

Best Practice Guideline

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Tree Removal and Pruning of Kauri

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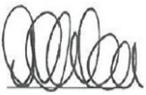
Version History

Date	Version	Author	Description of changes
May 2010	1.0	Tony Beauchamp	Original version
September 2017	2.0	Tony Beauchamp	Changes based on science results and risk management principles.
October 2017	2.1	Travis Ashcroft	Changes to Figure 1. Definition of 3x the radius of the canopy dripline.

Consultation and peer review

Role	Name	Date submitted
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Approval

Name	Role	Signature/ Date	Endorsement
Lynn McLveen Programme Manager	Approve / Note the contents of this document.	 17/10/17	<input checked="" type="radio"/> Yes / <input type="radio"/> No

Associated documents

Document name	Link
Hygiene Procedures for Kauri Dieback	https://www.kauridieback.co.nz/more/documents-and-resources/
Vehicle and Heavy Machinery Hygiene	
Land disturbance activities (incl. earthworks) around kauri	
Landfill disposal of contaminated material	

Glossary

Terminology	Meaning
DBH	Diameter of trunk at breast height
Dripline	The outer extent of the branch spread from the trunk.
Kauri dieback	Name of the disease that causes dieback on kauri caused by the pathogen <i>Phytophthora agathidicida</i>
KDP	Kauri Dieback Programme
Lesion	A region of tissue that has suffered damage by disease.
Outermost dripline	The furthest (maximum) extend of the branch spread from the trunk.
PA	<i>Phytophthora agathidicida</i>
Propagule	Microscopic life stage (like seeds) whose role is to progress the propagation of an organism to the next stage in their life cycle.
Ricker	Young kauri around 30 to 50 years old
Root Zone	The ground area around kauri, defined as 3 times the radius of the outermost canopy dripline.
SOP	Standard Operating Procedures
Sterigene	2% solution of detergent Sterigene®

Disclaimer

The information in this guideline is intended to be general information. It is not intended to take the place of, or to represent, the written law of New Zealand or other official guidelines or requirements. While every effort has been made to ensure the information in this document is accurate, the Kauri Dieback Programme (and any of their representatives involved in the drafting of these guidelines) does not accept any responsibility or liability for error of fact, omission, interpretation or opinion that may be present nor for the consequences of any decisions based on this information.

1.0 Purpose

To provide risk management guidelines to mitigate the spread of kauri dieback during tree removal and pruning of kauri (*Agathis australis*).

The guidelines are based on managing the risks associated with tree removal and pruning activities. A precautionary approach is taken to manage the level of scientific uncertainty around ascertaining whether all kauri wood is infected or not.

2.0 Background

Kauri dieback is a soil-borne disease that spreads primarily through the movement of contaminated soil. Just a pinhead of soil is all that is needed to spread the pathogen (that cause's kauri dieback), *Phytophthora agathidicida* (PA), to other areas.

In 2010, an interim tree removal and pruning Standard Operating Procedure (SOP) was developed by the programme and was externally reviewed by arborist and industry experts. The existing SOP is now updated and reviewed to incorporate new research results⁽¹⁾ and presented here as a best practice guideline.

These guidelines are for land managers, arboriculture industry and members of the public in undertaking tree removal & pruning activities of kauri and are based on managing the risks associated with pruning and felling parts of a kauri tree where PA is unlikely to occur (but we are not 100% certain) and mitigate areas of the tree where PA is known to occur.

3.0 Assumptions & Constraints

There is conclusive evidence to prove that PA has been found in certain parts of the tree, however there is inconclusive evidence that prevents us from determining the full spatial extent of PA in kauri wood. Due to this uncertainty, a number of assumptions have been made which has informed these guidelines:

- 3.1 Since we do not know the time from infection to when disease symptoms first occur on the tree, healthy trees may be infected. As a result all kauri and their root zone (i.e. 3 x the radius of the tree canopy dripline) are potentially infected with the disease.
- 3.2 2008-2013 research results^(1,2,5,6) determined via plating methods that PA was close to symptomatic lesions, both in depth (1.0 cm into sapwood-cambium) and height (<10cm).
- 3.3 PA distribution is proximate and associated within infected root, cambium and bark tissues, and is therefore unlikely to occur above symptomatic collar rot trunk lesions.

- 3.4 Kauri lose bark within 5 years of death. Contaminated bark that has been exposed to the kauri dieback organism will be found within and up to 10 cm above the extent of lesions.
- 3.5 Based on current information, the spatial distribution of PA within infected trees is unlikely to be fully systemic therefore;
- PA is not known to occur in depth into kauri heartwood.
 - PA is not known to occur in the tree canopy i.e. its branches, leaves, cones and seeds.
- 3.6 The spores and other propagules (life stages) of kauri dieback remain viable and infectious within kauri tissue for unknown period of time.
- 3.7 Long-lived spores (oospores) of kauri dieback can survive and remain viable in the soil, long after a tree dies (at least 6 years and potentially a lot longer)(Horner & Hough, 2015).
- 3.8 Soil, litter debris and root materials within the entire root zone of infected kauri can contain viable propagules of PA.
- 3.9 Movement of root, trunk, bark materials (including by-products produced during pruning or removal e.g. sawdust) could spread PA to other sites.
- 3.10 Disease spread outside the kauri root zone can occur by movement of infected material via human and animal vectoring. Although yet to be proven (Bellgard et.al, unpub.), there is anecdotal evidence that spread via wastewater run-off and water catchment discharge is possible.
- 3.11 Kauri infected with PA can die without showing obvious collar and trunk lesions.
- 3.12 If an infected tree with lesions was debarked or the bark had peeled off, you would no longer see the lesion on the tree. Areas where lesions may have occurred on bark-less trees may appear as secondary infection as wood rot. A number of field observations (T. Beauchamp, pers. comm.) have found that fungi causing wood rot has a tendency to contaminate trunk material below an active PA lesion when a tree is alive. So wood rot, in areas where one would expect a lesion to occur, may be an indicator of a lesion prior to the tree losing its bark.
- 3.13 Ricker (juvenile conical shaped) kauri can die without obvious lesions or with basal lesions and fall after only a year, so all fallen kauri must be treated as potentially infected or ‘contaminated’.

4.0 Before you begin

- 4.1 These guidelines has been developed to provide written advice on the management of kauri dieback during tree pruning or felling operations of kauri.
- 4.2 The guidelines are not policy but should be considered by planners, land managers and contractors when planning any operations.
- 4.3 Please contact your local council or land management agency if there are local policy or regulatory constraints.
- 4.4 Local mana whenua consider kauri a taonga (treasure). Any disposal of kauri wood to a landfill may be considered inappropriate to local iwi. Consultation with local iwi is advised.
- 4.5 The guide provides what is considered best practice based on the current information and uses risk management principles to reduce the likelihood of spread of PA during operations.

5.0 Planning Considerations

- 5.1 If you think you have found infected kauri, contain access to the site (contamination zone) at 3 times the radius of the canopy, do not remove any soil or vegetative material and contact 0800 NZ KAURI immediately.
- 5.2 The following Best Practice Guidelines should be read in conjunction with these guidelines, prior to undertaking any on-site operations.

Best Practice Guideline	Link
Hygiene Procedures for Kauri Dieback	https://www.kauridieback.co.nz/more/documents-and-resources/
Land disturbance activities (incl. earthworks) around kauri	
Vehicle and Heavy Machinery Hygiene	
Landfill disposal of contaminated material	

- 5.3 When planning the pruning or felling of trees, treat all kauri as potentially infected as the disease (i.e. tree symptoms showing dieback) may not be obvious if the tree is recently infected.
- 5.4 Felling and pruning of kauri should occur during dry periods. The only exception should be where trees pose an immediate health and safety hazard, or at sites where the contamination of personnel effects (e.g. footwear) and equipment with soil can be avoided.

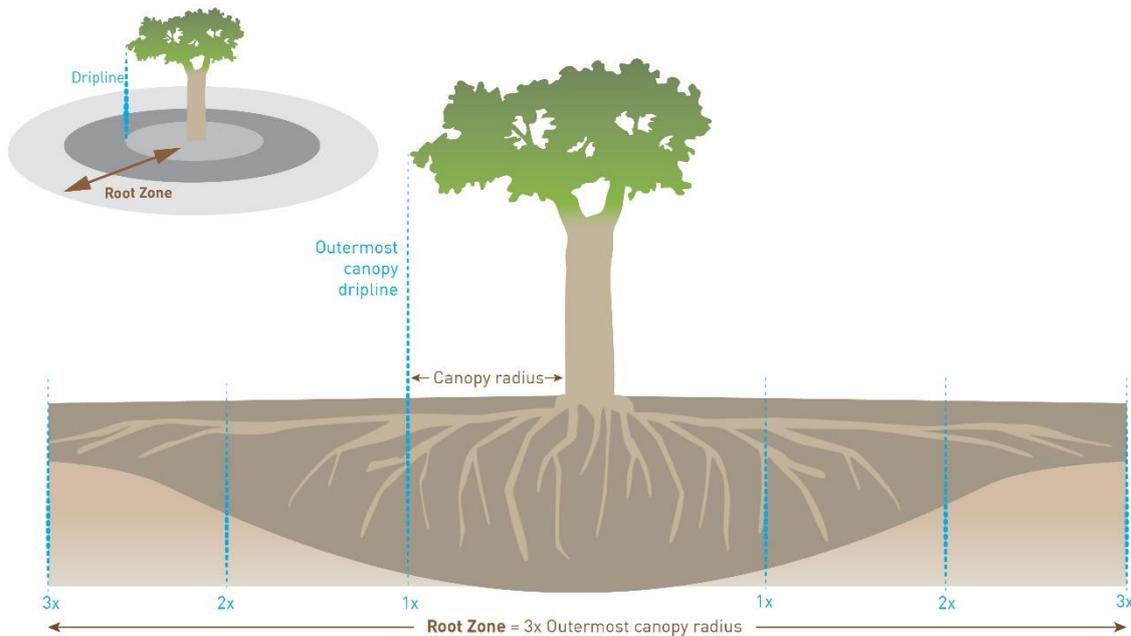
6.0 On-site Considerations

6.1 Establishment of root zones:

- Management of kauri dieback within the kauri root zone is crucial as soil surrounding kauri roots has a higher chance of being contaminated than soil that is not. The root zone is defined as 3 times the radius of the canopy dripline, the radius of which is measured from the trunk to the outermost canopy dripline (Figure 1).
- Before you begin operations, establish the root zone around each kauri that is being pruned and/or felled.
- If these zones overlap with other zones, then treat as one contiguous area.
- Establish entry and exit routes to/from each root zone to reduce the risk of spread of PA from/to other kauri.
- Cleaning infrastructure for a zone should be within 3 times the radius of the trees being pruned or felled. **Extreme care** should be taken to make sure any equipment and machinery does not damage the roots within this zone.
- Establish the on the ground infrastructure necessary to ensure that all vehicles and equipment remain clean, or are cleaned to be free of soil and organic material when leaving the zone or moving between root zones.
- The wash water, soil and organic material from any other zone **must not** be brought onto another zone.

- All personnel effects (e.g. footwear) and equipment must be cleaned of soil and organic material and sprayed with Sterigene before entering, leaving or moving between zones, or the equipment must be contained to prevent soil loss before cleaning at a depot with soil containment facilities.
- Soil and organic material retrieved from cleaned items must be either retained within the root zone from which it originated, or else collected, contained and disposed of at an approved landfill (see Best Practice Guidelines - Landfill disposal of contaminated material).

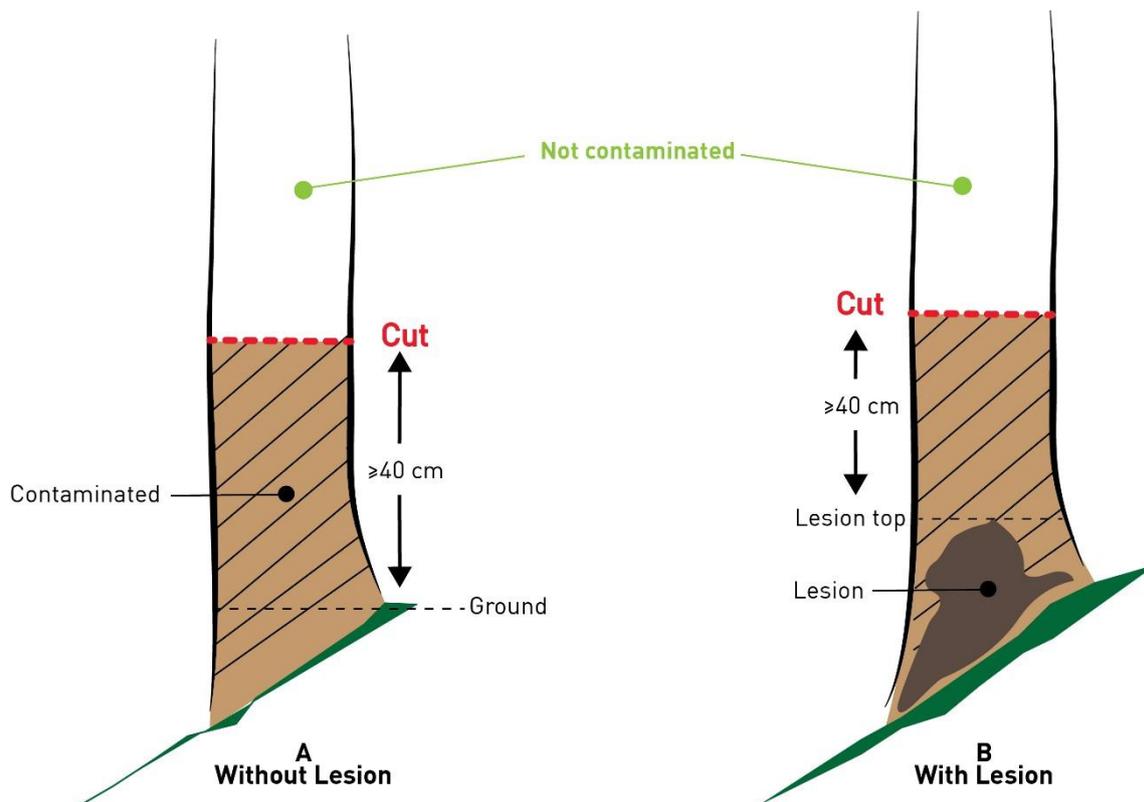
Figure 1: Root zone of kauri (3 times the radius of the outermost canopy dripline)



6.2 Pruning & Felling Operations:

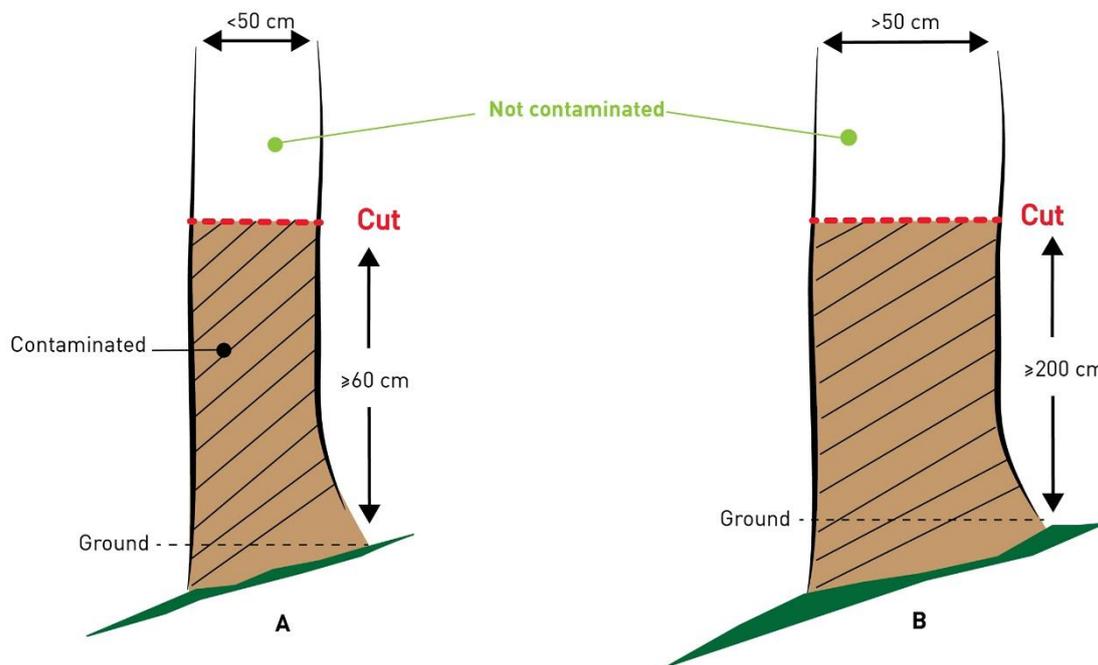
- **Live kauri** lacking bark lesions, should be cut at least 40 cm (or greater) above the highest point of the ground (Figure 2A). The material above this cut can be considered ‘not contaminated’ and can be removed.
- **Live kauri** that have bark lesions, should be cut at least 40 cm (or greater) above the upper point of the highest lesion on the trunk. The material above the cut can be considered as ‘not contaminated’ (Figure 2B).

Figure 2: Live Kauri (A) lacking bark lesions cut at least 40 cm above the highest point of the ground; (B) with bark lesions cut at least 40 cm above the highest lesion.



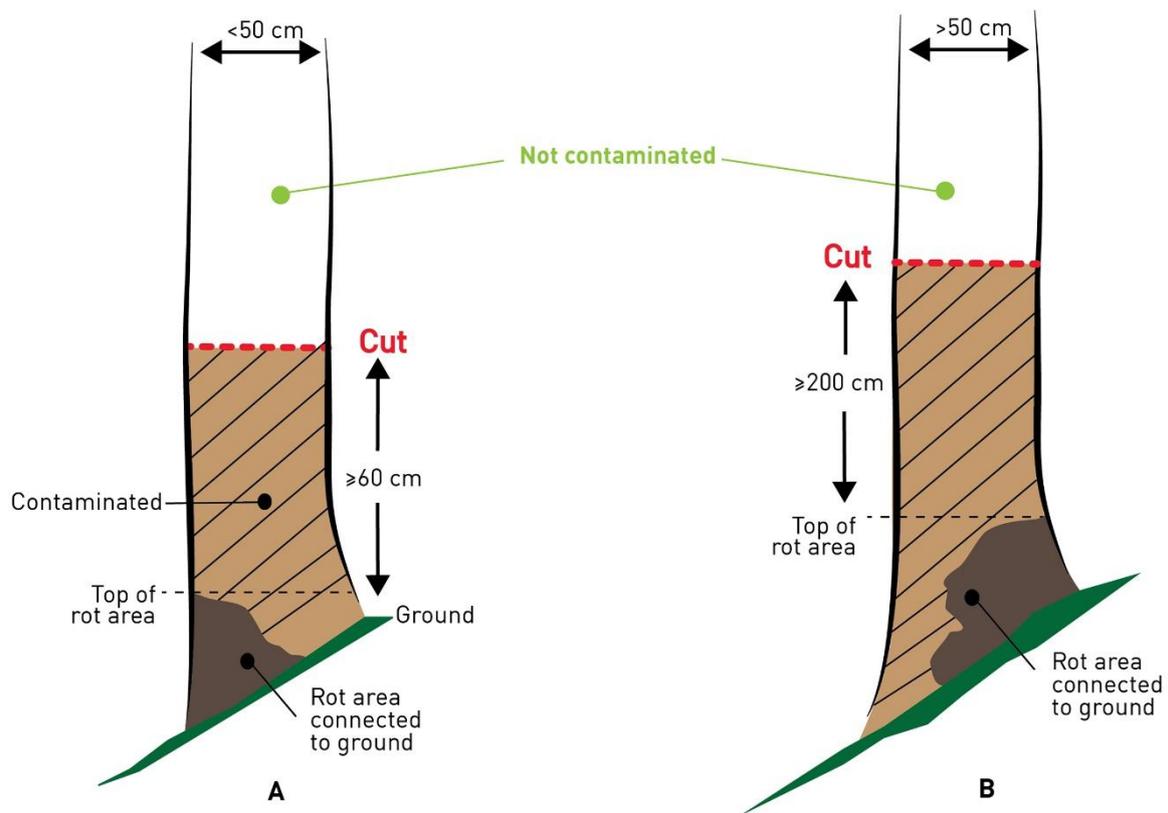
- Standing dead kauri** (1) lacking bark (2) with a clean rot-free outer trunk from the base of the tree and (3) less than 50 cm at breast height diameter (DBH); must be cut at least 60 cm (or greater) above the highest point from the ground (Figure 3A), and those with greater girth (>50 cm DBH), at least 200 cm (or greater) above the highest point from the ground (Figure 3B). The stump below the cut needs to be treated as “contaminated”. The material above the cut can be considered as “not contaminated”.

Figure 3: Standing dead kauri lacking bark and wood rot: (A) <50cm DBH – cut at least 60cm above ground; (B) >50cm DBH cut at least 200cm above ground.



- **Standing dead kauri** (1) lacking bark, and (2) evidence of wood rot that has extended from the ground up the outer trunk; should be cut at least 60 cm (or greater) above the top of the rot-zone if the DBH of the trunk is less than 50 cm (Figure 4A); and 200 cm (or greater) above the top of the rot-zone if the DBH of the trunk is greater than 50 cm (Figure 4B).

Figure 4: Standing dead kauri lacking bark with wood rot from the ground (A) <50cm DBH – cut at least 60cm above top of the rot (B) >50cm DBH cut at least 200cm above top of the rot.



- To minimise spread of PA, all material deemed contaminated should be left in the ground. If this cannot be done, then that material must be left within the root zone, or removed to a Kauri Dieback Programme Approved Landfill for deep burial.
- All personnel effects (footwear) and equipment must be cleaned of soil and organic material and sprayed with Sterigene before leaving the root zone or the equipment must be contained to prevent soil loss before cleaning at a depot with soil containment facilities.
- Disposal or recycling of contaminated kauri materials into green-waste, compost etc. should not take place as use of these materials may spread PA.
- Contaminated parts of kauri should not be removed off-site for firewood or other uses (e.g. woodwork or building).

- Care should be taken to avoid uncontaminated parts of the tree having contact with the soil. If any uncontaminated wood gets soil on it, remove soil using a brush and spray brush using Sterigene afterwards.
- Transportation of any uncontaminated wood should consider the vehicle and heavy equipment hygiene guidelines.
- Any wood waste generated off site from processing any uncontaminated wood should be disposed of appropriately and not disposed of back in a kauri forest.

7.0 Other considerations

- 7.1 Keep to formed tracks as much as possible.
- 7.2 Be particularly vigilant working around kauri stands, trees, streams and sites where the disease is known to be present.
- 7.3 Confine ground based machines to well drained country and configure machines to low ground pressure operations.

8.0 Additional Information

- 8.1 To find an approved aborist please visit www.nzarb.org.nz
- 8.2 For further information on kauri dieback contact 0800 NZ KAURI (695 2874) or visit www.kauridieback.co.nz

References

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2. Beever R.E.; Bellgard S.E.; Dick M.A.; Horner I.J.; Ramsfield T.D. 2010. Detection of *Phytophthora* taxon Agathis (PTA). Report for Ministry for Agriculture & Forestry,

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6. Waipara N.W.; Hill S.; L.M.W.; Hill L.M.W.; E.G.; Hough E.G.; Horner I.J. 2013. Surveillance methods to determine tree health, distribution of kauri dieback disease and associated pathogens. *New Zealand Plant Protection* 66: 235-241.