



LEGEND

CRITICAL ROOT ZONE

TREE PROTECTION ZONE AND FENCING

SURVEYED TREE TO BE RETAINED

UN-SURVEYED TREE TO BE RETAINED (MUST BE SURVEYED)

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. (1/3 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.

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Drawing title: Tree Management Plan

Project address: Pitt Meadows Civic Centre, 19125 119B Ave

Client: Metro Vancouver

Drawing No: 001

Date: 2022/04/25

Drawn by: MS

Page Size: TABLOID 11"x17"

Page #

1 of 1

Arboricultural Inventory and Report

For:

Metro Vancouver Housing

Site Location:

19125 119B Ave

Pitt Meadows, BC



To be submitted with Tree Retention and Removal Plan
dated April 25, 2022

Submitted to:

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Purchasing and Risk Management

Metro Vancouver

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Date: April 25, 2022

Submitted by:



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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Scope of Assignment:

Diamond Head Consulting Ltd. (DHC) was retained to complete an arboricultural assessment to supplement the proposed development application for the Pitt Meadows Civic Centre at 19125 119B Avenue. 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 is a vacant rectangular lot with an approximate area of 5487 m². The southern section of the lot is gravel and the northern section is grassy. There is an asphalt paved parking lot directly to the west. The trees on site are planted deciduous trees found within medians in the parking lot.

1.2 Proposed Land Use Changes

The proposed development consists of constructing a 6 storey multi-unit residential building with underground parking. In preparing this report, we reviewed the following information:

- Survey prepared by Target Land Surveying, dated June 18, 2021
- Site plan from Ryder Architecture

1.3 Report Objective

This report has been prepared to ensure the proposed development is compliant with the City of Pitt Meadows. The complete definition of protected trees, summarized below as:

- Trees with a stem diameter at breast height (DBH, measured at 1.4 m above grade) greater than 20 cm, measured for a single stem or cumulatively for multi-stemmed trees;
- City trees of any size

Additionally, 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 the construction process.



Figure 1. 19125 119B Ave in context of the surrounding landscape and infrastructure.

2.0 Process and Methods

Morgan Sullivan of DHC visited the site on August 20, 2021. 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 Manual¹ 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 and Replacement

Tree Protection Zones were calculated for each tree according to City of Pitt Meadows requirements, 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

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

Trees On-site

- There were fourteen city owned (14) protected trees on the site.
- In total, seven (7) protected trees are recommended for removal and seven (7) are recommended for retention on the site as part of this development proposal (see Appendix 1 for individual tree inventory information).
- Of the on-site trees, none have good or excellent health and structure; they have high retention value and potential longevity in an urban landscape. Thirteen (13) 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. One (1) tree has poor health and structure or is dying/dead and has low retention value.

Trees on Adjacent Properties

- There were five (5) privately owned off-site trees and one (1) privately owned off-site hedge with Tree Protection Zones extending into the subject site.
- In total, all five (5) private-owned off site trees and the one (1) hedge are recommended for retention.
- There were eighteen (18) off-site City trees with Tree Protection Zones extending into the subject site.
- In total, seventeen (17) city owned trees are recommended for retention, and one (1) city owned tree is recommended for removal.

Table 1: Summary of the tree inventory from 11925 119B Ave 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 City owned trees | | | | | | | |
| Acer rubrum | | 13 | 1 | | 7 | 7 | 14 |
| On-site totals | | 13 | 1 | | 7 | 7 | 14 |
| Off-site trees | | | | | | | |
| Chamaecyparis lawsoniana | 1 | | | | | 1 | 1 |
| Malus spp. | 2 | | | | | 2 | 2 |
| Picea spp. | 2 | | | | | 2 | 2 |
| Thuja occidentalis | 1 | | | | | 1 | 1 |
| Off-site totals | 6 | 0 | 0 | 0 | 0 | 6 | 6 |
| Off-site City owned Trees | | | | | | | |
| Fraxinus spp. | | 11 | 1 | | | 12 | 12 |
| Carpinus betulus | | 1 | | | | 1 | 1 |
| Acer rubrum | 3 | | | 2 | 1 | 4 | 5 |
| City totals | 3 | 12 | 1 | 2 | 1 | 17 | 18 |
| GRAND TOTAL | | | | | 8 | 30 | 38 |

3.2 Tree Risk Assessment

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

4.0 Discussion and Summary

4.1 Trees On-site

The trees on site are all city owned and most comprised of Red Maple (*Acer rubrum*) species planted in retained medians within the asphalt parking lot. Seven (7) conflict with the proposed underground parking lot and are recommended to be removed. Permission is required to be obtained from the city to remove these trees.

4.2 Trees on Adjacent Properties

All off-site trees are recommended to be retained with tree protection fencing installed.

All off-site city owned trees are recommended to be retained except for C18 which is recommended to be removed as it will conflict with the underground parking lot. Permission is required to be obtained from the city to remove this tree.

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.

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

| Surveyed (Y/N) | Tag # | Location | Species Common Name | Botanical Name | DBH (cm) | Height (m) | Dripline Radius (m) | Health and Structure Rating | Comments | Retention Value Rating | Retain/ Remove | Retention/TPZ Comments | *TPZ (m) |
|----------------|-------|--------------------|---------------------|----------------|----------|------------|---------------------|-----------------------------|--|------------------------|----------------|--|----------|
| Y | 5841 | On Site-City owned | Red Maple | Acer rubrum | 22 | 12 | 2 | Poor | Growing in garden bed. Columnar form with narrow unions. Old stake tie has girdled main stem at 1.5 m. | Low | Retain | Protect as required. TPZ fencing to be aligned with edge of hardscaping. | 2 |
| Y | 5842 | On Site-City owned | Red Maple | Acer rubrum | 18 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 9 m. | Medium | Retain | Protect as required. TPZ fencing to be aligned with edge of hardscaping. | 2 |
| Y | 5843 | On Site-City owned | Red Maple | Acer rubrum | 18 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 2 m. | Medium | Retain | Protect as required. TPZ fencing to be aligned with edge of hardscaping. | 2 |
| Y | 5844 | On Site-City owned | Red Maple | Acer rubrum | 18 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 2 m. | Medium | Retain | Protect as required. TPZ fencing to be aligned with edge of hardscaping. | 2 |

| Surveyed (Y/N) | Tag # | Location | Species Common Name | Botanical Name | DBH (cm) | Height (m) | Dripline Radius (m) | Health and Structure Rating | Comments | Retention Value Rating | Retain/ Remove | Retention/TPZ Comments | *TPZ (m) |
|-------------------|-------|---------------------------|---------------------------|-------------------|-------------|---------------|---------------------------|-----------------------------------|--|------------------------------|-------------------|--|-------------|
| Y | 5845 | On Site- City owned | Red Maple | Acer rubrum | 18 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 2 m. Exposed surface roots from being planted too high. | Medium | Retain | Protect as required. TPZ fencing to be aligned with edge of hardscaping. | 2 |
| Y | 5846 | On Site- City owned | Red Maple | Acer rubrum | 24 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. Exposed surface roots from being planted too high. | Medium | Retain | Protect as required. TPZ fencing to be aligned with edge of hardscaping. | 2 |
| Y | 5847 | On Site- City owned | Red Maple | Acer rubrum | 20 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. Exposed surface roots from being planted too high. | Medium | Retain | Protect as required. TPZ fencing to be aligned with edge of hardscaping. | 2 |
| Y | 5851 | On Site- City owned | Red Maple | Acer rubrum | 23 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. Exposed surface roots from being planted too high. | Medium | Remove | Conflicts with underground parking lot | 2 |
| Y | 5852 | On Site- City owned | Red Maple | Acer rubrum | 24 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. Exposed surface roots from being planted too high. | Medium | Remove | Conflicts with underground parking lot | 2 |
| Y | 5853 | On Site- City owned | Red Maple | Acer rubrum | 17 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. Exposed surface roots from being planted too high. | Medium | Remove | Conflicts with underground parking lot | 2 |

| Surveyed (Y/N) | Tag # | Location | Species Common Name | Botanical Name | DBH (cm) | Height (m) | Dripline Radius (m) | Health and Structure Rating | Comments | Retention Value Rating | Retain/ Remove | Retention/TPZ Comments | *TPZ (m) |
|----------------|-------|--------------------|---------------------|--------------------------|----------|------------|---------------------|-----------------------------|---|------------------------|----------------|--|----------|
| Y | 5854 | On Site-City owned | Red Maple | Acer rubrum | 15 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. Exposed surface roots from being planted too high. | Medium | Remove | Conflicts with underground parking lot | 2 |
| Y | 5855 | On Site-City owned | Red Maple | Acer rubrum | 14 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. | Medium | Remove | Conflicts with underground parking lot | 2 |
| Y | 5856 | On Site-City owned | Red Maple | Acer rubrum | 17 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. | Medium | Remove | Conflicts with underground parking lot | 2 |
| Y | 5857 | On Site-City owned | Red Maple | Acer rubrum | 19 | 12 | 2 | Moderate | Growing in garden bed. Columnar form with narrow unions. Codominant leaders at 3m. Exposed surface roots from being planted too high. | Medium | Remove | Conflicts with underground parking lot | 2 |
| Y | OS1 | Off Site | Apple spp. | Malus spp. | 20 | 6 | 5 | Good | View of tree obscured by hedge. Multiple stems with vigorous crown. | High | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | OS2 | Off Site | Spruce spp. | Picea spp. | 20 | 8 | 5 | Good | View of tree obscured by hedge. Young tree wit high vigour. | High | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | OS3 | Off Site | Spruce spp. | Picea spp. | 20 | 8 | 5 | Good | View of tree obscured by hedge. Young tree with high vigour. | High | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | OS4 | Off Site | Lawson Cypress | Chamaecyparis lawsoniana | 25 | 12 | 3 | Good | Vigourous tree. Codominant stems at 2 m. | High | Retain | Retain as required. Provide TPZ fencing. | 2 |

| Surveyed (Y/N) | Tag # | Location | Species Common Name | Botanical Name | DBH (cm) | Height (m) | Dripline Radius (m) | Health and Structure Rating | Comments | Retention Value Rating | Retain/ Remove | Retention/TPZ Comments | *TPZ (m) |
|----------------|----------|----------|---------------------|--------------------|----------|------------|---------------------|-----------------------------|---|------------------------|----------------|--|----------|
| Y | OS5 | Off Site | Apple spp. | Malus spp. | 20 | 6 | 5 | Good | View of tree obscured by hedge. Multiple stems with vigorous crown. | High | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | OS Hedge | Off Site | White Cedar | Thuja occidentalis | 15 | 2 | 1 | Good | Small hedge growing on property boundary | High | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C1 | City | Hornbeam | Carpinus betulus | 23 | 12 | 5 | Moderate | Growing adjacent to building as part of planted row. Full symmetrical crown. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C2 | City | Ash spp. | Fraxinus spp. | 20 | 12 | 4 | Moderate | Growing adjacent to building as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C3 | City | Ash spp. | Fraxinus spp. | 17 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C4 | City | Ash spp. | Fraxinus spp. | 15 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C5 | City | Ash spp. | Fraxinus spp. | 21 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C6 | City | Ash spp. | Fraxinus spp. | 19 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C7 | City | Ash spp. | Fraxinus spp. | 18 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. | 2 |

| Surveyed (Y/N) | Tag # | Location | Species Common Name | Botanical Name | DBH (cm) | Height (m) | Dripline Radius (m) | Health and Structure Rating | Comments | Retention Value Rating | Retain/ Remove | Retention/TPZ Comments | *TPZ (m) |
|-------------------|-------|----------|---------------------------|-------------------|-------------|---------------|---------------------------|-----------------------------------|--|------------------------------|-------------------|---|-------------|
| | | | | | | | | | | | | Provide TPZ fencing. | |
| Y | C8 | City | Ash spp. | Fraxinus spp. | 14 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C9 | City | Ash spp. | Fraxinus spp. | 14 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C10 | City | Ash spp. | Fraxinus spp. | 14 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C11 | City | Ash spp. | Fraxinus spp. | 18 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C12 | City | Ash spp. | Fraxinus spp. | 18 | 12 | 4 | Moderate | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. | Medium | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C13 | City | Ash spp. | Fraxinus spp. | 18 | 12 | 4 | Poor | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. Sparse crown in decline. | Low | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C14 | City | Red Maple | Acer rubrum | 18 | 12 | 4 | Dead | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. Previously topped. No live growth remains. | Nil | Retain | Retain as required. Provide TPZ fencing. | 2 |

| Surveyed (Y/N) | Tag # | Location | Species Common Name | Botanical Name | DBH (cm) | Height (m) | Dripline Radius (m) | Health and Structure Rating | Comments | Retention Value Rating | Retain/ Remove | Retention/TPZ Comments | *TPZ (m) |
|-------------------|-------|----------|---------------------------|-------------------|-------------|---------------|---------------------------|-----------------------------------|---|------------------------------|-------------------|--|-------------|
| Y | C15 | City | Red Maple | Acer rubrum | 18 | 12 | 4 | Dead | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. No live growth remains. | Nil | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C16 | City | Red Maple | Acer rubrum | 31 | 16 | 5 | Good | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. Crowns suppressed to become narrow because of neighbouring trees. | High | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C17 | City | Red Maple | Acer rubrum | 31 | 16 | 5 | Good | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. Crowns suppressed to become narrow because of neighbouring trees. | High | Retain | Retain as required. Provide TPZ fencing. | 2 |
| Y | C18 | City | Red Maple | Acer rubrum | 32 | 16 | 5 | Good | Growing in grass boulevard as part of planted row. Codominant stems at 3 m. Crowns suppressed to become narrow because of neighbouring trees. | High | Remove | Conflicts with underground parking lot. | 2 |

Appendix 2 Site Photographs



Photo 1. Looking southwest at Trees 5842-5847



Photo 2. Undersized trees in foreground with OS 1 & OS 2 in background



Photo 3. Example of exposed surface roots on Maple trees



Photo 4. Looking northeast at OS 4 & OS 5 with OS hedge



Photo 5. Tree C1 & C2



Photo 6. Looking east at City trees 3-6



Photo 7. Looking south towards City trees 15-18 with row of Ash trees showing on left



Photo 8. City trees 13 & 14

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 an 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 them 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 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 7 Report Assumptions and Limiting Conditions

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