Assessment of trees potentially impacted by proposed development at 3614 Hillside Ave, Nanaimo and tree protection plan for trees to be retained.

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Purpose:

Inventory and assess trees potentially impacted by development at 3614 Hillside Ave, Nanaimo BC. Determine trees not suitable for retention due to health or conflict with infrastructure and develop tree protection plan for trees to be retained.

Site Description:

On the Nanaimo city map viewer the current lot size for 3614 Hillside Ave is 0.39Ha. The property is mostly clear with a single existing reisidence and detached garage (Figure 1). There are several ornamental fruit trees surrounding the residence. There are several large conifers in the front yard and is borderd by short rows of Red alder (*Alnus rubra*) in the northwest and northeast property lines. There is a slight grade from the front to the rear of the property and a steep slope at the rear property line as it drops down to 3646 Cottleview Drive.

Figure 1. Orthophoto overview of 3614 Hillside Ave, Nanaimo BC.

Methods:

Preliminary development drawings were provided showing proposed construction including structures and hardscape. Trees on site were tagged with aluminum tree tags beginning with the number 1362 and affixed with aluminum nails. Trees on neighboring properties were not tagged and were given alphanumeric identifiers. Two clusters of trees were mapped and the number of stems >6cm DBH were counted. Both clusters contained all the same species and were of similar size and condition. A handful of trees along the east property line already had orange flagging with hand written numbers. These identifiers were included in the notes for each of these trees.

The site was walked and all trees >6cm DBH were identified and inventoried. For each tree the following data were collected: Species, DBH (diameter at breast height), General condition, Location, Defects, Hazard status, Recommended action, and any general notes about condition or location

The three recorded recommended 'Actions' for each tree are defined as follows:

> *Remove* – A tree that due to its health/condition or conflict with proposed construction is not able to be retained without suffering irreparable harm and/or posing a future hazard to people and property.
>
> *Retain and Monitor* - A tree that is suitable for retention because it is of adequate health and stability.

Retain with special mangment - A tree that lies close to construction activities and that may require later removal if conflicts are identified through final design plans and construction

For all trees on site a root protection area (RPA) was calculated at 6x DBH. This RPA is translated to tree protection fencing for trees to be retained and modified to accommodate construction activities where necessary.

Results:

A total of 61 individual trees were inventoried on site and adjacent properties (Table 1). Nineteen of these trees were located adjacent properties. Of these trees 40 were recommended for removal, with 16 being recommended to be retained with special management and 5 to be retained and monitored.

Fourteen of the trees recommended for removal are within or immediately adjacent to the footprint of proposed structures and hardscape. Twenty six trees trees recommended for removal are trees that are in conflict with structures or infrastructure but are located outside the construction footprint, or are poor candidates for retention given the proposed development and landscape plan. There were 16 'Landmark' sized trees identified on site or adjacent properties of various species. Five of these trees are recommended for removal and the remaining 11 recommended to be retained.

Table 1. Assessed trees at or adjacent to 3614 Hillside ave Nanaimo BC that have the potential to be impacted by development activities.									
Tag #/ID	Species	Landmark size	DBH (cm)	Condition	Defect	Hazard	Action	RPA (m)	Notes
362	Douglas fir	**Yes**	30	Good	Previously topped with regrown leaders	No	Remove	7 8	Multiple stems Leaders topped at 20m in the past with regrown 5m tops
363	Douglas fir	No	7	Good	Previously topped with regrown leaders Covered in English ivy	No	Remove	4 26	opped at same time and height as adjacent Fir trees
364	Douglas fir	**Yes**	07	Good	Previously topped with regrown leaders	No	Remove	6 42	
365	Douglas fir	**Yes**	86	Good	Previously topped with regrown leaders	No	Remove	5 6	ree is in good shape
366	Arbutus	No	2	Good	None	No	Remove	26	6 individual trees sized 9 2 cm and 8m tall
367	Arbutus	No	39	Good	None	No	Remove	2 34	Healthy tree growing near foundation and car parking
368	Ornamental cherry	No	50	Fair	Poor structure	No	Remove	3	
369	Ornamental cherry	No	40	Fair	Poor structure	No	Remove	2 4	
370	Bigleaf maple	**Yes**	80	Good	None	No	Remove	4 8	ree has rope swing
37	Arbutus	No	30	Good	None	No	Retain with special management	8	
372	Douglas fir	No	34	Good	None		Remove	2 04	
373	Red alder	No	20	Good	None	No	Retain with special management	2	wo stemmed tree on property ine
374	Red alder	No	5	Good	None	No	Retain with special management	0 9	With flagging and number 070
375	Red alder	**Yes**	34	Good	None	No	Retain with special management	2 04	Multi stemmed teee with flagging and number 07
376	Red alder	**Yes**	30	Good	None	No	Retain with special management	8	Multi stemmed tree on property line Flagging w th number 072
377	Red alder	**Yes**	32	Good	None	No	Retain with special management	92	Flagging numbered 073
378	Bigleaf maple	No	40	Good	None	No	Retain with special management	2 4	Located on edge of bank Flagging numbered 075
379	Red alder	**Yes**	40	Good	None	No	Retain with special management	2 4	Perhaps just over property ine Flagging numbered 074
380	Douglas fir	No	8	Poor	opped at 3m	No	Remove	0 48	Heav ly pruned
38	Douglas fir	No	25	Poor	opped at 3m	No	Remove	5	Heavily pruned
382	Western redcedar	No	4	Poor	opped at 3m	No	Remove	0 84	Heav ly pruned
383	Western redcedar	No	0	Poor	opped at 3m	No	Remove	0 6	Heav ly pruned
384	Douglas fir	No	0	Poor	opped at 3m	No	Remove	0 6	
385	Douglas fir	No	2	Poor	opped at 3m	No	Remove	0 72	
386	Pacific w llow	**Yes**	60	Fair	None	No	Remove	3 6	Large mature multi stemmed wi low tree One large upright has failed and is hung up in adjacent trees
387	Ornamental cherry	No	0	Poor	opped at 3m	No	Remove	0 6	
388	Pacific dogwood	N/A	30	Dead	None	No	Remove	8	On fence line
389	Douglas fir	No	30	Fair	opped at 4m	No	Remove	8	
390	Douglas fir	No	35	Fair	opped at 4m	No	Remove	2	
39	Western redcedar	No	2	Good	None	No	Remove	0 72	4 stems planted along fence line sized 8 4cm
392	Apple cu tivar	No	25	Fair	Unmaintaoned Suppressed from adjacent large con fer	No	Remove	5	
393	Ornamental cherry	No	55	Good	None	No	Remove	3 3	
394	Apple	No	30	Fair	Unmaintained	No	Remove	8	
395	Black spruce	No	8	Good	None	No	Remove	08	
396	Douglas fir	**Yes**	84	Good	None	No	Remove	5 04	
397	Douglas fir	No	60	Good	None	No	Remove	3 6	
398	Douglas fir	No	72	Good	None	No	Remove	4 32	Previous limb fa lure struck fence
399	Douglas fir	No	54	Good	None	No	Remove	3 24	
400	Douglas fir	No	60	Good	None	No	Remove	3 6	
675	Douglas fir	No	45	Good	None	No	Retain and Monitor	2 7	
676	Black pine	No	55	Good	None	No	Remove	3 3	
747	Red alder	No	7	Poor	None	No	Retain with special management	02	
748	Red alder	**Yes**	40	Fair	None	No	Retain with special management	2 4	Mu ti stemmed tree Located on property line
A	Red alder	**Yes**	38	Good	None	No	Retain with special management	2 28	Growing on property line adjacent to fence Phototrophic growth towards the site
B	Red alder	**Yes**	45	Good	None	No	Retain with special management	2 7	
C	Red alder	No	20	Fair	Poor structure	No	Retain with special management	2	One small dead stem adjacent
D	Red alder	**Yes**	45	Good	None	No	Retain with special management	2 7	On other side of fence adjacent to driveway
E	Red alder	No	25	Poor	Declining	No	Retain with special management	5	One dead stem On short at 4m
F	Red alder	**Yes**	40	Good	None	No	Retain with special management	2 4	
F	Weeping wi low	No	28	Good	None	No	Retain and Monitor	68	On adjacent property
G	Douglas fir	No	55	Good	None	No	Retain and Monitor	3 3	Adjacent property up slight slope
H	Western redcedar	**Yes**	50	Fair	Previously topped	No	Retain and Monitor	9	Approximately 4m from fence line
I	English oak	No	70	Good	None	No	Retain and Monitor	4 2	On adjacent property

Discussion:

There are 26 trees recommended for removal that are outside of the construction footprint. Trees 1396, 1397, 1398, and 1399 are mature Douglas fir (*Pseudotsuga menziesii*) situated between the property line and proposed building 1 (Appendix A). With only approximately 1.1m of clearance between the tree center and the building foundation there is not sufficient space to maintain the root integrity of these trees through construction. Trees 1392 and 1395 are ornamental apple trees (*Malus sp*) located on the west side of the property. These trees have not been maintained in recent years and exhibit poor structure and form. They are therefore not good candidates for retention and are recommended for removal and replacement with a more suitable species.

Trees 1389-91 are located between the property line and proposed building 5. Trees 1389 and 1390 are Douglas fir trees that were previously topped at 4m height. Consequently these trees are in poor condition and would not be suitable for retention. Tree 1391 is actually a cluster of 4 planted Western Redcedar (*Thuja* plicata) trees ranging in size from 8-14cm DBH. These trees could conceivably be retained but if there is any grading in the area then replanting with a more desireable species in a better location would be preferred. Tree 1388 is a Pacific dogwood (*Cornus nuttallii*) along the fence line that has recently died. This tree does not pose a hazard in any way but also provides little to no wildlife value and should be removed. Tree 1393 is one of two ornamental Cherry trees on property. This tree is located very close to the intersection of two hardscape pathways. This tree would not be suitable in this location due to low overhead branching that would prevent pedestrians from utililizing the pathway.

There are several large Douglas fir trees at the front of the property in front of proposed building 2. All three trees have been previously topped at approximately 20m with regrown tops 15m high. The quality of attachement for the new tops could not be assessed from the ground but there was no indication of weakness or decay. A level 3 climbing risk assessment would be required to determine if these unions present any risk and what if any mitigative measures (pruning, mechanical bracing) could be utilized to reduce any associated risk. Tree 1364 is situated with proposed infrastructure on three sides with the house and two walking paths located 2-3m away from the main stem. This tree has a calculated root protection radius of 6.4m. With encroachments on this radius on three sides it is not practical to retain this tree with current building plans. The two other Douglas fir here (1362, 1363)are located slightly further away from the building footprint however they do not have sufficient space to accommodate a suitable root protection area and can therefore not be retained through construction. Trees 1366 are a cluster of 6 small Arbutus trees sized 9-21cm DBH. These trees are not practical to be retained with a hydro kiosk planned for this location. Tree 1367 is located at the rear of building 2. It is currently situated between the building and the access road with no suitable space to accommodate it's root protection area.

Adjacent to building 1 there are several mature confier trees. Tree 1675 can be retained with special management. Tree 1400 has an RPA that intersects with the coner of the proposed building footprint. To accommodate foundation excaxvationa and construction the tree protection barriers would have to be positioned well inside of the root protection area. The same would be true of tree 1676 to accommodate foundation and foot path construction. Both these trees should therefore not be retained through construction. The stump for trees 1400 and 1676 are within the RPA for tree 1675 and should not be pulled with an excavator to avoid damaging the roots of this retained tree. Roots from 1400 and 1676

extending to the north and east can be removed by any means but the stumps should be ground if they are to be removed..

Tree 1371 is situated within an outdoor amenity green space. It is positioned at the toe of a small 1m slope. Based on civil drawings there is some grading expected throughout the site to produce a more moderate grade change. Civil drawings show the grading plan for the road centerline 5m to the west. Some minor cut up slope is likely possible (30-50cm) while maintaining root health and integrity. No soil can be added to the down-slope portion of the RPA which would bury established roots and the root collar. The final decidision on the retention of this tree may have to be made once grading plans are finalized and laid out on site.

Along the rear of the and the east side of the property are several trees located on adjacent properties with crowns that extend into the site (Appendix A). Many of these trees will have an overhead conflict with proposed three story buildings. Trees at the rear of the site in parituclar (A-F) lean towards proposed building 8 and would require extensive pruning to achieve suitable building clearance. This level of pruning would not be sustainable for these trees health and longevity. These trees will have to be removed to accommodate this development plan. As they are not on the subject property an agreement will have to be made with the neighboring property owner. Trees along the eastern property line will require similar overhead pruning, though not quite as extensively.

Of the 50 trees >6cm assessed on the development property, there are 40 trees recommended for removal. Following Schedule G of the Nanaimo tree protection bylaw there would be 63 replacement trees required or Cash-in lieu. This would be accompanied by a bond of $16 200 ($300x54) that is reimbursed after two years of survival. The city has a maximum cap of $30 000/Ha Bond/Cash-in-lieu which for this property would be $11 640 for the 0.388 Ha lot size.

Recommendations:

Once plans are finalized and detailed land surveys are complete, RPA should be established and maintained throughout construction at the minimum distance listed in Table 1, Appendix A for trees to be retained.

No soils should be removed from or piled within the RPA except for root excavations performed by a certified Arborist. No equipment should also be driven through the RPA to avoid unnecessary compaction of soils. Semi-permanent barriers should be installed around the RPA (to City of Nanaimo specifications [Appendix B] and minimum distance listed in Table 1) of trees to be retained after clearing is completed and remain in place until construction is complete.

Assess detailed grading plan around tree 1371 to determine if it can be retained with current plans or if plans can be adjusted to retain the tree with minimum root damage such as retaining walls to minimize grading required in outdoor amenity space.

Consult with neighboring property owners to the east and north regarding trees that represent an overhead conflict with proposed three story buildings.

Continued monitoring of the remaining trees should continue throughout development and for the first years after development. Retained trees will continue to adjust to the environmental changes on site and

some decline or mortality is possible. Replacement trees should be regularly watered throughout the following years after planting.

Limitations and Liabilities:

An arborist uses their education, training and experience to assess trees and provide prescriptions that promote the health and wellbeing, and reduce the risk of trees.

The prescriptions set forth in this report are based on the documented indicators of risk and health noted at the time of the assessment and are not a guarantee against all potential symptoms and risks, future and present.

Trees are living organisms and subject to continual change from a variety of factors including but not limited to disease, age, weather, climate, and human intervention. Disease and structural defects may be concealed in the tree or underground. It is impossible for an arborist to detect every flaw or condition that may result in failure, and an arborist cannot guarantee that a tree will remain healthy and free of risk.

To live near trees is to accept some degree of risk. The only way to eliminate the risks associated with trees is to eliminate all trees.

Assumptions and Limiting Conditions:

- Altering this report in any way invalidates the entire report.
- The use of this report is intended solely for the addressed client and may not be used or reproduced for any reason without the consent of the author.
- The information in this report is limited to only the items that were examined and reported on and reflect only the visual conditions at the time of the assessment.
- The inspection is limited to a visual examination of the accessible components without dissection, excavation, probing, or climbing unless otherwise reported. There is no guarantee that problems or deficiencies may not arise in the future, or that they may have been present at the time of the assessment.
- Sketches, notes, diagrams, etc. included in this report are intended as visual aids. While they are accurate to a high degree and are to scale, they should not be considered a substitute for land surveys or architectural drawings.
- All information provided by owners and or managers of the property in question, or by agents acting on behalf of the aforementioned is assumed to be correct and submitted in good faith. The consultant cannot be responsible or guarantee the accuracy of information provided by others.
- It is assumed that the property is not in violation of any codes, covenants, ordinances or any other governmental regulations.
- The consultant shall not be required to attend court or give testimony unless subsequent contractual arrangements are made.
- The report and any values within are the opinion of the consultant, and fees collected are in no way contingent on the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, or any finding to be reported.
- This contents of this report are valid for the duration of the site development, or 24 months maximum.

Report prepared by Ryan Murphy

ISA Certified Arborist PN-5779A

Tree Risk Assesor Qualified

Wildlife Danger Tree Assessor

RPBio #5341

Trees
- Remove
- Retain and Monitor
- Retain with special management
- Tree canopy
- RPA
- Tree protection

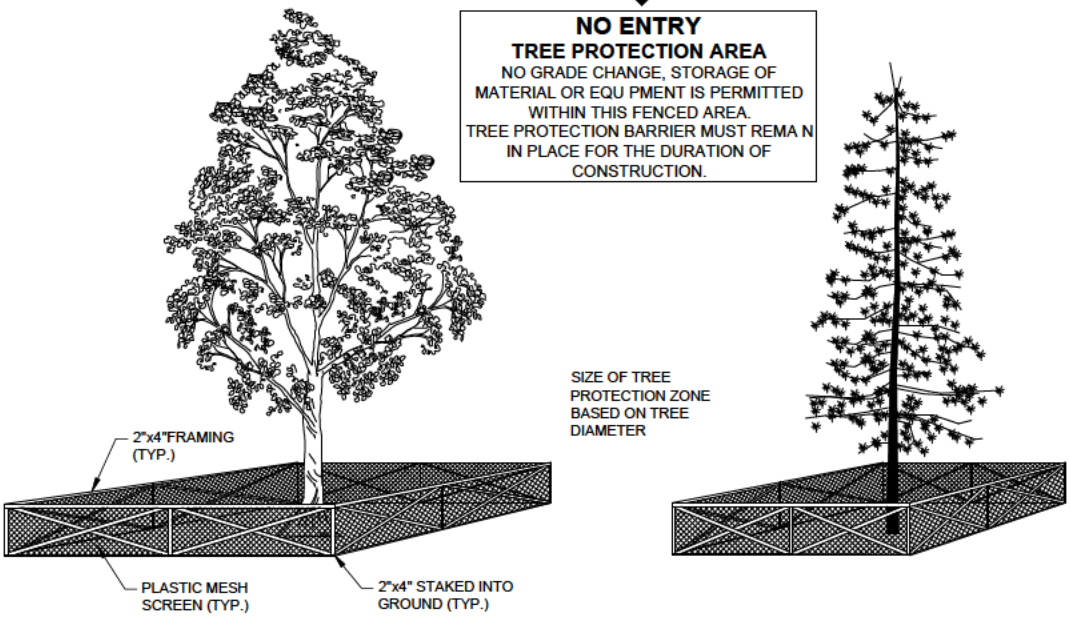
5 0 5 10 15 20 m

Appendix A: Map of trees assessed at 3614 Hillside Ave, Nanaimo BC potentially impacted by development activities over development plans

Appendix B:

SIGNAGE TO BE POSTED ON EACH TREE PROTECTION BARRIER (WEATHER PROOF, 11"x17" MINIMUM SIZE)

NO ENTRY
TREE PROTECTION AREA
NO GRADE CHANGE, STORAGE OF MATERIAL OR EQU PMENT IS PERMITTED WITHIN THIS FENCED AREA.
TREE PROTECTION BARRIER MUST REMA N IN PLACE FOR THE DURATION OF CONSTRUCTION.



TREE PROTECTION FENCING:

PRIOR TO CONSTRUCTION TAKING PLACE ON THE SITE A PROTECTION FENCE (SEE SPECIFICATIONS BELOW) SHALL BE INSTALLED ON THE SITE ACCORDING TO THE LAYOUT ON THE DRAWING ALONG THE EXISTING GRADE. PRIOR TO THE INSTALLATION OF THIS FENCE, THE LAYOUT SHOULD BE REVIEWED BY THE CITY ENGINEER. THE ENGINEER WILL INSTRUCT THE CONTRACTOR AND ALL SUBCONTRACTORS ON THE IMPORTANCE OF FOLLOWING THESE TREE PROTECTION MEASURES. THE CONTRACTOR AND ALL SUBCONTRACTORS WILL BE REQUIRED TO SIGN OFF THEIR CONCURRENCE OF THIS PLAN.

1. HEIGHT OF FENCE TO BE 1.2m (4').
2. 2"X4" S TO BE USED FOR VERTICAL POSTS, TOP AND BOTTOM RAILS AND CROSS BRACING (IN AN "X"); ROUND UN-TREATED VERTICAL POSTS MAY BE USED WITH A MINIMUM DIAMETER OF 9cm.
3. SPACING BETWEEN VERTICAL POSTS TO BE NO FURTHER APART THAN 3.7m (12') ON CENTRE.
4. STRUCTURE MUST BE STURDY WITH VERTICAL POSTS DRIVEN FIRMLY INTO THE GROUND.
5. CONTINUOUS PLASTIC MESH SCREENING (E.G. ORANGE SNOW FENCING).
6. SIGNS ENTITLED "TREE PROTECTION AREA" TO BE POSTED ON FENCE EVERY 15m.
7. LOCATION OF FENCE AS SHOWN ON PLAN.

MINIMUM PROTECTION REQUIRED AROUND TREE			
TRUNK DIAMETER (cm)	DISTANCE FROM TRUNK (m)	TRUNK DIAMETER (cm)	DISTANCE FROM TRUNK (m)
20	1.2	50	3.0
25	1.5	55	3.3
30	1.8	60	3.6
35	2.1	75	4.5
40	2.4	90	5.0
45	2.7	100	6.0

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOE\SSE\EDITION NO\13 MAY 2020\2019-09-19 REDLINE INCORPORATION - WORKING\2020 DRAWING SECTIONS\FINAL DRAFT\SECTION 3 DWG\STP-1

2.13.2020

CITY OF NANAIMO
THE HARBOUR CITY

TREE PROTECTION FENCING

Scale:	N.T.S.
Created:	FEB 2019
Rev Date:	MAY 2020
Dwg No:	TP-1