4: SWOT Analysis summary for Harrison’s urban forestry program.

Internal Environment	
Strengths (S)	Weaknesses (W)
<ul style="list-style-type: none"> There are clear OCP goals that value the protection and preservation of the natural environment Has private and public tree management bylaws to regulate tree removal on municipally managed lands Clearly defines heritage trees with ‘distinct’ tree status Damage to trees on municipal property is not permitted The Village is in favour of tree planting initiatives 	<ul style="list-style-type: none"> Bylaws provide insufficient requirements for tree protection and tree replacement; bylaw enforcement The definition of a ‘protected tree’ is lacking There is no hazard tree management strategy to assess priority areas for routine assessments Arborist reporting standards are not available to private property owners No jurisdiction for tree management on Crown land within municipal boundary Tree inventory of publicly-managed trees does not exist No resource management policy to respond to current and unknown future insect pests, disease, and climate change Emergency response and communication with residents after storm/tree mortality events require improvement No tree recruitment strategy with desired tree species and age distributions Current practices are reactive rather than proactive
External Environment	
Opportunities (O)	Threats (T)
<ul style="list-style-type: none"> Amend bylaws to set standards for tree protection and tree replacement; bylaw enforcement Develop a tree inventory and coordinate with the FVRD a system to update and maintain the database Implement a hazard tree assessment strategy for priority areas Require a portion of developer’s amenity contributions to fund urban forest management Support the Red Seal Horticulturalist on staff to become TRAQ qualified and an ISA certified arborist; Align inter-departmental procedures and boost lines of communication with the FVRD Set canopy cover targets for the urbanized area Improve practices for site-appropriate tree species selection, pruning cycles and watering Develop a disaster-driven management protocol to reactively respond to extreme events (drought, floods, wind, insect/disease outbreaks, ice storms) Provide tree care guidelines to residents for boulevard maintenance Consider a long-term tree replacement strategy to maintain/increase the tree population Develop boulevard tree planting incentives for private residents to increase tree genus and species diversity 	<ul style="list-style-type: none"> Lack of established and enforceable standards for private and public tree care decreases the tree population Village does not have authority to manage risk and liability for some lands within the Resource Area Western hemlock regenerates abundantly, is prone to failure and poses a risk to public safety/property damage Changing public expectations around the management of trees and forest stands Limited tree species diversity can make the urban forest vulnerable to forest pests and pathogens Predicted trends for the region include warmer, longer summers with dramatic swings in precipitation resulting in both more drought and flooding events Bark beetles and wood boring insects, needle casts, root rots, drought, and windthrow are ongoing concerns Lack of BMPs for tree protection during land development decreases the viable tree population Rare plant communities are at risk of degradation in wetland areas of the East Sector The Village Horticultural Technician has limited capacity to respond to all incoming tree management requests



4.4 PUBLIC AND PRIVATE TREE OWNERSHIP

Private parcels make up 51.15% of the total area of Harrison Hot Springs, many of the identified street trees are the responsibility of private residences, although the extent to which these private residences are managing the street trees is not known. Natural areas on private land account for 31.33% of the total area within municipal boundaries, primarily on the north side of town. These represent a significant contributor to Harrison Hot Springs' urban forest and, if unmaintained, pose a fire risk to the community. It is unclear if these areas are managed for fire risk and for any other hazards that could affect the town. Generally, the Village does not become involved with trees on private land except for where subdivision development is underway. The main mechanism and regulatory tool for the management of trees on private land is the *Tree Management and Preservation Bylaw No. 1015*¹⁶ as well as the *Subdivision and Development Servicing Bylaw No. 578*.¹⁷

There are other large natural areas within the municipal boundary that are designated as Crown resource land, accounting for 35.17% of the total area of the municipality. FVRD has jurisdiction over these resource lands, but the areas are not being proactively managed. Much like the large private areas of natural land, this presents a fire risk for the town and causes evacuation concerns. The Village has conducted some clearing and pruning of these trees, but has not conducted a full hazard inspection, as the trees are outside of their jurisdiction. The disconnect between the FVRD and the Village relates to building and landscaping inspections, which are performed by the FVRD. These development inspections only cover the building facades and interiors, and not the exterior landscaping. The Village of Harrison Hot Springs, therefore, cannot control or recommend landscaping to FireSmart standards. The Subdivision and Development Servicing Bylaw includes a list of some potential species for landscaping; however, this bylaw is only applicable to multi-family development and does not apply to single-family development or any existing structures.

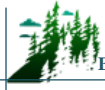
4.5 THE EXISTING URBAN FORESTRY PROGRAM

For both private and public street trees, management has previously been reactive to hazards or other issues that arise. Tree management issues and regulations are divided up into several bylaws, most notably the *Tree Management and Preservation Bylaw No. 1015* and the *Subdivision and Development Servicing Bylaws No. 578*. The requirements within these bylaws are often scant and vague, which can create confusion when implementing the bylaws or managing trees that have complex health issues or growth requirements.

The bylaws, as they currently stand, apply to all trees that are greater than 30cm DBH and over 7m in height. Native species over a range of specific diameters are referred to as 'distinct' trees and cannot be removed unless there is no other option. The criteria for determining that there is no other option than

¹⁶Tree Management and Preservation Bylaw No. 1015, 2012. *Village of Harrison Hot Springs*.

¹⁷Subdivision and Development Servicing Bylaw No. 578, 1993. *Village of Harrison Hot Springs*.



to remove a distinct tree would be defined in an arborist report provided by a qualified professional. This is assessed based on the health of the tree and its proximity to the new build, but more detailed guidance from the bylaw is not provided. All trees, regardless of whether they are distinct or not, require a permit to be removed. During construction, tree barriers are erected under the drip line of trees to be retained, however the enforcement is not strong, as shown in Figure 5. Bylaw enforcement is a contracted service and there are four enforcement officers hired for the summer months. During our background review, the protection of existing trees was identified as an area in need of improvement.

Currently, species of new plantings are chosen by the developer and reviewed by Village staff. New trees are either acting as replacements for removed trees or as part of new development projects.

Village staff cleans up large branches and debris as required, while major tree removal and pruning is performed by a qualified professional. The Village currently has a program to water street trees and there is an irrigation system in place along Esplanade Avenue, on the beach, and within a few of the Village Parks. There is a pruning cycle in effect for street trees and new plantings that is under development.

Municipal hazard trees are identified during the Horticulture Technician's regular drive-through of street trees and pocket parks. Images are taken of these hazard trees and placed on the Village server. If required, these images are also sent to the contractor for assessment. About 40-50 trees are managed annually using this system. These periodic assessments are part of the standard operating procedures for the Village; there is no other schedule of routine hazard tree inspections in place. If private residents are concerned about a hazardous tree on their property, they can consult the Tree Management Bylaw, the Harrison Hot Springs website, or call the Village office for guidance. If further assessment is required, then a local arborist contractor would be called in to create an arborist report for the tree in question.

While the Village policies offer a good starting point for their urban forestry program, their existing regulations need specificity in order to be most effective. There is also a capacity issue in both equipment and staff for enforcing bylaws and managing the trees that currently exist in the Village. There is not an arborist on staff at the Village, although one would be beneficial. Finally, a major issue is the lack of appropriate record-keeping for the trees that currently comprise the urban forest and for the modifications made to those trees through removals, maintenance, and new plantings.

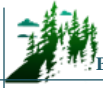


Figure 5. Construction piled against one of the large oaks on Lillooet Road; no tree protection present.

Village of Harrison Hot Springs

Fraser Valley Regional District

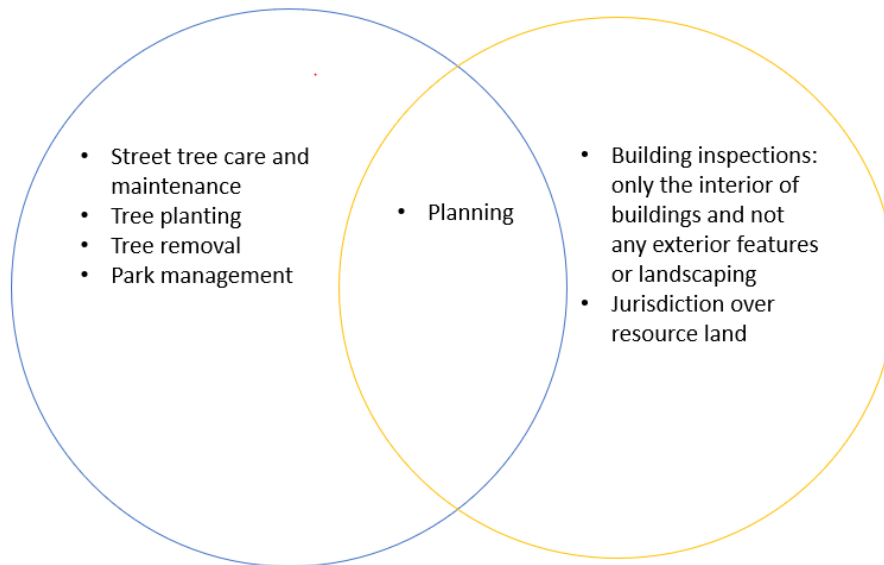
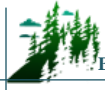


Figure 6. Division of responsibilities between the Village and the Fraser Valley Regional District.



5.0 STAFF AND PUBLIC CONSULTATION

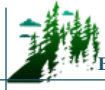
During the background review for this report, Blackwell had multiple meetings and discussions with staff regarding their concerns for the urban forest. The four major issues identified by Village staff are as follows:

1. Identification and management of hazardous trees;
2. Identification and management responsibility for trees within the municipal boundary;
3. Response to public expectations regarding tree health and urban forest resilience; and
4. Increasing tree species diversity to build resilience to climate change and to reduce the risk of pest and pathogen damage.

Public Open House #1

At the first open house, residents expressed concerns regarding the objectivity of arborist reports in development settings. Many residents observed that what they perceived as healthy trees were removed and not replaced during new development. Many of the attendees of the open house were vocal about wanting replacement trees planted in new developments where trees had been removed. There were also concerns regarding the lack of enforcement for tree protection bylaws. Some attendees also expressed frustration with the Official Community Plan not including specific goals that address the importance of the urban forest as a community resource. There were some concerns regarding the management of riparian areas, the reduction of shade for fish habitat, and the inputs of fine material into the river system thereby degrading salmon rearing habitat. The concerns relate specifically to the debris remaining after brushing. One resident showed a desire for increased shade trees by the lakefront, especially since the tent ban came into effect.

In the online survey, 46.4% of respondents said that they did not feel the tree protection guidelines were working and 53.6% were unsure. No respondents said that they thought the current tree protection guidelines were working effectively. 75% of respondents said they do not currently care for street trees near their property. When asked if they would support a tax increase to maintain the urban forest: 20% did not support an increase, 50% supported an increase of \$50/year, 20% supported an increase of \$100/year, 5% supported an increase of \$150/year, and 5% supported an increase of more than \$150/year. Additional text responses expressed concerns similar to what we heard at the open house. Residents were unclear on what the tree protection bylaws are in Harrison Hot Springs. Many respondents were very concerned about trees being removed for development without replacement trees. Respondents were also concerned regarding the continued preservation of trees in the Village valuable to the community, especially those along Esplanade Avenue, Lillooet Road, and in Rendall Park. Residents in the survey response also expressed concern regarding the Village's adaptation to climate change and how that affects the urban forest. The full survey responses can be found in Appendix A: Survey Responses.



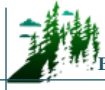
Public Open House #2

Once again, residents were very concerned about protecting trees during and after development. Specific areas were also highlighted for protection and new plantings, specifically Rendall Park, the north side of the lagoon, and the Miami River Greenway. Many expressed concern that the lack of new plantings and heavy influence of development would lead to a future with very few large trees in the Village. Attendees were also interested in integrating FireSmart principles into the Plan and planting a higher proportion of deciduous trees. One attendee was a representative of a development company in Chilliwack; she expressed that the current regulations were difficult to understand and clear guidelines are needed.

There were no respondents of the online survey.

Business Workshop

At the Business Workshop, representatives were broadly supportive of the “right tree in the right place”, especially regarding the aesthetic values of the community and presenting Harrison Hot Springs as a tourism destination. Attendees were also concerned about the jurisdictional conflict over Crown land within the municipal boundaries and the risk that unmanaged forested land could present to the community. Attendees were strongly in favour of a proposal to pool resources with other local municipalities to ask the FVRD for a district forester or other qualified professional. Representatives of the Tourism industry also advocated for staggered removals and replantings of trees with an unacceptable level of risk in order to minimize visual impact.



6.0 SYNOPSIS OF KEY THREATS

A major threat to the urban forest is the general lack of established and enforceable standards for private and public tree care. Overall, this lack of standards decreases the tree population and limits the Village’s ability to care for their urban forest. Village staff also have limited capacity to respond to all incoming tree management requests and to enforce the existing bylaws. There are significant areas of the urban forest – especially the large areas of natural private land and resource land – where the Village of Harrison Hot Springs does not have the authority to manage risk and liability. One of the major undertakings facing the Village will be communicating public expectations around the management of trees and forest stands.

Due to ongoing climate change, general predicted trends for the area include warmer, longer summers with dramatic swings in precipitation resulting in both more drought and flooding events.¹⁸ We have already seen the effects of this in past years, most notably the 2021 heat dome. Significant flagging from drought stress was noted on both younger trees and older ‘distinct’ trees across the Village, including the ‘distinct’ northern red oaks (*Quercus rubra*) on Lillooet Road. The ecosystem services of the urban forest will be reduced and less resilient in the face of threats associated with climate change, including drought and heat stress.

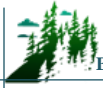
Climate change is also expected to increase flooding, by creating dramatic swings in precipitation and an overall increase in extreme weather events. More frequent high-intensity rainfall will increase the risk of flooding in low-lying areas and thereby damage trees. Complex drainage patterns exist in the East Sector that affect lowland water management and flood protection of residential areas; the drainage regime must be managed to avoid flooding in neighbouring parcels. The damage from flooding and other climatic threats reduces the efficacy and resilience of important ecosystem services of the urban forest.

Douglas-fir beetle, Swiss needle cast, Douglas-fir needle cast, mountain pine beetle, laminated root rot, Armillaria root rot, drought, and windthrow are major concerns in the Fraser Timber Supply Area. Western hemlock looper and western spruce budworm were also concerning in the past, but occurrences have declined in recent years.¹⁹ During the site visit, evidence of bronze birch borer was noticed along walking trails on Crown land (i.e., along Mount Street). Limited tree species diversity can compound the effects of forest health agents and promote the spread of forest pests and pathogens. There is also a threat from some native species, such as western hemlock (*Tsuga heterophylla*), to regenerate abundantly and outcompete other tree species. This has major safety implications, as hemlock is more prone to failure and poses a risk to public safety when planted close to homes and urbanized areas.

Climate change has also elevated the risk of fire across the province, as evidenced by the past several fire seasons. The large resource areas within municipal boundaries have not been managed for fire risk, and the responsibility and liability of these areas has not been well defined or understood. During the site visit,

¹⁸British Columbia Agriculture & Food Climate Action Initiative (2012). [Fraser Valley & Metro Vancouver: Snapshot Report](#)

¹⁹Ministry of Forests, Lands, and Natural Resource Operations (2015). [2015-17 Coastal Timber Supply Areas Forest Health Overview](#).



these areas were observed to have a high wildfire risk that threatens the town and its limited evacuation routes.

There are several threats that development poses to trees in the Village. Current regulations and bylaw do not provide strong criteria for when trees should and should not be removed for development; this is instead left to the discretion of the contracting arborist based on the tree's health and proximity to the proposed development. All phases of site preparation and construction for development can damage existing trees or alter soils and drainage patterns; these drainage and access issues during subdivision development can increase the number of trees requiring removal. Trees compete with infrastructure for space and funding, which can result in existing trees being in conflict with other infrastructure assets and services (and vice versa). The inspection requirements from the FVRD only cover the structure and its interior, not the surrounding landscape on the property. There is also a lack of enforcement and best management practices of the existing bylaw, leaving trees vulnerable during construction. Tree management and maintenance activities currently taking place are reactive to threats, thereby creating gaps in tree protection.

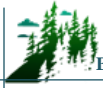
6.1 RECOMMENDATIONS FROM THE 2017 CWPP

Wildfire risk was outside of the consideration of this Plan, however the 2017 CWPP was reviewed and the following recommendations were pulled from the report as being most relevant to the urban forest:

RECOMMENDATION 2: Incorporate FireSmart recommendations as outlined in the 2017 FVRD CWPP prepared by BA Blackwell and Associates. Since the urban portion of the Village is flanked on either side by extensive and contiguous forested vegetation, a significant portion of the Village is at risk from wildfire. To address the wildfire risk to properties, wildland urban interface areas should be mapped and incorporated into the FVRD GIS database in order to identify the properties that would benefit from FireSmart measures.

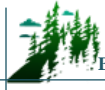
RECOMMENDATION 3: Develop a Parks and Trails Master Plan and include consideration for the placement, type, width, and objective of trails. Consideration should also be given to trail building and maintenance, as these activities can either increase wildfire risk (through fuels accumulations and unsafe work practices) or decrease wildfire risk (through proper placement, clean-up of combustible fuels trailside, and work practices which adhere to Wildfire Act and Regulations). The Master Plan could also include an emergency response plan to deal with the risks of fire within parks.

RECOMMENDATION 4: Review *Tree Management and Preservation Bylaw No. 1015* and revise to allow for homeowners to address wildfire hazards on their property associated with trees immediately adjacent to homes, as determined by a qualified professional.



RECOMMENDATION 5: Consider promoting FireSmart approaches for wildfire risk reduction to Village residents through Town Hall meetings, workshops and/or presentations. Aim to conduct the engagement/promotion campaign prior to and during the fire season. Consider supplying FireSmart materials to homeowners in the interface during these engagement campaigns and making this information available to tourists and visitors to the Village to increase awareness of wildfire risk.

RECOMMENDATION 6: Develop a Total Access Plan for the Village to create, map, and inventory trail and road networks in natural areas for suppression planning, identification of areas with insufficient access, and to aid in strategic planning. Georeferenced maps with ground-truthed locations of potential optimal firebreaks should be developed as part of the Total Access Plan and shared with fire suppression personnel and BCWS to support emergency response in the event of a wildfire. The plan should be updated every five years, or more regularly, as needed to incorporate additions and / or changes.



7.0 RECOMMENDATIONS

This section describes the recommendations to enhance the existing urban forestry program based on the tree inventory, SWOT analysis, and consultation with staff, stakeholders and the public. Recommendations are stratified into four broad categories:

1. Managing Trees on Public Property (Section 7.1)
2. Regulating Tree Removal and Replacement on Private Property (Section 7.2)
3. Tree Protection, Removal, and Replacement Standards (Section 7.3)
4. Recommendations for Improvements to Policies (Section 7.4)
5. Preferred Tree Species List (Section 7.5)
6. Community Framework (Section 7.6).

The full recommendation table can be found in the Executive Summary.

7.1 MANAGING TREES ON PUBLIC PROPERTY

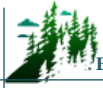
7.1.1 INTERDEPARTMENTAL COMMUNICATION AND COLLABORATION PROCEDURES

Many municipalities struggle with effective inter-departmental coordination for the implementation of urban forest policies related to tree retention and establishment. Varying priorities, project timelines, and professional backgrounds contribute to the inconsistent implementation of urban forest goals and objectives occurring between parks or urban forestry departments, and departments where tree related issues are not a core part of their work (i.e., Engineering, Utilities).

The solution to this challenge lies in establishing more formal lines of communication between relevant departments of the Harrison Hot Spring's Village Office with support from senior management; this could focus primarily on issues relating to tree retention during development, planting programs, tree replacement initiatives, and maintenance standards. Village staff may wish to form an informal working group to discuss tree-related planning, utility construction, and maintenance issues that brings together one staff member from Parks (Public Works & Utilities), Operations (Public Works & Utilities), Planning (Planning & Development), and a representative from the FVRD. Since the Village staff resource is small, and recognizing that the FVRD holds the GIS data management for the Village, it will be important to keep the working group schedule flexible.

Given the FVRD's involvement in both development planning, operations, and GIS management regarding the urban forest of Harrison Hot Springs, their cooperation will be necessary in order to succeed in the recommendations set forth in this UFMP. Consultation with the FVRD is advised in the following areas:

- Improvement to the system of inspections for new development in order to include exterior landscaping as a part of the inspection process – this will allow for the inclusion of FireSmart principles and promote increased tree planting on new developments;



- Development of a comprehensive forest health plan to manage potential pest and disease outbreak;
- Integration of emergency response following major storm events for damage to trees and to property by trees;
- Cooperative management of the resource lands within municipal boundaries which unmanaged pose a hazard.

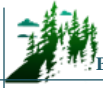


Figure 7. Potential members of an informal urban forestry working group.

RECOMMENDATION 7: Create an interdepartmental working group of selected staff members whose work relates to the protection or management of trees and tree parts. Core working group members may include staff from Planning & Development and Public Works & Utilities. Since the FVRD will be managing the Village’s mapping and GIS, a representative from this agency should be included.

RECOMMENDATION 8: Since a significant portion of forested land within the Village’s administrative boundary is owned by the Ministry of Forests, Lands and Natural Resource Operations (FLNRO), the Village should consider initiating meetings and discussions to explore the management of these Crown lands that lie outside of the Village’s jurisdiction. Ideally, a 200m management zone on Crown land should be agreed upon so that the Village could proactively manage in order to limit the burden of liability from wildfire and tree risks.

RECOMMENDATION 9: Recognizing that many small communities in the FVRD lack the resourcing to implement a robust urban forest management program, alternative solutions should be explored. For



example, a number of local governments could pool their collective resources (*i.e.*, pay a 1% fee), and in collaboration with the FVRD manage the natural areas within their respective municipal boundaries. The fee would go towards retaining the services of a regional Forester and/or arborist. Fuel treatments, FireSmart assessments, tree risk assessments, and operational tree work could be coordinated across multiple jurisdictions.

7.1.2 MAINTAINING AND RE-STOCKING THE URBAN FOREST

Management for a healthy urban forest requires a long-term commitment to new tree establishment, proactive and routine tree care practices for the existing tree population, and the adoption of relevant policies and bylaws to regulate tree removal and tree protection. Implementing these measures can assist in fostering resilience of the urban forest, as well as mitigates tree-related risk. Maintenance of municipally-owned and managed trees in Harrison Hot Springs is guided by the Village's *Official Community Plan No. 864* and *Tree Management and Preservation Bylaw No. 1015*. These planning documents outline the general approach to maintenance of the urban forest (Table 5).

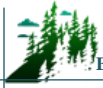
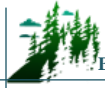


Table 5. Identified inclusions and gaps in Harrison Hot Spring's tree policy.

Planning Document	Included	Gaps
<i>Subdivision and Development Servicing Bylaw No. 578</i> (Private property)	Description of waste disposal for removed trees and shrubs.	Little to no reference to tree protection, tree planting, or landscaping. Protection of trees during construction is not actively enforced. No Village oversight for trees on private land except with regards to new multi-family development.
<i>Tree Replacement on Public Lands Policy 1.35</i> (Public property)	1:1 replacement ratio for public trees. Trees can be removed if they pose an unacceptable level of risk to the public, or to make room for the development of a Village project. Location and species are determined by Village staff.	No standards outlining suitable replacement tree attributes. No standards or criteria specified for determining if a tree presents an unacceptable level of risk to people, property or critical infrastructure.
<i>Tree Management and Preservation Bylaw No. 1015</i> (Private property)	'Distinct' tree attributes are clearly defined by species and size. Specifies standards for 'Qualified Person'. Provides care and removal guidelines for all trees in the Village.	No standards outlining what constitutes a suitable replacement tree. A 'Qualified Person' is not required to be tree risk assessment qualified (TRAQ). No tree protection recommendations for construction. No bylaw protection is given to replacement trees.
<i>Official Community Plan No. 864</i> (Private property)	Specifies recommended building setbacks on Lillooet and Cedar Ave. Geotechnical Hazard DPA 4 has guidelines for steep slopes. During landscape design, existing trees are to be preserved wherever possible.	No specification for canopy cover targets or species/age distribution goals. No quantifiable objectives stated for the urban forest.

RECOMMENDATION 10: Identify aging trees which are a value to the community (*i.e.*, the beach-front willows along Esplanade). Retain a certified arborist and tree risk assessor to assess these trees to determine expected lifespan, defects that may impact targets (people, property), and propose any mitigation measures. Produce a phased re-planting schedule, map suitable tree planting sites, and coordinate replacement plantings between Public Works & Utilities and Planning & Development, as needed.



7.1.3 PURCHASE OF NEW TREES AND GROWING STOCK

Suppliers of trees for new plantings are determined based on pricing, availability, and transport costs. Species selection of new planting is at the discretion of Village staff. The development of long-term nursery stock procurement agreements can be beneficial to both local nurseries and municipalities, as nurseries are provided longer-term security and municipalities can better control the quality of the stock being planted. Therefore, the Village should investigate opportunities to establish longer-term tree nursery procurement agreements with local tree nurseries in order to improve planted stock quality and to enable better pre-planting inspection of delivered stock. These pre-planting inspections should be consistent with recognized urban forestry best practices, which contribute to the establishment of higher-quality trees and less tree mortality once unacceptable stock is rejected.

RECOMMENDATION 11: Establish planting stock procurement agreements with local tree nurseries to improve the Village’s control over planted stock quality and to enable pre-planting inspection of delivered stock.

RECOMMENDATION 12: Develop routine procedures for pre-installation planting stock inspections consistent with recognized best practices,^{20,21} which contribute to the establishment of higher-quality trees and less tree mortality.

7.1.4 ESTABLISHMENT MAINTENANCE FOR NEWLY PLANTED TREES

Trees planted for less than three growing seasons are considered newly planted trees because they are recovering from transplant shock and their root systems are recovering. Therefore, they require more maintenance than established trees to see them through this critical period in order to avoid decline and mortality. Trees planted on municipal lands should be proactively managed – regular watering and mulching for three years during the summer dry season when soil moisture deficits are common (usually May to October for the BC south coast and Fraser Valley). It is further recommended that newly planted trees are structurally pruned after their three-year establishment period by Village staff. Following this period, the trees may then transition to a seven-year maintenance pruning cycle for established trees. Furthermore, all immature trees under Village ownership should be structurally pruned within the first ten years after they are planted.

²⁰ International Society of Arboriculture (2018). [ANSI A300 – Best Management Practices Planting Combo](#).

²¹ Master Municipal Construction Document (2022).

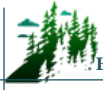


Table 6. Maintenance timeline for new planting stock and for established trees.

Within First 3 Years	Within First 10 Years	Ongoing Tree Care
Regular watering Mulched in 1 st and 3 rd year Structural pruning in 3 rd Year	3 structural pruning treatments	Maintenance pruning for all established trees should be on a 7-year cycle

Establishing trees will benefit from having a 10-15cm (4-6 inch) layer of organic mulch applied over the root ball. Mulch moderates soil moisture and temperature, prevents soil compaction, while contributing organic material to the soil as it decomposes.^{22,23} Care must be taken to ensure that the tree’s root flare is not buried by mulch, and that a 1m tree well (Figure 8) is created around the base. A mound of mulch should be created around the edges of the tree well to avoid runoff during watering. Mulch should be placed in the early spring when soil moisture and temperature levels are optimal; the mulch will maintain these conditions during the late spring and summer dry periods.



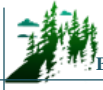
Figure 8. Example of a tree well around a newly planted tree.²⁴

Structural pruning techniques should encourage the development of strong central leaders and good branch spacing and branch-to-stem diameter ratios, while preventing the development of included bark. Pruning a newly planted tree at least three times during the first 10 years of its life (which can be conducted from the ground using hand-operated tools, such as pole pruners or hand saws) assists in the development of scaffold branch systems and can prevent structural defects such as codominant stems and included bark. Promoting a stable, structural form helps reduce future incidences of part- or whole-

²²Matheny, N. and J.R. Clark. 1998. *Trees and Development: A Technical Guide to Preservation of Trees During Land Development*. 183 pp.

²³Urban, J. (2008). *Up by Roots: Healthy Soils and Trees in the Built Environment*. 479 pp.

²⁴McGrath, D., Munroe, R., & Henry, J. (2019). *Ontario Landscape Tree Planting Guide*. 45 pp.



tree failure and the associated risk to people and property as well as reducing the need for arboricultural maintenance as the trees mature.

The street tree inventory prepared by Blackwell, and annual tree planting list records can be used to create a schedule of maintenance practices for both newly planted and established trees. Mortality rates of newly planted trees can be used to track the progress and success of the establishment maintenance program.

RECOMMENDATION 13: Institute a schedule of care and maintenance for newly planted trees, including pruning cycles for both newly established and mature trees.

RECOMMENDATION 14: Recognize the street tree inventory is a living document and requires constant revisions to remain relevant to Village staff. Regularly update records with tree removals and new tree plantings. In order for this to be successful, develop a standardized spreadsheet to track the inventory and incorporate spatially into the GIS system.

7.1.5 MAINTENANCE OF ESTABLISHED STREET AND PARK TREES

The Village’s Operations and Parks staff are responsible for the maintenance of trees located along portions of streets and within municipal parks throughout the urban area. Currently, 2,084 trees have been inventoried by Blackwell, including 388 park trees and 1,696 street trees. The Village’s established street trees are currently maintained on an as-needed basis only, with no cyclical maintenance schedule established. The current extent of street and park tree maintenance is determined from the findings of limited visual assessments completed by Parks staff. Street tree pruning and tree removals (along with replacements) are undertaken by external contractors contracted by Village staff. Follow-up inspections are not regularly scheduled and mitigation measures are not always implemented promptly. Unmaintained trees can lead to unrecognized tree or tree-part defects that may hold unacceptable levels of risk which could impact people’s safety and incur property or critical infrastructure damage. Though it is recognized that it is not possible to eliminate all tree risk from the urban forest, improvements can be made to Harrison Hot Springs’ approach and processes for tree risk management to reduce the burden of liability to the Village.

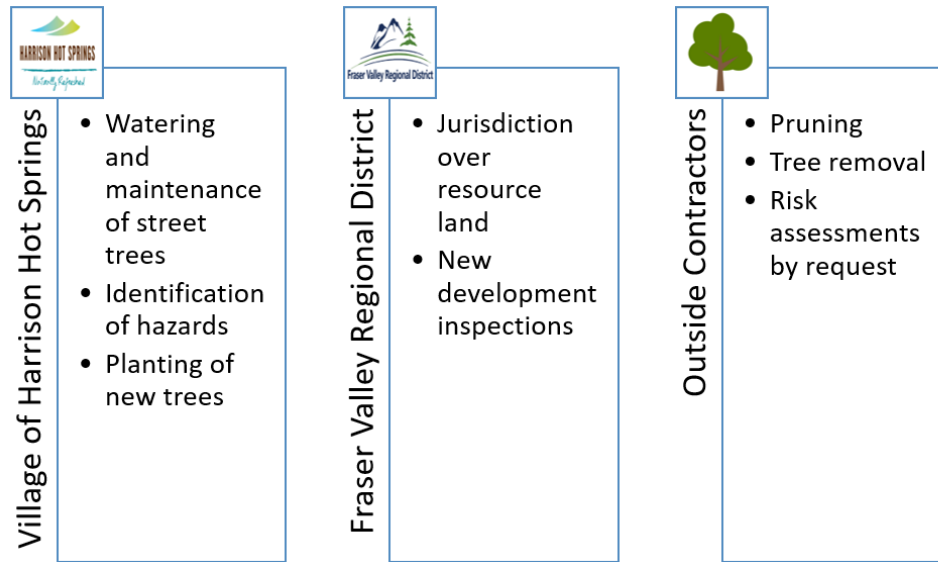
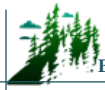


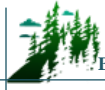
Figure 9. Current division of tree maintenance responsibilities.

Upon completion of the street and park tree inventory, it will be important to evaluate and review whether the recommended 7-year cycle pruning program meets annual tree maintenance objectives and is relatively balanced in terms of required resource expenditures and trees pruned. It is anticipated that additional resources will be required to sustain a cyclical maintenance cycle for established trees. Many municipalities – such as the City of Surrey and the City of Vancouver – operate on a five- or seven-year pruning cycle for street trees (park trees can go longer between pruning treatments), which is consistent with best practices for urban forest management.

7.1.6 TREE RISK MANAGEMENT OF VILLAGE-OWNED TREES

In the Village of Harrison Hot Springs, each year, roughly 30-50 hazard trees are pruned or removed by outside contractors. Potential trees with higher levels of risk include trees in hard surfaces, large aging trees with structural support concerns (such as the mature willows along the Esplanade beachfront), and trees vulnerable to pests and diseases (such as birch and western hemlock). These trees should be reinspected as recommended by an ISA qualified tree risk assessor.

The Village is responsible for the inspection and maintenance of street and park trees to assess the level of potential risk posed to persons or property and, if identified, reduce the severity of tree-related risk. None of the Village staff are International Society of Arboriculture qualified tree risk assessors (TRAQ). It is recommended that the Village implement a routine tree risk assessment schedule to be conducted by a qualified tree risk assessor, in addition to the drive-by reviews of potential hazard trees by Village staff and resident service requests. A tree risk assessment schedule could be based upon regular intervals (yearly, bi-yearly or on an as-needed basis) or to align with regular storm season events. Schedules are determined primarily upon the value of targets and the frequency of use. For example, homes are considered high value because people live in them and therefore may require a more regular inspection



schedule depending on the surrounding tree, park, or forest conditions. The Village’s preliminary street and park tree inventory (developed by Blackwell) does not currently include a risk assessment or risk rating for inventoried trees. When risk issues are identified by the Village, mitigation measures (which may include pruning, removal, or installation of structural supports) should be prescribed and implemented on a priority basis. The lack of regular tree risk assessments on Village-owned property increases the Village’s exposure to liability.

The Village should create a formal risk management policy, in order to ensure the effective implementation of tree risk management efforts. This policy will:

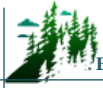
- Outline scope and responsibilities,
- Set reasonable goals and expectations that meet the Standard of Care,
- Set thresholds for acceptable levels of risk and uncertainty,
- Define minimum training and qualifications for tree risk assessors,
- Include a map that prioritizes areas for tree risk assessment,
- Describe risk management options in accordance with current industry standards and best management practices, including ANSI A300/ISA TRAQ standards,
- And require recordkeeping protocols for risk assessments and management activities.

The establishment of a tree risk management policy would also help support the allocation of necessary resources to reduce tree-related risk, uncertainty, and liability. For example, periodic inspections of Village-managed trees and hazard mitigation practices (e.g., installation of structural support systems or tree removal) should be more rigorously documented and accessible to Village staff (possibly through the use of a standardized form or other form of standard recordkeeping). Policies should also support ongoing investments in the installation and maintenance of structural support systems as an approach to risk management that can extend the life of large-stature trees with extensive canopies in the urban area.

Like all Canadian municipalities, the Village has a duty of care responsibility for public trees in order to limit their liability in the event of a tree failure. Duty of Care is the responsibility that the Village owes to those who use their land and public spaces to provide a reasonable degree of safety.²⁵ This Duty of Care is to some extent balanced by constraints of time and money, but implementing a formalized risk management strategy shows care on the part of the municipality. The Village also must conform to the Standard of Care, or actions that would be reasonable and expected under the circumstances.²⁶ The expected and reasonable Standard of Care in the case of municipal tree care would be generally accepted practices of arboricultural maintenance and tree risk assessment using an industry approved and accepted methodology. Demonstrating due diligence through a Standard of Care does not assume that perfection is possible, instead that reasonable action is both possible and prudent. The risk manager – the Village – must decide on a course of action that will satisfy Duty of Care and Standard of Care.

²⁵Dunster, J. A. (2018). *Trees and the Law in Canada*. Victoria: Dunster & Associates Environmental Consultants Ltd.

²⁶Dunster, J. A. (2018). *Trees and the Law in Canada*. Victoria: Dunster & Associates Environmental Consultants Ltd.



The management of natural areas can be challenging due to the Village’s resource constraints. In the East Sector lands, priority management actions are tree risk management and the control of the spread of invasive plant species. The frequency of tree risk assessments schedules should be determined by Village staff and to mitigate impacts from tree failures. High priority areas such as residences, trails, roads, hydro lines, and the cell tower were also assessed for fire risk as part of 2017 FVRD’s Community Wildfire Protection Plan (CWPP) and several fuel treatment units were proposed of moderate to high priority.

RECOMMENDATION 15: Decide whether the Village will be responsible for tree risk assessments by hiring qualified staff, or whether contracts with qualified tree risk assessors is a more viable approach for the Village given staffing and budget resources.

RECOMMENDATION 16: Develop a formalized and proactive tree risk assessment schedule conducted by a qualified tree risk assessor. Identify priority areas for tree risk assessment and prepare set of base maps for use by contractors and Village staff. Finance the cost of tree risk assessments by building it into annual operating budgets.

RECOMMENDATION 17: Document all tree risk assessments of Village-owned trees and make this documentation available to all staff. Ensure that tree risk mitigation is conducted as soon as possible. Trees that have been assessed and marked in the field but not mitigated, may create an unwanted exposure to liability for the Village.

RECOMMENDATION 18: Consider replacing some of the cottonwood trees that are fringing the north lagoon area. These trees are small in stature but often drop large limbs when they mature and therefore present a hazard in recreational areas. Remove cottonwoods in high-use areas and replace with deciduous or coniferous tree species tolerant to wind exposure and a fluctuating water table.

7.1.7 IMPROVING URBAN FOREST DIVERSITY

Natural diversity comes in several forms, including genus, species and structural diversity. Planning for the maintenance and improvement of diversity in these forms for an urban forest is an important component to this Plan. Urban forest diversity can be promoted through management activities such as selecting diverse seed and planting stock sources, promoting a range of ages (young to mature) among tree populations, or increasing the variety of tree genus and species planted. Structural diversity for the entire urban forest, including both urbanized and natural areas, is important. Tree species diversity should be aimed towards park, greenway, and street trees. Species selection in proximity to and within naturalized and resource areas should be based on the site’s ecology and use only native plant species.

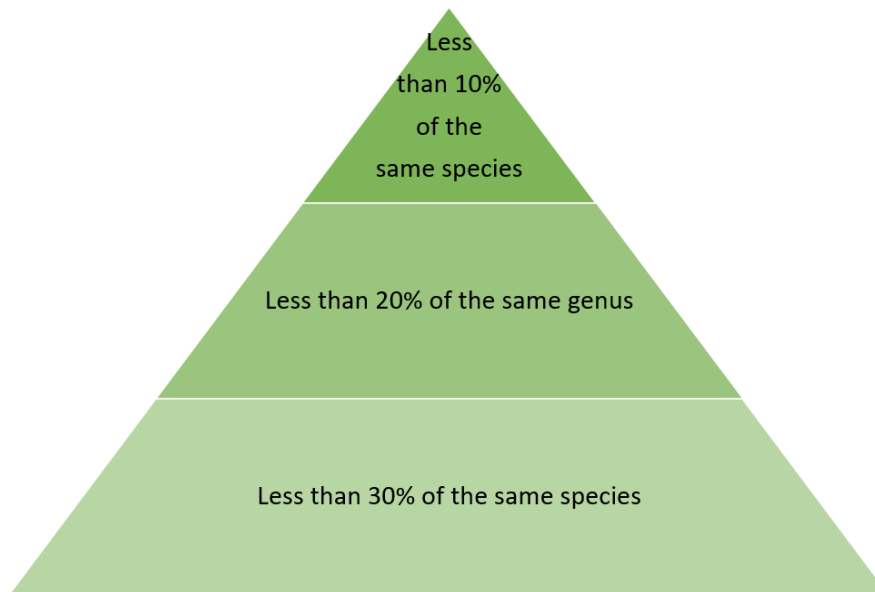
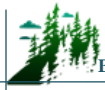


Figure 10. The 10-20-30 Rule of species diversity in urban forestry.

An urban forest composed of diverse species is more resilient to pests and diseases. Street and park tree planting programs should seek to improve resilience to stressors by increasing species diversity. Based on work by Santamour (1999), an appropriate urban forest diversity target²⁷ at the municipality level is the '10-20-30' rule: no single species shall represent more than 10% of the population, no genus represents more than 20%, and no family represents more than 30%. At the smaller scale of the neighbourhood, a better metric is the '5-10-15' rule. In comparison to other municipalities, the Village's smaller urban area should be considered at the neighbourhood level, and therefore the '5-10-15' metric is more appropriate. Table 7 and Table 8 illustrate the diversity of tree species in Harrison Hot Springs based on the inventory conducted by B.A. Blackwell. The Village would fail both the 10-20-30 rule and the 5-10-15 rule, as 20.69% of the trees in the urban area are western redcedar (*Thuja plicata*). However, other than the high percentage of western redcedar, the Village does have a high total number of species, genera, and families. Development of a comprehensive preferred tree species list for future plantings can help to increase species diversity within the municipality over time and support meeting diversity targets. Given the threat of climate change, it is imperative that the preferred tree species list considers climate change adaptability and susceptibility to pests and diseases of local or regional concern, to ensure that species-specific die-offs do not occur as extreme weather events and pest and disease outbreaks continue into the future. Preferred species should also be selected based on considerations of mature size, root systems, drought resistance, windthrow, wildlife values, and aesthetics that would make them appropriate and able to thrive in their assigned location. Please refer to Section 7.5 for the preferred species list.

²⁷Santamour, F. 1999. Trees for Urban Planting: Diversity, Uniformity, and Common Sense.

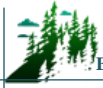


Table 7. Total number of species, genera, and families in Harrison Hot Springs.

Total Number of Species	96
Total Number of Genera	48
Total Number of Families	26

Table 8. Five most prevalent families, genera, and species in Harrison Hot Springs.

Family	Genus	Species
26.1% <i>Cupressaceae</i>	23.9% <i>Thuja</i>	20.7% <i>Thuja plicata</i>
14.8% <i>Aceraceae</i>	14.8% <i>Acer</i>	6.7% <i>Acer macrophyllum</i>
13.0% <i>Pinaeaceae</i>	6.6% <i>Betula</i>	5.6% <i>Cornus florida</i>
11.0% <i>Betulaceae</i>	5.6% <i>Cornus</i>	5.6% <i>Betula papyrifera</i>
6.4% <i>Roseaceae</i>	4.7% <i>Prunus</i> and <i>Pseudotsuga</i>	4.7% <i>Pseudotsuga menziesii</i>
All other families make up remaining 28.6%	All other genera make up remaining 39.7%	All other species make up remaining 56.7%

7.1.8 DISTURBANCE IN THE URBAN FOREST

Many pests and diseases can impact the health of trees in the urban forest, but only a few of them impact the tree so severely that it results in the tree becoming at risk of failure and/or being killed. In the Village, there is a large component of aging birch (*Betula papyrifera*) trees which are suspected to be infested with bronze birch borer (*Agrilus anxius*); this infestation could result in those birch trees or tree parts having high rates of failure that may strike a target (people or property). The Village currently manages pests and diseases reactively on a case-by-case basis, with appropriate responses determined upon assessment of the pest or disease issue. Many cases are resolved passively, while others may necessitate tree pruning or removal.

While many tree pests and diseases do not pose a significant threat to the urban forest, some can affect an entire species and potentially threaten a large portion of the urban tree population. Reducing the vulnerability of Harrison Hot Springs’ urban forest to pests and diseases that pose significant threats requires the implementation of a range of practices, such as:

- Site-appropriate tree species selection (i.e., right tree, right place), young tree pruning, cyclical pruning, watering, mulching, fertilization where required;
- Appropriate soil volumes and soil quality, reducing above- and below-ground conflicts for space and resources;
- Establishing underutilized and new native and non-invasive tree and shrub species; and
- Having a current and comprehensive public tree inventory that is supported by regular inspections.

An integrated municipal urban forest pest and disease management strategy can help prepare for threats specifically related to tree pests and diseases, provide guidance in terms of possible management approaches, and help determine when action may be required using established acceptable pest and disease thresholds. It can also provide a framework for pest-specific management when action is required.



Future plans should include the identification and prioritization of the full range of known and potential urban forest health agents, definitions for appropriate management techniques, and priority sites and possible pilot projects for the assessment of different management techniques. Development of a comprehensive pest and disease management strategy will require community and stakeholder consultation, as well as collaboration with the Fraser Valley Regional District.

The primary abiotic disturbances in the south coast of BC and Lower Mainland are wildfire, windthrow, and slope instability.

Wildfire is caused by a mixture of factors such as high temperatures, drought conditions, and available fuel that is triggered by lightning or human ignition. It is a concern when factors combine and the growth and spread of wildfire is influenced by slope, aspect, and wind speed. Wildfire can cause significant damage to homes and critical infrastructure, as well as block safe evacuation. This is especially true for Harrison Hot Springs, which has very limited access to and from the town. The 2017 CWPP²⁸ should be consulted for recommendations on wildfire protection.

Windthrow is a significant coastal disturbance agent, occurs more frequently than fire, and typically occurs in older forests and on moist sites. A common natural disturbance agent in BC's south coast and the Lower Mainland, windthrow can often benefit ecosystems by opening gaps in the forest canopy and contributing to greater vertical structural complexity. The risk from windthrow increases the closer failing trees are to human settlements, trail networks, and critical infrastructure. Windthrow can be closely tied to forest health issues such as root and stem rots.

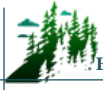
Steep slopes are present within the municipal boundary of Harrison Hot Springs and prone to instability depending upon the combination of vegetative cover and tree rooting depth, underlying parent material, surficial soil qualities, and rainfall intensity. Slope instability is manifested in landslides and debris flow events which are often triggered by heavy rainfalls and occur most frequently in gullies and ravines. These events can destroy downstream human settlements, bridges, and roads.

RECOMMENDATION 19: Identify the forest health risks (abiotic and biotic) of most concern and then develop a pest and disease management strategy in collaboration with the Fraser Valley Regional District. The strategy should prioritize which of the known and potential urban forest health agents are of the most concern. The Village should develop appropriate management techniques for each agent and outline cost implications.

7.1.9 RESPONDING TO TREE MANAGEMENT REQUESTS FROM THE PUBLIC

Communication with the public is an important part of management for public trees, in terms of both public expectation and identifying trees requiring additional management. Currently, members of the public can request management of a public tree via a public concern form either online or on paper. This

²⁸ B.A.Blackwell & Associates Ltd. (2017). *Village of Harrison Hot Springs Community Wildfire Protection Plan*.

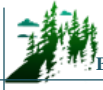


public concern form is not specific to tree care and is used for all municipal concerns. The Village should consider a form specifically for tree care requests and an option to upload a photo in order to better triage requests by their urgency and the issues involved. We would also recommend that the Village has a tree risk assessor and arborist on staff in order to respond to management requests promptly and appropriately.

There is an unwritten expectation from the Village that adjacent owners would care for street trees in order to alleviate the stress on the Village's limited resources. However, that expectation is not communicated to residents and a survey of Harrison Hot Spring's residents found that only 25% of respondents were caring for street trees near their homes. Based on this information, there is a gap in care where many street trees are not being watered or monitored. To fill this gap, the Village either needs to clearly communicate expectations regarding street tree care to residents or increase their capacity to care for the trees in-house.

RECOMMENDATION 20: Increase the ease with which residents can communicate with the Village regarding the care of publicly owned and maintained trees. Create an online form specific for tree care requests and include an option to upload photos.

RECOMMENDATION 21: Conduct a feasibility study to determine the relative costs and liability comparing resident responsibility for street tree care in front of their property as opposed to all street tree care performed by the Village. Once completed, clearly communicate the Village expectations regarding the care of publicly managed street trees to residents.



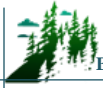
7.2 REGULATING TREE REMOVAL & REPLACEMENT ON PRIVATE PROPERTY

7.2.1 PROPOSED BYLAW AMENDMENTS

The *Tree Management and Preservation Bylaw No. 1015* only protects trees >30cm DBH and over 7.5m in height. Using height to determine protection status is not effective, because height is difficult to measure precisely without the use of specialized equipment. Therefore, the Village should consider removing the height attribute from the protected tree definition. Instead, replacement trees planted in response to single-family lot and subdivision developments should be included in the ‘protected tree’ classification. The Village should also clarify the difference between a ‘tree’ and a ‘protected tree’. Separating out these definitions is useful because knowing the attributes of what constitutes a ‘tree’ is needed for assessment purposes, whereas the attributes of what constitutes a ‘protected tree’ is useful for instituting tree protection measures. For example, many municipalities adopt a separate definition for a ‘tree’ at 20cm DBH, as opposed to ‘protected tree’ status for any tree >30cm DBH. The definition for a ‘distinct tree’ can remain, although a smaller DBH threshold of 75cm is recommended for all species. This would not only enlarge the population of trees with this status, but also recognizes the fact that there are not many trees left in urban areas that reach this stature. Clear definitions are important to communicate to residents, developers, contractors, and Village staff.

Tree protection and tree removal regulations rely on standard tree measurement methods during field assessments. These include the height above the ground where DBH is measured (usually 1.3 or 1.4m), and steps for measuring trees with multiple stems, and tree canopy radius or diameter, among others. In order for the municipality to ensure that measurements remain consistent, the Village should specify at what height DBH is measured and consider defining the size of a protected stump (useful for Bylaw enforcement, unless the tree is very large it is difficult to prove that the removed tree had protected status). The current *Tree Management and Preservation Bylaw No. 1015* considers that multi-stem trees should be measured using only the diameter of the largest stem; this should be changed to the standard used by the District of North Vancouver, where 100% of the largest stem’s diameter plus 60% of the diameter of other stems is taken into consideration when determining the DBH which impacts the overall tree size, and potential protected tree status. Guidance should be provided on owner responsibility for tree care when a tree straddles a property line and is deemed to have ‘shared’ status between property owners. Finally, legal topographic surveys performed by a licensed BC land surveyor should be required as the primary means for determining tree ownership.

In addition, arborist report standards should be defined for land development and subdivision projects, and for single family building permits and define the required information including photographs, inventory tables, drawings/maps, and the development of recommendations. The Village should also outline the necessary criteria that an accepted Qualified person must possess for different areas of expertise. Arborist reports must be completed by ISA certified arborists, if tree risk assessments are to be conducted on Village land (both public and private), the Qualified person must be TRAQ qualified. Since the Village has extensive natural areas, registered professional foresters (RPF) have the expertise, training



and knowledge to assess and manage forest stands. Therefore, windthrow hazard assessments, forest health studies, wildfire hazard reports and reforestation plans and prescriptions can only be completed by RPFs.

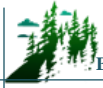
RECOMMENDATION 22: Amend the *Tree Management and Preservation Bylaw No. 1015* to enhance and protect the biodiversity of the natural environment in both the urbanized and resource lands within the Village (Goals 2-5):

- Remove the height requirement from the protected tree definition;
- Include replacement trees in the ‘protected tree’ classification;
- Clarify the difference between a ‘tree’ and a ‘protected tree’. ‘Tree’ to be >20cm DBH and ‘protected tree’ to be >30cm DBH;
- Specify at what height DBH is measured;
- Change the measurement of multi-stem trees’ diameters to 100% of the largest stem plus 60% of the additional stems;
- Define the size of a protected stump;
- Require legal topographic surveys be the primary means for determining shared status;
- Define arborist reporting standards, including the expected format for photographs, inventory tables, drawings/maps, and the development of recommendations; and
- Outline the accepted ‘Qualified Person’ for different areas of expertise.

7.2.2 THE REGULATION AND OVERSIGHT OF TREE CUTTING

When bylaw amendments as described in Section 7.4 are completed, it will be important for the Village to update its website with a step-by-step process for residents and developers to assist them when they are applying for a Tree Management Permit, so the information is easily accessed and understood (Figure 11). A number of local governments clearly outline when tree permits are required and the ensuing tree cutting application phases explaining what applicants can expect. The Village’s website could include a downloadable brochure or frequently asked questions page outlining the tree permit application process, similar to the District of North Vancouver.²⁹ Clearly communicating the intent behind the bylaw updates and tree cutting application process demonstrates the Village understands that the benefits of the urban forest need to be balanced with development proposals. In addition, the Village could also add to its website guidance for residents on how to handle a Bylaw protected tree that is actively failing.

²⁹ District of North Vancouver, Environment Department (n.d.). [Trees -- Frequently Asked Questions](#). Accessed on September 30, 2022.



Applying for a Tree Cutting Permit



Figure 11. Tree Permit Application graphic from the City of Coquitlam's website³⁰

The Village should consider defining the situations when an arborist report is required and when it is not. For example, the City of Surrey requires arborist reports to be prepared and submitted when 5 or more trees are cut on a parcel, and the City of Coquitlam requires a permit if more than 2 protected trees are removed within a 12-month period. Terms of reference should be prepared that detail the contents of an arborist report as prepared by an ISA certified arborist, so the Village can track reports and continually make updates to the terms of reference as needed.

Recognizing that other conditions requiring a Tree Management Permit may be needed, it will be important to stipulate these into a bylaw and clearly communicate with the public and business community. These other conditions could include riparian areas, steep slopes, lands with protective covenants or that are ecologically sensitive, and any specific areas or streets within the municipal boundaries the Village deems appropriate.

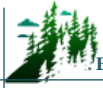
The planting of replacement trees should always be a condition of a Tree Management Permit and, if suitable planting space with an appropriate amount of soil and root space is not available, compensation on other parcels should be considered as an option with approval from Village staff.

It is important that tree cutting approval requirements address removal procedures on an owner's property as well as trees on neighbouring properties. Tree removal cannot occur on a neighbour's private property without their consent. If a tree is shared, both property owners will need to sign the application form before a Tree Management Permit will be granted. The root system of a tree on a neighbouring tree's roots may extend beyond property lines and requires the same protection measures as above-ground tree portions.

RECOMMENDATION 23: Update the Village's Licenses & Permits webpage to include:

- a step-by-step process for residents and developers when applying for a Tree Management Permit; and
- guidance on managing a tree on their property that is actively failing.

³⁰City of Coquitlam's Tree Management page [Tree Management Permit | Coquitlam, BC](#). Accessed September 27, 2022.



RECOMMENDATION 24: Define the re-development, land development, or subdivision situations when an arborist report, prepared by an ISA certified arborist, is required when removing trees on private land. When a tree has shared status, as shown on a legal topographic map prepared by a licensed BC land surveyor, require both property owners to place their signatures on application form.

RECOMMENDATION 25: Increase the scope of situations where Tree Management Permits are required, including riparian areas, steep slopes, lands with protective covenants or that are ecologically sensitive, and any other specific area or streets that the Village deems appropriate. Specify the qualifications and expertise necessary for the qualified professional to possess in order to successfully complete these reports to a professional level.

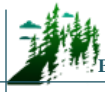
RECOMMENDATION 26: Require that replacement tree plantings are a condition of securing an approved Tree Management Permit and, if suitable planting space and soil volumes are not available, direct that compensation on other parcels be a necessary alternative.

7.2.3 TREE ESTABLISHMENT ON PRIVATE LANDS WITH COMMUNITY TREE PLANTING PROGRAMS

The implementation of community-wide tree planting programs can provide an engaging way to increase the urban tree canopy while promoting citizen stewardship of the urban forest. By providing access to programs that directly assist residents to plant trees on private lands, residents of the Village are incentivized to contribute to increasing tree canopy cover on the urbanized portions of the municipality. Three examples of programs and community events that support tree planting on private lands are provided below.³¹

- **Friends of Trees – Neighborhood Trees Program (Portland, OR):** an initiative that offers trees to residents through door-to-door canvassing and annual planting events. Residents can plant the trees they received through this program anywhere on their private property (e.g., backyards), or in some cases on approved municipal property (e.g., schools, boulevards). The program costs users between \$35 and \$75 per tree.
- **LEAF – Do-It-Yourself Planting Program (Toronto, ON):** enables citizens to complete an online workshop that covers topics related to tree planting and care, in order to receive discounts on the purchase of trees. The trees are then used for planting on the customer’s private property.
- **Tree Rebates and Tree Sales – (City of Vancouver, BC):** hosts annual tree sales in the spring which are held at various community centres throughout the City where residents can purchase at a reduced cost for planting in their yards and gardens. In addition, the City offers tree rebates where residents can visit participating nurseries and receive \$20 off a tree valued at \$50 or greater.

³¹ Hsieh, J. (2012). [Residential Tree Planting Programs -- A Review of Best Practices](#)



Implementation of tree planting incentive programs on private property, with the assistance of local community associations, environmental stewardship groups, and nurseries will enable the Village to work towards a more proactive approach of increasing canopy cover.

RECOMMENDATION 27: Consider implementing tree planting programs on private property with the assistance of local community associations, environmental stewardship groups, and with participation from local tree nurseries.

7.3 TREE PROTECTION, REMOVAL, AND REPLACEMENT STANDARDS

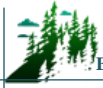
7.3.1 TREE PROTECTION

Land alteration as a result of development generally falls into the two distinct categories of subdivision or single-family building permits and typically occurs at different spatial scales. Subdivision usually encompasses large lots or multiple parcels where re-zoning and land use designation changes are necessary; single-family building permits are smaller in scale and existing property boundary locations remain intact. Therefore, the tree protection regulations should differ between these categories to recognize the different spatial scales and number of trees requiring removal, protection, and replacement. Recommended updates to pertinent bylaws are described below.

At a minimum, the *Tree Management and Preservation Bylaw No. 1015* (some recommended updates have already been described in Section 7.2) and the *Subdivision Development Servicing Bylaw No. 578* should be updated to include the development of critical root zone (CRZ) thresholds for different DBH sizes. The critical root zone is the minimum radius of roots that are biologically essential for tree health and structural stability, and is a measurement based on DBH multiplied by a factor of 6, 8, 10, or 12 (Table 9). The CRZ is often used in determining adequate tree protection zones (TPZ) during land development and construction. A TPZ is a fenced area around an existing tree(s) in which certain activities (e.g., storing materials or equipment, driving heavy machinery) are prohibited or limited to prevent or minimize negative impacts to trees (Figure 12). The size of the TPZ to ideally protect tree health and promote survival varies based on tree species, size, health, and maturity, but also must commonly accommodate the realities of construction activity.³² The Village can codify into bylaw tree protection specifications inclusive of the CRZ, tree protection barrier standards and inspections, arborist site supervision requirements, bylaw enforcement, and the release of securities. Infraction penalties for excessive pruning or damaging trees on private property recognizes that enforcement of non-compliance is needed.

Similar to the communication of the Tree Management Permit process, the Village's website should clearly outline all steps of the tree protection process, beginning with developing criteria for determining if a tree is protected, defining tree protection standards including drawings of tree protection barrier requirements on construction documents, and outlining planting stock and installation specifications for

³² Clark *et al.* (2021). Why Definitions Matter: The Tree Protection Zone and the Critical Root Zone. *Arborist News*.



tree replacements. Tree protection actions should dovetail with planning review, development, building and construction timelines to ensure tree barrier inspections, tree bonding, and landscape and replacement tree security amounts, along with the frequency of inspections and final-sign off are incorporated and not-overlooked.

In addition, the following are recommended updates pertinent to the *Subdivision Development Servicing Bylaw No. 578*:

- Provide credit to developers for retaining and/or transplanting mature trees in new subdivision plans only if an agreed upon 3-year maintenance plan between the developer and the Village is approved -- the maintenance work cost borne by the developer;
- Prioritize the protection of trees on streetscapes;
- Incorporate existing significant natural features into development planning, and
- Integrate mature trees by allowing variable front yard setbacks, minimizing grade changes, and preserving permeable surfaces. Include tree protection requirements.

RECOMMENDATION 28: Amend the *Tree Management and Preservation Bylaw No. 1015* with tree protection specifications inclusive of the critical root zone (CRZ), tree protection barrier standards and inspections, arborist site supervision requirements, bylaw enforcement, and the release of securities.

RECOMMENDATION 29: Implement infraction penalties in the *Tree Management and Preservation Bylaw No. 1015* for excessive pruning or damaging trees on private property.

RECOMMENDATION 30: Outline all steps of the tree protection process on the Village website, beginning with criteria for determining if a tree is protected, tree protection standards, and specifications for tree replacements.

RECOMMENDATION 31: Include on website a timeline of the process: tree barrier inspections, tree bonding, landscape and replacement tree securities, and frequency of inspections and final sign-off.

RECOMMENDATION 32: Provide credit to developers for retaining and/or transplanting mature trees in new subdivision plans only if an agreed upon 3-year maintenance plan between the developer and the Village is approved. The maintenance work cost is borne by the developer.

RECOMMENDATION 33: Integrate mature trees by allowing variable front yard setbacks, minimizing grade changes, and preserving permeable surfaces. Include tree protection requirements.

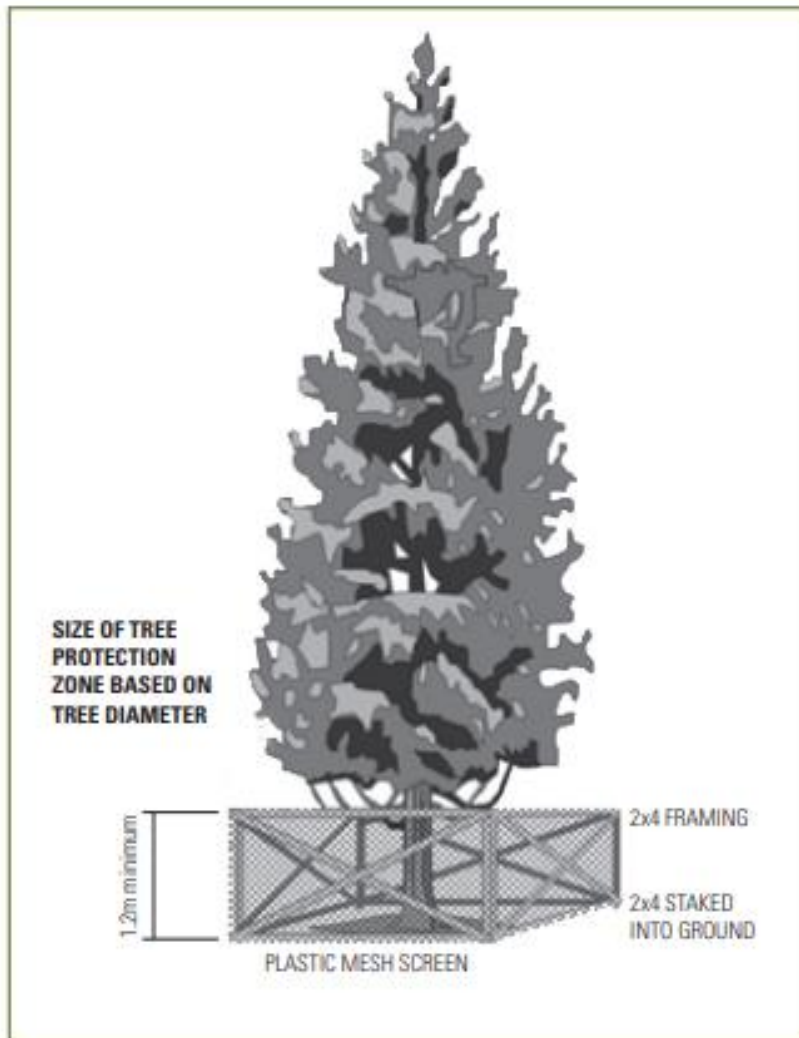
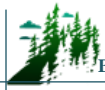


Figure 12. Tree Protection Barrier from the City of Surrey³³

³³ City of Surrey. [Tree Protection Barriers Bulletin](#). Accessed on September 30, 2022.

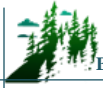


Table 9. Tree Protection Zones based on 6x, 10x, and 12x the diameter at breast height.

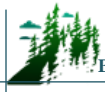
Trunk Diameter (cm)	Tree Protection Barrier Radius		
	6x (m)	10x (m)	12x (m)
20	1.2	2.0	2.4
25	1.5	2.5	3.0
30	1.8	3.0	3.6
35	2.1	3.5	4.2
40	2.4	4.0	4.8
45	2.7	4.5	5.4
50	3.0	5.0	6.0
55	3.3	5.5	6.6
60	3.6	6.0	7.2
65	3.9	6.5	7.8
70	4.2	7.0	8.4
75	4.5	7.5	9.0
80	4.8	8.0	9.6
85	5.1	8.5	10.2
90	5.4	9.0	10.8
95	5.7	9.5	11.4
100	6.0	10.0	12.0

7.3.2 TREE MANAGEMENT STANDARDS FOR NEW DEVELOPMENTS

In the urban area of Harrison Hot Springs, as in most urban municipalities, land use changes associated with development present one of the greatest threats to the protection, establishment, and growth of the urban forest. As portions of the Village are converted to residential, commercial, and institutional uses, it becomes increasingly difficult to protect remaining trees and woodlands and to find adequate and appropriate space to plant and restore these assets.

Above ground level, trees compete for growing space with buildings, utilities, transportation infrastructure, and people. Urban intensification can leave less space for mature and large-growing urban trees to develop as building lot and infrastructure density increases. Tree stem and crown growth are very susceptible to influences from competition; a smaller crown directly correlates to lower carbon sequestration, shading, windbreaking, and filtering of fine air particulates.³⁴

³⁴Pretzch *et al.* (2015). Crown size and growing space requirement of common tree species in urban centres, parks, and forests. *Urban Forestry and Urban Greening*.



Below ground level, tree roots must compete for space with utilities and building foundations, while soils designed to support above-ground infrastructure are often too compacted to provide adequate water, air, and nutrients for trees. Grading for site development may additionally damage trees or adversely alter drainage patterns. Trees must also contend with maintenance activities such as infrastructure repair, which can be harmful and injurious to root systems and trunks.

However, development-related land use change can also present opportunities for the integration of existing trees or natural areas, and the establishment of new tree plantings. This requires:

- A multi-disciplinary approach that includes operational considerations to ensure that spaces planned for tree protection and establishment provide adequate above- and below-ground conditions, and ongoing care to support tree growth to maturity;
- Securing space and sufficient soil volume needs for trees early on and throughout the planning process;
- Acceptable protection of individual trees, tree groupings and natural areas throughout the entire planning, construction, and warranty phases of development; and
- A willingness among the Village, the development community, and other partners to engage in creative planning, including the acceptance of alternative design standards, that support maximizing opportunities for both tree conservation and establishment while still addressing other planning and development objectives.

Many municipalities with strong urban forest policies and by-laws struggle with having adequate “boots on the ground” resources for follow-up on the implementation of their policies and bylaws. Therefore, some targeted enforcement helps ensure proper implementation by (a) demonstrating the municipality’s commitment and (b) providing opportunities to educate landowners and contractors on site. The Village should also identify and implement incentives for tree protection, tree establishment, and retention of existing tree stock. These could include:

- Recognition of stewardship efforts on both public and private lands through incentives such as an awards program; and
- Reducing an applicant’s tree replacement requirements or reducing permit fees if the applicant retains certain mature or healthy trees in new plans of subdivision or site plans.

RECOMMENDATION 34: Provide incentives to land developers for retaining mature trees, by reducing permit fees or tree replacement requirements in new plans for subdivisions.

7.3.3 TREE REPLACEMENT STANDARDS

Replacement trees help to re-establish canopy cover following the removal of trees, including mature and significant specimens. Replacement tree plantings should be a condition of tree cutting for all protected trees as established in bylaw. Suitable replacement trees are available at a number of nurseries throughout the Fraser Valley and a preferred species list is found in Section 7.5. In essence, landscaping and minimum tree planting requirements should be specified in the bylaw for subdivision development,



single-family building permits, development servicing, and for above- and below-ground critical infrastructure construction or repair. These requirements should apply to developers, residents, utility companies, outside agencies, and Crown corporations working within the Village’s municipal boundary. Tree replacement should also be included in the *Tree Replacement on Public Lands Policy 1.3.5*. It will be important to determine suitable replacement species and planting locations, so that Village staff no longer need to make ad-hoc decisions. Current practices for tree species selection for replacement trees is left to the discretion of Village staff on a case-by-case basis, rather than following a) guidelines set out in a preferred species list suitable to the Village’s ecology; or b) a larger strategy taking into account climate change adaptation, flammability, aesthetics, and site characteristics.

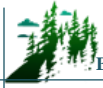
The Village’s existing tree species selection recently used for landscaping in new multi-family developments can form the basis for developing a replacement species list beyond the current scope.

Protected status should be conferred on all replacement trees – despite their being below the diameter at breast height threshold – as they will become the future urban forest if they receive adequate establishment maintenance. The Village should implement the preferred replacement tree species list with different categories into all Planning & Development communications internally and with the public. For example, the categories could include small trees (<10m tall), medium-sized trees (10-20m tall), large-sized trees (>20m tall), drought tolerant species, those suitable for natural areas, and those adaptable to a changing climate. Standard construction drawings of tree planting, tree transplanting, required soil depths, and irrigation details could be developed to ensure that trees are installed according to the ISA’s best management practices. Guidance related to the selection of suitable species and planting site conditions should accompany any tree replacement requirements. Communicate how replacement tree securities could work to residents and developers, for example: 50% would be released upon successful inspection by Village or FVRD staff with the remaining balance released upon a successful 2nd inspection after 1 year.

The Village should develop technical standards and details for tree planting in both public and private settings. Public Works & Utilities should apply for an increase in their annual operating budget to integrate the extra work load for installation and ongoing maintenance.

In practice, pertinent bylaws and guidelines developed by Village staff must be centrally provided in a singular document to allow ease for staff, FVRD, contractors, and proponents to implement them consistently, and for staff to update the guidelines when needed. Harmonization of guidelines and specifications for tree protection, tree replacement, and tree establishment in a dedicated document would greatly simplify the tree removal, protection, and replacement-related guidance by having all the relevant information in one central location for ease of access and understanding. This document should be made available to community groups, members of the public, developers, the business community and other stakeholders to inform tree-related activities on private lands.

RECOMMENDATION 35: The following are recommended updates pertinent to the *Subdivision Development Servicing Bylaw No. 578*:



- Require replacement trees as a condition of tree cutting in the Village for all Protected trees as defined in the *Tree Management and Preservation Bylaw No. 1015*;
- Develop a recommend replacement tree list with separations for different categories: small trees, mid-sized trees, large trees, drought tolerant trees, and those suitable for natural areas;
- Provide minimum boulevard widths and spacing for landscaping and tree planting, and continuous planting pits, as applicable;
- Provide minimum soil volume requirements for street tree planting. Recommended range is 15-30 m³ for a small tree, 20-70 m³ for a medium tree, and 45-150 m³ for a large tree;
- Implement replacement tree securities, with 50% released upon successful inspection by Village or FVRD staff and the balance return upon a successful second inspection at 1-year; and
- Implement maintenance warranty securities for three years to include watering, structural pruning, and any other nutrient or health mitigation requirement.

7.3.4 TREE COMPENSATION GUIDELINES FOR PUBLIC AND PRIVATE TREES

Where Village policy requires replacements for removed trees, these are established via a ratio of stems. Publicly-managed trees are replaced 1:1. Privately-owned trees removed without a permit require a replacement ratio of 2:1. When owners apply for and secure a Tree Management Permit, no replacement trees are required. As a consequence, it is likely the overall tree population is declining and that this trajectory will continue if tree replacements for removals with a permit are not added to the *Tree Management and Preservation Bylaw No. 1015* and *Subdivision Development Servicing Bylaw No. 578*.

It is recommended that the Village's current policies, bylaws, and guidelines more adequately support compensation for trees defined as 'Protected' or 'Distinct' as per *Tree Management and Preservation Bylaw No. 1015* that are removed with a permit from private and municipal lands in the form of stem-for-stem tree replacement and/or financial compensation. There are many approaches to tree removal compensation beyond stem-for-stem ratios, as shown in

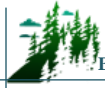
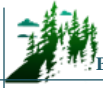


Table 10. The practice of compensation is recognized by many municipalities as a primary mechanism to accommodate development-related activities while mitigating tree and canopy cover loss (Table 11). Developing comprehensive tree compensation guidelines will be key to achieving a no-net-loss approach to tree cover removal, and to streamline compensation process for residents and developers using a tool that is applied consistently across the Village. It should be noted that for removals proposed on private lands, this policy approach requires significant staff time to negotiate compensation with every development applicant. These guidelines should include enough flexibility to be reasonably applied to a wide variety of site-specific scenarios. Neighbouring municipalities employ a range of tree compensation methods and formulas from which the Village’s own tree replacement requirements can be developed (Table 11).

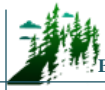
**Table 10. Overview of approaches to tree removal compensation.**

Compensation Method	Description of Method	Pros	Cons
Cash-in-lieu	A sum is paid to the municipality to compensate for tree removal and fund tree establishment.	1) Easy to calculate and implement if standard formula for determining replacement cost is used	1) May not always result in tree establishment 2) Rarely accounts for true value of tree(s) being removed
Stems per Unit Area Replacement	A number of trees are planted per unit area (e.g., stems/hectare).	1) Applicable to woodlands, forests, and plantations	1) Not applicable to individual trees or low-density sites
Tree Replacement	Ratio of replacement trees must be established to compensate for injury or removal (e.g., 3:1 replacement to removal ratio). Typically allows cash-in-lieu if trees are not planted on-site.	1) Easy to calculate and implement 2) May result in increased leaf area and canopy over time, if planted trees survive	1) May be costly 2) May not adequately replace lost canopy, leaf area, or benefits

Table 11. Local area municipalities tree replacement standards and requirements.

Municipality	Protected Tree DBH	Replacement Ratio	Replacement Specifications
Abbotsford	20 cm	2:1 for 20-30 cm 3:1 for > 30 cm	None
Burnaby	Development sites: 20.3 cm Non-development conifers: 30.5 cm Non-development deciduous: 45.7 cm	1:1 for < 30.5 cm 2:1 for 30.5-61 cm 3:1 for > 61 cm	Conifers must be > 2 m tall. Deciduous trees must be 5 cm caliper. Fruit trees must be 2.5 cm caliper.
Chilliwack	Conifers: 2.5 m tall Deciduous: 6 cm	50 trees per hectare (including retained trees)	Include street trees in development.
Coquitlam	20 cm	Replacement ratio depends on lot size and size of replacement trees.	Choose from 3 separate classes of trees.
Langley	30 cm	30 trees per acre minus 3 x number of trees retained > 30 cm	None
Maple Ridge	10 cm	1:1 for 20-30 cm 3:1 for 30-50 cm 4:1 for > 50 cm	Conifers must be > 2 m tall. Deciduous must be 6 cm caliper.
District of North Vancouver	75 cm	1:1 if lot is <420m ² 3:1 if lot is >420m ² or 20% canopy cover	None
Surrey	30 cm or 45 cm at base	2:1 (1:1 for <i>Alnus</i> or <i>Populus</i>)	None

It is recommended that the replacement ratio of removals on public land fall into two categories. The first would maintain the stem-to-stem ratio of 1:1 for street trees and specimen park tree removals. The second category considers larger areas of tree removal, as for example, removals associated with fuel hazard and windthrow treatments, post storm clean-up, and the construction of above- or below-ground utility infrastructure. For this scenario, appropriate tree compensation/reforestation measures require



stocking and species selection based on the site’s ecology and the Village’s desired future stand conditions (i.e., closely spaced trees will not develop into a stand resilient to windthrow, if that is the objective). Reforestation prescriptions developed by a registered professional forester would be needed.

For tree removals on private land, the 2:1 tree replacement ratio is adequate for parcels <420m². For parcels >420m² where greater tree loss could occur, the replacement ratio should be 3:1. These replacement ratios would apply to all trees removed with a permit that are ≥30cm DBH, regardless of height. For trees that have been removed without a permit, the tree removal ratio of 2:1 could remain, but add a monetary fine for non-compliance with the Bylaw.

By developing clear guidelines for replacement tree species and planting locations, current pressures placed on Village staff will be alleviated and the process of receiving compensation for the removal of existing trees will be expedited.

Policies and guidelines that support tree compensation should not be considered a ‘green light’ for wholesale removal of trees for development projects, as it takes decades for trees to mature and begin to make substantial contributions to the urban forest canopy. It is critical for newly planted trees to receive establishment maintenance for the first three growing seasons through regular watering, soil amendments, structural pruning, and attending to vandalism or mechanical injury at the earliest possible opportunity. Therefore, retention of existing healthy and large-statured trees should always be the primary planning consideration.

RECOMMENDATION 36: Develop tree compensation guidelines for trees removed from private land. Guidelines to include clear description of the compensation method, how compensation and securities are calculated, potential species list, and directions on the process for residents and developers.

RECOMMENDATION 37: Define replacement planting ratios to mitigate the loss of canopy cover due to land and infrastructure development:

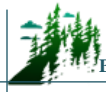
- Implement replacement ratio of 1:1 for street trees and specimen park trees on public land;
- Implement replacement ratio of 2:1 for trees >30cm removed on private parcels <420m²;
- Implement replacement ratio of 3:1 for trees >30cm removed on private parcels >420m²; and
- Implement replacement ratio of 2:1 and a monetary fine for non-compliance for trees removed without a permit on private land.

RECOMMENDATION 38: Require reforestation prescriptions by a registered professional forester for large areas of tree removal on public or private land.

7.4 RECOMMENDATIONS FOR IMPROVEMENTS TO POLICIES

7.4.1 OFFICIAL COMMUNITY PLAN

Harrison Hot Springs’ current *Official Community Plan Bylaw No. 864* (adopted in 2007, currently undergoing revision) is a document that provides policy framework for how land in the community should be used as well as a vision and set of goals for the Village and its development into the future. The document is supportive of sustaining and enhancing existing tree cover through its framework and



guidelines, though the focus is primarily on the preservation of trees within resource areas and naturalized lands.

The OCP recognizes the need to consider the economic, environmental, and cultural outcomes of land use decisions. This document also recognizes the modern challenges related to responsible resource use and climate change; however, there is no mention of how a healthy urban forest can help address these challenges.

The OCP includes policies to support the protection and maintenance of the urban forest, including specific commitments to:

- Protect forest cover on private lands designated as Resource using a tree protection bylaw and development permit area;³⁵
- Establish a tree protection area in the Geotechnical DPA where tree cutting is prohibited except where required for fuel treatments, wildfire control, right-of-way maintenance, or safety issues – the area will be regulated by tree cutting and development permits.³⁶

Within the municipality, many of Harrison Hot Springs' wooded natural areas are protected as Resource Lands. Under the current land use policies (Schedule 1-B of *Official Community Plan Bylaw No. 864*), forest cover on private lands designated as 'Resource' is to be preserved for visual purposes through the use of a tree protection bylaw and development permit area. Permitted use of Resource areas are confined to either limited private and public recreation or agriculture.

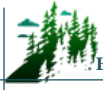
Outside of privately owned natural Resource areas, this document does not specifically address policies that support the protection, integration, and enhancement of tree cover as part of infill and greenfield developments, and there is no mention of the importance of incorporating shade trees in public spaces and along boulevards, or of incorporating natural spaces into the urban matrix. It is recommended that Official Community Plan policies related to tree protection, tree removal, and tree replacement in the urbanized portions of the municipality be developed and included into *Official Community Plan Bylaw No. 864*, specifically stating that development proponents must:

- Demonstrate how a proposed development (e.g., grading, building locations) has considered tree conservation;
- Outline specific measures for the preservation and protection of trees during and following construction; and
- Describe the tree loss and propose compensation measures (where preservation is not feasible), including specific recommendations for landscaping, and that suitable plant species must be selected from the Village's preferred species list.

The Village's OCP fails to explicitly recognize the role of the urban forest in helping communities remain sustainable, including mitigating and adapting to the impacts associated with climate change. Future

³⁵ Policy 3.3.4

³⁶ Policies 9.5.1 and 9.5.2



iterations of this document should include direction and policies that are generally supportive of urban forest protection, establishment, and enhancement, both within and outside of wooded natural areas. Supplemental policies should also state the method and determination of compensation and securities when approved development requires the removal of trees. These policies are appropriate for the Village to help protect and enhance its valued green infrastructure, while also being flexible and balanced enough to accommodate the range of intensified land uses needed to meet the community’s growth and design objectives (see Section 2.1).

Further, the Village is experiencing challenges related to consistent implementation of urban forest policies and multi-departmental coordination on tree-related issues, as well as coordination and communication with the FVRD to align inter-departmental procedures related to management of forested lands at the periphery of the municipality. There also appear to be gaps in the understanding of existing urban forest management practices and jurisdictional authority among Village staff and others who do not deal with tree-related issues as a core part of their work; this has created a ‘silo’ effect where departments and stakeholders work in isolation and do not exchange information or best practices with one-another. The solution to this challenge lies in establishing more formal lines of communication, and for Village staff directly involved in urban forestry to undertake outreach and education to improve awareness and implementation internally as well as to the public.

RECOMMENDATION 39: Within the forthcoming OCP update, amend the vision statement to support the protection, establishment, and enhancement of the Village’s urban forests.

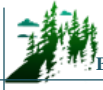
RECOMMENDATION 40: Develop an OCP goal that directs an approach to how development in the Village is managed into the future with regards to protection of the existing urban forest. This approach may include a revised development cost charge schedule that would be in support of the protection and enhancement of the existing urban forest.

7.4.2 TREE REPLACEMENT ON PUBLIC LANDS POLICY

In 2020, the Village approved Policy No. 1.35, which establishes standards for the preservation, management, and replacement of trees on Village-owned lands. This policy recognizes that trees are valuable to the Village’s ecosystems, and that by managing and preserving public trees, the municipality’s urban forest management goals can be more easily achieved. Typical criteria to permit the cutting and removal of public trees include: trees presenting a public hazard or trees growing in conflict with development plans for a Village initiative or project. This policy also specifies a replacement tree ratio of 1:1.

This policy is not supplemented with standards or best practices that provide guidance for preferred replacement species selection or planting protocols, which reduces the likelihood that the right trees for a given site are provided with adequate growing conditions. Opportunities for improvement of this policy are outlined below:

- Although the current approach to compensation works reasonably well, this policy should allow for a range of appropriate approaches to public tree removals that are suited to different



scenarios (rather than prescribing only a 1:1 replacement of 300mm caliber trees over 7.5m in height). Tree compensation need not (and should not) take a ‘one size fits all’ approach. Approaches should be based on, at a minimum, a ‘no net loss’ approach in the long-term population of the urban forest, and should be formalized and included in Village-wide guidance for tree compensation.

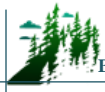
- The current policy should reference new supplemental standards for the planting of replacement trees, including a preferred tree species list that includes ornamental shade and conifer tree species for smaller spaces, and native species suitable for naturalized areas, Resource lands, and sensitive ecosystems such as riparian areas and the lakefront. Guidelines outlining best practices related to planting methods and site selection for tree planting should also be included in the standards document.

7.4.3 TREE BYLAWS AND THEIR IMPLEMENTATION

The Village of Harrison Hot Springs currently has three bylaws that specifically regulate activities related to trees: the *Tree Management and Preservation Bylaw No. 1015* which applies to Village-owned and private lands; the *Park Regulation Bylaw No. 1150* which applies to vegetation growing in public-use areas including parks, beaches, and boulevards; and the *Subdivision and Development Servicing Bylaw No. 578*, which applies to land development and construction sites in the urban area and greenfield sites. Each bylaw is described in more detail below. The Village is in the process of developing a new bylaw related to new residential builds created by subdivision or bareland strata plans; this will necessitate updates to the existing *Tree Management and Preservation Bylaw* to include requirements for new residential lots to plant one deciduous tree of a size in accordance with the lot.

7.4.4 TREE MANAGEMENT AND PRESERVATION BYLAW NO. 1015

The Village’s *Tree Management and Preservation Bylaw No. 1015* was developed to address some of the threats to trees on private properties and lands owned by the Village, including those related to development. It regulates the injury or destruction of any species of tree over 7.5m in height with a trunk diameter of 30cm or more, including those trees located on municipal lands, trees in Village-managed natural areas, and trees on private property. This bylaw was developed with the intent of preventing pre-emptive tree removals on properties in anticipation of development, and regulating the removal of large (‘distinct’) trees. Trees growing within the municipal boundary must be identified and assessed through an arborist report if removal is pursued due to conflict with infrastructure or potential tree-related hazards. A ‘Qualified Person’ (i.e., certified under the International Society of Arboriculture) is responsible for providing sign-off on these reports to ensure that trees are protected from cutting or removal without due cause. For applications under the ‘Distinct Tree’ component of the bylaw, removals are only permitted if no other reasonable alternatives are found by a Qualified Person (and pending approval by the Village). A Tree Management Permit is required to be submitted to the Village with a non-refundable application fee of \$40 and, if requested, a report completed by a Qualified Person. This regulation applies to all species of trees, and replacement trees may be required as a condition of permitting on Village land. An update



to the Tree Management and Preservation Bylaw is pending, which will include a requirement for each new residential building lot created by a subdivision or bareland strata plan to plant one deciduous tree of a specified size.

When a Tree Management Permit application is approved, Village staff under direction of the bylaw do not require tree replacement plantings. It is standard practice to implement tree replacement requirements for all trees removed under a Tree Management Permit.

Currently, replacement plantings on private land are only required for those situations when a protected tree is removed without a permit (in contravention of the bylaw), or irreparably injured at a ratio of 2:1.

If the Village institutes tree replacement requirements for trees removed with an approved permit, the consequences of removing trees without a permit must be heightened. This could be through the levy of a fine, and in cases of tree damage, to pay for the assessment and appraised value of the injured tree. Trees may be valued in accordance with the latest edition of the Council of Tree and Landscape Appraisers (CTLA) Guide for Plant Appraisal.³⁷ Other municipalities, such as the City of Surrey, require a security (\$3,000 per tree, not exceeding \$15,000 for a single-family lot) to be held by the Village from prior to construction until construction is completed and the tree is unharmed.³⁸ If the tree is damaged, then the Village retains the deposit and replacement trees must be planted.

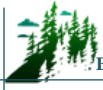
Better on-the-ground enforcement of this bylaw – as well as relevant tree protection measures stated in the *Subdivision and Development Servicing Bylaw* – is necessary to ensure that implementation and compliance related to tree maintenance and protection improves.

Although many municipalities have bylaws to regulate tree removal, few have developed approaches to track their efficacy. This bylaw is in place to protect public and private trees with policies that are generally in-line with best practices, however due to the limited capacity of Village staff, enforcement and ‘ground-truthing’ of tree protection is reduced and not consistent.

In Harrison Hot Springs, feedback from the public on the current standards of the *Tree Management and Preservation Bylaw* during the public survey period associated with the Public Open House in July 2022, expressed dissatisfaction with the protection it provides for trees in the Village. Many were troubled regarding the removal of trees during new development without the establishment of replacement trees. Residents also expressed concern over the objectivity of arborist reports required for tree removal, as these often resulted in the removal of what residents perceived to be healthy trees. Finally, the public requested greater transparency and public consultation for changes in policy around the urban forest (summary of public consultation found in Section 5.0 and survey responses in Appendix A: Survey Responses from Public Open House #1).

³⁷ Council of Tree and Landscape Appraisers. 2020. The Guide for Plant Appraisal, 10th Edition, Revised. 170 pp.

³⁸ City of Surrey (2022) Trees & Landscape: Building Site Requirements.



7.4.5 PARK REGULATION BYLAW NO. 1150

Harrison Hot Springs' *Park Regulation Bylaw* applies to trees and vegetation in publicly used areas (i.e., parks, beaches, boulevards) and specifies that no visitor can destroy or damage a tree (or part thereof) in a public area.

As with other bylaws, this requires additional support for enforcement and compliance. Harrison Hot Springs has both limited staff and limited capacity, leaving trees vulnerable to damage. We recommend increasing parks and operations resources where feasible, and with the support of Council, in order to provide more support for enforcement and compliance of bylaws for tree protection.

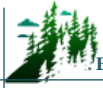
RECOMMENDATION 41: Consider conducting a feasibility study in conjunction with the FVRD to determine what resources are available to increase enforcement of the *Tree Management and Preservation Bylaw No. 1015* and *Park Regulation Bylaw No. 1150*. The study should define assigned areas of responsibility for staff of both local governments, and potential sources of operating budget increases to support enhanced bylaw enforcement and compliance for tree protection.

7.4.6 SUBDIVISION AND DEVELOPMENT SERVICING BYLAW NO. 578

The *Subdivision and Development Servicing Bylaw* regulates the provision of works and services on subdivision lands, and provides standards for land development. As part of the outlined standards in this document, tree protection measures during construction are provided. However, there are no specific landscaping requirements in place, and references to tree protection, planting, or landscaping are very scarce. Based on observations made during field assessments in the Village of Harrison Hot Springs in June 2022, tree protection measures required during construction are not actively enforced. Further, involvement of Village staff in the protection of trees during construction only extends to lands within subdivisions, and there is no oversight by staff on most private lands.

Currently, guidance for tree protection and retention during development is included in the *Subdivision and Development Servicing* bylaw without being mentioned in the *Tree Management and Preservation Bylaw*, while guidance and details for hardscape planting solutions (such as open planters or soil structural engineered solutions) are developed on a case-by-case basis for individual projects. While some of the guidance provided is consistent with best practices, having the guidance dispersed among policies with content that is largely unrelated to tree protection makes it challenging for contractors and staff to manage, update, and use. The current guidelines lack comprehensiveness and specificity related to integrating trees in hardscapes for infill and downtown settings. Municipality-wide guidelines for the improvement of planting site conditions and selection of suitable species are also not yet in place.

Recommended changes to the contents of this bylaw, as well as enforcement, are outlined below:



RECOMMENDATION 42: Include landscaping and minimum tree planting requirements for the development of servicing infrastructure such that development does not create a net loss and can instead, if feasible, expand the population of the urban forest.

RECOMMENDATION 43: Recommend minimum buffers or provide specific direction for determining Critical Root Zones (CRZ) for individual tree protection based on species and size.

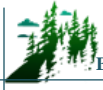
RECOMMENDATION 44: Provide guidance related to minimum boulevard widths and spacing for tree planting, and minimum widths for landscape strips and distances for tree spacing in order to provide adequate root and crown space for the healthy growth and development of new trees.

RECOMMENDATION 45: Amend the Village’s current list of landscaping plant species for use beyond multi-family developments, so that homeowners and single-family home developers may make use of these resources to plan species selection for both new and existing homes.

RECOMMENDATION 46: Require developers to plant trees on the subject property with a portion of amenity contributions going towards the Village’s urban forest program.

RECOMMENDATION 47: Strengthen the current building inspection process to include inspections of landscaping and tree planting on the newly developed properties. The current building inspection process only applies to the interior of buildings without consideration of the surrounding land – this will require collaboration with the FVRD.

RECOMMENDATION 48: Transfer requirements related to tree protection measures from the *Subdivision and Development Servicing Bylaw No. 578* to the *Tree Management and Preservation Bylaw No. 1015*.



7.5 PREFERRED TREE SPECIES

The list of 77 tree species in Table 12 have been selected after reviewing the preferred tree species selection lists from municipalities with similar Biogeoclimatic subzones including the District of Mission, City of Abbotsford, City of Chilliwack, City of Port Coquitlam, and City of Coquitlam. The initial list of 258 tree species was whittled down to 77 coniferous and deciduous species by:

- excluding potential invasive species (*i.e.*, sycamore maple);
- excluding climatically marginal species (*i.e.*, eucalyptus and windmill palm);
- excluding over representative species (*i.e.*, *Acer* species) in order to adhere to the 30-20-10 rule as described in Section 7.1.7; and
- by comparing it to Metro Vancouver Urban Forest Climate Adaptation Initiative’s tree species selection database.³⁹ The species in that list were assessed for their suitability to the current and projected future climate in the Metro Vancouver region. The tree species list from the Fraser Valley Regional District recommends the use of native plant species only and therefore was not seen as comprehensive enough to align with the objectives of urban forest diversity and climate change adaptation.

Tree type categories included in the list are:

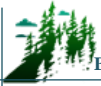
- Shade trees: are deciduous, meaning their leaves turn color and drop off in the fall. This makes them ideal energy savers, because they create shade in the summer and let in light during the winter. Shade trees are best planted at least 25 feet away from houses, buildings, or other obstacles;
- Conifer trees, also known as evergreens, have needles or needle-like leaves that usually stay green all year. Conifers are the best choice for windbreaks and privacy screens;
- Ornamental trees, are usually chosen for a particular characteristic, such as spring flowers, fall color, an attractive bark, or crown form. Small ornamental trees with a mature height of less than 25 feet work well under utility lines or in confined spaces; and
- Native trees are those that grow naturally in your area (for Harrison these are Douglas-fir, western hemlock and western redcedar). Their large size often makes them unsuitable for urban areas and they can suffer when planted in harsh growing conditions and poor soils. Often, ornamental or shade trees or native cultivars are better choices.

³⁹ [UFA UrbanTreesList.pdf \(metrovancover.org\)](#)



Table 12: Preferred tree species selection for replacement plantings in the Village of Harrison Hot Springs.

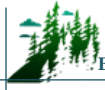
Scientific Name	Common Name	Height (m)	Width (m)	Form	Deciduous/Coniferous	Adaptable to Climate Change
<i>Acer campestre</i> 'Queen Elizabeth'	Queen Elizabeth maple	10	6	Small/Columnar	D	Somewhat
<i>Acer campestre</i> 'Red Shine'	red shine maple	9	3	Small/Columnar	D	Somewhat
<i>Acer cappadocicum</i>	coliseum maple	14	9	Medium/Columnar	D	Somewhat
<i>Acer griseum</i>	paperbark maple	8	6	Small/Weeping	D	Somewhat
<i>Acer platanoides</i> 'Emerald Queen'	emerald queen maple	15	13	Medium	D	Somewhat
<i>Acer platanoides</i> 'Princeton Gold'	Princeton gold maple	11	9	Medium	D	Somewhat
<i>Acer rubrum</i> 'Autumn Flame'	autumn flame maple	11	10	Medium/Columnar	D	Somewhat
<i>Acer rubrum</i> 'October Glory'	October glory maple	12	11	Medium/Columnar	D	Somewhat
<i>Acer rubrum</i> 'Red Sunset'	red sunset maple	14	10	Medium/Columnar	D	Somewhat
<i>Acer x freemanii</i> 'Autumn Blaze'	autumn blaze maple	13	10	Medium	D	Somewhat
<i>Aesculus hippocastanum</i>	common horse chestnut	21	18	Large	D	Somewhat
<i>Aesculus x carnea</i> 'Briotii'	ruby red horse chestnut	13	12	Medium	D	Somewhat
<i>Alnus cordata</i>	Italian alder	15	11	Medium	D	Very
<i>Araucaria araucana</i>	monkey-puzzle	23	15	Large	C	Very
<i>Arbutus unedo</i>	strawberry tree	6	5	Medium	D	Very
<i>Calocedrus decurrens</i>	incense cedar	18	11	Medium	C	Somewhat
<i>Carpinus betulus</i>	European hornbeam	12	10	Medium/Columnar	D	Somewhat
<i>Carpinus japonica</i>	Japanese hornbeam	6	6	Medium/Columnar	D	Somewhat
<i>Cedrus atlantica</i>	atlas cedar	18	14	Large	C	Very
<i>Cedrus deodara</i>	deodar cedar	18	14	Large	C	Very
<i>Celtis occidentalis</i>	hackberry	10	10	Columnar	D	Somewhat
<i>Cercidiphyllum japonicum</i>	katsura tree	10	10	Medium/Columnar	D	Somewhat
<i>Cercis canadensis</i>	eastern redbud	8	5	Columnar	D	Somewhat
<i>Chamaecyparis obtusa</i>	Hinoki false cypress	11	9	Medium	C	Somewhat



Scientific Name	Common Name	Height (m)	Width (m)	Form	Deciduous/Coniferous	Adaptable to Climate Change
<i>Chamaecyparis pisifera</i>	sawara false cypress	19	12	Large	C	Somewhat
<i>Cornus nuttallii</i> 'Eddie's White Wonder'	Pacific flowering dogwood	9	7	Small/Weeping	D	Somewhat
<i>Cornus rutgan</i> 'Stellar Pink'	stellar pink dogwood	6	5	Small/Weeping	D	Somewhat
<i>Crataegus crus-galli</i>	cockspur hawthorn	10	8	Small/Columnar	D	Very
<i>Crataegus x lavallei</i>	Lavalle hawthorn	8	6	Small/Columnar	D	Very
<i>Cryptomeria japonica</i>	Japanese redcedar	4	6	Small	C	Somewhat
<i>Cupressus arizonica</i>	Arizona cypress	14	10	Medium	C	Somewhat
<i>Cupressus macrocarpa</i>	Monterey cypress	16	12	Medium	C	Somewhat
<i>Cupressus sempervirens</i>	Italian cypress	13	8	Medium	C	Somewhat
<i>Davidia involucrata</i>	dove tree	15	13	Medium	D	Somewhat
<i>Fagus sylvatica</i> 'Dawyck'	dawyck beech	15	5	Medium/Columnar	D	Somewhat
<i>Fagus sylvatica</i> 'Purpurea'	copper beech	25	18	Large	D	Somewhat
<i>Fraxinus excelsior</i>	European ash	15	15	Medium	D	Somewhat
<i>Fraxinus ornus</i>	flowering ash	13	10	Medium	D	Very
<i>Ginkgo biloba</i>	maidenhair tree	15	13	Medium	D	Very
<i>Gleditsia triacanthos</i>	honey locust	13	13	Medium/Columnar	D	Very
<i>Juniperus chinensis</i>	Chinese juniper	19	10	Large	C	Somewhat
<i>Juniperus virginiana</i>	eastern red cedar	14	10	Medium	C	Somewhat
<i>Koelreuteria paniculata</i>	golden rain tree	11	9	Columnar	D	Somewhat
<i>Liquidambar styraciflua</i>	sweetgum	13	12	Medium	D	Somewhat
<i>Magnolia sieboldii</i>	Oyama magnolia	9	6	Small	D	Somewhat
<i>Malus baccata</i>	Siberian crabapple	11	8	Medium	D	Somewhat
<i>Metasequoia glyptostroboides</i>	dawn redwood	25	15	Large	D	Somewhat
<i>Nyssa sylvatica</i>	black gum	13	10	Medium/Columnar	D	Somewhat
<i>Oxydendrum arboreum</i>	sourwood	12	8	Medium	D	Somewhat
<i>Parrotia persica</i>	Persian ironwood	10	6	Small/Columnar	D	Somewhat



Scientific Name	Common Name	Height (m)	Width (m)	Form	Deciduous/Coniferous	Adaptable to Climate Change
<i>Picea omorika</i>	Serbian spruce	7	4	Medium	C	Somewhat
<i>Picea pungens</i>	Colorado blue spruce	20	10	Large	C	Very
<i>Pinus contorta</i>	shore pine	11	7	Medium	C	Very
<i>Pinus flexilis</i>	limber pine	9.5	5	Medium	C	Very
<i>Pinus sylvestris</i>	scots pine	10	7	Medium	C	Very
<i>Platanus x hispanica</i>	London planetree	19	14	Large	D	Somewhat
<i>Populus fremontii</i>	fremont cottonwood	22	13	Large	D	Somewhat
<i>Prunus x yedoensis</i>	Yoshino Cherry	12	7	Medium	D	Somewhat
<i>Pyrus calleryana</i>	callery pear	10	4	Small/Columnar	D	Very
<i>Quercus acutissima</i>	sawtooth oak	13	10	Medium/Columnar	D	Very
<i>Quercus coccinea</i>	scarlet oak	16	12	Large	D	Very
<i>Quercus robur</i>	English oak	18	20	Large	D	Somewhat
<i>Quercus rubra</i>	red oak	18	16	Large	D	Somewhat
<i>Quercus shumardii</i>	shumard oak	25	20	Large	D	Very
<i>Robinia pseudoacacia 'Frisia'</i>	black locust	21	15	Large	D	Very
<i>Sciadopitys verticillata</i>	Japanese umbrella pine	10	5	Columnar	C	Somewhat
<i>Sorbus aria</i>	whitebeam	12	5	Medium	D	Somewhat
<i>Sorbus x thuringiaca</i>	oakleaf mountain ash	10	8	Small	D	Somewhat
<i>Stewartia pseudocamellia</i>	Japanese stewartia	8	6	Small/Weeping	D	Somewhat
<i>Styrax japonica</i>	Japanese snowbell	7	7	Small/Weeping	D	Somewhat
<i>Taxodium distichum</i>	bald cypress	20	13	Large	C	Somewhat
<i>Tilia cordata 'Chancellor'</i>	chancellor linden	12	7	Medium	D	Somewhat
<i>Tilia cordata 'Greenspire'</i>	greenspire linden	12	7	Medium	D	Somewhat
<i>Tilia x euchlora</i>	Crimean linden	12	7	Medium	D	Somewhat
<i>Ulmus americana</i>	American elm	23	19	Large	D	Somewhat
<i>Zelkova serrata</i>	Japanese zelkova	10	12	Medium	D	Somewhat
<i>Zelkova serrata 'Green Vase'</i>	green vase zelkova	10	12	Medium	D	Somewhat



7.6 COMMUNITY ENGAGEMENT

During the Council workshop on March 23, 2022, protection of existing trees was identified as a strong community value held by residents and stakeholders. Councillors relayed that some residents expressed concern that anticipated development in the Village will continue to remove trees and not protect retained trees. Other values of the community shared during this workshop were climate change adaptation and FireSmart incorporation.

Enhanced tree management in the areas of policy, planning, and operations will also benefit from the enthusiasm and support of residents. One of the major criticisms brought forward in Open House #1 and the associated survey was the perceived lack of transparency regarding tree care in the Village, especially on newly developed sites. Village staff should increase outreach with the community via greater guidance on finding an arborist and the permitting process, as well as support for tree planting on private lands. Expectations around street care also must be clarified. Without a clear responsibility for care, many street trees are neglected.



8.0 MONITORING PERFORMANCE

Continued monitoring is critical in evaluating the effectiveness to policy amendments, development planning procedures, and operational procedures for tree management throughout lands where the Village has the jurisdiction to manage. Progress can be assessed in multiple ways and a framework should be developed that best meets the capacity and the workflow of Village staff. The urban forestry working group should regularly – either annually or biennially depending on the group’s preference and ability – review recommendations and goals for the urban forest and benchmark progress made.

Public Agency Cooperation for Crown Land Management

Within the municipal boundary, there are large parcels of forested provincially owned and managed Crown land which remain largely unmanaged. The performance indicator could be: ‘The Village initiates discussion and meetings with the Ministry of Forests, Lands, Natural Resource Operations (FLNRO) in order to manage this land and mitigate risks from biotic and abiotic threats to the community.’

Maintenance of Trees on Public Property

Unmaintained trees can lead to unrecognized defects that may hold unacceptable levels of risk. The performance indicator could be: ‘All street and park trees receive cyclical maintenance and care in order to thrive.’

New Plantings on Public Property

The main focus of management on public property is protecting existing trees, however new plantings are needed to help expand the urban forest. There are also municipal trees aging out that will eventually need to be replaced. The performance indicator could be: ‘A staged replanting plan for maturing trees to consider the long-term maintenance of canopy cover and establishment maintenance for new plantings to thrive and grow properly’.

Street Tree Species Diversity

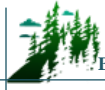
Species diversity amongst the Village’s street trees is an important tool for resisting pests, diseases, and other natural disturbances to the urban forest. A diversity of street tree species also creates aesthetic value for the town as a tourist destination. The performance indicator could be: ‘Street tree species diversity has a wide range of genera, families, and species that approach the 10-20-30 rule.’

Tree Risk Management

The Village has a duty of care for street and park trees to assess the level of potential risk posed to persons or property. The performance metric could be: ‘A tree risk assessment has been developed with a qualified person and when risk issues are identified, mitigation measures are prescribed and implemented. The Village has an arborist on staff with TRAQ certification.’

Tree Replacement on Private Property

One of the largest concerns that Blackwell heard during public consultation was regarding trees removed during development without adequate tree replacement as compensation. New plantings are



necessary for the urban forest to grow and expand. The performance indicator could be: 'Feedback from residents and developers is tracked to determine the efficacy of bylaw amendments.'

Amendments to the Tree Management and Preservation Bylaw and Subdivision and Development Servicing Bylaw

In this Plan, numerous amendments to the *Tree Management and Preservation Bylaw No. 1015* and the *Subdivision and Development Servicing Bylaw No. 578* are proposed. The performance indicator could be: 'Bylaw amendments have been implemented within two years.'

Clear Communication of Policies, Bylaws, and Tree Care

All documents and guidelines for the urban forest are easy to find and understand. Requirements are clearly communicated to residents and businesses. The performance indicator could be: 'Guidelines for trees on private property are available online in a single, centralized document, as well as resources for tree care.'

Bylaw Enforcement

The Village has adequate and effective enforcement of their bylaws for tree protection. The performance indicator: 'Staffing and funding for bylaw enforcement has been increased within two years.'

General Awareness of Trees as a Community Resource

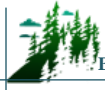
In public consultation, residents of Harrison Hot Springs showed that they were very engaged and interested in the urban forest and the protection of trees within the Village. The performance indicator: 'The urban forest working group conducts public consultation to gauge community values and awareness'.



Table 13 shows criteria and indicators to evaluate the performance of Harrison Hot Springs' urban management program.

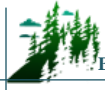
Table 13. Criteria for monitoring performance.

Criteria	Performance Indicator			
	Low	Moderate	Good	Optimal
Public agency cooperation for Crown land management	No meeting initiation with FLNRO	Meetings initiated	Agreement with FLNRO address hazards / risk	MOU + management plan initiated
Maintenance of trees on public property	No maintenance	Request-based maintenance	Maintenance on a 5-year cycle	5-year cycle + structural pruning on new trees
New plantings on public property	Tree establishment is ad hoc	Tree establishment occurs annually	Tree establishment based on gaps in inventory	Tree establishment based on canopy cover goals
Street tree species diversity	Tree species selected ad hoc	Tree species selection based on site conditions	Suitable species list developed	Species are monitored to rate effectiveness
Tree risk management	No TRA program	Request-based TRAs	Systematic TRAs and treatment occurs within 6 months	Systematic TRAs and treatment occurs once TRAs are completed
Tree replacement on private property	No information to public	Tree care information posted on Village website	Brochure of tree planting and tree care guidelines	Annual tree sales for purchase by residents
Adequate Village staffing to meet tree protection and management needs	No arboriculture staff	No training of existing horticulture staff	Contracts with RPFs and certified arborists with TRAQ	Arboriculture staff with contracts to professionals as needed
Amendments to the <i>Tree Management and Preservation Bylaw and Subdivision and Development Serving Bylaw</i>	No amendments to bylaws	Inter-departmental working group formed	Amendments to the S&DS and TM&P bylaw within 3 years	Amendments to the S&DS and TM&P bylaw within 2 years
Clear communication of policies, bylaws, and expectations of tree care	No communication plan	Posting information on the Village website	Development of brochures, guidelines	Tracking resident and developer response
Bylaw enforcement	Bylaw enforcement remains status quo	FVRD shares bylaw enforcement	Inclusion of tree protection in bylaw enforcement	Funding has been increased within two years
General awareness of trees as a community resource	No follow up with the public	Posting this UFMP on the Village website	Council and staff host a town hall meeting to discuss this UFMP	A staff-community working group is formed to discuss urban forest issues

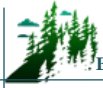


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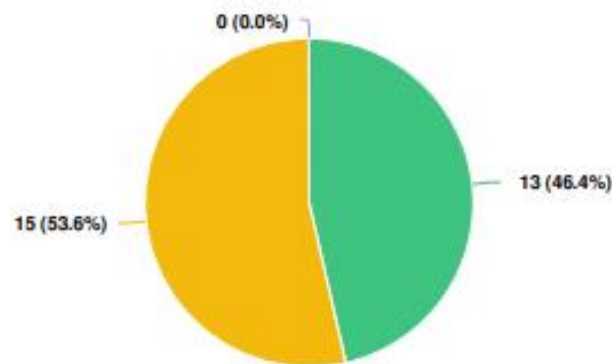
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<https://doi.org/10.3390/ijerph17124371>



APPENDIX A: SURVEY RESPONSES FROM PUBLIC OPEN HOUSE #1

Urban Forest Management Plan Feedback : Survey Report for 25 July 2022 to 23 August 2022

Q1 Are the tree protection guidelines working in Harrison Hot Springs?

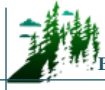


Question options

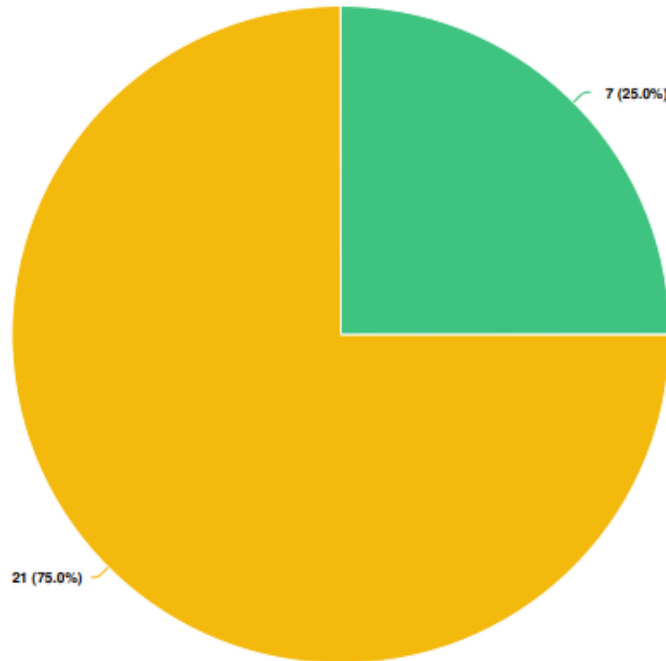
No I'm not sure Yes

Optional question (28 response(s), 1 skipped)

Question type: Dropdown Question



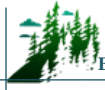
Q2 Do you currently care for street trees near your property? For example: water the trees and report on their health to the Village.



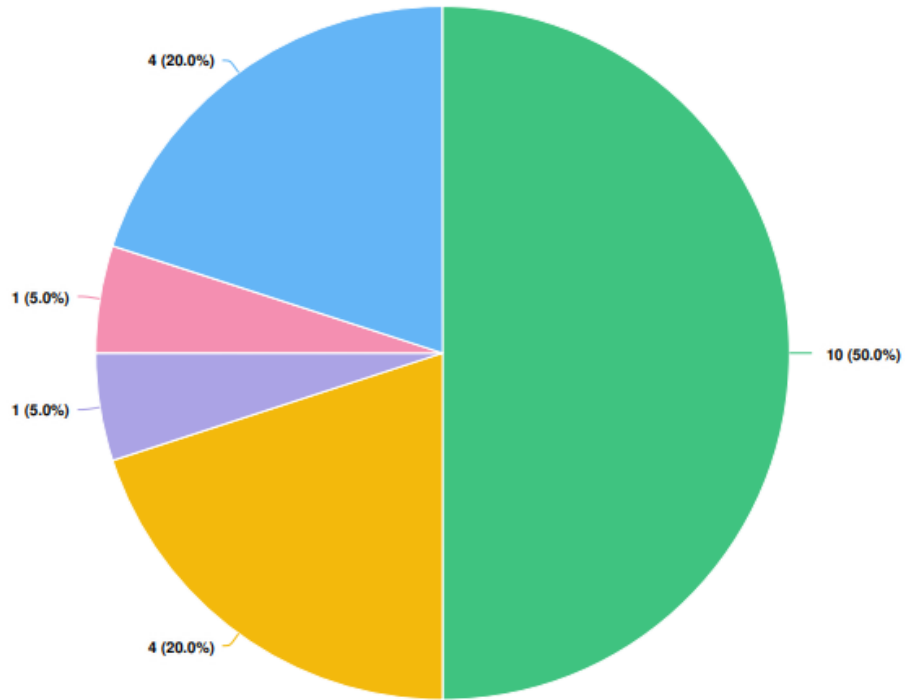
Question options

- Yes
- No

Optional question (28 response(s), 1 skipped)
Question type: Dropdown Question



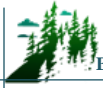
Q3 Would you support a tax increase to maintain the urban forest?



Question options

- \$50
- \$100
- \$150
- More than \$150
- I am not willing to pay to care for the urban forest

Optional question (20 response(s), 9 skipped)
Question type: Dropdown Question



Q4 Do you have any requests, question or comments about the Village's urban forest?

Bernadette

7/26/2022 12:13 PM

I don't know anything about tree protection guidelines in Harrison. Therefore, I don't know if a new forest management plan is needed or not.

C.Wilson

7/26/2022 12:53 PM

I feel it is important to keep any significant trees from being cut down. Perhaps new building architects and designers could work with existing trees and incorporate them into the overall layout of the build.

Terri

7/26/2022 01:05 PM

Do current property taxes not cover this? Also would suggest question 1 link to the current guidelines. Question 2 should include an option for no trees since they do not appear alongside all private properties.

Happy Harrison

7/26/2022 01:08 PM

Developers should be required to maintain trees where possible or to replace trees that are removed (with mature trees). As well they should be required to leave more green space in developments.

Paula

7/26/2022 01:47 PM

I believe the urban forest should be a high priority for the village but also believe the cost of maintaining it should be incorporated in the village's annual budget. Should overall costs, including annual maintenance of the urban forest require an annual property tax increase, I would have no problem with it as the only certainty we have is that costs will increase year over year. I don't see the value of having a set amount added for urban forest maintenance specifically as that would likely result in higher administrative costs for the village if asked to provide full transparency on the revenue generated and actual maintenance costs.

Tecjar

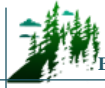
7/26/2022 01:52 PM

When doing preliminary investigations into future residential or commercial development projects, the Village should ensure that existing trees are incorporated into the plan. If any trees are to be removed, studies need to be done to determine the effects of removing the trees, i.e. drainage and flooding, erosion, habitat destruction, etc.

M

7/26/2022 02:51 PM

Your question on the tax increase does not have "no" for a response and is therefore skewed. Stop mowing over all the trees for condos. Stop clearcutting all along the lake and be more selective and wait



longer between cuts. A lot longer. Encourage home through tax incentives and education and sample plans to plant native species and trees (reduces heat in summer and saves money as well) and reduce lawns. I planted over 10 trees in my yard since we moved here. We have no lawn only pollinator habitat. Lead be example by using native perennials and shrubs and planting more trees.

Lisa Maree

7/26/2022 04:16 PM

I have no idea what the current tree protection guidelines are. While I support maintaining the trees of the Village - I also want to be safe from fire and falling trees.

Virginia

7/26/2022 05:18 PM

Would like to see more greenspace required with new developments. Forest buffers along main road in/out of HHS.

Cheryle

7/27/2022 07:02 PM

Less building. We need to protect our forests. And our village vibe.

Greg

7/27/2022 08:18 PM

Why does the previous question ask if I would support it then just ask for how much????

zeus zen

7/27/2022 09:20 PM

I don't see one. Plenty of "urban", scarcely a forest.

Poppy

7/28/2022 02:34 PM

Too many trees are being removed for development. Some should be left where the building takes place instead of clear cutting. The original plan for the large lot on Hot Springs Road was small RV size lots with cottages and some trees left in place. What happened to that idea?

HikerJohn

8/03/2022 12:57 AM

The trails within the Forest Recreation Site (East Sector) require upgrading. They should be gravelled to protect the trees roots from people walking on them and the gravel should have a border so as to contain the gravel. Hazardous trees along paths must be addressed. Establishing good trails will have the effect of restricting walkers to specific areas which would lessen the fire hazard. Also good access trails would shorten response times to action any fire.

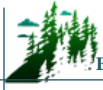
Ponysoldier

8/03/2022 05:38 AM

No

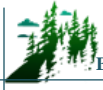
Wise Owl

Climate Change Emergency is now. Well cared for street trees are



8/07/2022 03:00 PM

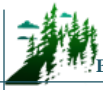
paramount to mitigating summer heat. Harrison Hot Springs must do everything possible to preserve the mature trees within the downtown and housing areas of the Village. Standing mature trees need to be protected and retained. The tree bylaw needs strengthening especially on definition of a protected tree and actual protection of "big" trees during development. Shade trees in the downtown core are sought out by visitors on busy picnic weekends. Every existing tree should be protected and maintained and more should be planted along Esplanade and Lillooet. None should be removed from Rendall Park. Homeowners should not be allowed to remove trees without a certified arborist reporting it's a safety danger. More guidance is needed on arborist's reporting standards for property owners. The tree bylaw should dictate that any tree removed should be replaced. Trees that are aging could be pruned and replacement trees planted and allowed to grow up before the aging tree is removed. The row of oak trees planted circa 1930 by Clark Gable, famous movie actor, along the 100 block of Lillooet should be maintained and protected. At least 4 of the original trees have been removed in the last 15 years one for obvious fungal infection but the others for less obvious reasons. The treatment of the one beside the new multistory condo development at St. Alice & Lillooet is unacceptable. It should be have been cordoned off and protected. The row of street trees behind the Harrison Lake Hotel should be pruned appropriately not cut back to stubs yearly. This row of trees offers many eco-services including cooling the street in summer and filtering heavy rainfall in the winter storms. The trees at 511 Lillooet slated for another multistory condo should also be cordoned off and protected during construction. Many of these 100-year old Douglas firs are on Village property not on the parcel to be developed. These trees are homes to little brown myotis bats who give us free mosquito control. They are a protected species. No trees in Rendall Park should be removed to facilitate the construction of this condo building. Trees between the Village office and the former tourist building should not be removed for construction of a new visitor centre or parking lot for it! They offer shade to cool the area. Street tree care should be a priority in the downtown core. Sadly those installed along the 200-block of Esplanade a few years back are dying - likely due to been planted in hot summer weather and in their root baskets or sacks by the contractors. It may be too late to save these trees but an effort to correct the situation is needed. Developers need to be obligated to protect trees, wetlands and provide wildlife corridors. The present clear cut and replace with asphalt and concrete is not in keeping with 21st century stewardship practices. Riparian setbacks that contain so many trees and shrubs need to be increased rather than allowing the minimum allowed by the regulations. Subdivisions like the one at 750 Hot Springs Road that once was rich in mature native trees and other horticultural plantings - all catalogued for a garden tour I once attended and did point out to the developers at their open house prior to the development- now



sports about 40 homes and only a few foundation plants. It is devoid of any shade trees former or newly installed. The property next door was recently clear cut for a 40-home development. This is not the stewardship an Urban Forest Management Plan should allow! Over all, the Village is lacking in requirements and enforcement of tree protection. Developers are especially culpable. Many commercial tree service companies active in our Village harm existing trees in our Village with their topping practices. Standards for tree protection and replacement should be set and enforced by bylaw. Tree care guidelines could be provided to residents for their own and street trees beside their property. Provide incentives and guidelines for residents to plant boulevard trees and directives to developers they must do so by contributing to an Urban Forest Management Fund. A long term strategy to protect and increase street trees in our Village is paramount to mitigating the ravages of climate change which, as i said, is NOW.

Optional question (16 response(s), 13 skipped)

Question type: Essay Question

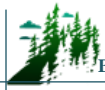


APPENDIX B: EAST SECTOR LANDS

On June 29, 2022, two foresters employed by B.A. Blackwell and Associates, Ltd. travelled by foot through the East Sector lands in the Village of Harrison Hot Springs in order to document forest health issues and tree risks present within the stand, as well as identify any signs of public use. The route taken by Judith Cowan and Jessica Walker is shown in Map 5.



Map 5. Assessed portion of the municipally owned and managed, East Sector lands.



This stand is located within the Coastal Western Hemlock (CWH) Zone as defined by the Biogeoclimatic Ecosystem Classification (BEC) system of British Columbia.⁴⁰ The site falls within the Dry Maritime (CWHdm) subzone, which is defined by wet winters, relatively dry and mild summers, and forests dominated by western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), and western redcedar (*Thuja plicata*). The terrain is mostly flat with no dominant aspect, and the site is located approximately 20m above sea level. Stem density varies from less than 40 stems/hectare to roughly 100 stems/hectare.

The East Sector lands are composed of maturing stands with fairly equal components of western hemlock, western redcedar, bigleaf maple (*Acer macrophyllum*), and black cottonwood (*Populus trichocarpa*), with several large trees holding significant wildlife value. Regeneration is primarily composed of pole-sized (7.5-12.5 cm diameter) western hemlock, with very little western redcedar regeneration observed. The stand has been logged previously, evident by the presence of large (<1m diameter) remnant western redcedar stumps with large holes created for springboard logging using cross-cut saws. Many young hemlocks are growing atop these nurse stumps or other woody debris (Figure 13).

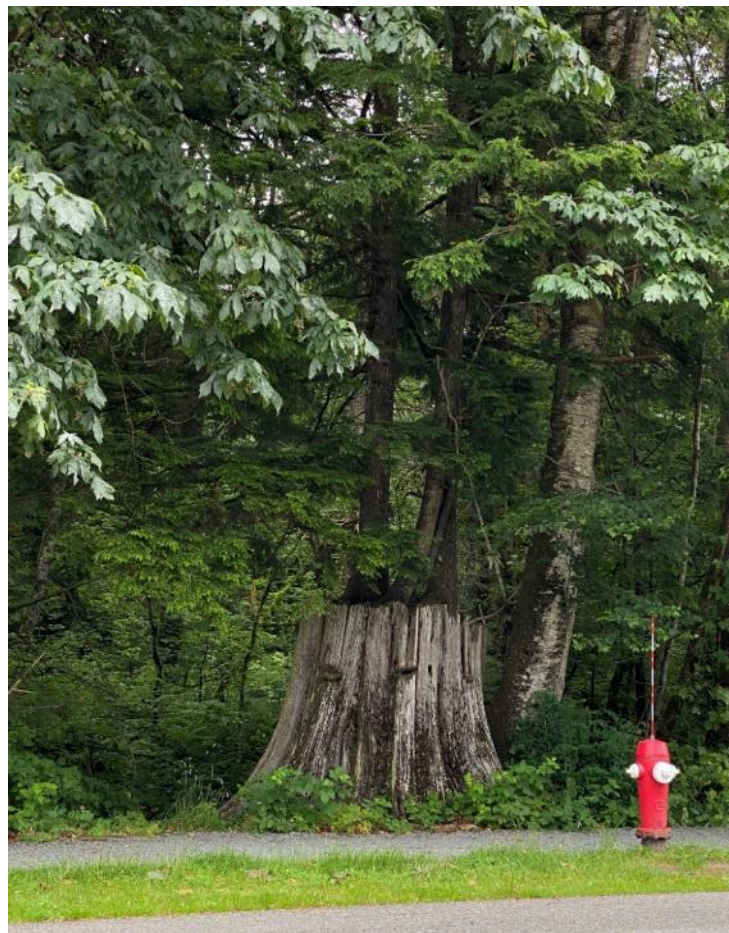
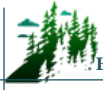


Figure 13. Pole-sized western hemlock growing atop nurse stump

⁴⁰Ministry of Forests (1994). [Field Guide for Site Identification and Interpretation for the Vancouver Forest Region](#)



The Village has identified several rare, threatened, and endangered species of plants and animals that occur within the East Sector, including the Pacific water shrew (*Sorex bendirii*), two rare plant communities associated with wetland and lowland habitats on the north side of the parcel (black cottonwood-red osier dogwood; black cottonwood-sitka willow), a sphagnum bog containing locally rare vegetation, and the aquatic and riparian habitats of the Miami River watershed.

Some scattered large paper birch (*Betula papyrifera*) exhibit senescence and die-off as they have reached the end of their life stage (Figure 14). No signs of root rot were observed except among the over-mature dying birches that have failed. Mid-stem breakage was observed throughout the assessed portions of the stand, mostly among western hemlock and bigleaf maple.

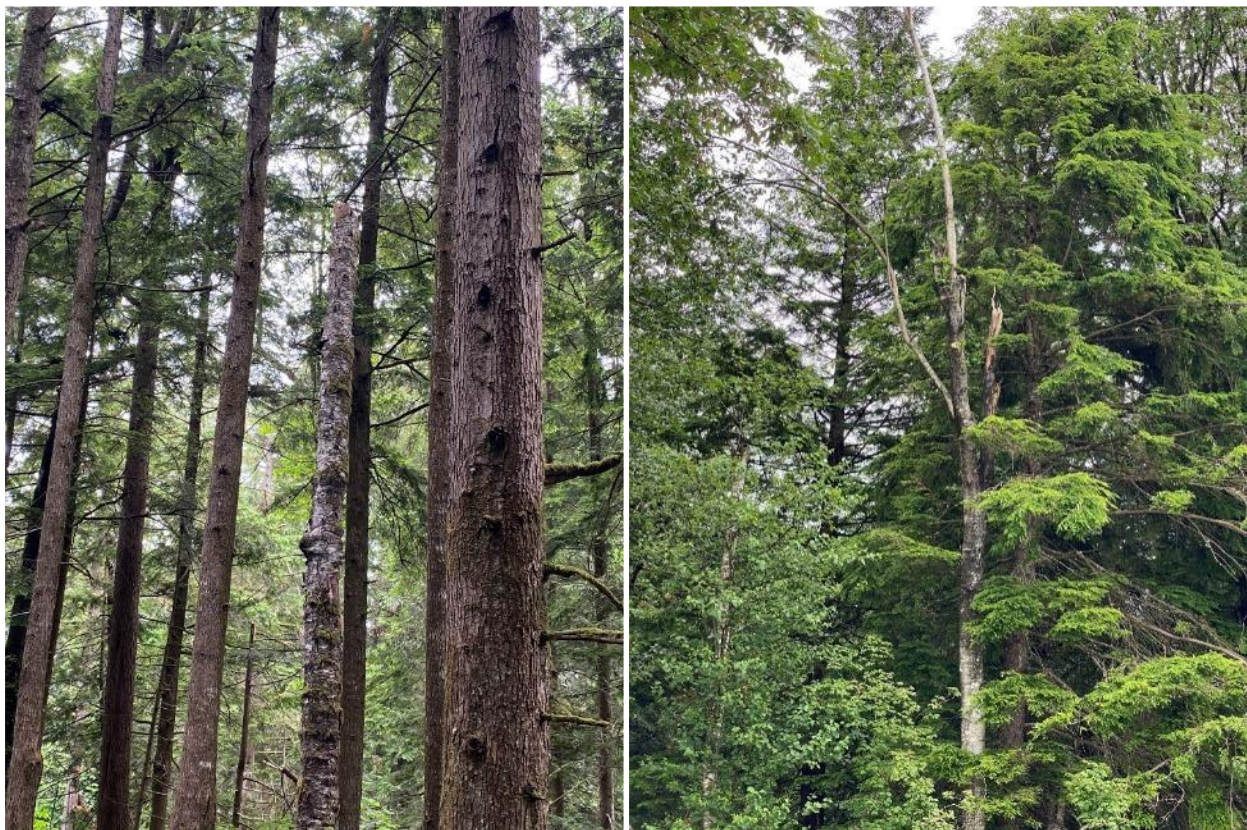
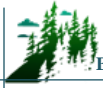


Figure 14. Failed and dying over-mature paper birch



Sites of western hemlock stem failure were strongly associated with mistletoe infection sites. Mistletoe-infested hemlocks were evenly distributed throughout the stand and infestation levels were moderate; however, the resulting burls that developed from the witches' brooms were generally large and easily observed from the ground (Figure 15).



Figure 15. Mistletoe infection and witch's brooms in crown of live (L) and dead (R) western hemlocks

Windthrow has occurred throughout the stand, primarily in wet areas, with western hemlock, western redcedar, and black cottonwood being most affected. At least two watercourses occur through the stand, including a portion of the Miami River and its eastern tributaries, and moist or boggy water-receiving sites are scattered throughout the forested land (Figure 16). Complex drainage patterns occur in the area, with portions of the land inundated with water during certain high-rainfall periods, affecting the lowland water management and flood protection of nearby residences. Throughout the stand, understory vegetation is dense to moderately dense, composed of native shrubby and herbaceous plants adapted to fresh to moist sites.

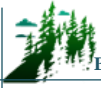


Figure 16. Water-receiving sites within East Sector

Branch failure resulting from witches' broom development, stem failure, and windthrow have all contributed to elevated levels of coarse woody debris in the understory. Fire risk in the East Sector is currently moderated by the moist water-receiving sites scattered throughout, including the moist ground and lush vegetated forest floor. However, continual surface fuel loading from branch and stem failure caused by windthrow and pests or disease may continue to increase to unacceptable levels, which will create a fire risk within the East Sector by increasing the potential for material ignition during a wildfire event (Figure 17, Figure 18). Ignitions within this parcel are likely to be human-caused, occurring along the forest edge near McCombs Drive.

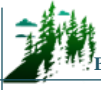


Figure 17. Stem failure of western hemlock (L) and western redcedar (R)



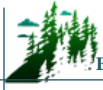
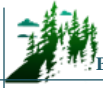


Figure 18. Windthrow in wet sites



The die-off of these large deciduous trees presents tree risk management issues for targets near the adjacent roadway at McCombs Drive, including private properties and homes located along the west side of this street, as well as members of the public who travel along the 3m-wide walkway on the east side of McCombs Drive (Figure 19). The hydro lines that run parallel to the walkway and the cell tower located east of McCombs Drive just north of Schooner Place may also be targets in the event of tree failures within the East Sector (Figure 20). Average tree heights range from 30-40m, which suggests that in the event of tree failures near the western edge of the East Sector lands, there is a high likelihood that the aforementioned targets will be struck. During the field assessment, no signs of formal or informal public use were observed within the stand; if future tree failures result in the breakage of trees (or any part thereof) that do not fall outside of the stand, it is unlikely that any important targets will be struck.



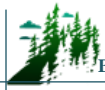
Figure 19. Trail and hydro lines along the stand edge could strike adjacent targets.



Figure 20. The communications tower located in the East Sector Lands could be impacted by a nearby tree failure.

The community is interested in protecting the important ecological values that have been identified within the East Sector, and it has been recognized that future planning must consider the drainage management requirements of this parcel as well as protection from potential hazards, as conservation and recreation opportunities are further developed.

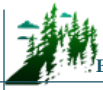
Blackwell recommends that similar field assessments are conducted on forested resource lands or Crown lands near potential targets within the Village of Harrison Hot Springs, so that potential risks from failing trees and hazardous fuel build-up can be documented and risks can be appropriately mitigated.



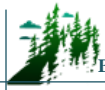
APPENDIX C: BYLAW COMPARISON TABLE

Table 14: A bylaw comparison between the Village of Harrison Hot Springs and the City of Surrey.

Village of Harrison Hot Springs		City of Surrey
Subdivision and Development Servicing Bylaw No. 578	Tree Management and Preservation Bylaw No. 1015	Tree Protection Bylaw No. 16100
No specific landscaping servicing requirements	-	Replacement trees must meet plant condition/structure requirements set out in latest edition of Canadian Landscape Standard; tree alterations and replacement made by city landscape architects
-	Only protects trees >30cm DBH <u>and</u> over 7.5m height	Protects trees that are: - >30cm DBH (including replacement trees) - trees in riparian areas - specimen-quality trees - significant trees - trees with evidence of nesting or use by raptors/ospreys/herons - trees on City property - select species that are >5cm DBH (deciduous) or >3m height (coniferous): arbutus, garry oak, coast redwood, dawn redwood, giant redwood, ginkgo
-	No protection for replacement trees	Protection specified for replacement trees
-	No definition for protected stumps	Protection for stumps >30cm diameter as measured from natural grade of ground
-	A 'Qualified Person' is defined as ISA Certified, but not TRAQ	An 'Arborist' is ISA certified as arborist and qualified as Tree Risk Assessor
Very little reference to tree protection, tree planting, or landscaping	No protections for trees on VoH property	All trees on City property are protected
Tree protection during construction is recommended, though not enforced (cage below dripline)	No tree protection requirements for construction	Tree protection barriers must be constructed around a tree to protect it from damage
-	Replacement trees only required on private property when trees are removed without a permit, with planting locations and species designated by VoH staff	Replacement trees are required to be planted to replace a tree that is cut, removed, or damaged



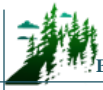
Village of Harrison Hot Springs		City of Surrey
Subdivision and Development Servicing Bylaw No. 578	Tree Management and Preservation Bylaw No. 1015	Tree Protection Bylaw No. 16100
-	Native trees (bigleaf maple, black cottonwood, Douglas-fir, grand fir, western hemlock, western redcedar) over specific diameters (80-120cm DBH) are 'Distinct Trees', which cannot be removed unless there is no other option	Select specimen-quality trees are designated by Council are 'Significant Trees', which are protected from cutting or damage
-	No guidance for residents on how to handle bylaw-protected trees that are actively failing	Detailed guidance provided for circumstances in which a tree can be removed and how residents can approach a failing tree
-	Homeowners may remove trees where the growth of existing trees is so dense that it blocks sunlight and inhibits growth of other vegetation	-
-	Homeowners may remove trees where root systems cause/will cause damage to foundations, sidewalks, ancillary buildings	Tree Management Permit for protected trees may be issued if a tree is situated within 2m of an existing building foundation or wall
-	Homeowners may remove trees where trees are located too close to a building where damage can be caused to the building/roof system, or where a Qualified Person indicates that a tree is dying or represents a danger/hazard to the property or adjoining properties	Tree Management Permit for protected trees may be issued if an arborist's report finds that a tree is an unreasonable hazard to the safety of property
Recommendations		
<i>Include landscaping and minimum tree planting requirements in development servicing</i>	<i>Specify separate definitions for 'tree' and 'protected tree'</i>	
	<i>Remove height from definition of 'protected tree', consider adding stump diameter</i>	
	<i>Add TRAQ to 'Qualified Person' definition</i>	
	<i>Add replacement tree securities</i>	
	<i>Incorporate tree protection parameters from Servicing bylaw</i>	



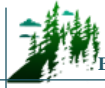
APPENDIX D: TREE INVENTORY SPECIES COMPOSITION

Table 15: The range of species identified during the street tree inventory.

Species		Total Count	Percent of Population
<i>Populus trichocarpa</i>	Black cottonwood	675	34.26%
<i>Thuja plicata</i>	Western redcedar	268	13.60%
<i>Acer macrophyllum</i>	Bigleaf maple	87	4.42%
<i>Cornus florida</i>	Flowering dogwood	73	3.71%
<i>Betula papyrifera</i>	Paper birch	72	3.65%
<i>Pseudotsuga menziesii</i>	Douglas fir	61	3.10%
<i>Taxus baccata</i>	English yew	50	2.54%
<i>Alnus rubra</i>	Red alder	48	2.44%
<i>Thuja occidentalis</i>	Juniper / Arborvitae	41	2.08%
<i>Gleditsia triacanthos v. iner.</i>	Honey locust	39	1.98%
<i>Fagus sylvatica</i>	European beech	32	1.62%
<i>Picea pungens</i>	Blue spruce	25	1.27%
<i>Acer rubrum</i>	Red maple	22	1.12%
<i>Prunus cerasifera</i>	Cherry plum	22	1.12%
<i>Prunus serrulate</i>	Japanese flowering cherry	22	1.12%
<i>Salix 'Chrysocoma'</i>	Weeping golden willow	20	1.02%
<i>Populus nigra 'Italica'</i>	Lombardy poplar	19	0.96%
<i>Tsuga heterophylla</i>	Western hemlock	19	0.96%
<i>Acer griseum</i>	Paperbark maple	16	0.81%
<i>Prunus emarginata</i>	Bitter cherry	16	0.81%
<i>Quercus robur</i>	English oak	15	0.76%
<i>Callitropsis nootkatensis</i>	Nootka cypress	14	0.71%
<i>Acer sieboldianum</i>	Siebold maple	13	0.66%
<i>Quercus rubra</i>	Red oak	12	0.61%
<i>Ginkgo biloba</i>	Ginkgo	11	0.56%
<i>Pinus ponderosa</i>	Ponderosa pine	11	0.56%
<i>Styrax japonicus</i>	Japanese snowbell	11	0.56%
<i>Cedrus atlantica</i>	Atlas cedar	10	0.51%
<i>Picea sitchensis</i>	Sitka spruce	10	0.51%
<i>Salix scouleriana</i>	Scouler's willow	10	0.51%
<i>Sorbus sitchensis</i>	Sitka mountain ash	10	0.51%
<i>Pinus sylvestris</i>	Scots pine	9	0.46%
<i>Salix lucida</i>	Shining willow	9	0.46%
<i>Acer davidii subsp. grosser</i>	Snakebark maple	8	0.41%
<i>Acer x freemanii</i>	Freeman maple	8	0.41%
<i>Betula pendula</i>	Silver birch	8	0.41%
<i>Cercidiphyllum japonicum</i>	Katsura	8	0.41%
<i>Rhododendron auriculatum</i>	Rhododendron	8	0.41%
<i>Acer palmatum 'Bloodgood'</i>	Japanese maple 'Bloodgood'	7	0.36%
<i>Juniperus scopulorum</i>	Rocky Mountain juniper	7	0.36%
<i>Malus floribunda</i>	Japanese crabapple	7	0.36%
<i>Acer circinatum</i>	Vine maple	6	0.30%



<i>Acer japonicum</i>	Fullmoon maple	6	0.30%
<i>Betula nigra</i>	River birch	6	0.30%
<i>Juglans regia</i>	English walnut	6	0.30%
<i>Acer platanoides 'Crimson King'</i>	Norway maple 'Crimson King'	5	0.25%
<i>Magnolia sargentiana</i>	(No common name)	5	0.25%
<i>Sorbus aucuparia</i>	Rowan	5	0.25%
<i>Syringa reticulata</i>	Japanese tree lilac	5	0.25%
<i>Cedrus deodara</i>	Deodar cedar	4	0.20%
<i>Larix occidentalis</i>	Eastern larch	4	0.20%
<i>Pinus cembra</i>	Swiss stone pine	4	0.20%
<i>Acer platanoides 'Emerald Queen'</i>	Norway maple 'Emerald Queen'	3	0.15%
<i>Chamaecyparis obtusa</i>	Hinoki cypress	3	0.15%
<i>Corylus avellana</i>	Common hazel	3	0.15%
<i>Corylus cornuta</i>	Beaked hazelnut	3	0.15%
<i>Cryptomeria japonica</i>	Sugi	3	0.15%
<i>Frangula purshiana</i>	Cascara buckthorn	3	0.15%
<i>Liquidambar styraciflua</i>	Sweetgum	3	0.15%
<i>Magnolia sieboldii</i>	Oyama magnolia	3	0.15%
<i>Picea glauca 'Conica'</i>	White spruce 'Conica'	3	0.15%
<i>Populus tremuloides</i>	Trembling aspen	3	0.15%
<i>Abies amabilis</i>	Pacific silver fir	2	0.10%
<i>Acer micranthum</i>	Small-leaved maple	2	0.10%
<i>Acer palmatum</i>	Japanese maple	2	0.10%
<i>Acer palmatum 'Katsura'</i>	Japanese maple 'Katsura'	2	0.10%
<i>Acer palmatum var. Dissectum</i>	Japanese laceleaf maple	2	0.10%
<i>Ailanthus altissima</i>	Tree of heaven	2	0.10%
<i>Alnus viridis</i>	Green alder	2	0.10%
<i>Castanea sativa</i>	Sweet chestnut	2	0.10%
<i>Fraxinus excelsior</i>	European ash	2	0.10%
<i>Ilex aquifolium</i>	English holly	2	0.10%
<i>Piceabreweriana</i>	Weeping spruce	2	0.10%
<i>Pinus monticola</i>	Western white pine	2	0.10%
<i>Quercus palustris</i>	Swamp Spanish oak	2	0.10%
<i>Robinia pseudoacacia</i>	Black locust	2	0.10%
<i>Salix integra 'Haruko Nishiki'</i>	Dappled willow	2	0.10%
<i>Syringa vulgaris</i>	Common lilac	2	0.10%
<i>Tilia americana</i>	American linden	2	0.10%
<i>Viburnum spp.</i>	Laurustinus	2	0.10%
<i>Acer palmatum 'Dissectum Atropurpureum'</i>	Japanese laceleaf maple 'Atropurpureum'	1	0.05%
<i>Acer palmatum 'Dissectum Viridis'</i>	Japanese laceleaf maple 'Viridis'	1	0.05%
<i>Acer tataricum</i>	Tatarian maple	1	0.05%
<i>Aesculus hippocastanum</i>	Horse chestnut	1	0.05%
<i>Camellia spp.</i>	Camellia	1	0.05%
<i>Crataegus douglasii</i>	Hawthorn	1	0.05%
<i>Juglans cinerea</i>	Butternut	1	0.05%



<i>Juniperus virginiana</i>	Eastern redcedar	1	0.05%
<i>Mahonia aquifolium</i>	Oregon grape	1	0.05%
<i>Picea engelmannii</i>	Engelmann spruce	1	0.05%
<i>Picea omorika</i> 'Pendula'	Serbian spruce pendula	1	0.05%
<i>Prunus</i> spp.	Cherry	1	0.05%
<i>Rhododendron macrocarpum</i>	Rhododendron	1	0.05%
<i>Sequoia sempervirens</i>	Coast redwood	1	0.05%
<i>Zelkova serrulata</i>	Japanese zelkova	1	0.05%
Total		1970	100%