Appendix AA Tree Risk Assessment

Fast-Track Approvals Act 2024 Substantive Application

Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

19 August 2026

Nathan Hughes
Independent arborist consultant

Tree risk assessment

Harmony Energy NZ #6 Limited
8902 State Highway 27, Okoriore

Phone: [redacted]
Email: [redacted]
www.arboristconsultant.co.nz

NZARB
New Zealand Arboricultural Association Inc.
STANDARD MEMBER

Nathan Hughes
Dip. Arboriculture (Distinction)

Contents

Appendices

1. Statement of experience and qualifications

My name is Nathan Hughes, I am an independent arborist consultant.
I have 15 years' experience in the arboriculture industry.

My qualifications:
Diploma in Arboriculture (Level 6) with Distinction.
International Society of Arboriculture Tree Risk Assessment Qualification.
Advanced Certificate in Arboriculture with Distinction.
Certificate of Horticultural Practice with Distinction.
Copies of my qualification certificates are in the appendices.

I have read and understood the Environment Court Practice Note 2023 (Code of Conduct for Expert Witnesses) and confirm that this report has been prepared in compliance with that Code of Conduct.

2. Introduction

2.1. This tree risk assessment was conducted at 8302 State Highway 27, Okoroire.
This assessment was commissioned by Christina Walker, planning director for Harmony Energy NZ #6 Limited.

2.2. The subject of this assessment was a line of poplar trees beside the tanker race. These are referred to as the 'subject trees' throughout this report.
The on-site inspection was completed May 13, 2026.
This report was completed May 22, 2026.

2.3. The purpose of this tree risk assessment was to determine the risk of harm presented by the subject trees, and to make recommendations to manage any risks that may be present.

2.4. All observations and recommendations in this report are a result of the assessment at the time of inspection. The risks presented by the subject tree(s) will change over time.

3. Method

3.1. The trees were given a brief visual inspection to assess their overall health and structural condition.

3.2. The inspection was carried out from ground level only. An aerial tree inspection[1], or an analysis of defects using diagnostic equipment was not carried out. Excavation of soil or removal of grass or other vegetation to inspect the root crown and roots was not undertaken.

3.3. General observations of the site and the subject trees have been recorded.

[1] An aerial tree inspection is where a tree is inspected above ground level. This is carried out by an arboricultural consultant using arboricultural climbing techniques. This allows a far more thorough inspection of the tree than a visual inspection from ground level only. Individual defects are able to be examined in more detail, and often defects are identified that are not visible from the ground.

4. Tree location

4.1. Property description: Dairy farm.

4.2. The subject trees form a line of trees beside the tanker race. The trees overhang the tanker race.

4.3. The tanker race serves as the main entry into the farm and is accessed by people and vehicles on a daily basis.

4.4. Targets:[2]: People, vehicles, and fences.

4.5. Photos showing the subject trees are below.

Photo 1

[2] A target is a person, a building, or another item which could be impacted if a tree or any part of a tree fails.

Photo 2

Photo 3

Phone: [redacted]
Email: [redacted]
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Photo 4

5. Basic tree information

5.1. Species: *Populus spp.*

5.2. General observations of the species:
Deciduous.
Growth speed: Fast.
Positive attributes: Rapid establishment of large trees.
Negative attributes: The wood is light and weak which pre-disposes the limbs and trunks to breakage.

5.3. Measurements
Tree height: 30-35 metres.
Total canopy length of the line of trees: 140 metres.

6. Tree health

6.1. It must be understood that the health of a tree and the structural condition of a tree are both different considerations. A tree may be in good health, but at the same time it may have poor structural condition, or vice versa.

6.2. Tree health observations:
Life stage: Mature.
Foliage: As the leaves had changed colour for Autumn, and many of the leaves had been shed it was not possible to accurately assess the foliage cover percentage, the foliage density or the foliage colour.
Leaf size: Normal.
Vigour: Good.
Woundwood and reaction wood[3] growth: Excellent.

6.3. Pests & diseases: None Significant.

[3] Where a defect in a tree is causing strength loss, a tree will often put on extra wood growth around the weakened area to increase the strength of that area.

7. Observations

7.1. There was evidence of a large number of trunk and limb failures over a long period of time. The photos below are some examples of the failures.

Photo 5

Photo 6

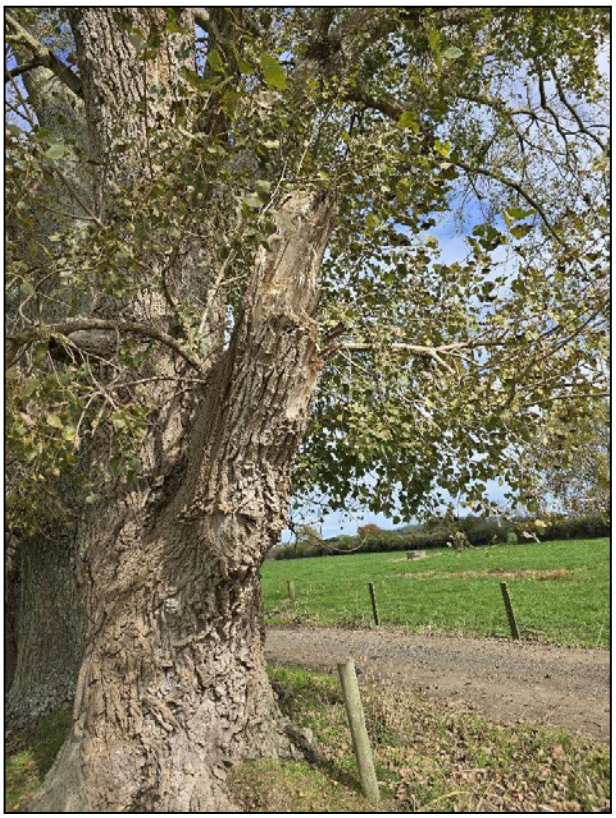

Photo 7

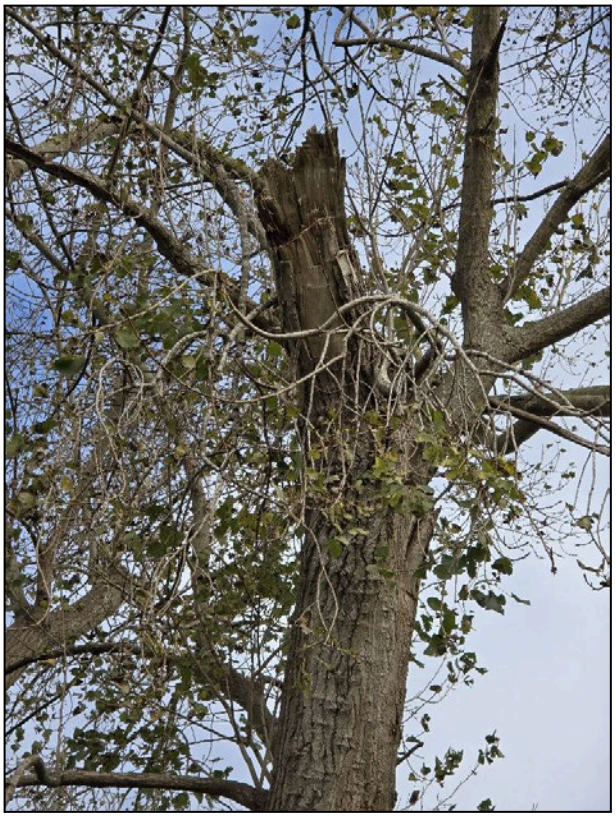

Photo 8

Phone: [redacted]
Email [redacted]
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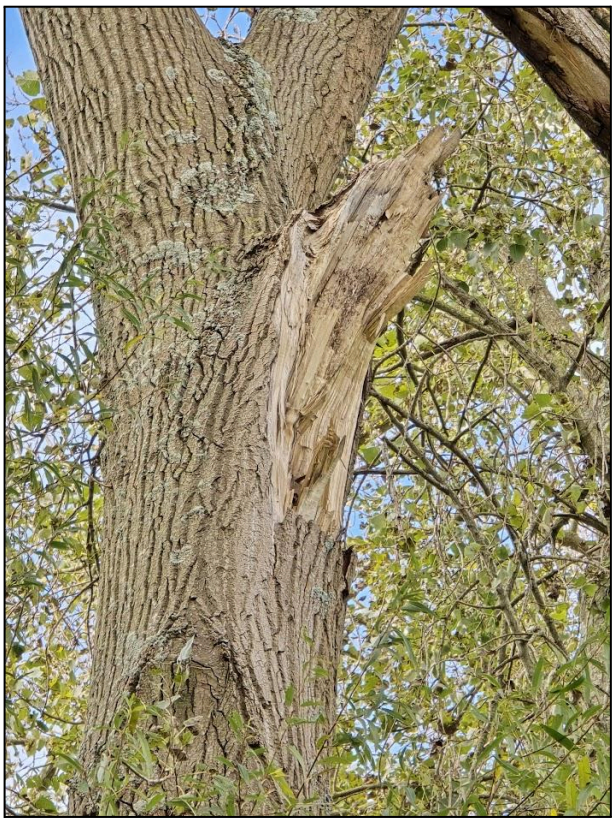

Photo 9

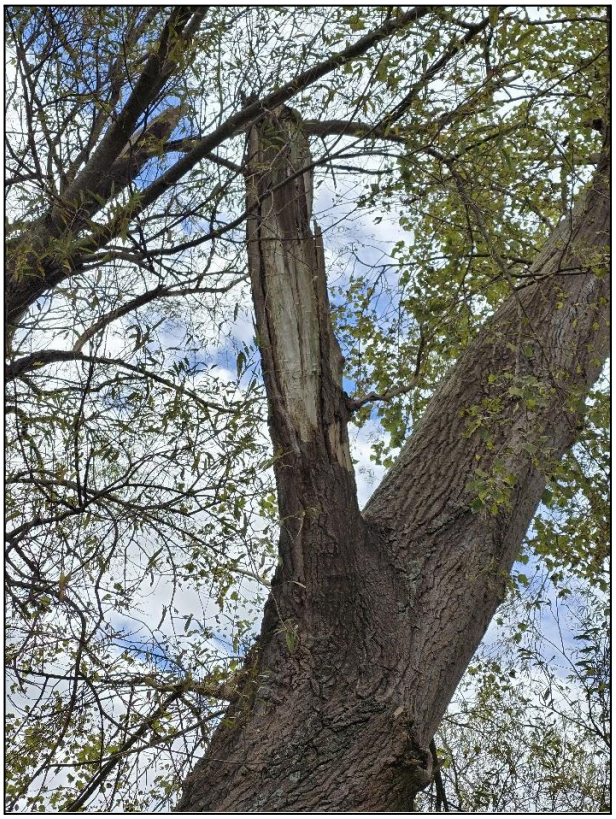

Photo 10

Phone: [redacted]
Email: [redacted]
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Photo 11

Photo 12

Phone: [redacted]
Email [redacted]
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Photo 13

Photo 14

8. Property usage

8.1. The property is currently operating as a dairy farm. The client is proposing to convert the property into a solar energy farm. The future of the property can be broken down into three stages:
1: Dairy farm.
2: Solar farm (construction phase).
3: Solar farm (operational).

8.2. The level of risk presented by the subject trees is greatly influenced by the occupancy of the area around the trees.

8.3. Estimated occupancy: Dairy farm
Daily vehicle movements: 20
Infrastructure: Farm fences.

8.4. Estimated occupancy: Solar farm (construction phase)
The construction period is estimated to be up to two years.
Daily vehicle movements: 380
Infrastructure: solar panels, security fences and gates.
The area beneath the subject trees will be occupied by people during the construction of the Infrastructure.

8.5. Estimated occupancy: Solar farm (operational).
Daily vehicle movements: 30
Infrastructure: solar panels, security fences and gates.

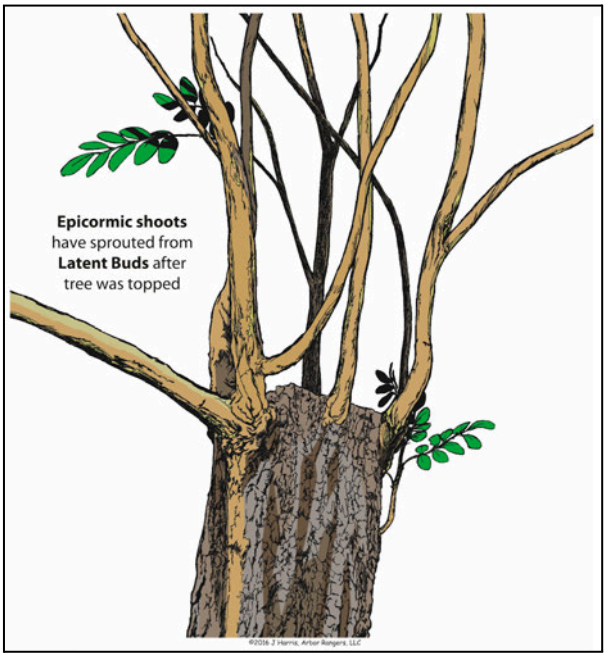
8.6. Risk based on occupancy:
The highest period of risk to people will be during the construction phase as a result of the high number of daily vehicle movements, and people working beneath the trees to install fences, gates, and solar panels.
After the construction phase the risk to people will be lower due to a reduction in the number of vehicle movements, and the completion of the infrastructure. However, the risk to infrastructure will be greater due to the permanent presence of the solar panels, security fences, and gates.

9. Recommendations

9.1. The sole responsibility for determining any actions taken as a result of this report is with the duty holder[4]. Each duty holder may have a different level of risk that they consider to be acceptable.

9.2. Not recommended:
Pruning to reduce the height of the trees.
Pruning to reduce the width of the trees.
Pruning to reduce the weight of the trunks and limbs.

9.3. Comments on the pruning operations in 9.3:
This pruning will cause the growth of epicormic shoots[5]. These shoots are weakly attached and will be prone to failure as they increase in size.
Poplar trees have a low capacity to compartmentalise and contain decay. These pruning operations will allow decay to enter the trunks and limbs. This decay will spread over time causing structural weakness.
An example of young epicormic shoots is below.
A document regarding 'topping' from the International Society of Arboriculture is on the next 3 pages.



[4] The person or entity responsible for the safety of the trees.
[5] Epicormic shoots are new shoots that grow from dormant buds under the tree's bark. They grow rapidly and are often weakly attached. Epicormic shoots are produced in response to stress such as excessive pruning or topping, unsuitable soil conditions, decay, pests and diseases. The presence of epicormic shoots may indicate that the tree is attempting to recover lost leaf area rather than normal, healthy growth.

Why Topping Hurts Trees

Learn why topping is not an acceptable pruning technique and discover recommended alternatives.

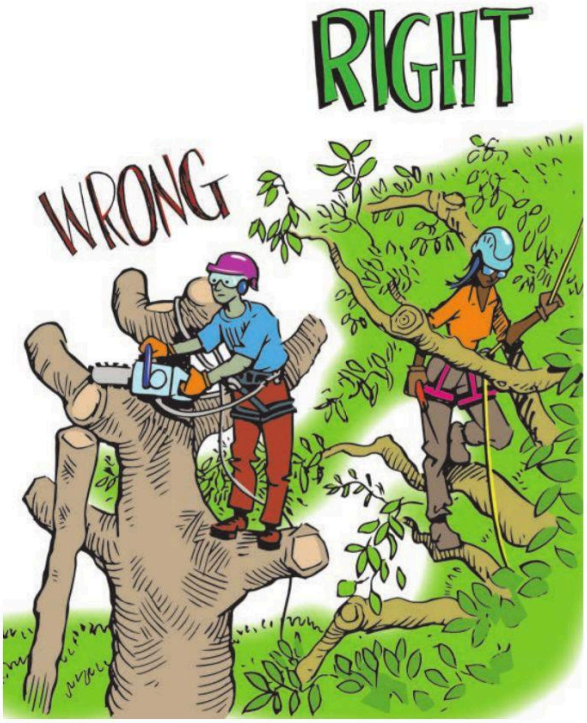
Topping is perhaps the most harmful tree pruning practice known. Yet, despite more than 25 years of literature and seminars explaining its harmful effects, topping remains a common practice.

What Is Topping?

Topping is the indiscriminate cutting of tree branches to stubs or to lateral branches that are not large enough to assume the terminal role.

Other names include "heading," "tipping," "hat-racking," and "rounding over."

Topping is often used to reduce the size of a tree. Homeowners may feel a large tree poses a risk to their property; however, topping is not a viable method of height reduction, and may increase risk in the long term.



Topping Stresses Trees

Leaves are the food factories of a tree; however, topping can remove 50-100% of a tree's leaf-bearing crown. Removing the leaves can potentially starve a tree and trigger various survival mechanisms. Dormant buds are activated, forcing rapid growth of multiple shoots below each cut. The tree needs to grow a new crop of leaves as soon as possible. If a tree does not have the stored energy reserves to do so, it will be seriously weakened and may die.

A stressed tree with large, open pruning wounds is more vulnerable to insect and disease infestations. The tree may lack sufficient energy to chemically defend the wounds against invasion, and some insects are actually attracted to the chemical signals trees release.

Topping Can Lead to Sunburn

Branches within a tree's crown produce thousands of leaves to absorb sunlight. When the leaves are removed, the remaining branches and trunk are suddenly exposed to high levels of light and heat. The result may be sunburn of the tissues beneath the bark, which can lead to cankers, bark splitting, and death of some branches.

Topping Can Lead to Unacceptable Risk

The survival mechanism that causes a tree to produce multiple shoots below each topping cut comes at great expense to the tree *(see figure above)*. These shoots develop from buds near the surface of the old branches. Unlike normal branches that develop in a socket of overlapping wood tissues, these new shoots are anchored only in the outermost layers of the parent branches and are weakly attached.

The new shoots grow quickly, as much as 20 feet (6 m) in one year in some species. Unfortunately, the shoots are weakly attached and prone to breaking, especially during windy or icy conditions. While the original goal was to reduce risk by reducing height, risk of limb failure has now increased *(see figure below)*.

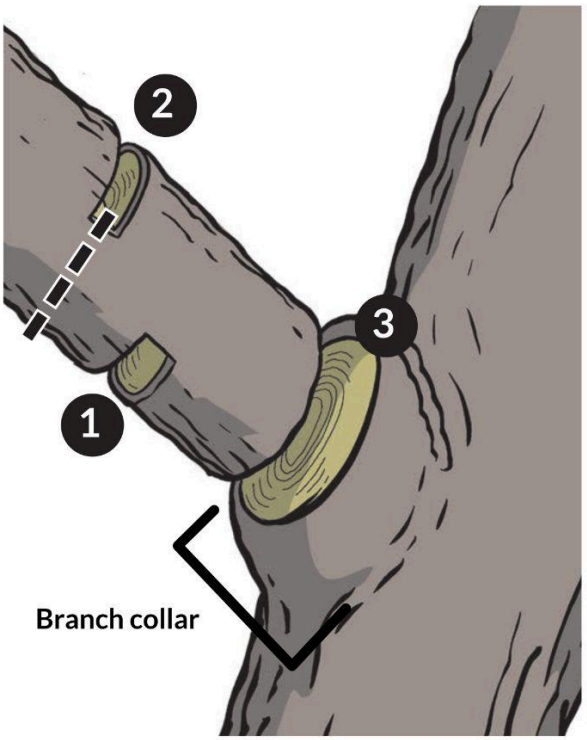
Topping Makes Trees Ugly

Topping destroys the natural form of a tree.
Trees form a variety of shapes and growth habits, all with the same goal of presenting their leaves to the sun. Topping removes the ends of the branches, often leaving ugly stubs. Without leaves (for up to six months of the year in temperate climates), a topped tree appears disfigured and mutilated. **A tree that has been topped can never fully regain its natural form.**

Topping Leads to Decay

Correct pruning cuts are made just beyond the branch collar *(see figure below)*. The tree is biologically equipped to close such a wound if the tree is healthy enough and the wound is not too large.

Cuts made indiscriminately between lateral branches create stubs or wounds that the tree may not be able to close. The exposed wood tissues begin to decay. Normally, a tree will "wall off," or compartmentalize, the decaying tissues, but few trees can defend the multiple severe wounds caused by topping. The decay organisms are given a free path to move through branches.



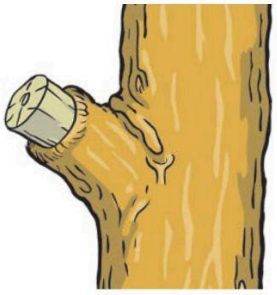
How to Make a Pruning Cut:

1. Make an undercut about 12–18 inches (30–46 cm) from the limb's point of attachment.

2. Make a second cut from the top, directly above or a few inches farther out on the limb. Doing so removes the limb, leaving a stub.

3. Remove the stub by cutting back to the branch collar, but do not cut the collar. This technique reduces the possibility of tearing the bark.

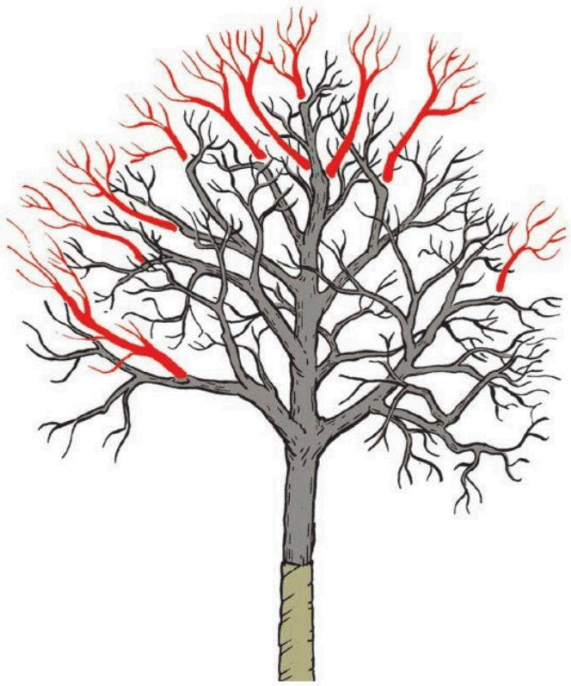
If the tree has started closing over a stub, cut just the dead stub and not the live tissue.



Topping Is Expensive

The cost of topping a tree is not limited to only the job cost. Some hidden costs include:

- Increased maintenance costs. If the tree survives, it will likely require corrective pruning within a few years (e.g., crown reduction or storm damage repair). If the tree dies, it will have to be removed.
- Reduced property value. Healthy, well-maintained trees can add 10–20% to the value of a property. Disfigured, topped trees are considered an impending expense.
- Increased liability potential. Topped trees may pose an unacceptable level of risk. Because topping is considered an unacceptable pruning practice, any damage caused by branch failure of a topped tree may lead to a finding of negligence in a court of law.



Proper branch reduction preserves natural form.

Alternatives to Topping

Sometimes a tree must be reduced in height or spread, such as for providing utility line clearance. There are recommended techniques for doing so. Small branches should be removed back to their point of origin. If a larger limb must be shortened, it should be pruned back to a lateral branch that is large enough (at least one-third the diameter of the limb being removed) to assume the terminal role. This method of branch reduction helps to preserve the natural form of the tree.

Sometimes the best solution is to remove the tree and replace it with a species that is more appropriate.

What Is a Certified Arborist?

ISA Certified Arborists® are individuals who have proven a level of knowledge in the art and science of tree care through experience and by passing a comprehensive examination developed by some of the nation's leading experts on tree care.
ISA Certified Arborists must also continue their education to maintain their certification. Therefore, they are more likely to be up to date on the latest techniques in arboriculture.

Finding an Arborist

Visit TreesAreGood.org for free tools:

- The "Find an Arborist" tool can help you locate an arborist in your area.
- The "Verify a Credential" tool enables you to confirm whether an arborist has an ISA credential.

Be an Informed Consumer

One of the best methods to use in choosing an arborist is to educate yourself about some of the basic principles of tree care. Visit TreesAreGood.org to read and download all brochures in this series.

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9.4. It is important to note that structural failures in the trunks and limbs of the subject trees will continue to occur over time. This will present a risk to people, vehicles, and infrastructure beneath the trees.
Property access may be affected if branches or trunks fall onto the accessway beneath.

9.5. **My recommendation:**
After assessing the risk presented by the subject trees and the proposed occupancy of the area beneath and nearby the trees I recommend that the subject trees should be removed.
The removal of these trees should be completed before the construction of the solar farm begins.

Phone: [redacted]
Email [redacted]
www.arboristconsultant.co.nz

Appendices

10. Site map
11. Author's qualifications
12. Definition of terms
13. Limitation of liability

10. Site map

The line of trees is circled in white below.

11. Author's qualifications

Wintec
Waikato Institute of Technology
Te Kuratini o Waikato

Nathan David Hughes

HAVING SATISFIED THE REQUIREMENTS OF
WAIKATO INSTITUTE OF TECHNOLOGY
HAS BEEN AWARDED THE

Diploma in Arboriculture (Level 6)
with Distinction

DATE: 23 March 2006 NUMBER: 7341116

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Nathan David Hughes

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WAIKATO INSTITUTE OF TECHNOLOGY
HAS BEEN AWARDED THE

Advanced Certificate in Arboriculture
Distinction

DATE: 06-MAY-03 NUMBER: 020011

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DATE: 20-MAR-02 NUMBER: 010009

ACADEMIC BOARD CHAIRMAN COUNCIL CHAIRMAN

The International Society of Arboriculture

Hereby Announces That

Nathan Hughes

Has Earned the Credential

ISA Tree Risk Assessment Qualification®

By successfully meeting ISA Tree Risk Assessment Qualification requirements through demonstrated attainment of relevant competencies as supported by the ISA Credentialing Council

Caitlyn Pollihan
CEO & Executive Director

14 April 2026 — Issue Date

14 April 2033 — Expiration Date

12. Definition of terms

Aerial tree inspection:
This is where a tree is inspected above ground level. This is carried out by an arboricultural consultant using arboricultural climbing techniques. This allows a far more thorough inspection of the tree than a visual inspection from ground level only. Individual defects are able to be examined in more detail, and often defects are identified that are not visible from the ground.

Bacterial wetwood:
This is an infection of the heartwood of the tree, which is often an indication of an internal defect. The bacterial wetwood is caused by several common types of anaerobic soil bacteria. These bacteria release gases which create internal pressure in the wood. This pressure forces liquids out of cracks in the wood, bark, branch crotches and pruning wounds. The bacteria do not cause any wood decay, in fact infected wood is very resistant to decay. Defects with a bacterial wetwood often do not occlude because the seeping liquid kills the tree tissues that are involved in wound closure.

Chlorosis or Chlorotic:
The leaves of a tree are said to be chlorotic when they turn yellow in colour due to a lack of chlorophyll. This is evidence that the tree is declining in health. Chlorosis can be caused by a number of factors, including nutrient deficiencies, poor soil drainage, drought stress, compacted soil, high soil pH, and root damage from pests, disease, or construction.

Cobra bracing system:
This is a specialised tree bracing system. Cobra is a rope system designed to support trunks and branches with weak unions.

Compartmentalise:
A tree is unable to 'heal' or 'repair' decayed wood. Trees 'compartmentalise' decay by creating chemical and physical boundaries that limit the spread of decay into the living wood. Some species are very effective at preventing the spread of decay. The compartmentalisation ability of some species is less effective, and the decay can continue to spread throughout the living wood.

Consequences of failure:
The consequences of failure rating is an estimate of the level of injury that is likely to occur if the defect fails and the associated part of the tree impacts a person, a building, or another item.

Defect:
A defect is any part of a tree that is 'defective'. A defect may cause strength loss. Examples of defects: an area of decay in a branch or trunk, a weak branch attachment, a cavity in a branch or trunk.

Delamination:
Delamination is a crack that has caused the wood in a limb or trunk to delaminate. This crack runs parallel to the limb or trunk.

Double leader (or co-dominant leader):
This is when a single trunk (leader) of a tree forks to form two leaders.

Drip-line:
This is a line drawn on the ground directly below the outermost reaches of the canopy. Everything on the trunk side of this line is described as 'within the dripline'.

Duty holder:
The person or entity responsible for the safety of the trees.

Epicormic shoots:
Epicormic shoots are new shoots that grow from dormant buds under the tree's bark. They grow rapidly and are often weakly attached. Epicormic shoots are produced in response to stress such as excessive pruning or topping, unsuitable soil conditions, decay, pests and diseases. The presence of epicormic shoots may indicate that the tree is attempting to recover lost leaf area rather than normal, healthy growth.

Failure:
Failure is when part of a tree loses all of its strength and 'fails'. Examples of failures include: branches breaking, branch and trunk unions splitting apart, a trunk splitting and falling when a decayed area causes the trunk to 'fail' at that point, or root plate failure causing an entire tree to fall.

Individual tree inspection:
A detailed inspection of an individual tree. This is an inspection carried out by a qualified arboricultural consultant for the purposes of identifying the risk associated with an individual tree.

Included bark:
Often called an 'inclusion', or an 'included union'. This is a condition where there is bark present on the inside of a branch or trunk union. This bark prevents the trunk and branch fibres from knitting together and results in a weak union.

Internal defect:
An internal defect is a defect that is internalised in the structure of a tree without any visible evidence.

International Society of Arboriculture:
The International Society of Arboriculture is an international society that promotes the professional practice of arboriculture.

Leader:
This is a description for an upright trunk or branch. Usually a large part of the structure of the tree.

Likelihood of impact:
When a defect fails, this is the likelihood of the failed part of the tree impacting a person, building, or other property.

Occupancy rating:
The occupancy rating is an estimate of the amount of time that the target area of a tree is occupied by people and other targets. This is expressed as a number of hours per day (averaged over one week).

Occluded:
A pruning cut or a wound which has been completely covered over by wood growth is called occluded. A pruning cut or a wound which is only partially covered over by wood growth is called partially occluded.

Property:
Items which may be damaged by tree failure (with the exception of people). For example: buildings or structures.

Reaction wood:
Where a defect in a tree is causing strength loss, a tree will often put on extra wood growth around the weakened area to increase the strength of that area.

Residual risk:
Residual risk is the level of risk that remains after the recommendations have been completed.

Root protection zone:
'Root protection zone' means for a tree with a spreading canopy, the area beneath the canopy spread of a tree, measured at ground level from the surface of the trunk, with a radius to the outermost extent of the spread of the tree's branches, and for a columnar tree, means the
area beneath the canopy extending to a radius half the height of the tree. Works within the root protection zone have an extremely high likelihood of having adverse effects on the health of a tree.

Soil compaction
Soil compaction is caused when soil particles are pressed together, reducing the space (pores) between them. This often happens due to vehicles and machinery. As a result, the soil becomes dense and hard, which has several negative effects on trees. These include: reduced root growth, limited water infiltration, limited oxygen infiltration, and reduced nutrient uptake.

STEM:
STEM (Standard Tree Evaluation Method) is a widely used system in New Zealand for evaluating trees using a point scoring system. This is a simple and clear method of evaluating and comparing trees. STEM is often used by councils and developers to assist with the management of trees. The STEM system can also be used to determine the value of a tree in New Zealand currency.

Target:
A target is a person, a building, or another item which could be impacted if a tree or any part of a tree fails.

Target area:
This is the area underneath and around a tree that is likely to be impacted by all or part of the tree if a failure occurs.

Tree risk assessment survey:
An inspection of multiple trees on one property. This is usually carried out for the

purposes of identifying the risks associated with individual trees.

Union:
A branch union is the point where the branch is attached to the trunk or to another branch. A trunk union is the point where two or more trunks join together.

Vehicle movements:
Part of an occupancy rating may be vehicles driving through the target area of a tree. One vehicle driving through the target area is one vehicle movement.

Visual tree inspection:
This is an inspection carried out by a qualified arborist consultant using visual techniques only. Inspection or analysis using diagnostic equipment is not used in a visual tree inspection.

Woundwood:
This is wood growth that a tree produces around bark wounds and pruning cuts to cover the wound or pruning cut.

13. Limitation of liability

13.1. Limitations
This Report has limitations due to the level of visual inspection that is possible and/or the extent of assessment conducted and does not take into account unforeseen or unassessed factors, such as natural disasters, weather conditions, soil conditions or sudden changes in tree health or stability.

13.2. Report validity time frame
Report assessments and recommendations may remain valid for a maximum period of 12 months from the date of tree inspection unless alternate periods are stipulated in the Report.

13.3. Tree Management
This Report does not guarantee the complete identification of all risks associated with assessed trees. Ongoing tree management, tree maintenance practices and regular monitoring are necessary for effectively mitigating risks.

13.4. Site-Specific Factors
The assessments contained in the Report have been determined after consideration of information relating to site- specific conditions and factors supplied by the client. The consultant has relied on this client-supplied information and has assumed that this information is both complete and accurate. Any inaccuracies or omissions related to the client-supplied information may affect the recommendations and accuracy of the Report.

13.5. Assessment-specific Factors
The client is responsible for defining the risk tolerance thresholds used to classify the level of risk, and associated actions, to be reported by Hughes Consultancy Ltd. If the client has not defined the risk tolerance thresholds, then the client is deemed to have accepted the risk tolerance thresholds used by the Hughes Consultancy Limited.

13.6. Local Regulations
It is essential to consider local laws, regulations, and permits related to tree care, removal, or management. Compliance with these regulations remains the sole responsibility of the client.

13.7. Exclusive use
The Report is commissioned by and prepared for the exclusive use of the client and should not be used or relied upon by any other person or entity. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person or party to whom it is addressed, without the prior expressed written consent of Hughes Consultancy Ltd.

13.8. Third parties
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