Diamond Head Consulting Ltd.
Arborist Report

For:

Lot 11 at UBC South Campus
Vancouver, BC
October 2, 2017

To be submitted with Tree Retention Plan
Dated: October 3, 2017

Submitted to:

UBC Properties Trust
200 – 3313 Shrum Lane
Vancouver BC V6S 0C8

Submitted by:

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The following Diamond Head Consulting staff performed the site visit and prepared the report.

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ISA Certified Arborist (PN-1920A)
ISA Qualified Tree Risk Assessor (TRAQ)
BC Parks Wildlife and Danger Tree Assessor

This report summarizes the planned management of trees on the site. If there are any questions or concerns as to the contents of this report, please contact us at any time.

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1.0 Introduction

The objective of this report is to ensure the proposed development is in compliance with the development permit application rules for tree inventories at the University of British Columbia (UBC). Trees over 15cm in diameter at breast height were assessed, including: species, diameter at breast height (dbh) measured to the nearest 1 cm at 1.4 m above natural grade (tree's base), estimated height and general health and defects. Critical root zones were calculated for each of the trees with the potential for development impacts. Tree hazards were assessed according to International Society of Arboriculture and WCB standards. Suitability for tree retention was evaluated based on the health of the trees and their location in relation to the proposed building envelopes and infrastructure. This report outlines the existing condition of the trees on and adjacent to the property, summarizes the proposed tree removals and retention trees as well as suggested guidelines for protecting the remaining trees during the construction process.

1.1 Limits of Assignment

- Our investigation is based solely on our visual inspection of the trees on our last site visit for the inventory. Our inspection was conducted from ground level. We did not conduct soil tests or below root examination to assess the condition of the root system of the trees.
- This report does not provide any estimates to implement the proposed recommendations provided in this report.
- This report is valid for six months from the date of submission. Additional site visits and report revisions are required after this point to ensure accuracy of the report for the City's development permit application process.
- Tree Risk Assessments were completed following ISA Standards to the accepted industry standard of care. However, trees that do not have signs of visible weakness can fail under abnormal weather conditions and wind events.
- See additional limitations at the end of this report.

1.2 Purpose and Use of Report

- Provide documentation pertaining to on and off site trees to supplement the proposed development permit application.

Figure 1. Aerial image showing the approximate location of the subject site – Lot 11 UBC South Campus on Ross Road (Photo from Google Earth).

2.0 Observations

2.1 Site Overview

The subject site consists of a well forested site of mature Douglas-fir and Western redcedar trees with an understory of Bigleaf maple, Red alder and scattered Western hemlock and Cherry trees. The area is predominantly flat.

In the context of the proposed development there is opportunity for tree retention at the east end of the site due to the location of a previous eagles nest in one of the trees. There is a proposed underground parkade that will occupy the majority of the remainder of the site boundary. Tree attributes, critical root zones and recommendations for the trees are listed below in **Table 2**.

2.2 Tree Inventory

The following is an inventory of assessed trees, each of which is identified on the accompanying map. There are numerous trees that were not identified on the tree survey but were gathered in the tree assessment. Due to the lack of time available to gather this information for a

submission, only the general attributes of these trees were collected (diameter and species). These tree have been highlighted on the accompanying map with a label showing their species followed by their diameter (eg. Alder 350 would be a red alder tree with a 350mm diameter at breast height).
Tree species, characteristics, comments, recommendations and required root protection zones have been provided in **Error! Reference source not found.** for most of the trees that are located on the survey. Their locations are illustrated on the accompanying map.

Overall Health and Structure Rating

- **Excellent =** Tree of possible specimen quality, unique species or size with no discernible defects, or heritage tree.
- **Normal =** Tree is in good condition with no significant structural weaknesses or health concerns, considering its growing environment and species.
- **Moderate =** Tree has noted health and/or minor structural weaknesses, however, treatments may be recommended to improve the health or structural condition of the tree.
- **Poor =** Tree is in serious decline from its typical growth habits and has multiple very definable health and/or structural weaknesses. These trees may have difficulty adapting to land use changes.
- **Dead/Dying =** Tree was found to be dead, and/or has severe defects and is in severe decline.

Tree Risk Assessment

The risk assessment has been completed following the methods in the Tree Risk Assessment Manual, published in 2013 by the International Society of Arboriculture. This is the current industry standard for assessing tree risk. This method assigns risk based on the likelihood of failure, the likelihood of impact and the severity of consequence if a failure occurs. The risk rating matrix used to calculate risk is found in Appendix A. The tree risk assessment findings summarized in Table 2. The possible targets that the trees could strike if all or parts of the trees failed include: the adjacent homes/buildings, Ross Road, and the trail system.

2.3 Photographs

Photo 1. View of the east edge of Lot 11 and just east of it. The large firs are to be retained.

Photo 2 and 3. Note that many of the trees along the northern edge of the area to be retained have been impacted by grade changes and the new sidewalk construction. Some of these trees are to be removed while others could be enhanced by providing a good organic mulch layer over their root zones. Many of the trees could be lift pruned. The large fir tree in the right photo is tree 2599.

Photo 3. Looking at the island of cypress trees in the area of trees to be retained at the east end of the site.

2.4 Tree Inventory Table

Table 1. Tree Inventory (in the area where trees are possible to be retained).

Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Overall Condition	Comments	Retain/ Remove	Tree Retention Comments	Root Protection Zone (m)**	Drip Line Radius (m)
1	Douglas-fir	*Pseudotsuga menziesii*	110	31	Normal	Large dominant tree on edge	Remove	Within the proposed development footprint.	6.6	
1191	Western Redcedar	*Thuja plicata*	68	14	Poor	Broken top at 14m in decline. tagged as 2931	Remove		4.1	5
2936	Western Redcedar	*Thuja plicata*	56	15	Poor	Thinning due to root encroachment. Dead top. Layered tree with 2949 and 2940- remove all three	Remove		3.4	5
11097		*Pseudotsuga menziesii*	137	38	Normal	Crown starts at 17m. Minor deadwood in upper canopy. Cone crop present. Lack of water for this summer?; Significant tree due to size and previous eagles nest. Crook in stem where nest sat. About 8m of growth above	Retain	Offsite Tree. Entire area could use root zone enhancements of applying organic mulch. Lift pruning	8.2	7
11098	Douglas-fir	*Pseudotsuga menziesii*	76	35	Normal	Crown starts at 17m. Minor deadwood in upper canopy. Cone crop present. Lack of water for this summer?	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	4.6	7
11099	Douglas-fir	*Pseudotsuga menziesii*	86	35	Normal	Crown starts at 17m. Minor deadwood in upper canopy. Cone crop present. Lack of water for this summer?; Some dead branching may be due to proximity of road and curb work. Enhancements to root zone with mulching recommended	Retain	Offsite tree. Entire area could use root zone enhancements of applying organic mulch. Lift pruning	5.2	7
2599	Douglas-fir	*Pseudotsuga menziesii*	86	35	Normal	Crown starts at 16m. Minor deadwood in upper canopy. Many branch stubs from7-17m will look better with pruning. Can use lift truck.; Some dead branching may be due to proximity of road and curb work. Enhancements to root zone with mulching recommended	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	5.2	7

Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Overall Condition	Comments	Retain/ Remove	Tree Retention Comments	Root Protection Zone (m)**	Drip Line Radius (m)
2930	Western Redcedar	*Thuja plicata*	16	7	Normal	Sweep at base. Could use root zone enhancements		Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
2932	Western Redcedar	*Thuja plicata*	15	7	Normal	Could use root zone enhancements	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	4
2933	Cherry sp.	*Prunus sp.*	26	19	Moderate	Previous broken top at 6m. Good new top, safe to retain with group	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	5
2934	Western Redcedar	*Thuja plicata*	72	25	Moderate	Thinning crown with some dead upper branches; Requires root zone enhancements to retain; Small codom on north side at 2m	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	4.3	6
2935	Western Redcedar	*Thuja plicata*	43, 38	15	Moderate	Thinning due to root encroachment - enhance with mulch	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	6.0	4
2939	Western Redcedar	*Thuja plicata*	16	8	Moderate	Requires root zone enhancements- mulching. Has a thinning crown	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
2943	Douglas-fir	*Pseudotsuga menziesii*	70	32	Normal	Crown starts at 15m	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	4.2	7
2944	Cherry sp.	*Prunus sp.*	38	18	Moderate	3'stems at 1m. Acute union of middle stem with inclusion.; Future hazard	Remove	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2.3	4
2945	Western Redcedar	*Thuja plicata*	20	8	Normal	Sweep at base. Could use root zone enhancements	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
2946	Western Redcedar	*Thuja plicata*	48	16	Normal	Crown is to ground. Has healthy foliage. Sweep at base as is growing right beside fir	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2.9	5

Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Overall Condition	Comments	Retain/ Remove	Tree Retention Comments	Root Protection Zone (m)**	Drip Line Radius (m)
2947	Western Redcedar	*Thuja plicata*	19	7	Normal	Sweep at base. Could use root zone enhancements	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
2948	Western Redcedar	*Thuja plicata*	17	11	Normal	Sweep at base. Could use root zone enhancements	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	4
2950	Western Redcedar	*Thuja plicata*	15	8	Moderate	Requires root zone enhancements- mulching. Has a thinning crown	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
2952	Cherry sp.	*Prunus sp.*	16	15	Normal		Remove		2	3
6613	Cherry sp.	*Prunus sp.*	17	17	Normal	Height to diameter ratio is high	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
6617	Western Redcedar	*Thuja plicata*	15	7	Normal	In group of cedars and fir	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	4
6734	Douglas-fir	*Pseudotsuga menziesii*	15	9	Normal	In group of cedars and fir	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	4
6758	Western Redcedar	*Thuja plicata*	18	17	Normal	In group of cedars and fir	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	4
6773	Bigleaf Maple	*Acer macrophyllum*	21	8	Moderate	Broken top. Lean out to west. Same tree as 6733. Two stems to east have inclusion at base and dead branching - third stem at east is dead.	Remove		2	5
6782	Western Redcedar	*Thuja plicata*	15	5	Normal	In group of cedars and fir	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	4
6789	Western Redcedar	*Thuja plicata*	38	16	Excellent	4 layered stems here; Dead top on main stem- likely due to too much light	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2.3	4

Tag #	Common Name	Botanical Name	DBH (cm)	Ht (m)	Overall Condition	Comments	Retain/ Remove	Tree Retention Comments	Root Protection Zone (m)**	Drip Line Radius (m)
6792	Western Redcedar	*Thuja plicata*	15	8	Normal	Keep 6859 too- 12 cm cedar; Will need to expose these trees in winter as they won't be able to handle the summer sun with shade needles	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
6817	Western Redcedar	*Thuja plicata*	15	7	Normal	In group of cedars and fir	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	4
6835	Western Redcedar	*Thuja plicata*	40	6	Normal	4 stems. Largest 18cm. Healthy young tree	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2.4	3
6836	Cherry sp.	*Prunus sp.*	17	10	Normal	Retain with group	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
6839	Cherry sp.	*Prunus sp.*	19	9	Normal	Single healthy stem	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	4
6840	Western Redcedar	*Thuja plicata*	25	10	Normal	Healthy young tree	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
6842	Western Redcedar	*Thuja plicata*	18	6	Normal	Healthy young tree under maple	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2	3
6867	Western Redcedar	*Thuja plicata*	28	15	Dead/Dying	Almost dead	Remove		2	4
7285	Douglas-fir	*Pseudotsuga menziesii*	85	36	Normal	Crown starts at 18m deadwood branch stubs on sw side.; Dominant tree	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	5.1	7
7309	Douglas-fir	*Pseudotsuga menziesii*	48	20	Normal	Very heavy cone crop; Small codom at 3m could be lift pruned on west side to 5m	Retain	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2.9	7
7322	Western Redcedar	*Thuja plicata*	46	19	Normal	U dear canopy of large fir	Remove	Entire area could use root zone enhancements of applying organic mulch. Lift pruning	2.8	3

** - Root protection zone is measured from the outer edge of the stem of the tree. If using these measurements for planning/mapping purposes this needs to be taken into account: and ½ the trees diameter added to the distance to accommodate the survey point being in the center of the tree.

Tree Risk Assessment Table

Only trees that had an overall risk rating of High or above are included in the following table. The remainder of the trees on the subject site are a moderate risk rating or lower and are suitable for retention in **their current land use and condition**. With the proposed development there may different scenarios in which each tree could strike a target and this will need to be assessed once the development concept has been determined and work is to begin. At that time a project arborist will need to be engaged to ensure there is a safe worksite.

There are no trees that were inventoried on the subject site that have a high-risk rating.

3.0 Summary

The site inventory identified 147 on-site trees, 2 off-site trees and 15 City street trees that were to be identified in the arborist report. UBC requires that replacement trees be planted for trees that are removed. UBC will decide the quantities of required replacement trees. 165 trees are proposed for removal in this development application.

Site Tree Inventory

	Sum of Existing	Sum of Retain	Sum of Remove
Deciduous			
Bigleaf maple	40	2	38
Cherry	6	6	0
Red alder	37	0	37
Paper birch	6	1	5
Coniferous			
Douglas-fir	7	7	0
Western Hemlock	4	0	4
Western Redcedar	42	27	15
Grand Total	**147**	**48**	**99**

Off Site Tree Inventory*

	Sum of Existing	Sum of Retain	Sum of Remove
Deciduous			
UBC Stret trees	15	12	3
Bigleaf Maple	1	0	1
Coniferous			
Western Redcedar	1	0	1
Grand Total	**17**	**12**	**5**

* Note there are many trees to be retained offsite and their root protection zones will need to be accommodated with the project design. Their condition and attributes have been generally assessed and will be assessed in more detail once a greenway plan concept is further discussed.

The location of protected trees, their Tree Protection Zones (TPZ) as well as those trees to be removed have been illustrated on the accompanying Tree Retention Plan.

3.1 Tree Retention Discussion

The opportunity for retention viability is very limited on this site due to the proposed development footprint or site occupancy. Trees that were found unsuitable were not considered for retention, and trees that were found to have moderate or suitable retention viability have been retained if possible and were project design conflicts could be reasonably resolved, this only occurs offsite. For tree retention offsite the following are recommendations for proper protection during construction:

- **Off-site UBC trees along Ross Road:** 3 trees are proposed for removal and 12 are to be retained. Tree protection barriers are recommended at a 2.5m distance from the tree except where hardscapes do no permit.
- **Off-site trees to the south of the project boundary:** Arborist supervision of the proposed excavation along the southern boundary will be necessary to determine the extent of root damage to trees to be retained. Minor adjustments may be required during excavation to accommodate trees including watering, leaving roots hanging or in place.
- b) The proposed path connections must be constructed using low impact methods above the existing grade. The design and construction methods of the path must be approved by the project arborist prior to construction. On-site arborist supervision will be required during the construction of the path. Materials like gravel, or porous concrete, a resin based gravel or other alternatives should be explored.

4.0 Trees on Adjacent Properties

Once the scope of work is delineated there will likely be trees on the subject property that are outside the proposed development. These trees will have to be protected where they are adjacent to the development or have the potential to be impacted by construction activities, vehicle parking or the storage of materials. Root protection zones for the trees have provided within Table 1. Tree Inventory.

Note: the developer or subject site owner must verify that all off-site trees within or that could be affected by the scope of construction are identified and surveyed for location whether they are identified by DHC or not. Any off site trees that are recommended for removal will require the adjacent property owner's permission and may require additional permits.

5.0 Construction Guidelines

The following are recommendations for risk mitigation and proper tree protection during the construction phase of the project.

Tree Retention Zones

Six to eight times the diameter was used in consideration to determine the optimal root protection zone (RPZ) and Tree Protection Zone (TPZ) setbacks, and adjusted to suit the specific needs of the tree and site conditions. **The optimal root protection zone is to be measured in the field from the outer edge of the stem of the tree.** The RPZ is the area around the tree in which no grading or construction activity may occur without project arborist approval and is required for the tree to retain good health and vigor.

The following are tree preservation guidelines and standards for the RPZs:

- No soil disturbance or stripping;
- The natural grade shall be maintained within the protection zone;
- No storage, dumping of materials, parking, underground utilities or fires;
- Any plan affecting trees should be reviewed by a consultant including demolition, erosion control, improvement, utility, drainage, grading, landscape, and irrigation;
- Special foundations, footings and paving designs are required if within the tree protection zone;
- Utilities should be routed around the RPZ;
- Excavation within the tree protection zone should be supervised by a consulting arborist;
- Surface drainage should not be altered so as to direct water into or out of the RPZ; and
- Site drainage improvements should be designed to maintain the natural water table levels within the RPZ.

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

Tree Protection Fences

Prior to any construction activity on site, tree protection fences must be constructed at the specified distance from the tree trunks. 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. This must be constructed prior to tree removal, excavation or construction and remain intact throughout the entire period of construction. Further standards for fencing construction can be found at:

http://vancouver.ca/your-government/protection-of-trees-bylaw.aspx

Unsurveyed Trees

Trees that are identified by DHC on the Tree Retention Plan, and within this report as unsurveyed trees have been hand plotted for approximate location only. Their location and ownership cannot be confirmed without being 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 for the transporting logs from private-owned land in the province of BC. It is the owner of the properties responsibility to apply for a timber mark prior to the removal of 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

The excavation and construction activities adjacent to the RPZs can influence the moisture availability to the subject trees. This is due to a reduction in the total rooting mass, changes in 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 protection zones should be monitored during hot and dry weather. When soil moisture conditions are dry, supplemental irrigation should be provided. Irrigation should wet the soil to the depth of the root system (approximately 30 cm deep).
- Any planned changes to the surface grades within the RPZ, including the placement of mulch, should be designed so that the water will flow away from the tree trunks.
- Excavation adjacent to trees can alter the soils hydrological processes by draining the water faster than it had naturally. It is recommended that when excavating within 6 m of any tree, the site be irrigated more frequently to account for this.

Tree Pruning

All heavy machinery (excavators, cranes, dump trucks, etc.) working within five meters of tree crowns 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 the tree crowns, a line with colored flags should be suspended at the height of the crowns along the length of the protected tree area. If there are concerns regarding the clearance required for machinery and workers within the tree protection zone, or just outside of it, the project arborist should be consulted so that a pruning prescription can be developed or a zone surrounding the crowns can be established. Any wounds incurred to the subject trees during construction should be reported to the project arborist immediately.

Fertilization

Fertilization or root zone enhancement treatments may be recommended by the project arborist during the construction phase.

Paving Within and Adjacent to Tree Protection Zones

If the development plans propose the construction of paved areas and/or retaining walls close to the proposed tree protection zones measures should be taken to minimize impacts. Construction of these features would raise concerns regarding proper aeration, drainage, irrigation and opportunities for adequate root growth. The following design and construction guidelines are recommended be followed to minimize the long-term impacts to trees if any paving or retaining walls are necessary:

- Any excavation activities near the TPZ (tree protection zone) should be monitored by a Certified Arborist. Excavation should remove and disturb as little of the rooting zone as possible and all roots greater than 2 cm in diameter should be hand pruned.
- The natural grade of the rooting zone should be maintained. Any retaining walls should be designed at heights that will maintain the existing grade to within 20 cm of its current level. If the grade is altered, it should be raised not reduced in height.
- The long-term health of the tree is directly dependent on the volume of available, below ground growing space. If the RPZ must be compromised, the planned distance of structures from the trunks of the subject trees should not be closer than 50% of the RPZ on more than two sides of the tree.
- Compaction of sub grade materials can cause the trees to develop shallow rooting systems. This can contribute to long-term damage to pavement surfaces as the roots grow. Minimizing the compaction of sub grade materials using structural soils and increasing the strength of the pavement reduces the reliance on 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 the TPZs

If there are plans to landscape the ground within the TPZ, measures should be taken to minimize impacts. It is not recommended that the existing grass layer be stripped, as this will damage the surface roots. The 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; however the depth of this new topsoil layer should not exceed 20 cm. Planting should take place within the newly placed topsoil mixture and should not disturb the original rooting zone of the trees. Two meters around the base of each tree should be left unplanted and covered in mulch.

Monitoring During Construction

Ongoing monitoring should be provided for the duration of the 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:

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

All findings and recommendations will be documented in a summary report. All concerns will be highlighted along with recommended mitigation measures.

6.0 Limitations

1. Except as expressly set out in this report and in these Assumptions and Limiting Conditions, Diamond Head Consulting Ltd. ("**Diamond Head**") makes no guarantee, representation or warranty (express or implied) with regard to: this report; the findings, conclusions and recommendations contained herein; or the work referred to herein.

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3. The findings, conclusions and recommendations made in this report reflect Diamond Head's best professional judgment in light of 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 as at the date of this report. Except as expressly stated in this report, the findings, conclusions and recommendations set out in this report 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**", including without limitation structural defects, scars, decay, fungal fruiting bodies, evidence of insect attack, discoloured 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; and 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 the trees recommended for retention are both healthy and safe, no guarantees, representations or warranties are made (express or implied) that those trees will remain standing or will not fail. The Client acknowledges that it is both professionally and practically impossible to predict with absolute certainty the behaviour of any single tree, or groups of trees, in all given circumstances. Inevitably, a standing tree will always pose some risk. Most trees have the potential for failure and this risk can only be eliminated if the risk is removed. If Conditions change or if additional information becomes available at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary. Diamond Head expressly excludes any duty to provide any such modification of Conditions change or additional information becomes available.

5. Nothing in this report is intended to constitute or provide a legal opinion, and Diamond Head expressly disclaims any responsibility for matters legal in nature (including, without limitation, matters relating to title and ownership of real or personal property and matters relating to cultural and heritage values). Diamond Head makes no guarantee, representation or warranty (express or implied) as to the requirements of or compliance with applicable laws, rules, regulations, or policies

established by federal, provincial, local government or First Nations bodies (collectively, "**Government Bodies**") or as to the availability of licenses, permits or authorizations of any Government Body. Revisions to any regulatory standards (including by-laws, policies, guidelines an any similar directions of a Government Bodies in effect from time to time) referred to in this report may be expected over time. As a result, modifications to the findings, conclusions and recommendations in this report may be necessary. Diamond Head expressly excludes any duty to provide any such modification if any such regulatory standard is revised.

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

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

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

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

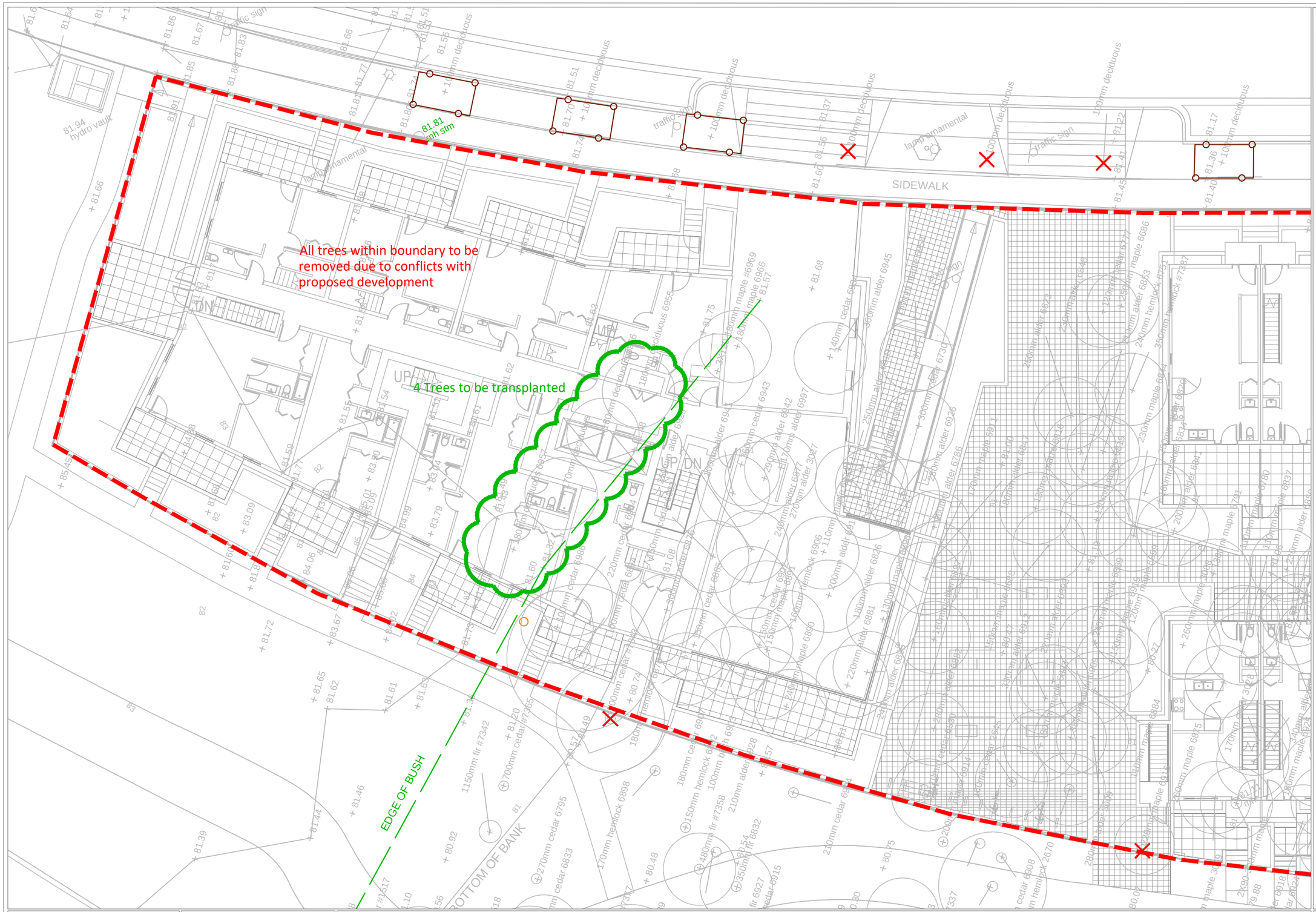
7.0 Appendix 1 – Overall risk rating and action thresholds using TRAQ

Matrix 1. Likelihood matrix.

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 matrix.

Likelihood of Failure & 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



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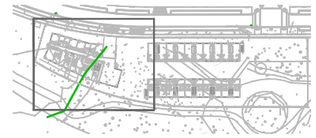


LEGEND

- TREE PROTECTION ZONE
- TREE PROTECTION FENCE
- TREE TO BE RETAINED
- UN-SURVEYED TREE
- 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. ($\frac{1}{2}$ 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:

SCALE - 1:200

DIAMOND HEAD
3551 COMMERCIAL STREET
VANCOUVER BC | V5N 4E8
T 604.733.4886 | F 604.733.4879

Drawing title: Tree Retention and Removal Plan
Project address: Lot 11
Client: UBC Properties Trust

Drawing No: XXX
Date: 2017/10/03
Drawn by: KW
Page Size: TABLOID 11"x17"

All trees within boundary to be removed due to conflicts with proposed development

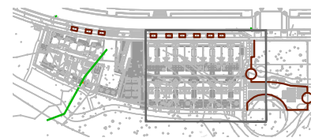
EDGE OF PAVEMENT

PLAN EPP29408

TOP OF BANK

BOTTOM OF BANK

KEY



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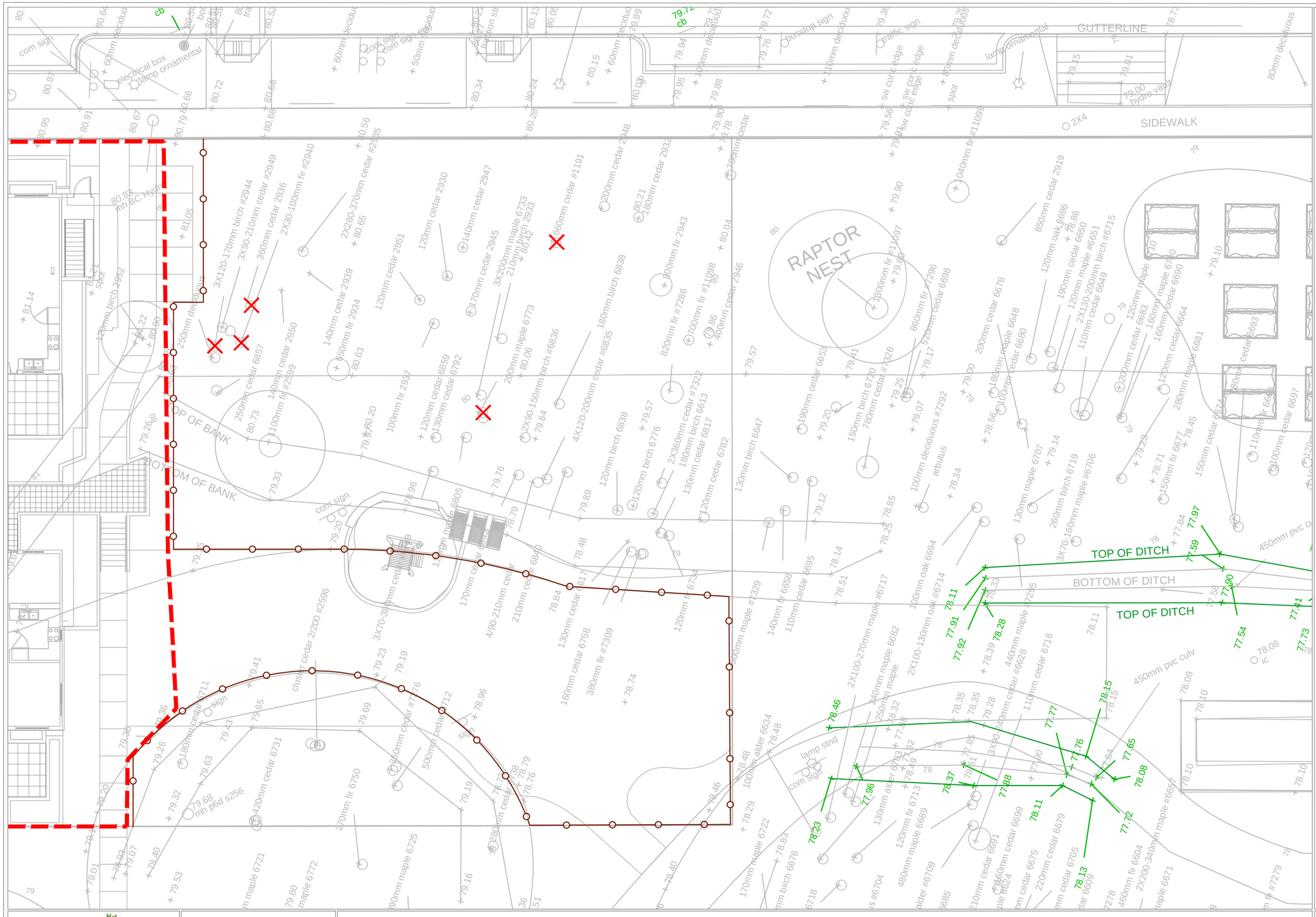

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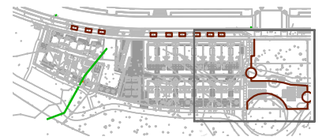

LEGEND

- TREE PROTECTION ZONE
- TREE PROTECTION FENCE
- TREE TO BE RETAINED
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