

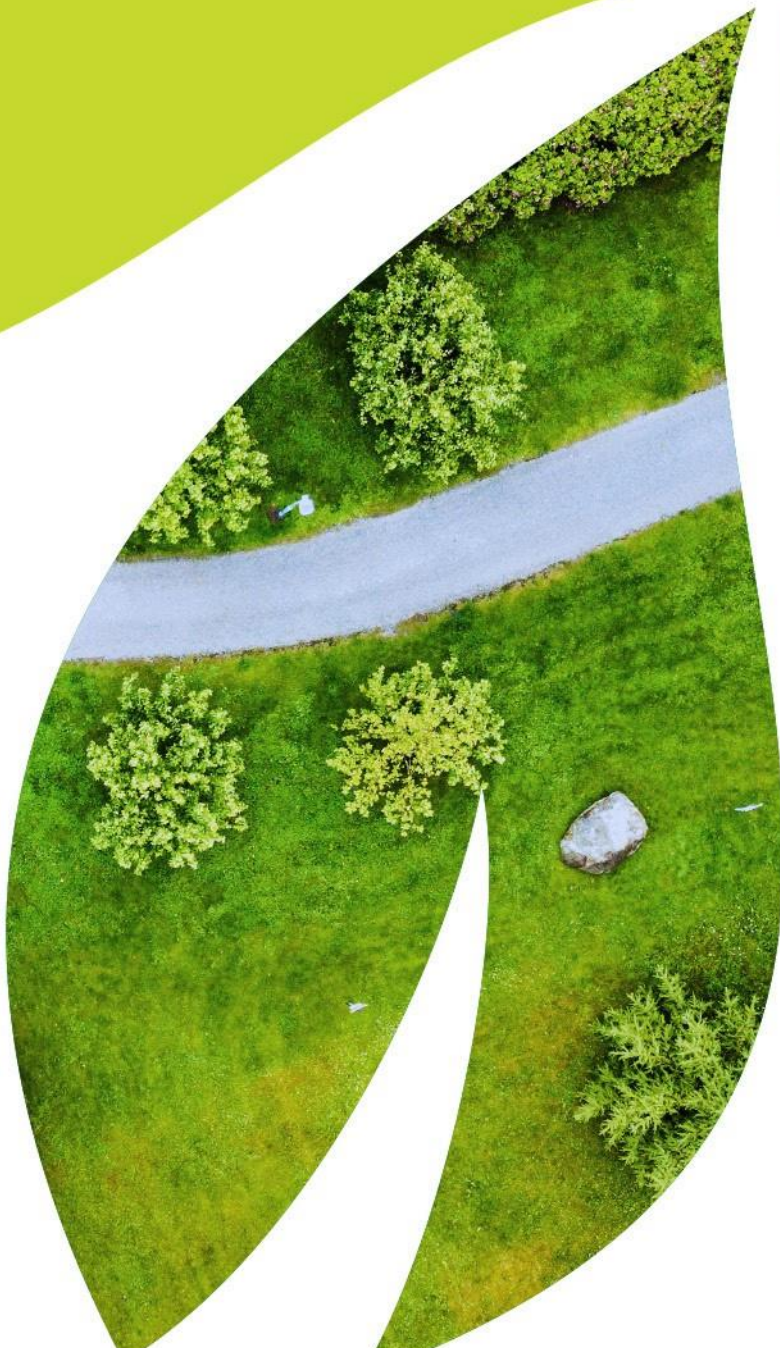


Creating Green Space
Sustainability

Arboricultural Report

Redwood Rows

Wendywood Lane and Ruatara
Drive, Kerikeri





Arboricultural Report

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Abstract

Trees can provide a wide variety of benefits, as well as potential risks. Tree safety management is a matter of balancing the two. Tree failures can have significant consequences to health and safety, and result in property damage. Risk assessments are often applied to guide decisions regarding the safety of trees and to mitigate the potential impacts of full or partial failure. Understanding and being able to manage risk may help reduce preventable tree failures and unnecessary removals.

Risk is often defined as the probability of some specified adverse event occurring within a specified time interval, using a combination of the likelihood of an event occurring and the severity of its potential consequences. Typically, risk considers the likelihood that all or part of the tree will fail, the likelihood of the target being present/struck and the consequences of failure. Also considered as part of the assessment are environmental factors, such as soil, precipitation, pests, etc, which might cause failure, species-specific failure profiles, and site history.

1. Introduction

1. Arborlab Consultancy Services Limited has been engaged by Far North District Council to undertake an arboricultural assessment of two separate rows of Redwood trees (*Sequoia sempervirens*) growing within Council land near Wendywood Lane and Ruatara Drive, Kerikeri.
2. The trees were inspected on 28 October 2020. The findings and recommendations contained herein are based on the visual assessments undertaken on this date.
3. The purpose of this report is to identify risk posed by the trees, provide a baseline condition for any future tree assessments and recommend management recommendations to mitigate and minimise risk.
4. The risk assessments were carried out using the Quantified Tree Risk Assessment (QTRA) method. Occupation rates on the use of the site and the adjacent public land were estimated. For further information on tree risk methodology and limitations please refer to Appendix A.

Site Description

5. The two sites are located near central Kerikeri. One row of the trees is located between Wendywood Lane carriageway and a carpark at New World supermarket. The other row is located between Kerikeri Retirement Village to the south and other private residential to the north.
6. Both rows of trees are linear groups of mature redwoods (*Sequoia sempervirens*). The two sites and locations of the subject trees are depicted in Figures 1 and 5 below.



Figure 1: Group of redwood at Wendywood Lane circled.



Figure 2 - Northern end of Wendywood Lane trees, viewed from Wendywood Lane.



Figure 3 - Northern end of Wendywood Lane trees, viewed from New World carpark.



Figure 4: Pedestrian 'desire-line' beneath trees at Wendywood Lane.



Figure 5: Group of redwood at Ruatara Drive circled.



Figure 6: Southern aspect of trees at Ruatara Drive.



Figure 7: Northern aspect of trees at Ruatara Drive.



2. Findings

9. The following table provides an average description of the trees within both the groups of redwoods.

Table 1: Tree Inventory

Botanical Name	Common Name	Height (m)	Girth at 1.8m above ground level (mm)	Crown Spread (m)	Form	Structure	Vitality (Health)	Age Class
<i>Sequoia sempervirens</i>	Redwood	34	3000	10	Good	Good	Fair	Mature

Visual Tree Assessment

Wendywood Lane Tree Row

10. A supermarket, and associated car-park was constructed to the south of the western end of the trees at Wendywood Lane. To the north of the majority of the trees is a public, cul-de-sac road. The eastern end of the group has a sports field to the south and residential dwellings to the north.
11. The trees are assessed to have generally fair vitality. Some of the trees have thinner foliar cover than others and a number of trees have epicormic shoots on their main stems. This symptom can be a response to stress, which can also impact vitality. The response is likely to be a result of changes in the trees' growing environment, and potentially damage caused to their root systems during development of the supermarket carpark. No trees in this row presented any major structural issues, such as major deadwood, cavities, fungal fruiting bodies or severe leans. It was noted that a number of trees have been removed (stumps within group noted) and several trees have had their tops removed, though at the time of report, no reasons for these removals have been provided.

12. Ruatara Drive Tree Row

13. The group at Ruatara Drive has a retirement village to the south and residential dwellings to the north. This group could generally be described as having slightly better health/vitality than the trees at Wendywood Lane. No major structural issues were visibly evident.



QTRA Analysis

14. When considering the level of risk posed by trees, the scenario with most severe consequence is assessed. If, through the basic principles of QTRA (land use/target occupancy, size of part likely to fail and the probability of failure), it is found that the Annual Risk of Harm (ARoH) is assessed to be Broadly Acceptable, a level 2 or 3 tree assessment (more detailed) is generally not considered to be warranted.
15. With regard to the Wendywood Lane trees, the most severe consequence is the failure is of a lateral branch failing and contacting a vehicle parked in the super market car park.
16. With regard to the trees at Ruatara Drive the most severe consequence is the failure is of a lateral branch failing and contacting a dwelling.
17. The annual risk of harm of both these failure risks were assessed to be within the Broadly Acceptable range ($<1/1,000,000$ ARoH), within the QTRA framework.

3. Discussion

18. The trees at Wendywood Lane have a reduced vitality, likely due to alterations to their growing environment over time. This may have resulted in the removal of some trees and the decline of others, to the extent that their tops (having died from the top down) have been removed.
19. No dead trees, or trees in severe decline (with dead tops) were noted during the assessment. Some trees were noted to have reduced vitality, which in isolation does not increase the probability of failure or the ARoH.
20. In order to improve the long-term prognosis of their successful retention, the health of both groups should be monitored and measures could be implemented to improve health. A simple and cost-effective way to improve tree health is by adding well-aged tree mulch to as much of the permeable root zone area as possible. This improves soil health and water retention within the soil during dry periods.

4. Conclusions

21. In general, the trees have a reduced level of vigour and vitality.
22. The level of risk associated with both groups is assessed to be within the Broadly Acceptable range.

5. Recommendations

23. The trees are reassessed every two years by a suitably qualified arborist.
24. Where possible, add well aged tree mulch to the trees' root zones. Mulch should be limited to a maximum depth of 100mm and should not be in contact with the trees' trunks.





Appendix A – Assessment Methodology, Limitations, Summary of QTRA and Duty of Care

Limitations

1. This assessment of the tree has been undertaken to determine the risk posed and provide measures to mitigate the risk; no assessment or reference on the trees' values and benefits have been evaluated.
2. A Visual Tree Assessment (VTA) consistent with modern arboricultural practices (Mattheck and Breloer, 1994) was conducted on 28 October 2020. The model is derived from the principles of biomechanics and uses the trees' growth responses and form as a way of detecting and if necessary, investigating potential issues that can increase the likelihood of tree or branch failure.
3. All observations were made from ground level only and the trees were assessed as a group as a Level 1 assessment. The inspection was limited to a Level 1 assessment, which is focused on identifying trees with imminent and/or probable likelihood of failure. In a Level 1 visual assessment, the assessor is looking for obvious defects such as, but not limited to dead trees, large cavity openings, large dead or broken branches, fungal fruiting bodies, large cracks and severe leans.
4. Hand-held devices have been used to record data onsite. Trunk height, girth and crown spread were estimated.
5. A risk assessment was carried out using the Quantified Tree Risk Assessment (QTRA) method. Occupation rates on the use of the site and the adjacent public land were estimated.
6. No decay detecting equipment, such as a Picus tomograph or Resitograph was used as part of the inspection process.
7. No soil analysis, tissue sampling and/or geological investigations were carried out and all data was collected without the use of any invasive and/or diagnostic tools.
8. It should be noted that trees are dynamic organisms by nature and are exposed to varying weather conditions, which on occasion can be severe. In general, risk assessments are undertaken with consideration to normal weather conditions experienced over a 12-month period. While the QTRA model is a very useful tool, there are necessary limits to its ability to predict tree failure. The QTRA method looks for what is most likely to happen as a probability, not a prediction. Importantly, probability of failure (PoF) is expressed as an annual probability under normal weather conditions across the year. This is because trees can generally be expected to have adapted to their environment to meet these normal conditions. Weather that departs significantly from 'normal' conditions may produce a different failure rate.
9. This report provides an Annual Risk of Harm (ARoH) using the framework of QTRA. While QTRA provides advisory thresholds to assist risk decision making, it is for the tree manager/owner to adopt these or other thresholds, having taken account of their own



management priorities, objectives and resources, and the potential impact on third parties. In some occasions, the ARoH may not reflect arboricultural best practice, in as such, the management of the tree needs to be considered in regards to best practice, albeit this will be led by target prioritisation.



Quantified Tree Risk Assessment

1. Quantified Tree Risk Assessment (QTRA) is an internationally recognised model, which enables accredited users to determine the annual risk of harm (ARoH) from tree and branch failure. The assessment process involves:
 - An analysis of the land use adjacent to the tree in terms of its vulnerability to an impact and its likely occupation
 - A consideration of the likely consequences of an impact based on the size of the tree/branch
 - An estimate of the probability that the tree or branch will fail within the coming 12 months (based on prevailing weather conditions for the geographical location)
25. QTRA expresses the annual risk of harm from tree or branch failure as a probability. Advisory thresholds contained within the QTRA model enable tree owners to determine their 'tolerability' of a given risk and decide what, if any, action is needed to manage the risk.
26. QTRA's advisory thresholds are based on the Tolerability of Risk Framework (ToR). ToR is a conceptual model developed by the UK's Health and Safety Executive. By taking into account the magnitude of a risk and the level of societal concern it is likely to engender, ToR enables risks to be categorised into one of three defined 'tolerability regions'.
27. Some risks will be of such magnitude they are simply unacceptable to society regardless of the benefits that might be derived. Others risks are considered to be so insignificant they are regarded as being broadly acceptable in the context of daily life. Other risks will generally be tolerated by society so that the associated benefits can be secured as long as the risk is managed in a way that it is as low as reasonably practical (a concept referred to as ALARP).
28. Table 1 is an abridged version of the 'tolerability regions' incorporated into QTRA's advisory thresholds.

Table 1: QTRA Advisory thresholds

Tolerability region	Annual of risk of harm
Unacceptable risk	Risks >1/10,000
Tolerable risk	Risks between 1/10,000 and 1/1,000,000
Broadly acceptable risk	Risks <1/1,000,000

29. Even though QTRA's advisory thresholds provide a robust, proportionate and defensible framework for managing the risk of harm from tree and branch failure the factors and processes which ultimately determine the tolerability of a given risk are dynamic in nature, and can vary, depending on a multitude of factors. This makes it important that tree owners ultimately decide, based on their local circumstances, objectives and priorities what constitutes an acceptable, tolerable and unacceptable level of risk.



Duty of care

- a. The owner of the land on which a tree stands, together with any party who has control over the tree(s) owes a duty of care to ensure:
 - that insofar as is reasonably practical that people and property are not exposed to unreasonable levels of risk from tree failure.
 - reasonable care is taken to avoid acts or omissions that cause a reasonably foreseeable risk of injury/harm to persons or property.
- b. The concept of ‘a reasonably foreseeable risk of harm’ reflects the potential for healthy and structurally sound trees to occasionally fail and the practical limitations associated with identifying any asymptomatic degradation in roots, stems and branches.