Arboricultural Inventory and Report

For: UBC Properties Trust

Site Location: BCR Lots 5 and 6, UBC

To be submitted with Tree Management Plan dated February 24, 2022.

Submitted to:
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Date: February 24, 2022

Submitted by:

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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.

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ISA Tree Risk Assessment Qualified (TRAQ)

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Please contact us if there are any questions or concerns about the contents of this report.

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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 BCR Lots 5 and 6, UBC, Vancouver. This report contains an inventory of protected on and off-site trees and summarizes management recommendations with respect to future development plans and construction activities. Off-site trees are included because pursuant to municipal bylaws, site owners must include the management of off-site trees that are within the scope of the development. This report is produced with the following primary limitations, detailed limitations specified in Appendix 7:

1) Our investigation is based solely on visual inspection of the trees during our last site visit. This inspection is conducted from ground level. We do not conduct aerial inspections, soil tests or below grade root examinations to assess the condition of tree root systems unless specifically contracted to do so.

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 context of their surrounding land use at the time of assessment.

3) The scope of work is primarily determined by site boundaries and local tree-related bylaws. 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 original report's scope. 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 required after the first submission are not included within 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.
- Obtaining a tree removal permit from the relevant municipal authority prior to 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 present onsite to supervise any works in or near tree protection zones.

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1.0 Introduction

1.1 Site Overview

The subject site consists of two (2) lots with an approximate total area of 1.07 ha. The subject site has some gravel parking areas and one (1) tree stand, but otherwise is barren. The topography varies throughout the subject site. Red Alder (*Alnus rubra*) is the main tree species found on the subject site.

1.2 Proposed Land Use Changes

The proposed consists of a residential development. In preparing this report, we reviewed the following information:

1. Base Survey by Murray & Associates dated February 6, 2020.
2. U/G Parking Level P1 Plan (Main Level) by dys architecture dated January 27, 2022.

1.3 Report Objective

This report has been prepared to ensure the proposed development is compliant with UBC Technical Guidelines Section 32 01 93.01 for Tree and Shrub Preservation in relation to development. Protected trees identified on the subject site and documented in this report have a dimeter at breast height of 15 cm or greater.

This report outlines the existing condition of trees adjacent to the subject site that have a drip line or critical root zone that extends on to the subject site, summarizes the proposed off-site tree retention and removal, and suggests guidelines for protecting retained trees during the construction process.

2.0 Process and Methods

Dean Bernasch of DHC visited the site on February 14th, 2022. The following methods and standards are used throughout this report.

2.1 Tree Inventory

Trees on site and trees shared with adjacent properties were marked with a numbered tag and 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. Off-site trees were inventoried, but 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 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 to be the six-times the diameter of each tree, but may be modified based on professional judgement of the project arborist to accommodate species specific tolerances and site specific growing conditions.

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

3.0 Findings: Tree Inventory and Risk Assessment

3.1 Tree Inventory

One (1) on-site tree stand was found, consisting of twenty-eight (28) trees. Of these trees, twelve (12) had poor and eleven (11) had moderate health and structure. Three (3) of these trees (#'s 94, 99, 797) were found to be dying and two (#'s 91 and Snag01) were dead.

All the above trees are recommended for removal as part of this project, due to conflicts with the proposed underground parkade.

Twenty-one (21) trees were found growing along Wesbrook Mall and Binning Road along the perimeters of Lots BCR 5 and BCR 6. All these trees had good health. Nine (9) of these trees are recommended for protection and retention as per our accompanying Tree Management Plan. The remaining twelve (12) are recommended for removal, due to conflicts with proposed roadworks.

3.2 Tree Risk Assessment

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

Appendix 1 Tree Inventory Table

The tree inventory below contains information on tree attributes and recommendations for removal or retention (it only includes the additional trees required for removal in this second arborist report amendment. 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 Management Plan.

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

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)
86	On Site	Red Alder	Alnus rubra	16	9		3	Poor	Tree growing in tight group of three. Lean SW.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
87	On Site	Red Alder	Alnus rubra	25	12		3	Poor	DBH approximate. Edge of stand. Fruiting bodies seen along base of trunk on south side. Dead top. Lean SE.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
88	On Site	Red Alder	Alnus rubra	20	10		2	Poor	DBH approximate. At edge of stand. Dead and broken top. Lean SE.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
89	On Site	Red Alder	Alnus rubra	19	9		5	Poor	At edge of stand. Lean south.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
90	On Site	Red Alder	Alnus rubra	25	12		3	Poor	DBH approximate. Within stand. Dead top. Lean SW.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
91	On Site	Red Alder	Alnus rubra	25	10		1	Dead	DBH approximate. Within stand. Beside 91. Lean SW.	Nil	Remove	Tree conflicts with proposed underground parkade.	2.0

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)
92	On Site	Red Alder	Alnus rubra	30	11		7	Poor	DBH approximate. At edge of stand. Lean SW. Top appears dead/dying.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
93	On Site	Red Alder	Alnus rubra	25	10		3	Poor	DBH approximate. Growing at edge of stand. Fruiting bodies seen on south side of trunk near base.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
94	On Site	Red Alder	Alnus rubra	15	6		3	Dying	Tree growing on south side at base of tree 95. Good lean south. Appears to be dying.	Nil	Remove	Tree conflicts with proposed underground parkade.	2.0
95	On Site	Western Red Cedar	Thuja plicata	35	9		4	Moderate	DBH approximate. Within stand. Crown somewhat thin from around 3m to top of tree. Two stems arise at 8m. Acute union with inclusion.	Medium	Remove	Tree conflicts with proposed underground parkade.	2.1
96	On Site	Big-Leaf Maple	Acer macrophyllum	40	7			Poor	Tree growing within stand. Three stems approximately 15, 15 and 10cm DBH each. One stem has broken top. One is growing along ground until leader arises 3m from union. Tree overall appears to be in decline.	Low	Remove	Tree conflicts with proposed underground parkade.	2.4

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)
97	On Site	Red Alder	Alnus rubra	25	11		6	Poor	DBH approximate. Growing at edge of stand. Good lean north. Deadwood and decay throughout crown.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
98	On Site	Red Alder	Alnus rubra	35	14		7	Poor	DBH approximate. Tree growing at edge of stand. Lean north.	Low	Remove	Tree conflicts with proposed underground parkade.	2.1
99	On Site	Red Alder	Alnus rubra	35	9		2	Dying	DBH approximate. Growing within stand. Lean NE. Appears almost completely dead.	Nil	Remove	Tree conflicts with proposed underground parkade.	2.1
100	On Site	Big-Leaf Maple	Acer macrophyllum	35	8		5	Moderate	DBH approximate. Growing at edge of stand. History of previous branch failures in crown. Lean northwest.	Low	Remove	Tree conflicts with proposed underground parkade.	2.1
790	On Site	Red Alder	Alnus rubra	35	10		7	Moderate	DBH approximate. Growing at edge of stand. Crown fully asymmetric and lean to NE.	Low	Remove	Tree conflicts with proposed underground parkade.	2.1
791	On Site	Bitter Cherry	Prunus emarginata	15	11		8	Moderate	In stand. Good Phototropic lean to south. Deadwood in crown. Note dormant time for tree.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
792	On Site	Big-Leaf Maple	Acer macrophyllum	30	9		4	Moderate	In stand. Two stems from base. Approximately 10 and 20cm DBH each. Suppressed by 973.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0

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)
793	On Site	Big-Leaf Maple	Acer macrophyllum	25	12		6	Moderate	Likely now exposed in stand due to recent adjacent tree removals. Two stems from base. 10 and 15cm DBH approximately. Somewhat suppressed by adjacent 973.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
794	On Site	Western Red Cedar	Thuja plicata	15	8		2	Moderate	Likely recently exposed due to adjacent tree removals. Now open grown. Growing in low area of stand. Single stem.	Medium	Remove	Tree conflicts with proposed underground parkade.	2.0
795	On Site	Big-Leaf Maple	Acer macrophyllum	20	10		3	Moderate	DBH approximate. Growing in stand. Recently exposed in stand position due to adjacent tree removals. Crown asymmetric to north.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
796	On Site	Honey Locust	Gleditsia triacanthos	25	10		3	Moderate	DBH approximate. Growing in stand at bottom of slopes in wet area. Surrounded by blackberry.	Medium	Remove	Tree conflicts with proposed underground parkade.	2.0
797	On Site	Douglas-Fir	Pseudotsuga menziesii	15	10		3	Dying	No foliage left in crown. Some cone crop still seen within crown.	Nil	Remove	Tree conflicts with proposed underground parkade.	2.0
969	On Site	Red Alder	Alnus rubra	34	10		7	Poor	Tree growing at edge of stand in tight group of three trees. Lean SW.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0

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)
971	On Site	Big-Leaf Maple	Acer macrophyllum	27	10		3	Moderate	DBH approximate. Tree growing at edge of stand. Slight lean NE.	Low	Remove	Tree conflicts with proposed underground parkade.	2.0
972	On Site	Western Red Cedar	Thuja plicata	65	12		5	Poor	Edge of stand. 3 stems from base. 35 20 10cm DBH each approximately. Dead tops.	Low	Remove	Tree conflicts with proposed underground parkade.	3.9
973	On Site	Douglas-Fir	Pseudotsuga menziesii	106	25		6	Moderate	In stand. Dominant. Appears might have lost top in past. Crown starts about half way up tree and appears quite stressed.	Medium	Remove	Tree conflicts with proposed underground parkade.	6.4
Snag01	On Site	Red Alder	Alnus rubra	40	6			Dead	Dead snag growing at edge of stand behind 971. Lean north.	Nil	Remove	Tree conflicts with proposed underground parkade.	2.4
UBC01	On Site	Red Maple	Acer rubrum	20	10		2	Good	Start of row. Tree growing in narrow lawned boulevard between Wesbrook Mall and sidewalk.	High	Retain	Protect and retain as per TMP.	2.0
UBC02	On Site	Red Maple	Acer rubrum	20	10		2	Good	Middle of row. Tree growing in narrow lawned boulevard between Wesbrook Mall and sidewalk.	High	Retain	Protect and retain as per TMP.	2.0
UBC03	On Site	Red Maple	Acer rubrum	20	10		2	Good	End of row. Tree growing in narrow lawned boulevard between Wesbrook Mall and sidewalk.	High	Retain	Protect and retain as per TMP.	2.0

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)
UBC04	On Site	Red Maple	Acer rubrum	20	10		2	Good	Start of row. Tree growing in narrow lawned boulevard between Wesbrook Mall and sidewalk.	High	Retain	Protect and retain as per TMP.	2.0
UBC05	On Site	Red Maple	Acer rubrum	20	10		2	Good	Middle of row. Tree growing in narrow lawned boulevard between Wesbrook Mall and sidewalk.	High	Retain	Protect and retain as per TMP.	2.0
UBC06	On Site	Red Maple	Acer rubrum	20	10		2	Good	End of row. Tree growing in narrow lawned boulevard between Wesbrook Mall and sidewalk.	High	Retain	Protect and retain as per TMP.	2.0
UBC07	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing at beginning of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Retain	TPZ to dripline will provide tree with adequate protection. Protect and retain as per TMP.	To Dripline
UBC08	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Retain	Protect and retain as per TMP.	2.0
UBC09	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0

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)
UBC10	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC11	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC12	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC13	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC14	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Retain	TPZ to dripline will provide tree with adequate protection. Protect and retain as per TMP.	To Dripline
UBC15	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0

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)
UBC16	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC17	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC18	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC19	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC20	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing as part of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0
UBC21	On Site	Red Maple	Acer rubrum	10	3		1	Good	Somewhat recently planted. Growing at end of evenly spaced row. Tree growing in lawned boulevard between road and sidewalk.	High	Remove	Tree conflicts with proposed roadworks.	2.0

Appendix 2 Site Photographs

Photo 1. Overview of trees (from right to left) UBC07 to UBC21.

Photo 2. Overview of on-site stand.

Photo 3. Overview of trees (from left to right) UBC01 to UBC06.

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 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

A Tree protection zone (TPZ) is determined using either dripline or a DBH multiplier to define a radius measured in all directions from the outside of a tree's trunk. It is typically determined 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. For retained trees, the TPZ and fencing indicated in this report are proposed as suitable in relation to the level of disturbance proposed on the site plan provided to the project arborist. Arborist consultation is required if any additional work beyond the scope of the plans provided is proposed near the tree. Work done in addition to the proposed impacts discussed in this report may cause the tree to decline and die.

Tree Protection Fencing: Tree protection zones (TPZs) will be protected by Tree Protection Fencing except where site features constrict roots (e.g., retaining walls or roads), where continual access is required (e.g., sidewalks), or when an acceptable encroachment into the TPZ is proposed, in which case the fencing will be modified. Tree Protection Fencing is shown on the Tree Protection Plan and, where it varies from the TPZ, the rationale is described in the inventory table in Section 3.1.

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.

Prior to any construction activity, Tree Protection Fencing must be constructed as shown on the Tree Protection Plan. 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 Fencing must be constructed prior to tree removal, excavation or construction and remain intact for 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 surveyed. 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 7 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 bylaws, 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.

Removal of existing curbs and installations of proposed curbs within 1.5m of TPZ of trees UBC06 must occur under arborist supervision.

Any proposed sidewalk or road works within 1.5m of TPZs of trees UBC07, UBC08 and UBC14 must occur under arborist supervision.

LEGEND

- CRITICAL ROOT ZONE
- TREE PROTECTION FENCING
- SURVEYED TREE TO BE RETAINED
- UN-SURVEYED TREE TO BE RETAINED
- TREE TO BE REMOVED

NOTES

1. The location of un-surveyed trees on this plan is approximate. Their location and ownership cannot be confirmed without being surveyed by a Registered BC Land Surveyor.
2. All tree protection fencing must be built to the relevant municipal bylaw specifications.The dimensions shown are from the outer edge of the stem of the tree.
3. The tree protection zone shown is a graphical representation of the critical root zone, measured from the outer edge of the stem of the tree. (½ the trees diameter was added to the graphical tree protection circles to accommodate the survey point being in the center of the tree)
4. Any construction activities or grade changes within the Root Protection Zone must be approved by the project arborist.
5. This plan is based on a topographic and tree location survey provided by the owners' Registered British Columbia Land Surveyor (BCLS) and layout drawings provide by the owners' Engineer (P Eng).
6. This plan is provided for context only, and is not certified as to the accuracy of the location of features or dimensions that are shown on this plan. Please refer to the original survey plan and engineering plans.

REFERENCE DRAWINGS

1. Base Survey by Murray & Associates dated February 6, 2020.
2. U/G Parking Level P1 Plan (Main Level) by dys architecture dated January 27, 2022.

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