Arboricultural Inventory and Report

For:

1768 Argyle Avenue
West Vancouver, BC

Submitted to:
Attn: Carman Kwan
Prinicipal Architect
Architectural Collective
carman@architecturalcollective.com

Date: August 20, 2024

Submitted by:

DIAMOND HEAD
3559 Commercial Street
Vancouver, BC 604.733.4886

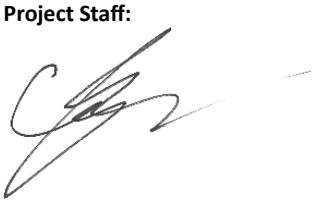
The following Diamond Head Consulting staff conducted the on-site tree inventory and prepared or reviewed the report.

All general and professional liability insurance and staff accreditations are provided below for reference.

Reviewer:

Trevor Cox, RPP, MCIP
ISA Certified Arborist (PN-1920A)
ISA Tree Risk Assessment Qualified (TRAQ)
BC Wildlife and Danger Tree Assessor

Project Staff:



Calvin Wagner
ISA Certified Arborist (PN-9131A)
ISA Qualified Tree Risk Assessor (TRAQ)

Austin Tahiliani
ASPB Professional Biologist (6081)
ISA Certified Arborist (PN-9345A)
ISA Qualified Tree Risk Assessor (TRAQ)

Don't hesitate to contact us if there are any questions or concerns about the contents of this report.

Contact Information:

Phone: 604-733-4886

Fax: 604-733-4879

Email: trevor@diamondheadconsulting.com

Website: www.diamondheadconsulting.com

Insurance Information:

WCB: # 657906 AQ (003)

General Liability: Northbridge General Insurance Corporation - Policy #CBC1935506, $10,000,000

Errors and Omissions: Lloyds Underwriters – Policy #1010615D, $1,000,000

Scope of Assignment:

Diamond Head Consulting Ltd. (DHC) was retained to complete an arboricultural assessment to supplement the proposed development application for 1768 Argyle Avenue, West Vancouver. This report contains an inventory of protected on and off-site trees and summarizes management recommendations concerning future development plans and construction activities. Off-site trees are included because, pursuant to municipal by-laws, site owners must consist of the management of off-site trees within the development's scope. This report is produced with the following primary limitations, detailed limitations specified in Appendix 8:

1) Our investigation is based solely on a visual inspection of the trees during our last site visit. This inspection is conducted from ground level. We only conduct aerial inspections, soil tests or below-grade root examinations to assess the condition of tree root systems if specifically contracted.

2) Unless otherwise stated, tree risk assessments in this report are limited to trees with a *high* or *extreme* risk rating in their current condition and in the context of their surrounding land use at the time of assessment.

3) Site boundaries and local tree-related bylaws primarily determine the scope of work. Only trees specified in the scope of work were assessed.

4) Beyond six months from the date of this report, the client must contact DHC to confirm its validity because site base plans and tree conditions may change beyond the scope of the original report. Additional site visits and report revisions may be required after this point to ensure report accuracy for the municipality’s development permit application process. Site visits and reporting needed after the first submission are not included in the original proposal fee and will be charged to the client at an additional cost.

The client is responsible for:

- Reviewing this report to understand and implement all tree **risk**, removal and protection requirements related to the project.
- Understanding that we did not assess trees off the subject property and, therefore, cannot be held liable for actions you or your contractors may undertake in developing this property, which may affect the trees on neighboring properties.
- Obtain a tree removal permit from the relevant municipal authority before any tree cutting.
- Obtaining relevant permission from adjacent property owners before removing off-site trees and vegetation.
- Obtaining a timber mark if logs are being transported offsite.
- Ensuring the project is compliant with the tree permit conditions.
- Constructing and maintaining tree protection fencing.
- Ensuring an arborist is onsite to supervise any works in or near tree protection zones.

Table of Contents

1.0 Introduction 1
1.1 Site Overview 1
1.2 Proposed Land Use Changes 1
1.3 Report Objective 1
2.0 Process and Methods 3
2.1 Tree Inventory 3
2.2 Tree Risk Assessment 3
2.3 Tree Protection 4
3.0 Findings: Tree Inventory and Risk Assessment 4
3.1 Tree Inventory 4
3.2 Tree Risk Assessment 5
Appendix 1 Complete Tree Inventory Table 7
Appendix 2 Site Photographs 12
Appendix 3 Tree Health and Structure Rating Criteria 15
Appendix 4 Tree Retention Value Rating Criteria 16
Appendix 5 Risk Rating Matrices 17
Appendix 6 Construction Guidelines 20
Appendix 7 Report Assumptions and Limiting Conditions 25

1.0 Introduction

1.1 Site Overview

The subject site currently resides as part of John Lawson Park. This relatively flat area is along the waterfront and hosts a variety of deciduous and coniferous trees as well as native and non-native shrubs and other vegetation. The Navvy Jack Heritage House lies in the middle of the park, on the 1768 Argyle Avenue lot.

1.2 Proposed Land Use Changes

Proposed changes to the site include a new addition to the Navvy Jack House on its west side and a new deck and patio on the west side. A new loading and access pad is planned for the north side of the lot, as well as several new pathways to the northwest and south of the Navvy Jack House. New landscaping is also expected to accompany the redevelopment.

1.3 Report Objective

This report has been prepared to ensure the proposed development complies with the West Vancouver Interim Tree Bylaw No. 4892, 2016. Refer to Bylaw No 4892 for the complete definition of protected trees, summarized below:

- Trees with a stem diameter at breast height (DBH, measured at 1.4 m above grade) of 75 cm or greater calculated as single stem or the cumulative total of multiple stems;
- Arbutus (*A. menziesii*) and Garry oak with a DBH of 20 cm or greater;
- City trees of any size; and,
- Trees containing the nest of an eagle or heron or that are the habitat of a protected wildlife species.

Additionally, park trees within 3 m of the property line or any neighbouring trees with a tree protection zone that extends into the subject site have been captured in the arborist report.

This report outlines the existing condition of protected trees on and adjacent to the property, summarizes the proposed tree retention and removal, and suggests guidelines for protecting retained trees during construction.

Figure 1. 1768 Argyle Avenue, in the context of the surrounding landscape and infrastructure. (WestMAP 2022 Aerial Imagery)

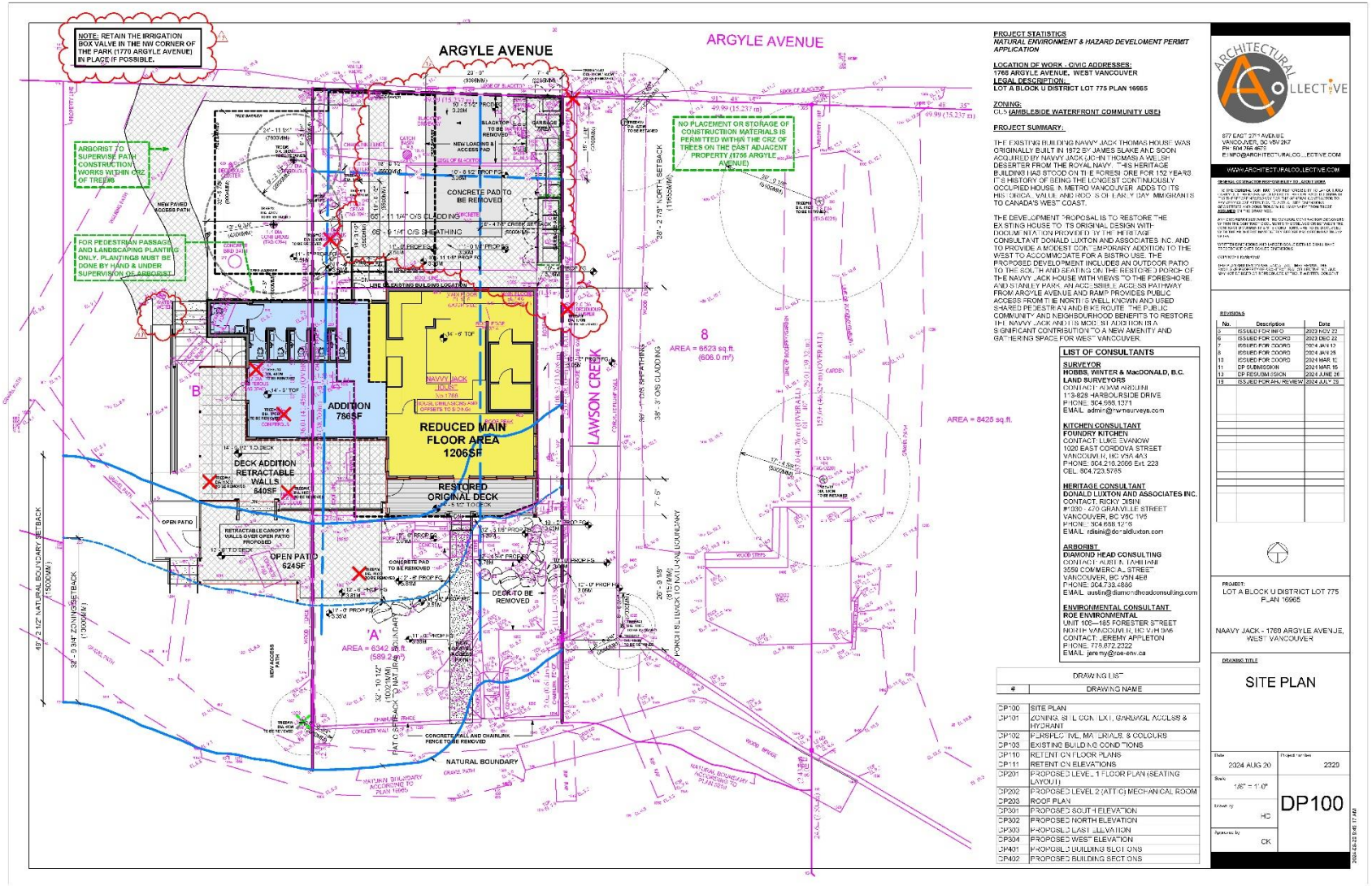


Figure 2. Site Plan for 1768 Argyle Avenue. Architectural Collective, August 20, 2024.

2.0 Process and Methods

In the summer of 2021, DHC was retained by the District of West Vancouver to prepare an arboricultural inventory of John Lawson Park (1716, 1734, 1744, 1756, 1768, 1770, and 1792 Argyle Avenue) in preparation for redevelopment of the Navvy Jack House. Calvin Wagner of DHC visited the site on August 17, 2021, and produced a report for the District of West Vancouver on September 21, 2021. This updated report builds upon the findings of the 2021 report to reflect new recommendations for the retention or removal of onsite and nearby trees.

The following methods and standards are used throughout this report.

2.1 Tree Inventory

Trees on site and trees shared with adjacent properties were assessed for attributes including: species; height measured to the nearest meter; and, diameter at breast height (DBH) measured to the nearest centimeter at 1.4 m above grade. As trees belong to the District of West Vancouver, they were not tagged. Off-site trees were inventoried, but also not tagged. The general health and structural integrity of each tree was assessed visually and assigned to one of five categories: *excellent; good; moderate; poor; or dying/dead*. Descriptions of the health and structure rating criteria are given in Appendix 3.

Tree retention value, categorized as *high, medium, low, or nil,* was assigned to each tree or group of trees based on their health and structure rating, and potential longevity in a developed environment. Descriptions of the retention value ratings are given in Appendix 4. Recommendations for tree retention or removal were determined by taking in to account a tree's retention value rating, its location in relation to proposed building envelopes and development infrastructure.

2.2 Tree Risk Assessment

Tree risk assessments were completed following methods of the ISA Tree Risk Assessment Manual[1] published in 2013 by the International Society of Arboriculture, which is the current industry standard for assessing tree risk. This methodology assigns risk based on the likelihood of failure, the likelihood of impact and the severity of consequence if a failure occurs. Only on-site hazard trees that had *high* or *extreme* risk ratings in their current condition and in context of their surrounding land use were identified and reported in section 3.2. Appendix 5 gives the likelihood and risk rating matrices used to categorize tree risk. DHC recommends that on-site trees be re-assessed for risk after the site conditions

[1] Dunster, J.A., Smiley, E.T., Matheny, N. and Lilly, S. (2013). Tree Risk Assessment Manual. *International Society of Arboriculture*. Champaign, Illinois.

change (e.g. after damaging weather events, site disturbance from construction, creation of new targets during construction or in the final developed landscape).

2.3 Tree Protection

Tree protection zones were calculated for each tree according to a 10 x DBH radius but may be modified based on professional judgement of the project arborist to accommodate species-specific tolerances and site specific growing conditions.

3.0 Findings: Tree Inventory and Risk Assessment

3.1 Tree Inventory

The tree inventory is summarized in Table 1 and the complete tree inventory is given in Appendix 1.

District-owned (on-site) trees

There were thirty-four (19) protected trees on the site. All trees are owned by the District of West Vancouver.

Of the on-site trees, two (2) trees have good or excellent health and structure; they have high retention value and potential longevity in an urban landscape. A further five (5) trees have moderate health and structure and have medium retention value but may require remedial work to promote their health and structural integrity if retained. Ten (10) trees have poor health and structure or are dying/dead and have low retention value. Two (2) trees have no retention suitability, due to their very poor condition and low potential for remediation.

Trees on Adjacent Properties

There were zero (0) privately owned off-site trees with tree protection zones extending into the subject site.

Table 1: Summary of the tree inventory from 1768 Argyle Avenue, containing the number of trees categorized by retention value and the recommended number to be retained or removed. The complete tree inventory is given in Appendix 1.

Tree Species	Retention Value				Recommendation		
	High	Medium	Low	Nil	Remove	Retain	Total
On-site trees							
Big-Leaf Maple (A. macrophyllum)		1			1		**1**
Common Hazelnut (C. avellana)			3		2	1	**3**
Dogwood spp. (Cornus spp.)				1		1	**1**
Douglas-fir (P. menziesii)		2			2		**2**
English Holly (I. aquifolium)	1					1	**1**
Fir spp. (Abies spp.)		1	1		2		**2**
Golden Chain Tree (Laburnum x watereri)			1		1		**1**
Grand fir (A. grandis)		1			1		**1**
Mugo Pine (P. mugo)			1		1		**1**
Norway Spruce (P. abies)	1		1			2	**2**
Paper Birch (B. papyrifera)			1	1	2		**2**
Western Red Cedar (T. plicata)			2		1	1	**2**
On-site totals	**2**	**5**	**10**	**2**	**13**	**6**	**19**
				GRAND TOTAL			**19**

3.2 Tree Risk Assessment

There were no trees on this site that posed a *high* or *extreme* risk at the time of assessment.

3.3 Discussion

Several on-site trees conflict with the proposed works, including trees #12-16 and #36, which are located directly on the footprint of the proposed expansion. As such, their potential for retention is not possibe due to the current site plan design. Trees #17 and #40 are in poor condition and have severe root zone conflicts with proposed blacktop removal, which reduces the likelihood of their survival post-construction. Tree #35 conflicts with a proposed pathway that follows the west side of the Navvy Jack House. It is recommended for removal. Tree #38 has been requested for removal by the client per DWV recommendations. The remaining trees should be protected with tree protection fencing per the specifications outlined in Appendix 6.

Trees #8 and #9

Trees #8 and #9 lie between the Navvy Jack House and a proposed walkway at the west edge of the site. An ISA Certified Arborist should supervise works for the proposed pathway immediately west adjacent of the CRZ of tree #8, as well any planting done between the new addition on the Navvy Jack House and the south end of the CRZ of tree #8.

Trees #10 and #11

Trees #10 and #11 are located adjacent to a planned concrete sidewalk to their east. This sidewalk must installed under arborist supervision, above grade, using zero excavation and low-impact methods. See comments on TMP for details regarding installation methods.

Trees #17 and #40

The blacktop which currently covers the CRZ of trees #17 and #40 is proposed for removal. This blacktop covers a significant portion of these trees' CRZ. Removing the blacktop would have a large negative impact on these trees, as it would be a significant change in growing conditions compared to what they are used to. These trees are recommended for removal due to their low retention value, and low likelihood of survival after these works.

Appendix 1 Complete Tree Inventory Table

The complete tree inventory below contains information on tree attributes and recommendations for removal or retention. Tree ownership in this inventory table is not definitive, its determination here is based on information available from the legal site survey, GPS locations, and field assessment during site visits. Tree Protection Zones are measured from the outer edge of a tree's stem. If using these measurements for mapping the tree protection zone, ½ the tree's diameter must be added to the distance to accommodate a survey point at the tree's center. Where tree protection fencing is proposed to vary from the minimum municipal TPZ, comments will be included in the Retention/TPZ comments and shown on the Tree Retention and Removal Plan.

*TPZ is the tree protection zone size required by the relevant municipal bylaw or, if not defined, the project arborist.

Surveyed?	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
Yes	8	City	Fir spp.	*Abies spp.*	42	20	40-59%	5	Moderate	Growing in planting bed. Tagged as tree 94. Single straight stem with an asymmetrical crown.	Medium	Retain	Protect and retain as requried.	4.2
Yes	9	City	Dogwood spp.	*Cornus spp.*	28	10		2	Dying	Growing in planting bed, underneath adjacent spruce crown. Majority of crown is dead, leaving patches of discoloured foliage scattered on stem. Some branches show sloughing bark.	Nil	Retain	Protect and retain as requried.	2.8
Yes	10	City	Norway Spruce	*Picea abies*	55	24	80-100%	6	Good	Growing next to fence for Navvy Jack House. Dominant tree in area. Single straight stem with full crown.	High	Retain	Sidewalk construction must be installed under arborist supervision, above grade, using zero excavation and low-impact methods.	5.5

Surveyed?	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
													See TMP for more details.	
Yes	11	City	Western Red Cedar	*Thuja plicata*	27	10	40-59%	4	Poor	Growing next to fence for Navvy Jack House. Growing within crown of large spruce. Asymmetrical crown with small leader and larger vertical, upswept stem near top.	Low	Retain	Sidewalk construction must be installed under arborist supervision, above grade, using zero excavation and low-impact methods. See TMP for more details.	2.7
Yes	12	City	Norway Spruce	*Picea abies*	25	10	40-59%	1	Poor	Growing next to fence for Navvy Jack House. Suppressed by neighbouring trees. Crown is small and asymmetrical.	Low	Remove	CRZ conflicts with proposed loading and access pad.	2.5
Yes	13	City	Douglas-Fir	*Pseudotsuga menziesii*	43	18	60-79%	5	Moderate	Growing next to property line for Navvy Jack House. Single stem with crook at 8m. Sharing crown on south side with adjacent tree #14.	Medium	Remove	Tree location conflicts with proposed building additions.	4.3
Yes	14	City	Douglas-Fir	*Pseudotsuga menziesii*	37	18	60-79%	5	Moderate	Growing next to property line for Navvy Jack House. Single straight stem with an above ground root flare. Crown extends to touch Navvy Jack House.	Medium	Remove	Tree location conflicts with proposed building additions.	3.7

Surveyed?	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
No	15	City	Big-Leaf Maple	*Acer macrophyllum*	15	4		1	Moderate	Small, multistemmed maple growing within bushes of natural area.	Medium	Remove	Tree location conflicts with proposed building additions.	2
Yes	16	City	Paper Birch	*Betula papyrifera*	16	8		3	Dying	Single stem with very little foliage left near base. Top half is dead. Small top has broken off.	Nil	Remove	Tree location conflicts with proposed building additions.	2
No	17	City	Paper Birch	*Betula papyrifera*	31	9		3	Poor	Two stems with union at base (16, 15), growing at edge of Lawson Creek. Restricted root zone due to pavement and creek wall. Stems have crooks and weak unions.	Low	Remove	Tree is unlikely to survive removal of the blacktop given its current condition and potential disturbance during this work.	3.1
Yes	18	City	Grand Fir	*Abies grandis*	61	24		4	Moderate	Growing within planting bed. Tagged as 221. Codominant at 7m with very acute union. Open growing, full crown.	Medium	Retain	Protect and retain as required.	6.1
Yes	19	City	Fir spp.	*Abies spp.*	53	22		4	Poor	Growing within planting bed. Tagged as 220. Stem bends at 14m and becomes codominant at 15m with acute unions. Signs of previous top failure and weak branch union.	Low	Retain	Protect and retain as required.	5.3

Surveyed?	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
No	35	City	Western Red Cedar	*Thuja plicata*	6	3		1	Poor	Minor chlorosis and loss of vigour in upper crown. Identified as missing tree #2 in A. Banks email Nov 30, 2022.	Low	Remove	Tree location conflicts with proposed pathway	2
No	36	City	Common hazelnut	*Corylus avellana*	20	4		2	Poor	Tall open-grown shrub growing in rear garden. Identified as missing tree #3 in A. Banks emil Nov 30, 2022.	Low	Remove	Tree location conflicts with proposed patio.	2
No	37	City	Mugo pine	*Pinus mugo*	10	2		2	Poor	Significant dieback in crown, rooted within retaining wall. Adjacent to tree 41. Identified as missing tree #4 in A. Banks email Nov 30, 2022.	Low	Retain	Protect and retain as required.	2
No	38	City	Common Hazelnut	*Corylus avellana*	17	5		3	Poor	Multiple stems embedded in chainlink fence. Rooted in retaining wall. Identified as missing tree #6 in A. Banks email Nov 30, 2022.	Low	Retain	Protect and retain as required. TPZ has been reduced to allow for pedestrian passage on the east side of the house.	2
No	39	City	Golden chain tree	*Laburnum x watereri*	42	6		2	Poor	Roted in retaining wall. Identified as missing tree #7 in A. Banks email Nov 30, 2022	Low	Retain	Protect and retain as required.	4.2

Surveyed?	Tag #	Location	Species Common Name	Botanical Name	DBH (cm)	Height (m)	LCR	Dripline Radius (m)	Health and Structure Rating	Comments	Retention Value Rating	Retain/ Remove	Retention/TPZ Comments	*TPZ (m)
No	40	City	Common Hazelnut	*Corylus avellana*	34	5		2	Poor	Growing in same location as tree 17. Multiple small stems with average dbh of 5 cm.	Low	Remove	Tree is unlikely to survive removal of the blacktop given its current condition and potential disturbance during this work.	3.4
No	41	City	English Holly	*Ilex aquifolium*	18	2		1	Good		High	Retain	Protect and retain as required.	2

Appendix 2 Site Photographs

Photo 1. #Tree 8, as seen from west of the site.

Photo 2. Tree #14, showing exposed roots.

Photo 3. Tree #15, growing under canopy of adjacent trees.

Photo 4. Tree #38, growing in retaining wall.

Photo 5. Tree #39, growing in retaining wall along Lawson Creek.

Appendix 3 Tree Health and Structure Rating Criteria

The tree health and structure ratings used by Diamond Head Consulting summarize each tree based on both positive and negative attributes using five stratified categories. These ratings indicate health and structural conditions that influence a tree's ability to withstand local site disturbance during the construction process (assuming appropriate tree protection) and benefit a future urban landscape.

Excellent: Tree of possible specimen quality, unique species or size with no discernible defects.

Good: Tree has no significant structural defects or health concerns, considering its growing environment and species.

Moderate: Tree has noted health and/or minor to moderate structural defects. This tree can be retained, but may need mitigation (e.g., pruning or bracing) and monitoring post-development. A moderate tree may be suitable for retention within a stand or group, but not suitable on its own.

Poor: Tree is in serious decline from previous growth habit or stature, has multiple defined health or structural weaknesses. It is unlikely to acclimate to future site use change. This tree is not suitable for retention within striking distance of most targets.

Dying/Dead: Tree is in severe decline, has severe defects or was found to be dead.

Appendix 4 Tree Retention Value Rating Criteria

The tree retention value ratings used by Diamond Head Consulting provide guidance for tree retention planning. Each tree in an inventory is assigned to one of four stratified categories that reflect its value as a future amenity and environmental asset in a developed landscape. Tree retention value ratings take in to account the health and structure rating, species profile*, growing conditions and potential longevity assuming a tree's growing environment is not compromised from its current state.

High: Tree suitable for retention. Has a good or excellent health and structure rating. Tree is open grown, an anchor tree on the edge of a stand or dominant within a stand or group. Species of *Populus, Alnus* and *Betula* are excluded from this category.

Medium: Tree suitable for retention with some caveats or suitable within a group**. Tree has moderate health and structure rating, but is likely to require remedial work to mitigate minor health or structural defects. Includes trees that are recently exposed, but wind firm, and trees grown on sites with poor rooting environments that may be ameliorated.

Low: Tree has marginal suitability for retention. Health and structure rating is moderate or poor; remedial work is unlikely to be viable. Trees within striking distance of a future site developments should be removed.

Nil: Tree is unsuitable for retention. It has a dying/dead or poor health and structure rating. It is likely that the tree will not survive, or it poses and unacceptable hazard in the context of future site developments.

* The species profile is based upon mature age and height/spread of the species, adaptability to land use changes and tree species susceptibility to diseases, pathogen and insect infestation.

** Trees that are 'suitable as a group' have grown in groups or stands that have a single, closed canopy. They have not developed the necessary trunk taper, branch and root structure that would allow then to be retained individually. These trees should only be retained in groups.

Appendix 5 Risk Rating Matrices

Trees with a *probable* or *imminent* likelihood of failure, a *medium* or *high* likelihood of impacting a specified target, and a *significant* or *severe* consequence of failure have been assessed for risk and included in this report (Section 3.2). These two risk rating matrices showing the categories used to assign risk are taken without modification to their content from the International Society of Arboriculture Tree Risk Assessment Qualification Manual.

Matrix 1: Likelihood

Likelihood of Failure	Likelihood of Impacting Target			
	Very Low	**Low**	**Medium**	**High**
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Risk Rating

Likelihood of Failure and Impact	Consequences of Failure			
	Negligible	**Minor**	**Significant**	**Severe**
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Appendix 6 Tree Protection Fencing Specifications

Amendment Bylaw No. 5089, 2020

Schedule A – Tree Protection Specifications

To ensure tree protection barrier(s) are placed around any tree(s) which are not to be cut or removed. To ensure that the trunk, branches and root structure are not damaged by any construction operations. Subject to any additional specifications imposed by the Director, all tree protection barriers required to be constructed pursuant to this bylaw must meet the following requirements:

1. The tree protection barrier must be 1.2 m in height.
2. 2x 4"s must be used for vertical posts, top and bottom rails and cross-bracing (in an "X") construction with continuous snow fence and staked to the ground. The structure must be sturdy and staked to the ground and remain intact for the entire period of demolition and/or construction.
3. Signage must be displayed indicating that the area within the protection barrier is a "protection zone" and stating that no encroachment, storage of materials or damage to trees is not permitted within the "protection zone".
4. Any work that needs to occur near or inside the tree protection barrier shall be supervised onsite by an ISA Certified Arborist.
5. located at distances based on tree diameter, using the table below:

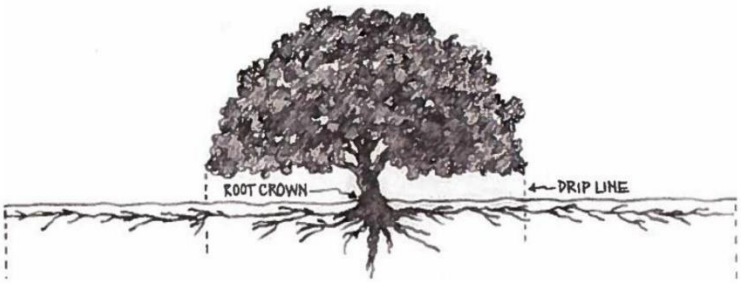
Trunk Diameter (DBH) Measured at 1.4 m from natural grade	**Protection Zone** Minimum Fence Distance
20 cm	1.2 m
25 cm	1.5 m
30 cm	2.1 m
35 cm	2.4 m
40 cm	2.7 m
50 cm	3.0 m
55 cm	3.3 m
60 cm	3.6 m
75 cm	4.5 m
90 cm	5.4 m
100 cm	6.0 m

1149541v1

TREE PROTECTION

SHARED OWNERSHIP TREES AND NEIGHBOUR'S TREES

The distance table on the previous page must be used to determine location of tree protection fencing for shared trees and trees on properties adjacent to the development, of any size.



Root Protection Zone

- A tree's root system grows within the top 60 cm of the surface of good quality, well drained and uncompacted soil.
- The root system can extend to more than two to three times the drip-line distance.

Tree fencing-wood framed snow fence

1149541v1

Appendix 7 Construction Guidelines

Tree management recommendations in this report are made under the expectation that the following guidelines for risk mitigation and proper tree protection will be adhered to during construction.

Respecting these guidelines will prevent changes to the soil and rooting conditions, contamination due to spills and waste, or physical wounding of the trees. Any plans for construction work and activities that deviate from or contradict these guidelines should be discussed with the project arborist so that mitigation measures can be implemented.

Tree protection Zones

Tree protection zones (TPZs) are specifically intended to protect a tree's roots from negative construction impacts. TPZs are required to retain good health and vigor of the tree during development and in the future landscape. The TPZ boundary is measured as a radius in all directions from the outer surface of the tree's stem. The TPZ radius is determined by the extent of tree protection zones according to local municipal bylaw specifications and may be modified based on professional judgement of the project arborist to accommodate species specific tolerances and site specific growing conditions.

Tree Protection Zones

Tree protection zones (TPZs) are fenced areas around the recommended TPZ. Within a TPZ, no construction activity, including materials storage, grading or landscaping, may occur without project arborist approval. Within the TPZ, the following are tree preservation guidelines based on industry standards for best practice and local municipal requirements:

- No soil disturbance or stripping.
- Maintain the natural grade.
- No storage, dumping of materials, parking, underground utilities or fires within TPZs or tree driplines.
- Any planned construction and landscaping activities affecting trees should be reviewed and approved by a consulting arborist.
- Install specially designed foundations and paving when these structures are required within TPZs.
- Route utilities around TPZs.
- Excavation within the TPZs should be supervised by a consultant arborist.
- Surface drainage should not be altered in such a way that water is directed in or out of the TPZ.

- Site drainage improvements should be designed to maintain the natural water table levels within the TPZ.

Tree Protection Fences

Prior to any construction activity, tree protection fences must be constructed at the root protection zone perimeter. The protection barrier or temporary fencing must be at least 1.2 m in height and constructed of 2" by 4" lumber with orange plastic mesh screening. Tree protection fences must be constructed prior to tree removal, excavation or construction and remain intact throughout the entire duration of construction.

Tree Crown Protection and Pruning

All heavy machinery (excavators, cranes, dump trucks, etc.) working within five meters of a tree's crown should be made aware of their proximity to the tree. If there is to be a sustained period of machinery working within five meters of a tree's crown, a of line of colored flags should be suspended at eye-level of the machinery operator for the length of the protected tree area. Any concerns regarding the clearance required for machinery and workers within or immediately outside tree protection zones should be referred to the project arborist so that a zone surrounding the crowns can be established or pruning measures undertaken. Any wounds incurred to protected trees during construction should be reported to the project arborist immediately.

Unsurveyed Trees

Unsurveyed trees identified by DHC in the Tree Retention Plan have been hand plotted for approximate location only using GPS coordinates and field observations. The location and ownership of unsurveyed trees cannot be confirmed without a legal survey. The property owner or project developer must ensure that all relevant on- and off-site trees are surveyed by a legally registered surveyor, whether they are identified by DHC or not.

Removal of logs from sites

Private timber marks are required to transport logs from privately-owned land in BC. It is property owner's responsibility to apply for a timber mark prior to removing any merchantable timber from the site. Additional information can be found at: http://www.for.gov.bc.ca/hth/private-timber-marks.htm

Regulation of Soil Moisture and Drainage

Excavation and construction activities adjacent to TPZs can influence the availability of moisture to protected trees. This is due to a reduction in the total root mass, changes in local drainage conditions,

and changes in exposure including reflected heat from adjacent hard surfaces. To mitigate these concerns the following guidelines should be followed:

- Soil moisture conditions within the tree root protection zones should be monitored during hot and dry weather. When soil moisture is inadequate, supplemental irrigation should be provided that penetrates soil to the depth of the root system or a minimum of 30 cm.
- Any planned changes to surface grades within the TPZs, including the placement of mulch, should be designed so that any water will flow away from tree trunks.
- Excavations adjacent to trees can alter local soil hydrology by draining water more rapidly from TPZs more rapidly than it would prior to site changes. It is recommended that when excavating within 6 m of any tree, the site be irrigated more frequently to account for this.

Root Zone Enhancements and Fertilization

Root zone enhancements such as mulch, and fertilizer treatments may be recommended by the project arborist during any phase of the project if they deem it necessary to maintain tree health and future survival.

Paving Within and Adjacent to TPZs

If development plans propose the construction of paved areas and/or retaining walls close to TPZs, measures should be taken to minimize impacts. Construction of these features would raise concerns for proper soil aeration, drainage, irrigation and the available soil volume for adequate root growth. The following design and construction guidelines for paving and retaining walls are recommended to minimize the long-term impacts of construction on protected trees:

- Any excavation activities near or within the TPZ should be monitored by a certified arborist. Structures should be designed, and excavation activities undertaken to remove and disturb as little of the rooting zone as possible. All roots greater than 2 cm in diameter should be hand pruned by a Certified Arborist.
- The natural grade of a TPZ should be maintained. Any retaining walls should be designed at heights that maintain the existing grade within 20 cm of its current level. If the grade is altered, it should be raised not reduced in height.
- Compaction of sub grade materials can cause trees to develop shallow rooting systems. This can contribute to long-term pavement damage as roots grow. Minimizing the compaction of

subgrade materials by using structural soils or other engineered solutions and increasing the strength of the pavement reduces reliance on the sub-grade for strength.

- If it is not possible to minimize the compaction of sub-grade materials, subsurface barriers should be considered to help direct roots downward into the soil and prevent them from growing directly under the paved surfaces.

Plantings within TPZs

Any plans to landscape the ground within the TPZ should implement measures to minimize negative impacts on the above or below ground parts of a tree. Existing grass layer in TPZs should not be stripped because this will damage surface tree roots. Grass layer should be covered with mulch at the start of the project, which will gradually kill the grass while moderating soil moisture and temperatures. Topsoil should be mixed with the mulch prior to planting of shrubs, but new topsoil layer should not be greater than 20 cm deep on top of the original grade. Planting should take place within the newly placed topsoil mixture and should not disturb the original rooting zone of the trees. A two-meter radius around the base of each tree should be left unplanted and covered in mulch; a tree's root collar should remain free from any amendments that raise the surface grade.

Monitoring during construction

Ongoing monitoring by a consultant arborist should occur for the duration of a development project. Site visits should be more frequent during activities that are higher risk, including the first stages of construction when excavation occurs adjacent to the trees. Site visits will ensure contractors are respecting the recommended tree protection measures and will allow the arborist to identify any new concerns that may arise.

During each site visit the following measures will be assessed and reported on by a consulting arborist:

- Health and condition of protected trees, including damage to branches, trunks and roots that may have resulted from construction activities, as will the health of. Recommendations for remediation will follow.
- Integrity of the TPZ and fencing.
- Changes to TPZ conditions including overall maintenance, parking on roots, and storing or dumping of materials within TPZ. If failures to maintain and respect the TPZ are observed, suggestions will be made to ensure tree protection measures are remediated and upheld.
- Review and confirmation of recommended tree maintenance including root pruning, irrigation, mulching and branch pruning.
- Changes to soil moisture levels and drainage patterns; and
- Factors that may be detrimentally impact the trees.

Appendix 8 Report Assumptions and Limiting Conditions

1) Unless expressly set out in this report or these Assumptions and Limiting Conditions, Diamond Head Consulting Ltd. (“Diamond Head”) makes no guarantee, representation or warranty (express or implied) regarding this report, its findings, conclusions or recommendations contained herein, or the work referred to herein.

2) The work undertaken in connection with this report and preparation of this report have been conducted by Diamond Head for the “Client” as stated in the report above. It is intended for the sole and exclusive use by the Client for the purpose(s) set out in this report. Any use of, reliance on or decisions made based on this report by any person other than the Client, or by the Client for any purpose other than the purpose(s) set out in this report, is the sole responsibility of, and at the sole risk of, such other person or the Client, as the case may be. Diamond Head accepts no liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm (including without limitation financial or consequential effects on transactions or property values, and economic loss) that may be suffered or incurred by any person as a result of the use of or reliance on this report or the work referred to herein. The copying, distribution or publication of this report (except for the internal use of the Client) without the express written permission of Diamond Head (which consent may be withheld in Diamond Head’s sole discretion) is prohibited. Diamond Head retains ownership of this report and all documents related thereto both generally and as instruments of professional service.

3) The findings, conclusions and recommendations made in this report reflect Diamond Head’s best professional judgment given the information available at the time of preparation. This report has been prepared in a manner consistent with the level of care and skill normally exercised by arborists currently practicing under similar conditions in a similar geographic area and for specific application to the trees subject to this report on the date of this report. Except as expressly stated in this report, the findings, conclusions and recommendations it sets out are valid for the day on which the assessment leading to such findings, conclusions and recommendations was conducted. If generally accepted assessment techniques or prevailing professional standards and best practices change at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary. Diamond Head expressly excludes any duty to provide any such modification if generally accepted assessment techniques and prevailing professional standards and best practices change.

4) Conditions affecting the trees subject to this report (the “Conditions”, include without limitation, structural defects, scars, decay, fungal fruiting bodies, evidence of insect attack, discolored foliage, condition of root structures, the degree and direction of lean, the general condition of the tree(s) and the surrounding site, and the proximity of property and people) other than those expressly addressed in this report may exist. Unless otherwise stated information contained in this report covers only those Conditions and trees at the time of inspection. The inspection is limited to visual

examination of such Conditions and trees without dissection, excavation, probing or coring. While every effort has been made to ensure that any trees recommended for retention are both healthy and safe, no guarantees, representations or warranties are made (express or implied) that those trees will not be subject to structural failure or decline. The Client acknowledges that it is both professionally and practically impossible to predict with absolute certainty the behavior of any single tree, or groups of trees, in all given circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential for failure and this risk can only be eliminated if the risk is removed. If Conditions change or if additional information becomes available at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary. Diamond Head expressly excludes any duty to provide any such modification of Conditions change or additional information becomes available.

5) Nothing in this report is intended to constitute or provide a legal opinion and Diamond Head expressly disclaims any responsibility for matters legal in nature (including, without limitation, matters relating to title and ownership of real or personal property and matters relating to cultural and heritage values). Diamond Head makes no guarantee, representation or warranty (express or implied) as to the requirements of or compliance with applicable laws, rules, regulations, or policies established by federal, provincial, local government or First Nations bodies (collectively, “Government Bodies”) or as to the availability of licenses, permits or authorizations of any Government Body. Revisions to any regulatory standards (including by-laws, policies, guidelines an any similar directions of a Government Bodies in effect from time to time) referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary. Diamond Head expressly excludes any duty to provide any such modification if any such regulatory standard is revised.

6) Diamond Head shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.

7) In preparing this report, Diamond Head has relied in good faith on information provided by certain persons, Government Bodies, government registries and agents and representatives of each of the foregoing, and Diamond Head assumes that such information is true, correct and accurate in all material respects. Diamond Head accepts no responsibility for any deficiency, misinterpretations or fraudulent acts of or information provided by such persons, bodies, registries, agents and representatives.

8) Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

9) Loss or alteration of any part of this report invalidates the entire report.