1139 Burdett Ave, Victoria

Construction Impact Assessment &
Tree Preservation Plan

Prepared For: Tim Stemp
1139 Burdett Ave
Victoria, BC
V8V 3H3

Prepared By: Talbot, Mackenzie & Associates
Noah Borges – Consulting Arborist
ISA Certified # PN-8409A
TRAQ – Qualified

Date of Issuance: May 8, 2019
Jobsite Property: 1139 Burdett Ave, Victoria

Date of Site Visit: February 13, 2019

Site Conditions: Residential lot. No ongoing construction activity.

Summary: We do not anticipate any by-law protected trees will be significantly impacted by the proposed construction. We recommend where driveways, parking areas, and walkways encroach within the critical root zones (CRZs) of trees to be retained (e.g. Arbutus #33, Cherry NT2, Plum NT3), they be "floated" overtop their root systems and be surfaced using permeable materials. The project arborist should also be on site to supervise these excavations to ensure no large roots are damaged. Five non-by-law protected trees will be removed.

Scope of Assignment:

- To inventory the existing bylaw protected trees and any trees on municipal or neighbouring properties that could potentially be impacted by construction or that are within three metres of the property line
- Review the proposal to renovate the existing building and construct a two-storey addition, a new driveway, and three at-grade parking spaces
- Comment on how construction activity may impact existing trees
- Prepare a tree retention and construction damage mitigation plan for those trees deemed suitable to retain given the proposed impacts

Methodology: We visually examined the trees on the property and prepared an inventory in the attached Tree Resource Spreadsheet. Each by-law protected tree was identified using a numeric metal tag attached to its lower trunk. Municipal trees and neighbours' trees were not tagged. Information such as tree species, DBH (1.4m), crown spread, critical root zone (CRZ), health, structure, and relative tolerance to construction impacts were included in the inventory. The by-law protected trees with their identification numbers were labelled on the attached Site Plan. The conclusions reached were based on the information provided within the attached plans from Christine Lintott Architects (dated May 1, 2019).

Limitations: No exploratory excavations have been requested and thus the conclusions reached are based solely on critical root zone calculations and our best judgement using our experience and expertise. The location, size and density of roots are often difficult to predict without exploratory excavations and therefore the impacts to the trees may be more or less severe than we anticipate.
Summary of Tree Resource: Eleven trees were inventoried, including one bylaw protected Arbutus tree at the southwest corner of the property. The applicant owns the property to the east, where three trees are located within 3m of the property boundary.

Trees to be Removed: Five non-bylaw protected trees will require removal due to construction related impacts:

- Trees #2, 31, 32, 34, and 35 are within the footprints of the proposed driveway, parking area, or “bicycle storage access aisle”.

Potential Impacts on Trees to be Retained and Mitigation Measures

- Arbutus #33 (103cm DBH, 15.5m CRZ) is located at the southwest corner of the lot. The proposed parking area, driveway, and walkway to the bicycle storage area are all within 7m of the base of the tree. If excavation to bearing soil is required to construct these paved areas, large roots may be encountered, which, if severed, could significantly impact the health of the tree. The house addition also encroaches within the tree’s CRZ, though we do not anticipate large, critical roots will be encountered during excavation. Based on discussions with the applicant, it is our understanding that a raised permeable driveway be constructed in the area where the proposed driveway, parking area, and walkway cross over the CRZ of the tree. The “floating driveway/parking area/walkway” specifications are attached.

The objective is to avoid root loss and to instead raise the driveway/parking area/walkway and their base layers above the roots. This may result in the grade of the “floating driveway/parking area/walkway” being raised above the existing grade (the amount depending on how close roots are to the surface and the depth of the driveway base layers). This may also result in soils which are high in organic content being left intact underneath. Based on discussions with the applicant, it is our understanding that the final grades of the driveway shown on the attached site plans are based on minimal excavation and the total thickness of the base layers and pavers to be approximately 30cm. Without an exploratory excavation, we cannot be certain of the depth at which roots will be encountered, so the final grades may vary slightly.

To allow water to drain into the root systems below, we also recommend that the parking area surface be made of a permeable material (instead of conventional asphalt or concrete) such as permeable asphalt, paving stones, or other porous paving materials and designs such as those utilized by Grasspave, Gravelpave, Grascrete and open-grid systems.

It is also our understanding that the bike aisle (south of the parking area and garage) will be surfaced with gravel with a permeable binder to minimize excavation within its footprint. The grade of the bike storage area has also been raised to minimize excavation within the tree’s CRZ and the “low landscaping wall” at the south end of the bike aisle has been removed in the latest site plans.

We recommend the project arborist be on site to supervise all excavation within the CRZ of this tree, including for construction of the house addition and stairway from the second floor. Any non-critical roots encountered should be pruned back to sound tissue to encourage
compartmentalization of wounds. The accessory structure in the backyard to be demolished should also be completed under arborist supervision. The recommended barrier fencing (see attached site plans) may only be adjusted as required during construction of the paved areas and demolition of the accessory structure.

- **Plum NT1** (14cm DBH) is located approximately 2.75m from the new driveway apron. We do not anticipate any roots from this tree will be encountered during excavation. Barrier fencing should be erected around the perimeter of this tree’s CRZ to avoid accidental mechanical damage and soil compaction.

- **Cherry NT2** (58, 42cm DBH) A pathway along the northeast corner of the existing house is proposed to be constructed approximately 2m away from this tree. If excavation to bearing soil is required, we anticipate large roots from this tree will be encountered, which if severed, could significantly impact its health and structure. We recommend the project arborist supervise any excavation within the tree’s CRZ and any large roots encountered must be retained. The same “floating” techniques and permeable surfacing options recommended within the CRZ of Arbutus #33 should be applied to this tree. Barrier fencing around this tree may only be adjusted during construction of this pathway.

It should be noted that the 42cm stem has a large trunk wound, possibly from an old tear-out injury. A large area of bark has been stripped but it appears the wound has been compartmentalized. If this tree is to be retained, it may be prudent to have a climbing arborist inspect the wound and possibly prune the stem to reduce the load above the wound and to attain clearance from the utility lines.

- **Purple Leaf Plum NT3** (15cm DBH) is located on the west neighbour’s property near the existing fence. The new driveway is proposed to be constructed 1m from the property boundary. Assuming that excavation will occur to bearing soil within the driveway footprint, and will likely extend at least 30cm outside the footprint, we recommend the project arborist supervise excavation within this tree’s CRZ if tree retention is desired, and that any large roots encountered be retained. We do not anticipate critical roots will be severed or that the tree’s long-term health will be impacted.

- **Western Red Cedar NT4** (~40cm DBH) and **Holly NT5** (25cm DBH) are both located on the neighbouring lot to the east, which is also owned by the applicant. Neither are by-law protected.

The holly is located 2-2.5m from the southeast corner of the existing house, which is to be demolished and where a new foundation will be formed. Assuming excavation occurs 1m outside the building footprint, we anticipate roots from this tree will be encountered. Roots will also be encountered if excavation down to bearing soil is required for construction of the proposed pathway along the east side of the house. If tree retention is desired, we recommend the project arborist supervise the excavation and any large roots encountered be retained underneath the pathway. Some hand-digging, in combination with machine digging will be required. Though holly trees typically exhibit good tolerance of root disturbance, depending on the number and size of roots encountered, the tree’s health and structure could be significantly impacted.
Excavation for construction of the new addition and pathway will occur approximately 3-3.5m from cedar NT4, and roots are likely to be encountered. We do not anticipate its long-term health will be significantly impacted but if tree retention is desired, we recommend the project arborist prune any severed roots back to sound tissue at the edge of excavation.

- **Underground Services:** Based on discussions with the applicant and the attached plans, the underground water, storm, and sewer service connections will be upgraded. The gas service may also have to be upgraded. We recommend any existing services be capped and abandoned as far as possible from any trees to be retained. If any excavation is required within the CRZs of trees to be retained, we recommend the project arborist be on site to supervise the excavation.

  - **Water:** The new water service will be installed underneath the new driveway. Based on the attached plans, excavation will occur approximately 1.5m from the neighbour’s Plum NT3. We anticipate small roots may be encountered. We recommend the project arborist supervise any excavation within the tree’s CRZ and prune back any severed roots to sound tissue at the edge of excavation.

  - **Sanitary Sewer and Storm Drain:** These services will be installed underneath the existing driveway, where we do not anticipate roots from any trees to be retained will be encountered. Trench drains will be installed in the backyard up to Apple #35. Some small roots may be encountered from Arbutus #33, but the edge of excavation is approximately where we anticipated it would be for the new building addition.

  - **Gas:** The existing gas service is located east of the house and may have to be upgraded. If so, preferably, it will also be installed west of the house, underneath the existing driveway. If it has to be installed east of the house, excavation will be required within the CRZ of Cherry NT2. The project arborist will have to supervise this excavation, which should be completed using a hydro-vac, air-spade, a combination of machine and hand-digging, or with the use of a pneumatic borer.

  - **Arborist Supervision:** All excavation occurring within the critical root zones of protected trees should be completed under supervision by the project arborist. Any severed roots must be pruned back to sound tissue to reduce wound surface area and encourage rapid compartmentalization of the wound. In particular, the following activities should be completed under the direction of the project arborist:

    - Any construction-related activity within the CRZ of Arbutus #33
    - Excavation for construction of the proposed walkway within the CRZ of Cherry NT2
    - Excavation for construction of the proposed driveway within the CRZ of Plum NT3
    - Any excavation to upgrade the water, sewer, gas, or storm laterals within the CRZ of trees to be retained

- **Barrier fencing:** The areas surrounding the trees to be retained should be isolated from the construction activity by erecting protective barrier fencing. Where possible, the fencing should
be erected at the perimeter of the critical root zones. The barrier fencing must be a minimum of 4 feet in height, of solid frame construction that is attached to wooden or metal posts. A solid board or rail must run between the posts at the top and the bottom of the fencing. This solid frame can then be covered with plywood, or flexible snow fencing. The fencing must be erected prior to the start of any construction activity on site (i.e. demolition, excavation, construction), and remain in place through completion of the project. Signs should be posted around the protection zone to declare it off limits to all construction related activity. The project arborist must be consulted before this fencing is removed or moved for any purpose.

- **Minimizing Soil Compaction**: In areas where construction traffic must encroach into the critical root zones of trees to be retained, efforts must be made to reduce soil compaction where possible by displacing the weight of machinery and foot traffic. This can be achieved by one of the following methods:
  
  - Installing a layer of hog fuel or coarse wood chips at least 20 cm in depth and maintaining it in good condition until construction is complete.
  - Placing medium weight geotextile cloth over the area to be used and installing a layer of crushed rock to a depth of 15 cm over top.
  - Placing two layers of 19mm plywood.
  - Placing steel plates.

- **Mulching**: Mulching can be an important proactive step in maintaining the health of trees and mitigating construction related impacts and overall stress. Mulch should be made from a natural material such as wood chips or bark pieces and be 5-8cm deep. No mulch should be touching the trunk of the tree. See “methods to avoid soil compaction” if the area is to have heavy traffic.

- **Blasting**: If required, care must be taken to ensure that the area of blasting does not extend beyond the necessary footprints and into the critical root zones of surrounding trees. The use of small low-concussion charges and multiple small charges designed to pre-shear the rock face will reduce fracturing, ground vibration, and overall impact on the surrounding environment. Only explosives of low phytotoxicity and techniques that minimize tree damage should be used. Provisions must be made to ensure that blasted rock and debris are stored away from the critical root zones of trees.

- **Scaffolding**: This assessment has not included impacts from potential scaffolding including canopy clearance pruning requirements. If scaffolding is necessary and this will require clearance pruning of retained trees, the project arborist should be consulted. Depending on the extent of pruning required, the project arborist may recommend that alternatives to full scaffolding be considered such as hydraulic lifts, ladders or platforms. Methods to avoid soil compaction may also be recommended (see “Minimizing Soil Compaction” section).

- **Landscaping and Irrigation Systems**: The planting of new trees and shrubs should not damage the roots of retained trees. The installation of any in-ground irrigation system must take into account the critical root zones of the trees to be retained. Prior to installation, we recommend the irrigation technician consult with the project arborist about the most suitable
locations for the irrigation lines and how best to mitigate the impacts on the trees to be retained. This may require the project arborist supervise the excavations associated with installing the irrigation system. Excessive frequent irrigation and irrigation which wets the trunks of trees can have a detrimental impact on tree health and can lead to root and trunk decay.

- **Arborist Role:** It is the responsibility of the client or his/her representative to contact the project arborist for the purpose of:
  
  - Locating the barrier fencing
  - Reviewing the report with the project foreman or site supervisor
  - Locating work zones, where required
  - Supervising any excavation within the critical root zones of trees to be retained
  - Reviewing and advising of any pruning requirements for machine clearances

- **Review and site meeting:** Once the project receives approval, it is important that the project arborist meet with the principals involved in the project to review the information contained herein. It is also important that the arborist meet with the site foreman or supervisor before any site clearing, tree removal, demolition, or other construction activity occurs and to confirm the locations of the tree protection barrier fencing.

Please do not hesitate to call us at (250) 479-8733 should you have any further questions.

Thank you,

Noah Borges
ISA Certified #PN-8409A
TRAQ – Qualified

Talbot Mackenzie & Associates
ISA Certified Consulting Arborists

Encl. 1-page tree resource spreadsheet, 20-page site and building plans with trees, 1-page conceptual site servicing plan, 1-page floating driveway/parking area/walkway specifications, 1-page barrier fencing specifications, 2-page tree resource spreadsheet methodology and definitions

**Disclosure Statement**

Arborists are professionals who examine trees and use their training, knowledge and experience to recommend techniques and procedures that will improve their health and structure or to mitigate associated risks. Trees are living organisms, whose health and structure change, and are influenced by age, continued growth, climate, weather conditions, and insect and disease pathogens. Indicators of structural weakness and disease are often hidden within the tree structure or beneath the ground. It is not possible for an Arborist to identify every flaw or condition that could result in failure or can he/she guarantee that the tree will remain healthy and free of risk. Remedial care and mitigation measures recommended are based on the visible and detectable indicators present at the time of the examination and cannot be guaranteed to alleviate all symptoms or to mitigate all risk posed.
<table>
<thead>
<tr>
<th>Tree ID</th>
<th>Common Name</th>
<th>Latin Name</th>
<th>DBH (cm)</th>
<th>Crown Spread (m)</th>
<th>CRZ (m)</th>
<th>Relative Tolerance</th>
<th>Health</th>
<th>Structure</th>
<th>Remarks and Recommendations</th>
<th>By-Law Protected</th>
<th>Retention Status</th>
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<tbody>
<tr>
<td>2</td>
<td>Willow</td>
<td>Salix spp.</td>
<td>45, 21</td>
<td>6</td>
<td>7.0</td>
<td>Moderate</td>
<td>Fair</td>
<td>Fair/poor</td>
<td>Included bark in unions</td>
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<td>X</td>
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<tr>
<td>31</td>
<td>Norway Spruce</td>
<td>Picea abies</td>
<td>40</td>
<td>6</td>
<td>5.0</td>
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<td>X</td>
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<td>32</td>
<td>Hawthorn</td>
<td>Crataegus spp.</td>
<td>24, 18, 15</td>
<td>3</td>
<td>4.5</td>
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<td>Fair</td>
<td>Fair</td>
<td></td>
<td>N</td>
<td>X</td>
</tr>
<tr>
<td>33</td>
<td>Arbutus</td>
<td>Arbutus menziesii</td>
<td>103</td>
<td>10</td>
<td>15.5</td>
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<td>Good</td>
<td>Minor dieback</td>
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<td>Pyrus spp.</td>
<td>30</td>
<td>4</td>
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<td>Malus spp.</td>
<td>23, 16, 16</td>
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<td>Fair/poor</td>
<td>Fair/poor</td>
<td>Trunk wounds</td>
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<td>X</td>
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<tr>
<td>NT1</td>
<td>Purple Leaf Plum</td>
<td>Prunus cerasifera</td>
<td>14</td>
<td>4</td>
<td>1.5</td>
<td>Moderate</td>
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<td>Fair</td>
<td>Municipal (ID: 16064)</td>
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<td>98, 42</td>
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<td>Fair</td>
<td>Fair</td>
<td>Shared, topped, large trunk wound on 42cm stem</td>
<td>Y (Neighbour's)</td>
<td>Retain</td>
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<tr>
<td>NT3</td>
<td>Purple Leaf Plum</td>
<td>Prunus cerasifera</td>
<td>~15</td>
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<td>2.0</td>
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<td>Neighbour's, next to fence</td>
<td>N (Neighbour's)</td>
<td>Retain</td>
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<tr>
<td>NT4</td>
<td>Western Red Cedar</td>
<td>Thuja plicata</td>
<td>~40</td>
<td>5</td>
<td>6.0</td>
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<td>Fair</td>
<td>Fair/poor</td>
<td>Neighbour's, 3m from fence, topped</td>
<td>N (Neighbour's)</td>
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<tr>
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<td>Holly</td>
<td>Ilex spp.</td>
<td>25</td>
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<td>2.5</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Neighbour's, next to fence</td>
<td>N (Neighbour's)</td>
<td>Retain</td>
</tr>
</tbody>
</table>

Prepared by:
Talbot Mackenzie & Associates
ISA Certified and Consulting Arborists
Phone: (250) 479-8733
Fax: (250) 479-7050
email: tmmtreehelp@gmail.com
BC LAND SURVEYORS SITE PLAN OF:
Civic: 1139 Burdett Avenue
Legal Lot A Fairfield Farm Estate,
Victoria City, Plan VIP62357
Parcel Identification: 023-276-801 in the City of Victoria
Scale: 1:200. Distances are in metres.
The intended print size is 11" by 17".

LEGEND
Elevations are to geodetic datum.
+ - denotes existing elevation
Tree diameters are in centimetres.
Lot Area = 783.1 m²

July 20, 2018
File: 12.816 - 0
POWELL & ASSOCIATES
B.C. Land Surveyors
250-2950 Douglas Street
Victoria, BC V8T 4H4
phone (250) 382-8655

Setbacks are derived from field survey.
Parcel dimensions shown herein are
derived from Land Title Office records.
This document shows the relative location
of the surveyed features and shall not be
used to define property boundaries.
TREE PROTECTION FENCING

1. FENCE WILL BE CONSTRUCTED USING 38 mm X 89mm WOOD FRAME: TOP, BOTTOM AND POSTS * USE ORANGE SNOW-FENCING MESH AND SECURE THE WOOD FRAME WITH "ZIP" TIES OR GALVANIZED STAPLES.

2. ATTACH A 500mm x 500mm SIGN WITH THE FOLLOWING WORDING: WARNING- TREE PROTECTION AREA. THIS SIGN MUST BE AFFIXED ON EVERY FENCE OR AT LEAST EVERY 10 LINEAR METERS.

* IN ROCKY AREAS, METAL POSTS (T-BAR OR REBAR) DRILLED INTO ROCK WILL BE ACCEPTED
Specifications for Floating Driveway, Parking and Walkway Areas

1. Excavation for construction of the driveway/parking/walkway areas must remove the sod layer only, where they encroach on the root zones of the protected trees.

2. A layer of medium weight felted Geotextile fabric (Nilex 4535, or similar) is to be installed over the entire area of the critical root zone that is to be covered by the driveway. Cover this Geotextile fabric with a layer of woven Amoco 2002 or Tensar BX 1200. Each piece of fabric must overlap the adjoining piece by approximately 30-cm.

3. A 10cm layer of torpedo rock, or 20-mm clean crushed drain rock, is to be used to cover the Geotextile fabric.

4. A layer of felted filter fabric is to be installed over the crushed rock layer to prevent fine particles of sand and soil from infiltrating this layer.

5. The bedding or base layer and permeable surfacing can be installed directly on top of the Geotextile fabric.
Tree Resource Spreadsheet Methodology and Definitions

**Tag**: Tree identification number on a metal tag attached to tree with nail or wire, generally at eye level. Trees on municipal or neighboring properties are not tagged.

**NT**: No tag due to inaccessibility or ownership by municipality or neighbour.

**DBH**: Diameter at breast height – diameter of trunk, measured in centimetres at 1.4m above ground level. For trees on a slope, it is taken at the average point between the high and low side of the slope.

* Measured over ivy

~ Approximate due to inaccessibility or on neighbouring property

**Crown Spread**: Indicates the diameter of the crown spread measured in metres to the dripline of the longest limbs.

**Relative Tolerance Rating**: Relative tolerance of the tree species to construction related impacts such as root pruning, crown pruning, soil compaction, hydrology changes, grade changes, and other soil disturbance. This rating does not take into account individual tree characteristics, such as health and vigour. Three ratings are assigned based on our knowledge and experience with the tree species: Poor (P), Moderate (M) or Good (G).

**Critical Root Zone**: A calculated radial measurement in metres from the trunk of the tree. It is the optimal size of tree protection zone and is calculated by multiplying the DBH of the tree by 10, 12 or 15 depending on the tree’s Relative Tolerance Rating. This methodology is based on the methodology used by Nelda Matheny and James R. Clark in their book “Trees and Development: A Technical Guide to Preservation of Trees During Land Development.”

- 15 x DBH = Poor Tolerance of Construction
- 12 x DBH = Moderate
- 10 x DBH = Good

To calculate the critical root zone, the DBH of multiple stems is considered the sum of 100% of the diameter of the largest stem and 60% of the diameter of the next two largest stems. It should be noted that these measures are solely mathematical calculations that do not consider factors such as restricted root growth, limited soil volumes, age, crown spread, health, or structure (such as a lean).
Health Condition:

- Poor - significant signs of visible stress and/or decline that threaten the long-term survival of the specimen
- Fair - signs of stress
- Good - no visible signs of significant stress and/or only minor aesthetic issues

Structural Condition:

- Poor - Structural defects that have been in place for a long period of time to the point that mitigation measures are limited
- Fair - Structural concerns that are possible to mitigate through pruning
- Good - No visible or only minor structural flaws that require no to very little pruning

Retention Status:

- X - Not possible to retain given proposed construction plans
- Retain - It is possible to retain this tree in the long-term given the proposed plans and information available. This is assuming our recommended mitigation measures are followed
- Retain * - See report for more information regarding potential impacts
- TBD (To Be Determined) - The impacts on the tree could be significant. However, in the absence of exploratory excavations and in an effort to retain as many trees as possible, we recommend that the final determination be made by the supervising project arborist at the time of excavation. The tree might be possible to retain depending on the location of roots and the resulting impacts, but concerned parties should be aware that the tree may require removal.
- NS - Not suitable to retain due to health or structural concerns