REGIONAL DISTRICT OF NANAIMO

REQUEST FOR TENDER No. 20-038

Gabriola Island Village Way Path Construction Project

Addendum 1 (21 Pages)
Issued: June 23, 2020

Closing Date & Time: on or before 3:00 PM Pacific Time on July 8, 2020

This addendum shall be read in conjunction with and considered as an integral part of the Request for Tender. Revisions supersede the information contained in the original Tender or previously issued Addendum. No consideration will be allowed for any extras due to any Vendor not being familiar with the contents of this Addendum. All other terms and conditions remain the same.

Item 1 RECEIPT OF ADDENDA

Acknowledge receipt of addenda by email to nathan.trobridge@newcastleengineering.com

Item 2 Refer to the Supplementary General Conditions, Gabriola Island Village Way Path Construction. Add item 3.11.5:

The contractor will submit a Tree Management Plan prepared by an Arborist for approval by Regional District of Nanaimo identifying the following:

1. Tree protection measures to be used for all trees being retained;
2. Location and details of tree protection fencing;
3. Monitoring plan to ensure tree protection measures are in place for the duration of the project;
4. Emergency response plan and contact information.

Item 3 Refer to Drawing 0110-017-02, Add:

1. Remove existing tree (Douglas-fir) at station 1+160 LT.

Item 4 Include Tree Risk Assessment Village Way Path, Gabriola Island dated June 17, 2020 prepared by Strategic Natural Resource Consultants Inc.

Attachments:

1. Tree Risk Assessment Village Way Path, Gabriola Island dated June 17, 2020 prepared by Strategic Natural Resource Consultants Inc. 19 pages

End of Addendum 1

STRATEGIC

June 17, 2020

Tree Risk Assessment Village Way Path, Gabriola Island

Walter Ernst, RPF (4071), ISA Cert. Arb. (PN-7288AM), TRAQ Cert.

Project ID #: 19-1217-20
Client: Regional District of Nanaimo

PROFESSIONALLY RESOURCEFUL

Table of Contents

1.0 Introduction / Site History

A tree risk assessment (TRA) was completed on behalf of the Regional District of Nanaimo (RDN) for select trees located at the proposed pathway upgrade – 'Village Way Path' by Walter Ernst of Strategic Natural Resource Consultants Inc. (SNRC). The trees were assessed on June 16th, 2020. The purpose of the TRA was to assess the current health, stability, and the overall risk posed by three Douglas-fir (*Pseudotsuga menziesii*) trees located directly adjacent to the proposed pathway upgrade. More specifically the trees are located on the north side of North Road (to the west of Ross Way) and adjacent to the Madrona Marketplace complex. Refer to Figure 1 for the location of the three trees assessed.

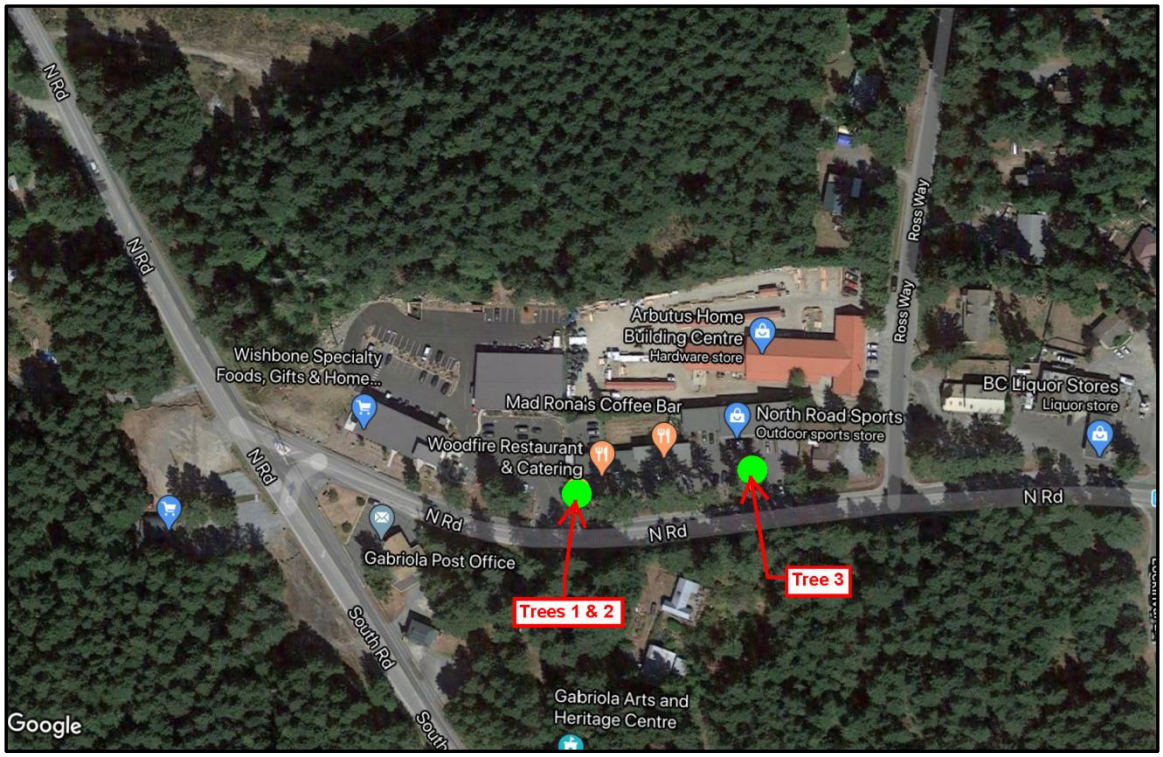


Figure 1: Village Way Path Tree Risk Assessment Location.

Initial discussions between Walter Ernst (SNRC) and Elaine McCulloch (RDN) outlined some general details specific to the trees in question. In addition, the proposed Village Way Path site plan design (Drawing #s 2, 3, and 10 Revision 6 dated June 6, 2020; completed by Newcastle Engineering Ltd.) was provided by the RDN in order to determine if the construction works would have any negative impacts on the long term health of the trees (root impacts specifically).

2.0 Methodology

The three trees were assessed utilizing the 'ISA Tree Risk Assessment Fillable Form' (2013 version). Refer to Appendix I for the ISA Tree Risk Assessment Forms.

Specific tree (overall tree health and any structural concerns) and site characteristics were observed during the assessment with the crown, stem, and root systems assessed individually. The overall risk for each tree was determined based on the following criteria:

- The potential of the tree or tree part to fail,
- The likelihood of the tree or tree part impacting a target (business infrastructure vehicles, or the general public), and
- The consequences of failure.

Diameter at breast height (DBH at 1.3m) and height was determined for each tree. Trees were not marked in the field.

Equipment utilized for the field assessment included a compass, laser, iPad, mallet, suunto clinometers, and a diameter tape.

3.0 Results and Recommendations

The assessment was carried out under sunny and calm weather conditions. The following observations were made with regards to the three trees assessed.

Tree 1:
This tree consists of a smaller intermediate Douglas-fir (*Pseudotsuga menziesii*) of moderate health. The DBH and height of this tree are 33.7cm and 12.3m. Refer to Figures 2 and 3.

Figure 2: Tree #1 Douglas-fir

Figure 3: Tree #1 Douglas-fir

The tree has approximately 45% live crown ratio. Even though the tree looks in poorer form, it still has healthy (green) looking foliage. The base of the stem was sound as determined with a mallet. The root system was not visible and; therefore, difficult to assess. However, given the current condition and location of the tree dripline (critical root zone area) in relation to the existing pavement (parking lot and North Road), there is a low to moderate probability that roots were previously impacted through site changes (drainage, grade, compaction) or through physical damage.

Based on the field observations, the following risks were determined:

- a **low risk** associated with root failure and/or whole tree failure (significant damage to vehicles and/or injury / death to the public if the tree was to fail)

Upon review of the proposed Village Way Path site plan designs, it is anticipated that construction works adjacent to this tree will be minor, and should have minimal impact on the tree or to its root system. The critical root zone (CRZ) where development activities should be avoided or minimized is 4m for this tree.

Recommendations: Retain and monitor this tree for changes to health, structural stability, and associated risks (every 2-3 years).

Tree 2:

This tree consists of a larger Douglas-fir (*Pseudotsuga menziesii*) of poorer health. The tree has two codominant forks at approximately 1.0m on the stem. The DBH and height of this tree are 87.5cm and 29.9m (18.3m for the secondary fork). Refer to Figures 4 to 6.

Figure 4: Tree #2 Douglas-fir. *Porodaedalea pini* conk on main stem.

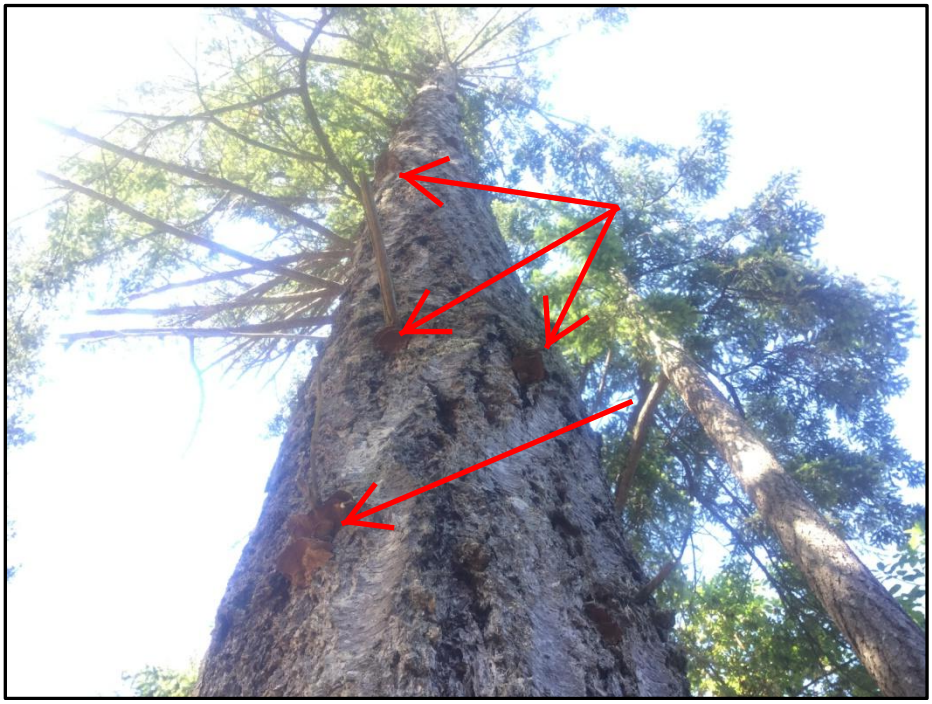


Figure 5: Tree #2 Douglas-fir. *Porodaedalea pini* conks on main stem.

Figure 6: Tree #2 Douglas-fir. Tight fork union (weak attachment).

Crown:
The tree has approximately 51.5% live crown ratio. It was estimated that 70% of the foliage is healthy, 10% is chlorotic (yellowing), and 20% is necrotic (foliage death along twig segments). Heavy thinning was observed within the crown which indicates the tree is in a gradual state of decline.

Main stem:
A significant number of *Porodaedalea pini* conks were observed on the main stem of the tree (minor amount on the secondary fork) which indicates the presence of a column of heartwood and sapwood rot well up the stem. Through sounding it was determined that there are hollow sections in the stem. Additionally, the two forks have a tight union where joined with the potential for included bark resulting in a weaker attachment. Based on the above observations, there is potential for the stem to break off as a result of the high rot component (weak outer supporting shell) or the weaker fork attachment.

Root system:
The root system was not visible and; therefore, difficult to assess. Given the current condition and location of the tree dripline (critical root zone area) in relation to the existing pavement (parking lot and North Road), there is a lower probability that roots were previously impacted through site changes (drainage, grade, compaction) or through physical damage. Approximately 5-10% of the roots within the trees dripline (critical root zone) overlap with the previously established pavement.

Based on the field observations, the following risks were determined:

- a **low to moderate risk** associated with root failure and/or whole tree failure (significant damage to business infrastructure, vehicles and/or injury / death to the public if the tree was to fail).

- a **moderate to high risk** associated with partial or whole tree failure (significant damage to business infrastructure, vehicles and/or injury / death to the public if the tree was to fail).

Recommendations: It is recommended that this tree is either fully removed or wildlife treed at 3-4m (which would reduce the overall risk to low).

Tree 3:
This tree consists of a larger Douglas-fir (*Pseudotsuga menziesii*) of poorer health. The DBH and height of this tree are 63.8cm and 27.2m. Refer to Figures 7 and 8.

Figure 7: Tree #3 Douglas-fir.

Figure 7: Tree #3 Douglas-fir. Thinning and chlorosis in upper crown.

Crown:
The tree has approximately 78% live crown ratio. It was estimated that 25% of the foliage is healthy, 60% is chlorotic (yellowing), and 15% is necrotic (foliage death along twig segments). Heavy thinning and a stress cone crop were observed within the crown which indicates the tree is in a gradual state of decline.

Main stem:
The base of the stem was sound as determined with a mallet. No indicators of rot are present on the stem (e.g. pathogen fruiting bodies, bird activity etc.).

Root system:
The root system was not visible and; therefore, difficult to assess. Given the current condition and location of the tree dripline (critical root zone area) in relation to the existing pavement (parking lot and North Road), there is a moderate probability that roots were previously impacted through site changes (drainage, grade, compaction) or through physical damage. Approximately 30-40% of the roots within the trees dripline (critical root zone) overlap with the previously established pavement.

Based on the field observations, the following risks were determined:

- a **low to moderate risk** associated with root failure and/or whole tree failure (significant damage to business infrastructure, vehicles and/or injury / death to the public if the tree was to fail)

Upon review of the proposed Village Way Path site plan designs, it is anticipated that construction works adjacent to this tree will be minor, and should have minimal impact on the tree or to its root system. The critical root zone (CRZ) where development activities should be avoided or minimized is 6m for this tree.

Recommendations: Retain and monitor this tree for changes to health, structural stability, and associated risks (every 2-3 years).

The overall risk and recommendations for the three trees have been summarized in Table 1 below:

Table 1: Summary of Overall Tree Risk and Recommendations.

Tree #(s)	Species	Overall Risk	Recommendations
1	Douglas-fir	L	Retain and Monitor.
2	Douglas-fir	M-H	Full removal or wildlife tree at 3-4m height.
3	Douglas-fir	L-M	Retain and Monitor.

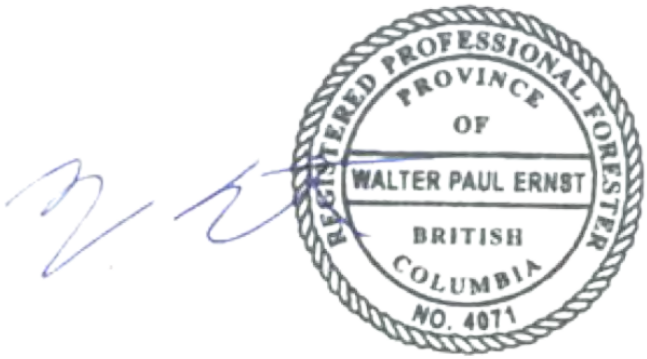
4.0 Limitations

It should be understood that the tree risk assessment is based on the circumstances and observations as they existed at the time of the site inspection (tree health, weather, and soil conditions) and was completed with the tools available (compass, laser, iPad, mallet, suunto clinometer, and diameter tape). Only the trees outlined in the report were assessed. The opinions in this assessment are given based on observations made and using generally accepted professional judgment; however, because trees are living organisms and subject to change, damage, and disease, the results, observations, recommendations, and any analysis as set out in this assessment are valid only for the conditions which were present on the day of assessment.

No guarantee, warranty, representation or opinion is offered or made by as to the length of the validity of the results, observations, recommendations, and analysis contained within this assessment. As a result, the Client shall not rely upon this assessment, save and except for representing the circumstances and observations, analysis and recommendations that were made as at the date of such inspections. It is recommended that the trees discussed in this assessment should be reassessed periodically.

5.0 Signature and Professional Seal

Field work and Report completed by: Walter Ernst, RPF (4071), ISA Cert. Arb. (PN-7288AM), and TRAQ Cert.

Signature and Seal
 **17/06/20**
Date (dd/mm/yy)

Appendix I – ISA Basic Tree Risk Assessment Forms

Basic Tree Risk Assessment Form

Client RDN Parks Operations Date 2020-06-16 Time 9:53am

Address/Tree location Madrona Marketplace East (Village Way Path) Tree no. 1 Sheet _____ of _____

Tree species Douglas-fir (Pseudotsuga menziesii) dbh 33.7m Height 12.3m Crown spread dia. 8m

Assessor(s) Walter Ernst, RPF, ISA Cert. Arb., TRAQ Cert. Time frame 2-3 Tools used Mallet, compass, iPad, Dtape, laser, suunto

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target zone: Target within 1 x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate (1–rare 2–occasional 3–frequent 4–constant)	Practical to move target?	Restriction practical?
1	Public	✔	✔	✔	3	No	No
2	Moving cars (parking lot access road)		✔	✔	3	No	No
3							
4							

Site Factors

History of failures None observed. **Topography** Flat ■ Slope ☐ 5-10 % **Aspect** 354

Site changes None ☐ Grade change ■ Site clearing ☐ Changed soil hydrology ■ Root cuts ■ Describe Adjacent paved parking and main road.

Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ■ Pavement over roots ■ 15-20 % Describe Parking lot / main road

Prevailing wind direction SE **Common weather** Strong winds ■ Ice ☐ Snow ☐ Heavy rain ■ Describe Winter storm winds

Tree Health and Species Profile

Vigor Low ■ Normal ■ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 85 % Chlorotic _____ % Necrotic 15 %

Pests Unknown. **Abiotic** Potential decline due to previous site changes.

Species failure profile Branches ☐ Trunk ☐ Roots ☐ Describe Nothing obvious.

Load Factors

Wind exposure Protected ■ Partial ☐ Full ☐ Wind funneling ☐ Stand of trees across road **Relative crown size** Small ■ Medium ☐ Large ☐

Crown density Sparse ■ Normal ■ Dense ☐ **Interior branches** Few ■ Normal ☐ Dense ☐ **Vines/Mistletoe/Moss** ☐ None.

Recent or planned change in load factors None.

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 45 %

Dead twigs/branches ■ 2-3 % overall Max. dia. 2-3

Broken/Hangers Number _____ Max. dia. _____

Over-extended branches ☐

Pruning history

Crown cleaned ☐ Thinned ☐ Raised ☐

Reduced ☐ Topped ☐ Lion-tailed ☐

Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐

Codominant ☐ _____ Included bark ☐

Weak attachments ☐ _____ Cavity/Nest hole ____ % circ.

Previous branch failures ☐ _____ Similar branches present ☐

Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐

Conks ☐ Heartwood decay ☐ _____

Response growth _____

Main concern(s) None imminent. Smaller intermediate tree.

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐ _____

Likelihood of failure Improbable ■ Possible ☐ Probable ☐ Imminent ☐ _____

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐

Codominant stems ☐ Included bark ☐ Cracks ☐

Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐

Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐

Cavity/Nest hole _____ % circ. Depth _____ Poor taper ☐

Lean _____° Corrected? _____

Response growth _____

Main concern(s) None. Stem seemed sound at base when sounding with mallet.

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure

Improbable ■ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth _____ Stem girdling ☐

Dead ☐ Decay ☐ Conks/Mushrooms ☐

Ooze ☐ Cavity ☐ _____ % circ.

Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____

Root plate lifting ☐ Soil weakness ☐

Response growth _____

Main concern(s) Previous damage or site changes.

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure

Improbable ■ Possible ☐ Probable ☐ Imminent ☐

Risk Categorization

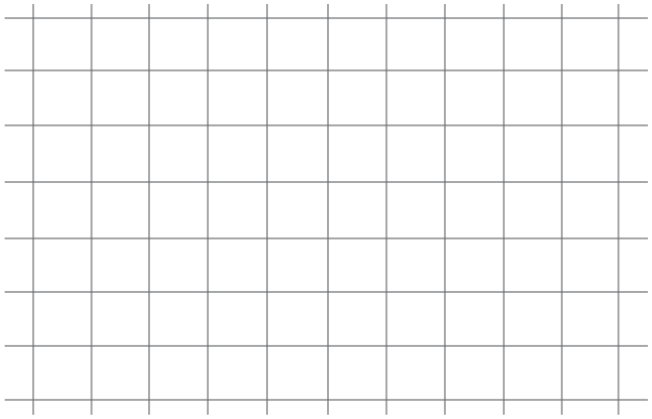
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Likelihood: Failure: Possible	Likelihood: Failure: Probable	Likelihood: Failure: Imminent	Likelihood: Impact: Very low	Likelihood: Impact: Low	Likelihood: Impact: Medium	Likelihood: Impact: High	Likelihood: Failure & Impact (from Matrix 1): Unlikely	Likelihood: Failure & Impact (from Matrix 1): Somewhat	Likelihood: Failure & Impact (from Matrix 1): Likely	Likelihood: Failure & Impact (from Matrix 1): Very likely	Consequences: Negligible	Consequences: Minor	Consequences: Significant	Consequences: Severe	Risk rating of part (from Matrix 2)
1	Roots / whole tree	Damage to vehicles and death / injury to public.	33.7	12.5	1	None	●	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
			33.7	12.5	2	None	●	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
							●	○	○	○	○	○	○	●	○	●	○	○	○	○	●	○	
2							○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
4							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

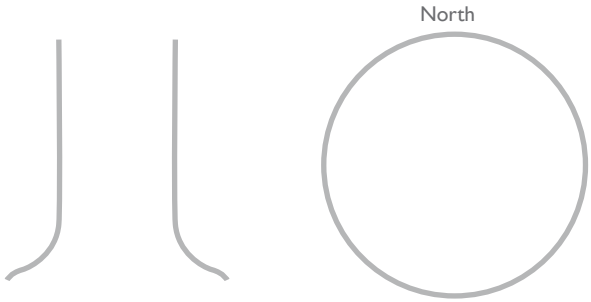
Matrix 1. Likelihood matrix.

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





Notes, explanations, descriptions No immediate concerns with tree. Monitor for decline and future risk.

Mitigation options None. **Residual risk**

Residual risk

Residual risk

Residual risk

Overall tree risk rating Low ■ Moderate ☐ High ☐ Extreme ☐ **Work priority** 1 ☐ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ☐ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** 2-3 years

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason

Inspection limitations ☐ None ■ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe Hard to see roots fully.

Basic Tree Risk Assessment Form

Client RDN Parks Operations Date 2020-06-16 Time 9:53am

Address/Tree location Madrona Marketplace East (Village Way Path) Tree no. 2 Sheet _____ of _____

Tree species Douglas-fir (Pseudotsuga menziesii) dbh 87.5cm Height 29.9 / 18.3m Crown spread dia. 10m

Assessor(s) Walter Ernst, RPF, ISA Cert. Arb., TRAQ Cert. Time frame 2-3 Tools used Mallet, compass, iPad, Dtape, laser, suunto

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target zone: Target within 1 x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate (1–rare 2–occasional 3–frequent 4–constant)	Practical to move target?	Restriction practical?
1	Public	✔	✔	✔	3	No	No
2	Adjacent business infrastructure		✔	✔	4	No	No
3	Parked cars (parking lot)		✔	✔	3	No	No
4	Vehicles on main road	✔	✔	✔	3	No	No

Site Factors

History of failures None observed. **Topography** Flat ■ Slope ☐ 5-10 % **Aspect** 354

Site changes None ☐ Grade change ■ Site clearing ☐ Changed soil hydrology ■ Root cuts ■ Describe Adjacent paved parking and main road.

Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ■ 5-10 % Describe Parking lot / main road

Prevailing wind direction SE **Common weather** Strong winds ■ Ice ☐ Snow ☐ Heavy rain ■ Describe Winter storm winds

Tree Health and Species Profile

Vigor Low ■ Normal ☐ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 70 % Chlorotic 10 % Necrotic 20 %

Pests Unknown. **Abiotic** Potential decline due to previous site changes.

Species failure profile Branches ☐ Trunk ☐ Roots ☐ Describe Nothing obvious.

Load Factors

Wind exposure Protected ■ Partial ☐ Full ☐ Wind funneling ☐ Stand of trees across road b **Relative crown size** Small ☐ Medium ■ Large ☐

Crown density Sparse ■ Normal ☐ Dense ☐ **Interior branches** Few ■ Normal ☐ Dense ☐ **Vines/Mistletoe/Moss** ☐ None.

Recent or planned change in load factors None.

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 51.5 %

Dead twigs/branches ■ 5 % overall Max. dia. 5-7cn

Broken/Hangers Number _____ Max. dia. _____

Over-extended branches ☐

Pruning history

Crown cleaned ☐ Thinned ☐ Raised ☐

Reduced ☐ Topped ☐ Lion-tailed ☐

Flush cuts ☐ Other Previously pruned.

Cracks ☐ _____ Lightning damage ☐

Codominant ☐ _____ Included bark ☐

Weak attachments ☐ _____ Cavity/Nest hole ____ % circ.

Previous branch failures ■ Broken off. Similar branches present ■

Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ■

Conks ■ Heartwood decay ■ Porodaedalea pini conks

Response growth Observed - heartwood and sapwood rot.

Main concern(s) Heavy thinning in upper crown. Potential breakage in crown due to heart rot (weak points).

Load on defect N/A ☐ Minor ■ Moderate ☐ Significant ☐

Likelihood of failure Improbable ☐ Possible ■ Probable ☐ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐

Codominant stems ■ Included bark ☐ Cracks ☐

Sapwood damage/decay ■ Cankers/Galls/Burls ☐ Sap ooze ■

Lightning damage ☐ Heartwood decay ■ Conks/Mushrooms ■

Cavity/Nest hole _____ % circ. Depth _____ Poor taper ☐

Lean _____ ° Corrected? Minor sap ooze.

Response growth Unknown. Codom forks with included bark.

Main concern(s) Significant Porodaedalea pini conks up main fork (minor up sec. fork). See pg 2 for more details.

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ■

Likelihood of failure

Improbable ☐ Possible ■ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth _____ Stem girdling ☐

Dead ☐ Decay ☐ Conks/Mushrooms ☐

Ooze ☐ Cavity ☐ _____ % circ.

Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____

Root plate lifting ☐ Soil weakness ☐

Response growth _____

Main concern(s) Previous damage or site changes to Roots unknown. Potential rot extends from stem to roots.

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ■

Likelihood of failure

Improbable ☐ Possible ■ Probable ☐ Imminent ☐

Risk Categorization

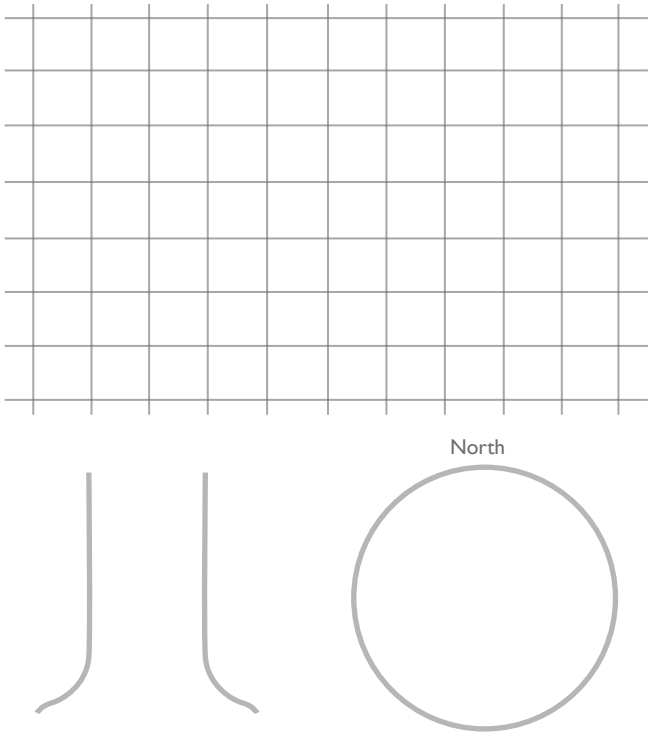
Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Likelihood: Failure: Possible	Likelihood: Failure: Probable	Likelihood: Failure: Imminent	Likelihood: Impact: Very low	Likelihood: Impact: Low	Likelihood: Impact: Medium	Likelihood: Impact: High	Likelihood: Failure & Impact (from Matrix 1): Unlikely	Likelihood: Failure & Impact (from Matrix 1): Somewhat	Likelihood: Failure & Impact (from Matrix 1): Likely	Likelihood: Failure & Impact (from Matrix 1): Very likely	Consequences: Negligible	Consequences: Minor	Consequences: Significant	Consequences: Severe	Risk rating of part (from Matrix 2)
1	Roots	Decrease in root health leading to tree decline and increase in risk.	87.5	30	1	None	○	●	○	○	○	○	●	○	●	○	○	○	○	○	○	●	Low
			87.5	30	2	None	○	●	○	○	○	○	○	●	○	●	○	○	○	○	○	●	Mod
			87.5	30	3	None	○	●	○	○	○	○	○	●	○	●	○	○	○	○	●	○	Mod
2			87.5	30	4	None	○	●	○	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3	Main stems	Whole or partial tree failure causing damage / death or injury.	87.5	20-30	1	None	○	○	●	○	○	○	●	○	○	●	○	○	○	○	○	●	Mod
			87.5	20-30	2	None	○	○	●	○	○	○	○	●	○	○	●	○	○	○	○	●	High
			87.5	20-30	3	None	○	○	●	○	○	○	○	●	○	○	●	○	○	○	●	○	High
4			87.5	20-30	4	None	○	○	●	○	○	●	○	○	●	○	○	○	○	○	○	●	Low
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

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



Notes, explanations, descriptions

Mod to high risk tree. Main concerns are stem breakage, fork split off
Where have included bark. Carpenter ants observed on bark.
17m to building. Extensive heart rot, sounding indicates hollow column
up main stem. Weak points / breakage.

Mitigation options

Full removal of tree or wildlife them 4m height.

Residual risk Low

Residual risk

Residual risk

Residual risk

Overall tree risk rating Low ☐ Moderate ■ High ■ Extreme ☐

Work priority 1 ■ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ■ Moderate ☐ High ☐ Extreme ☐

Recommended inspection interval

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason

Inspection limitations ☐ None ■ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe Hard to see in uppermost crown and most of roots.

Basic Tree Risk Assessment Form

Client RDN Parks Operations Date 2020-06-16 Time 9:04am

Address/Tree location Madrona Marketplace East (Village Way Path) Tree no. 3 Sheet _____ of _____

Tree species Douglas-fir (Pseudotsuga menziesii) dbh 63.8cm Height 27.2m Crown spread dia. 12m

Assessor(s) Walter Ernst, RPF, ISA Cert. Arb., TRAQ Cert. Time frame 2-3 Tools used Mallet, compass, iPad, Dtape, laser, suunto

Target Assessment

Target number	Target description	Target zone: Target within drip line	Target zone: Target within 1 x Ht.	Target zone: Target within 1.5 x Ht.	Occupancy rate (1–rare 2–occasional 3–frequent 4–constant)	Practical to move target?	Restriction practical?
1	Public	✔	✔	✔	3	No	No
2	Adjacent business infrastructure			✔	4	No	No
3	Parked cars	✔	✔	✔	3	No	No
4							

Site Factors

History of failures None observed. **Topography** Flat ■ Slope ☐ 8 % **Aspect** 322

Site changes None ☐ Grade change ■ Site clearing ☐ Changed soil hydrology ■ Root cuts ■ Describe Adjacent paved parking and main road.

Soil conditions Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ■ Pavement over roots ■ 30-40 % Describe Parking lot / main road

Prevailing wind direction SE **Common weather** Strong winds ■ Ice ☐ Snow ☐ Heavy rain ■ Describe Winter storm winds

Tree Health and Species Profile

Vigor Low ■ Normal ☐ High ☐ **Foliage** None (seasonal) ☐ None (dead) ☐ Normal 25 % Chlorotic 60 % Necrotic 15 %

Pests Unknown. **Abiotic** Potential decline due to previous site changes.

Species failure profile Branches ☐ Trunk ☐ Roots ☐ Describe Nothing obvious.

Load Factors

Wind exposure Protected ■ Partial ☐ Full ☐ Wind funneling ☐ Stand of trees across road. **Relative crown size** Small ☐ Medium ■ Large ☐

Crown density Sparse ☐ Normal ■ Dense ☐ **Interior branches** Few ☐ Normal ■ Dense ☐ **Vines/Mistletoe/Moss** ☐ None.

Recent or planned change in load factors None.

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 78 %

Dead twigs/branches ■ 2-3 % overall Max. dia. 5cm

Broken/Hangers Number _____ Max. dia. _____

Over-extended branches ☐

Pruning history

Crown cleaned ☐ Thinned ☐ Raised ☐

Reduced ☐ Topped ☐ Lion-tailed ☐

Flush cuts ☐ Other _____

Cracks ☐ _____ Lightning damage ☐

Codominant ☐ _____ Included bark ☐

Weak attachments ☐ _____ Cavity/Nest hole ____% circ.

Previous branch failures ☐ _____ Similar branches present ☐

Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐

Conks ☐ Heartwood decay ☐ _____

Response growth _____

Main concern(s) None imminent. Heavy thinning and stress come crop in upper crown (response to potential root issues). Looks like small portion of main leader previously broke off.

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐ _____

Likelihood of failure Improbable ■ Possible ☐ Probable ☐ Imminent ☐ _____

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐

Codominant stems ☐ Included bark ☐ Cracks ☐

Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐

Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐

Cavity/Nest hole _____ % circ. Depth _____ Poor taper ☐

Lean 320 ° Corrected? Yes, very slight lean.

Response growth _____

Main concern(s) None. Stem seemed sound at base when sounding with mallet. Very minor sapsucker holes at base.

Load on defect N/A ■ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure

Improbable ■ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth _____ Stem girdling ☐

Dead ☐ Decay ☐ Conks/Mushrooms ☐

Ooze ☐ Cavity ☐ _____% circ.

Cracks ☐ Cut/Damaged roots ☐ Distance from trunk _____

Root plate lifting ☐ Soil weakness ☐

Response growth _____

Main concern(s) Previous damage or site changes may have impacted long term health of tree.

Load on defect N/A ☐ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure

Improbable ☐ Possible ■ Probable ☐ Imminent ☐

Risk Categorization

Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood: Failure: Improbable	Likelihood: Failure: Possible	Likelihood: Failure: Probable	Likelihood: Failure: Imminent	Likelihood: Impact: Very low	Likelihood: Impact: Low	Likelihood: Impact: Medium	Likelihood: Impact: High	Likelihood: Failure & Impact (from Matrix 1): Unlikely	Likelihood: Failure & Impact (from Matrix 1): Somewhat	Likelihood: Failure & Impact (from Matrix 1): Likely	Likelihood: Failure & Impact (from Matrix 1): Very likely	Consequences: Negligible	Consequences: Minor	Consequences: Significant	Consequences: Severe	Risk rating of part (from Matrix 2)
1	Roots	Decrease in Root health leading to tree decline and increase in risk.	63.8c	30m	1	None	○	●	○	○	○	○	●	○	●	○	○	○	○	○	○	●	Low
			63.8c	30m	2	None	○	●	○	○	○	○	○	●	○	●	○	○	○	○	○	●	Mod
			63.8c	30m	3	None	○	●	○	○	○	○	○	●	○	●	○	○	○	○	●	○	Mod
2							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
4							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

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Matrix 2. Risk rating matrix.

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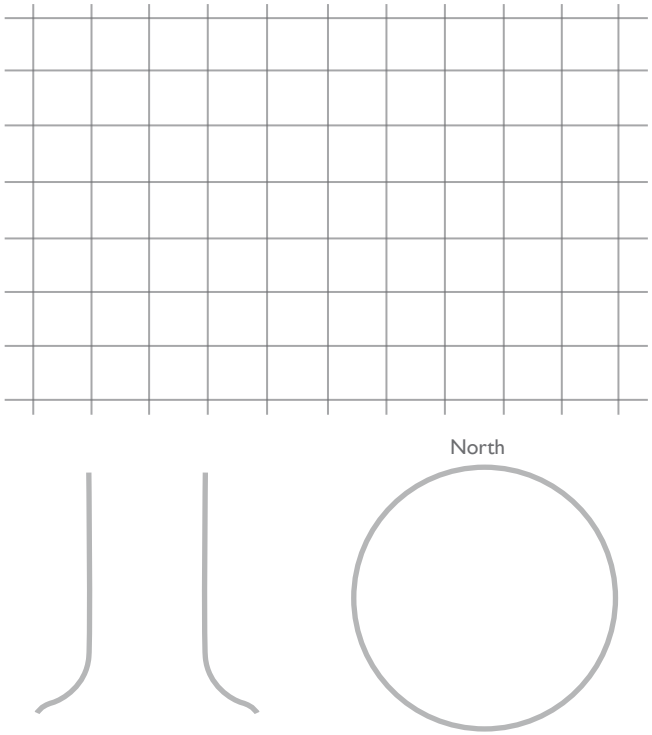

Notes, explanations, descriptions No immediate concerns with tree. Monitor for decline and future risk. 19m to building.

Mitigation options None. **Residual risk**

Residual risk

Residual risk

Residual risk

Overall tree risk rating Low ■ Moderate ■ High ☐ Extreme ☐ **Work priority** 1 ☐ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ☐ Moderate ☐ High ☐ Extreme ☐ **Recommended inspection interval** 2-3 years

Data ■ Final ☐ Preliminary **Advanced assessment needed** ■ No ☐ Yes-Type/Reason

Inspection limitations ☐ None ■ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe Hard to see in uppermost crown and most roots.