Appendix C: Hazard Tree Assessment

Beachcomber Regional Park
Management Plan 2017-2027

Regional District of Nanaimo

STRATEGIC

March 30, 2017

Tree Risk Assessment Report – Beachcomber Regional Park

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PROFESSIONALLY RESOURCEFUL

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1.0 Introduction and Background

A tree risk assessment was completed on behalf of the Regional District of Nanaimo (RDN) for Beachcomber Regional Park (BRP) on March 14, 2017 by Walter Ernst (R.P.F. / Cert. Arb. / Urban Tree Risk Assessor) and Chris Leitao (TFT) of Strategic Natural Resource Consultants Inc. (SNRC). The tree risk assessment findings will be incorporated within the RDN management plan for Beachcomber Park which is to be completed in April 2017.

BRP is just over 1.0 hectares in size and is located along a narrow spit approximately 5.5 km northwest of Nanoose Bay. The park is bound by the ocean and Marina Way. Refer to Appendix I for BRP locator map.

A geo-referenced park map showing the trail systems and 2 park benches was provided by the RDN which was utilized to conduct the assessment.

Previous correspondence between Walter Ernst of SNRC and Lesya Fesiak of the RDN outlined the following objectives for the tree risk assessment and provided the basis for the methodologies used in the field and within this report.

- To conduct a tree risk assessment along higher public use areas (trails and benches) within BRP in order to minimize risks (immediate or potential future) to the general public utilizing the area.
- Develop a summary report of hazard tree removal / modification requirements (short-term / long-term) as well as costs associated with the tree work in order to aid the RDN in prioritizing tree work and establishing a cost estimate for the work.

2.0 Site Description

BRP consists of a multi-layer second growth Douglas-fir stand with scattered minor components of Arbutus, Garry oak, grand fir and bigleaf maple. Tree heights ranged from 15 to 40m (avg. 22m) and diameters ranged from 15 to 100cm (avg. 47cm). Given that BRP is highly exposed to the dominant winds (located on narrow spit), the stand has naturally acclimated to the winds over time. The Biogeoclimatic Ecosystem Classification subzone and site series is CDFmm1 (moist maritime) subzone with 01(03) site series. The ground is gently to moderately sloping with slopes ranging from 0-40%. Scattered rocky outcrops exist on upper slopes. Understory vegetation consists of predominantly salal, dull Oregon grape, red huckleberry, prickly rose, trailing blackberry, and ocean spray with minor components of bracken fern, Pacific crab apple and bitter cherry. Very light *Armillaria ostoyae* and *Phellinus weirii* root rot (at ≤2%) was observed on the occasional dead tree (standing or from overturned root wads). Approximately 12 out of 15 Arbutus (or 80%) within the park have recently died or are rapidly declining as a result of the Madrone Canker pathogen (most likely *Fusicoccum aesculi).* Root rot has also occurred on some of the Arbutus trees as a secondary effect. Literature indicates that Arbutus are more susceptible to the canker where growing closer to the ocean, are exposed to sunlight, and already have health concerns. Additionally the canker spores from infected trees can travel to other trees through wind and rain (*Forest Pest Leaflet, Common Pests of Arbutus in British Columbia, December 2000*). Refer to Figures 1 to 3 for photos showing the canker growths on Arbutus.

Figure 1: Photo showing canker growth on Arbutus tree.

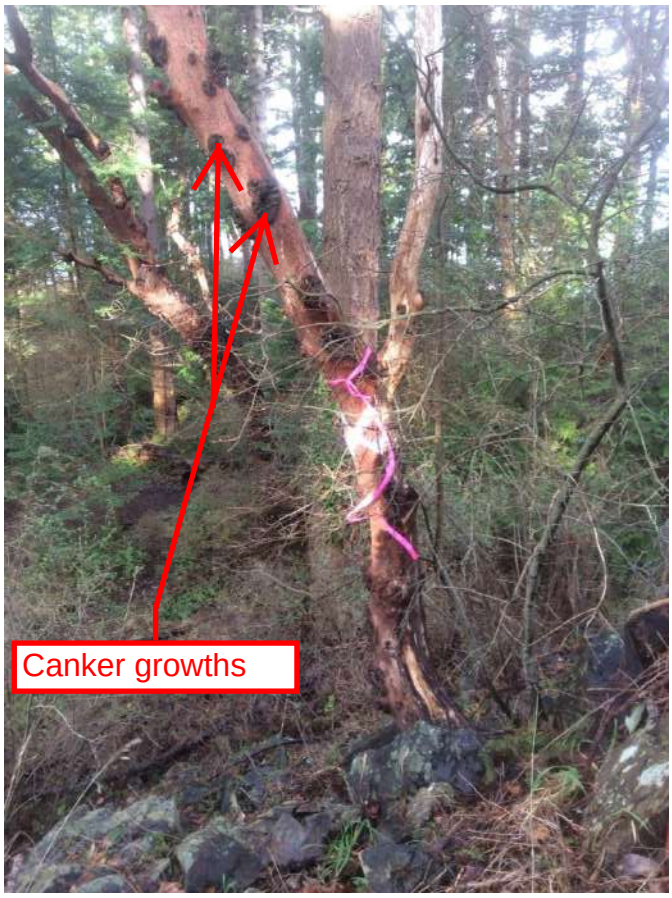

Figure 2: Photo showing numerous canker growths on recently dead Arbutus tree.

Figure 3: Photo showing numerous canker growths at base of dead Arbutus tree.

3.0 Methodology

As mentioned above, the tree risk assessment was focused along higher public use areas, primarily, along the existing trails, 2 park benches, and the adjacent beaches and parking lot. One additional trail which had significant use was mapped at the southern end of the park. This trail connects to the main trail network. Trees were assessed for their health, any significant defects, the potential for failure, and the risk posed to the general public. Where tree work was prescribed, the work was classed as either: 'Urgent' or 'Future' and as either a 'Tree Removal' or 'Modification' treatment. Modification treatments include pruning and wildlife tree creation (topping). For each removal or modification tree, standard tree data (height, DBH, rot level) was collected using an iPad, laser, mallet, and diameter tape. Diameter of trees was measured at diameter at breast height (DBH- 1.3m). All 'Urgent Removal' trees were marked with a pink ribbon (with the tree number written down) and spray painted with a blue 'X' (refer to Figure 4 on the next page). 'Urgent Modification' trees were marked with only a pink ribbon (with the tree number written down). Trees requiring potential future work and monitoring were not marked in the field. All trees identified were inventoried and mapped. Numerous photos were taken of each tree identified; however, only a select few were utilized for this report. Additional photos are available upon request.

Figure 4: Photo showing marking standard used for Urgent Removal Trees

4.0 Results / Discussion / Recommendations

Immediate and Future Tree Work Requirements:

Based on the tree assessment, 17 trees were identified for either 'Urgent' or 'Potential Future' treatment (9 Arbutus, 6 Douglas-fir, 1 grand fir and 1 bigleaf maple). The diameters of these trees averaged at 47cm, and the heights averaged at 14.7cm. All trees were either in proximity to high consequence areas including the trail pathways, park benches, beaches, and parking lot. Refer to Figure 5 and Appendix II for the Tree Risk Assessment Map.

Figure 5: Beachcomber Regional Park – Tree Risk Assessment Map

The recommended treatment timelines and specific tree work for the identified trees have been summarized in the following table (for more details on specific tree conditions, and required tree work refer to Appendix III – Tree Risk Assessment Data and Recommended work):

Table 1: Recommended treatment timelines and tree work

Timeline / Tree Work Category	Applicable Tree #s	Recommended Work
Urgent Tree Removal	Trees 1 to 2, 4, and 6 to 7 (3 Arbutus & 2 Douglas-fir)	Directionally fall whole trees. Minimize damage to adjacent trees. Cut stems and large limbs into firewood lengths, fully limb the trees, and cut all non-firewood limbs and tops into 2m lengths and scatter to lay flat on the ground away from the trail pathways. For Tree #6 (Arbutus), rigging will be required in order to ensure two adjacent small Garry oak (3-4m height; located 5m to south of tree) are not damaged. Refer to Tree Risk Map for Garry oak locations.
Urgent Wildlife Tree Creation	Tree 12 (Arbutus)	Top tree at 4m height to remove weight off main stem. Care required in minimizing damage to adjacent Garry Oak. Refer to Tree Risk Map for Garry Oak location. Ensure rigging used to suspend limb, and worker may need to make a few cuts to avoid damage to Garry Oak. Adjacent Douglas-fir tree can be utilized to climb up and remove top. A long hand pruner or chainsaw is required. Cut debris to 2m lengths and scatter to lay flat to the ground away from the trail path.
Future Removal	Trees 3, 5, and 14 to 17 (3 Douglas-fir, 1 Arbutus, 1 bigleaf maple, and 1 grand fir)	Reassess tree for risk. Directionally fall if required (same prescription as for Urgent Tree Removal category indicated above). Minimize damage to adjacent trees.
Future Pruning	Trees 8 to 11, and 13 (4 Arbutus and 1 Douglas-fir)	Reassess tree for risk and / or further decline. Prune dead limbs. For Tree #8 (Douglas-fir), removal of a broken off hanger limb 13-14m up the tree stems is required. Ensure pruning cuts are completed to ISA Arboriculture Standards. Cut pruned debris to 2m lengths and scatter debris to lay flat on the ground away from the trail pathway.

**** Ensure that debris from Arbutus are not in direct contact with other mature or immature Arbutus trees to minimize canker spread.**

The trees prescribed for urgent tree removal or wildlife tree creation posed a moderate to high risk to trail users at the present time and would likely fail within 1 to 2 years (refer to Figures 6 and 7 for photo showing examples of an Urgent Tree Removal and Urgent Wildlife Tree Creation). The trees prescribed for future tree removal or prunings posed a low to moderate risk to trail users at the present time and are not expected to fail within the short-term (e.g. next 1-2 years). These trees or portion of the trees may potentially fail 2-5 years from now. These trees should be monitored and re-assessed in 1-2 years time to assess for increased risk and / or further decline. The future removal and pruning prescriptions were based on observations during the field visit. Refer to Figure 8 for a photo showing an example of a Future Pruning tree. These prescriptions may need to be modified when re-assessed, if the trees have further declined or the trees / tree parts pose an increased risk to the trail users. Frequency of trail use is estimated as moderate over the year, and exposure of trail users to the tree risks is of short duration (with the exception of the park benches where people may be stationary for longer periods of time).

Figure 6: Photo showing Urgent Removal –Tree #1 (Arbutus) at parking lot

Figure 7: Photo showing Urgent Wildlife Tree Creation –Tree #12 (Arbutus) at parking lot.

Figure 8: Photo showing a Future Pruning Tree –Tree #8 (Douglas-fir).

Garry oak trees were observed directly adjacent Trees 6 and 12 (both Arbutus). When conducting tree work on these trees, ensure that damage to the adjacent Garry oak is avoided as these trees are a protected species. Some rigging during tree work will be required to avoid the Garry oaks. The Garry oak trees are identified on the attached Tree Risk Assessment map. Refer to Figure 9 showing two Garry oaks located adjacent Tree #6.

For Arbutus pruning treatments, it is recommended spurless climbing be completed to avoid injury to these trees (thin-bark more prone to damage) and to avoid further disease spread.

Figure 9: Photo showing two small Garry Oak adjacent to Tree #6.

Two additional dead Arbutus trees were noted outside the park boundary to the east and directly adjacent a trail pathway (refer to Tree Risk map for locations). These trees were not marked in the field. The two Arbutus pose moderate and high risks to trail users, have significant decay within the stems and roots, and are expected to fail within the next 1-2 years. If possible (through consultation with the applicable landowner), it is recommended these trees also be removed (either through directionally falling with a pull rope to avoid damage to neighboring trees or by piecing down) or topped to a level where they pose a lower risk.

Special to trees requiring entire removal, it was recommended to dirdectionlly hand fall the trees in order to minimize damage to adjacent trees. However, it will be up to the faller to determine the safest way to remove the trees without damaging adjacent trees. Refer to Appendix III for specific tree work recommendations.

As mentioned within Section 2.0, approximately 12 out of 15 Arbutus (or 80%) within the park have recently died or are rapidly declining as a result of the Madrone Canker pathogen (most likely *Fusicoccum aesculi).* Arbutus growing closer to the ocean, and are exposed to higher levels of sunlight, and other environmental stresses seem to be more prone to the disease. For infected Arbutus trees that are moderately healthy literature indicates that pruning of dead / infected branches or limbs can have beneficial impacts minimizing the spread of the cankers. Pruning should be conducted in the late winter to early spring for better results. As sudden exposure of Arbutus to the sun can cause sunscald (which may facilitate infection by the canker fungus), when removing other trees, minimize opening size adjacent healthy Arbutus (*Forest Pest Leaflet, Common Pests of Arbutus in British Columbia, December 2000*). The moderately healthy to healthy Arbutus within the park should not be impacted by other tree removals, as removal trees are typically farther away from these trees and will nor create a huge opening when removed. Inadequate information was available to determine if debris removal would effectively aid in sanitation of the stand. It is recommended that debris from Arbutus do not come in direct contact with other mature or immature Arbutus trees in order to minimize canker spread.

Cost Estimates for Recommended Tree Work:

The table below indicates the cost estimates for completion of the 'Urgent' and 'Future' tree work. Refer to Appendix III – Tree Risk Assessment Data and Recommended work for cost rates per tree. The costs below were obtained from various tree removal experts, and are based on tree removal or modification treatments only with retaining the debris on-site. The estimate does not account for additional costs for travel, trucks, and additional crew persons if required. It is recommended to have qualified tree companies field review the identified trees and provide pricing from their own perspective.

Table 2: Cost Estimates for Recommended Tree Work

<table>
<tr><th>Timeline / Tree Work Category</th><th>Estimated Cost</th><th>Total Costs for Urgent and Future Tree Work</th></tr>
<tr><td>Urgent Tree Removal (5 trees)</td><td>$479.00 + taxes</td><td rowspan="2">$611.00 + taxes (additional costs incl. travel, truck use, additional crew persons)</td></tr>
<tr><td>Urgent Wildlife Tree Creation (1 tree)</td><td>$132.00 + taxes</td></tr>
<tr><td>Future Removal (6 trees)</td><td>$668.00 + taxes</td><td rowspan="2">$1,178.00 + taxes (additional costs incl. travel, truck use, additional crew persons)</td></tr>
<tr><td>Future Pruning (5 trees)</td><td>$510.00 + taxes</td></tr>
<tr><td>Total Cost:</td><td colspan="2">$1,789.00 + taxes (additional costs incl. travel, truck use, additional crew persons)</td></tr>
</table>

For the 9 Arbutus trees assessed, if debris from the tree work were to be chipped and hauled away instead of retained on-site, the additional cost is estimated to range from **$1,000 to $2,500 + taxes** depending on the complexity of the work. All debris (stems and

branches) would have to be carried out to a chipper and only debris 15cm or less can be chipped. A 2-3 person crew would be required to complete the work.
Specific to the 2 Arbutus located outside the park, if these trees were to be removed, it is estimated it would cost an additional **$244.00 + taxes** to directionally fall them (and to retain cut debris on ground).

An additional assessment of the Arbutus trees by an ISA Certified Arborist is recommended in the near future in order to determine the best course of action with the Madrone canker epidemic within the park. As part of this assessment, all mature Arbutus should be field reviewed to determine the degree of the infection, recommended actions for sanitation treatments (including tree removal or pruning), and recommendations to prevent or minimize further spread of the pathogen within the stand. The time and cost of the additional assessment is estimated at **$1,690.20 + taxes** (includes fieldwork, truck cost and office work).

4.0 Limitations

The tree assessment was completed under the site conditions (weather, natural / unnatural disturbances etc.) and tree conditions (visible defects) present at the time of the assessment and with the tools available (laser, ipad, mallet, D-tape).

5.0 Signature and Professional Seal

Field work completed by: Walter Ernst, RPF (#4071), ISA Certified Arborist (PN-7288A), Certified Tree Risk Assessor (CTRA 1467) and Chris Leitao, TFT

Office work completed by: Walter Ernst, RPF (#4071), ISA Certified Arborist (PN-7288A), Certified Tree Risk Assessor (CTRA 1467)

Signature and Seal

30/03/17

Date (dd/mm/yy)

Appendix I – Beachcomber Regional Park Locator Map

Appendix II - Beachcomber Regional Park Tree Risk Assessment Map

STRATEGIC
NATURAL RESOURCE CONSULTANTS
Campbell River
321-1180 Ironwood St.
p: 250.287.2246

Projection: NAD 1983 BC Environment Albers
Scale: 1:1,000
Date: 3/30/2017
Produced By: evan.ross

Appendix III – Tree Risk Assessment Data / Recommended Tree Work

Location: Beachcomber Regional Park Tree Risk Assessment
Completed By: Walter Ernst, RPF, Cert Arb., and Chris Leitao, TFT
Date: March 14, 2017

Tree #	Spp.	DBH (cm)	Ht (m)	Location	Risk	Tree Condition	Treatment Recommendations	Timeline for Tree Removal or Modification Treatment (Urgent, Future Treatment, Monitor)
1	Arbutus	35.0	6.5	Edge of park adjacent parking lot.	**M-H**	Imminent failure. Dead tree with broken limb hanging within fork. Significant rot. Potential for loose limb to slide out and fall. Madrone Canker suspected.	Directionally fall whole tree. Minimize damage to adjacent trees. Cut stem and large limbs into firewood lengths, fully limb the tree, and cut all non-firewood limbs and tops into 2m lengths and scatter to lay flat on the ground away from the trail pathway.	Urgent / Removal
2	Fdc	17.0	24.0	Within Park	**H**	Spindly tall dead Fdc tree. Flaking bark near top. Potential for top to break off. Tree 6-7m from Trail.	Directionally fall whole tree. Minimize damage to adjacent trees. Cut stem and large limbs into firewood lengths, fully limb the tree, and cut all non-firewood limbs and tops into 2m lengths and scatter to lay flat on the ground away from the trail pathway.	Urgent / Removal
3	Fdc	14.0	20.0	Within Park, not marked.	**L-M**	Small spindly Fdc with very small crown. Fairly protected by other trees. Potential to break off on stem.	Reassess tree for risk. Directionally fall if required (same prescription as above).	Future / Removal
4	Fdc	20.0	11.0	Within Park	**M-H**	Spindly tall dead Fdc tree with slight lean to trail. Tapped base with mallet and sounded hollow indicating rot. Flaking bark near top. Potential for top to break off. Tree 3m from Trail.	Directionally fall whole tree. Minimize damage to adjacent trees. Cut stem and large limbs into firewood lengths, fully limb the tree, and cut all non-firewood limbs and tops into 2m lengths and scatter to lay flat on the ground away from the trail pathway.	Urgent / Removal
5	Fdc	44.0	16.0	Within Park	**M**	Larger Fdc with heavy arch on trail. 1/3 of structural roots exposed; however, they seem mostly sound. Base of tree seems sound. Potential to break at roots. Thinning crown.	Reassess tree for further decline and risk. Directionally fall whole tree if required (same prescription as above).	Future / Removal
6	Arbutus	40.0	13.0	Within Park	**M-H**	Recently dead arbutus from Madrone Canker. Cankers all up and down tree, and root tapping indicates rot. Main stem seems fine. Sloughing bark higher up. Very shallow soils with rock. Potential for root breakage.	Directionally fall whole tree. Topping or piecing down is not an option due to safety concerns. Some rigging required to ensure two small Garry Oak (3-4m height) located 5m to south of tree are not damaged. Refer to Tree Risk Map for Garry Oak locations. Cut stem and large limbs into firewood lengths, fully limb the tree, and cut all non-firewood limbs and tops into 2m lengths and scatter to lay flat on the ground away from the trail pathway.	Urgent / Removal
7	Arbutus	24.0	5.0	Within Park	**M**	Recently Dead arbutus from Madrone Canker. Growths all up and down tree. Main stem seems fine. Sloughing bark. Very shallow Soils with rock. Tree may or may not hit trail.	Directionally fall whole tree. Topping or piecing down not an option due to safety concerns. Cut stem and large limbs into firewood lengths, fully limb the tree, and cut all non-firewood limbs and tops into 2m lengths and scatter to lay flat on the ground away from the trail pathway.	Urgent / Removal
8	Fdc	110.0	40.0	Within Park, not marked.	**L-M**	Large healthy Fdc with large limb lodged in limbs 13-14m up the stem. Potential to fall. Additionally 8-12 larger dead limbs along first 1/3 of tree stem.	Reassess risk. Remove broken off limb and combine with limbing lower 8-12 dead limbs. Ensure pruning cuts are completed to ISA Arboriculture Standards. Cut pruned debris to 2m lengths and scatter debris to lay flat on the ground away from the trail pathway.	Future / Pruning
9	Arbutus	55.0	14.0	Within Park, not marked.	**L**	Arbutus with dead limb 5m up tree. Limb is 4-5m length. Potential to break off at some point but not imminent. Arbutus still live and moderately healthy. Likely infected with Madrone Canker.	Reassess tree for further decline and risk. Prune dead limb. Ensure pruning cuts are completed to ISA Arboriculture Standards. Cut pruned debris to 2m lengths and scatter debris to lay flat on the ground away from the trail pathway.	Future / Pruning
10	Arbutus	85.0	15.0	Within Park, not marked.	**L**	Recently dead arbutus from Madrone Canker. Cankers all up and down tree. Main stem seems sound. Some sloughing bark. 2 limbs without bark which have potential to break off one day but not imminent.	Reassess tree for risk. Prune 2 limbs. Ensure pruning cuts are completed to ISA Arboriculture Standards. Cut pruned debris to 2m lengths and scatter debris to lay flat on the ground away from the trail pathway.	Future / Pruning
11	Arbutus	65.0	15.0	Within Park, not marked.	**L**	Arbutus with dead limbs. Potential to break off at some point but not imminent. Arbutus still live with low to moderate health. Upper 1/3 of tree still has foliage. Madrone Canker infected tree.	Reassess tree for further decline and risk. Prune dead limbs. Ensure pruning cuts are completed to ISA Arboriculture Standards. Cut pruned debris to 2m lengths and scatter debris to lay flat on the ground away from the trail pathway.	Future / Pruning
12	Arbutus	55.0	7.0	Within park near benches, trail, and beach.	**M-H**	Dead tree with significant rot at base. Open wound at base with 2/3 rot. Madrone Canker.	Create wildlife tree. Top at 4m height to remove weight off main stem. Care required to minimize damage to adjacent Garry Oak. Refer to Tree Risk Map for Garry Oak location. Ensure rigging used to suspend limb, and may need to make a few cuts to avoid damage to Garry Oak. Can use adjacent Fdc tree to climb up and remove top. Long hand pruner or chainsaw required. Cut debris to 2m lengths and scatter to lay flat to the ground away from the trail path.	Urgent / Topping (wildlife tree)
13	Arbutus	95.0	17.0	Within Park, not marked.	**L-M**	Arbutus with dead limbs. Potential to break off at some point but not imminent. Arbutus still live and in low to moderate health. Upper 1/3 of tree still has foliage. Tree is declining rapidly. Open cavity at base with some rot but still structurally sound. Madrone Canker infected tree.	Reassess tree for further decline and risk. Prune dead limbs. Ensure pruning cuts are completed to ISA Arboriculture Standards. Cut pruned debris to 2m lengths and scatter debris to lay flat on the ground away from the trail pathway.	Future / Pruning
14	Arbutus	60.0	14.0	Within Park, not marked.	**M**	Dead gnarly arbutus. Very twisty stem. Potential to break where angles sharply near top. Open cavity at base. Madrone Canker.	Directionally falling of whole tree preferred. Topping would be tricky with rigging required and safety a concern (would have to utilize neighbouring Fdc to rig and cut top. Long prune saw required). Minimize damage to adjacent trees. Cut stem and large limbs into firewood lengths, fully limb the tree, and cut all non-firewood limbs and tops into 2m lengths and scatter to lay flat on the ground away from the trail pathway.	Future / Removal
15	Bg	31.0	13.0	Within Park, not marked.	**L**	Recently dead standing Bg. No major defects noted. Seemed sound from tapping with mallet. Some black staining at base which could be Armillaria sign.	Reassess tree for risk. Directionally fall whole tree if required. Minimize damage to adjacent trees (same prescription as above for cutting of debris)	Future / Removal
16	Mb	30.0	10.0	Adjacent trail within park	**L-M**	Dying maple, has slight lean away from trail. Root system looks weaker with rot exposed. Broken off top.	Reassess tree for further decline and risk. Directionally fall whole tree if required. Minimize damage to adjacent trees (same prescription as above for cutting of debris)	Future / Removal
17	Fdc	19.0	9.0	Just inside park	**L-M**	Spindly Fdc with roots exposed on uphill side. Some rot noted in roots. Tree unlikely to reach trail due to shorter height and direction of lean.	Reassess tree for risk. Directionally fall whole tree if required. Minimize damage to adjacent trees (same prescription as above for cutting of debris)	Future / Removal
	AVG:	**47.0**	**14.7**					

Tree Risk Summary:

Spp.	#	%
Arbutus	9	53
Fdc	6	35
Bg	1	6
Mb	1	6
Total	**17**	**100**

****All urgent priority removal trees hung with pink ribbon, and painted with a blue X (indicating removal) and urgent modification trees were only flagged with pink ribbon.**

****It is recommended that debris from Arbutus do not come in direct contact with other mature or immature Arbutus trees in order to minimize canker spread.**