
ARK IN THE PARK

STANDARD OPERATING PROCEDURES: KAURI DIEBACK DISEASE MANAGEMENT.



Agathis australis, Kauri. Photo: Chris Chadwick.

Ark in the Park is a collaborative ecosystem restoration project between Forest and Bird and Auckland Council, supported by Te Kawerau ā Maki.



1. Table of Contents

1. Background and current context.....	2
1.1. Kauri dieback disease	2
1.2. Previous measures taken to minimise spread	2
1.3. Work undertaken at the Ark in the Park	2
1.4. Controlled Area Notice	3
1.5. Enforcement of legislation	3
1.6. Rāhui	3
1.6.1. Cultural safety protocols:	4
1.7. Auckland Council Kauri Dieback SOP	4
2. Ark in the Park Procedures	5
2.1. AiP operations around kauri	5
2.2. Identification of AiP workers	5
2.3. Vehicle use	6
2.4. Cleaning tools and methods	6
2.4.1. AiP cleaning station	6
2.4.2. Phytosanitary kits	6
2.5. When to “Scrub, Spray, Stay”	7
3. Working around kauri root zones.....	7
4. Additional requirements and field tips.....	8
5. Training and refresher training.....	8
6. Summary of Ark in the Park kauri dieback SOP	9
7. Appendix.....	10
7.1. Kauri identification	10
7.2. Version history	11
7.3. Map of Zones of operation and high value kauri zones	12

1. Background and current context

1.1. Kauri dieback disease

Kauri Dieback is caused by a microscopic soil-borne pathogen (a disease causing agent) called *Phytophthora agathidicida*. It is a fungus-like organism that can survive in the soil away from kauri for many years and can spread in tiny amounts of soil and water. A long lag time between infection and visible symptoms on the infected kauri makes it difficult to confirm that an area is free of the disease. The disease kills kauri of all ages and sizes and there is no cure currently known.

The disease is known to be spreading in the Waitākere Ranges, including within the Ark in the Park. The recorded distribution of kauri dieback relative to kauri areas within the Waitākere Ranges Regional Park (WRRP) has risen from 7.9% infected and a further 2.7% possibly infected in 2011 to 18.95% infected and a further 4.65% possibly infected in 2016. (Source: Kauri Dieback Report 2017, Auckland Council). An up to date map can be accessed via the [Tiaki Tāmaki Makaurau website](#).

Spread is caused by movement of water in the soil, through root-to-root contact, **and through humans and pest animals transporting even tiny amounts of soil**. Human activity is a major risk for spreading the disease within the Ark in the Park, around the Waitākere Ranges, and to other areas.

1.2. Previous measures taken to minimise spread

Since the Ark became aware of the disease, various measures have been taken to minimise its spread through human activity. These have included:

- Installation of additional Sterigene stations,
- Re-routing of certain pest management lines,
- Planning work to avoid as much of the wettest months as possible,
- Carefully working within Zones of Operation. This approach was preceded by:
 - Use of shoe covers for particular stretches of lines (discontinued after a trial).
 - ‘Scrub in, scrub out’ procedure at kauri areas marked by white triangles. This trial resulted in biosecurity and biodiversity outcomes being threatened, so after review with Auckland Council staff, it was also discontinued.

1.3. Work undertaken at the Ark in the Park

Work is planned to minimise foot traffic, and takes into account both weather and current ground conditions. Ark in the Park fieldwork is carried out by a combination of volunteers, staff, and contractors, referred to here on as ‘AiP workers’. This Standard Operating Procedure (SOP) sets out the methods by which AiP workers will comply with restrictions to access and soil movement, as described below, in order to minimise the risk of spread of the disease.

Activity	Frequency per site per year	No. of people per trip
Baiting.	3.	1 or 2.
Trapping.	Weekly to fortnightly.	1 or 2.
Maintenance of access lines.	Typically, 1 visit per line per year.	2 to 8.
Pest plant control.	Ongoing throughout year.	1 to 4.
Pest monitoring.	≤4 monitors requiring 8 visits per line.	1 or 2.
Kōkako census and nest monitoring.	1 annual census with nest monitoring throughout summer. July to March.	1 to 8; 1 to 3 in any given area.

1.4. Controlled Area Notice

A Controlled Area Notice (CAN) has been issued by the Ministry of Primary Industries over an area encompassing AiP. A CAN is an enforceable mechanism under the Biosecurity Act that controls the movement of materials that may cause a biosecurity risk, in this instance visible soil.

Adherence with the CAN in the Waitākere Ranges requires:

No goods (including personal effects, vehicles, companion animals and tools) may be brought into, or removed from, the Controlled Areas, **unless they are free of all visible soil.**

No soil or plant material (other than food items and personal effects made of plant material) may be brought into, or removed from the Controlled Area.

AiP workers must adhere to compulsory procedures:

All footwear must be cleaned (removal of all visible soil and application of the disinfectant provided) at every cleaning facility encountered within the Controlled Area, provided the facility is designed for the cleaning of footwear.

1.5. Enforcement of legislation

There are Auckland Council signs placed at track entrances with information about fines which may be issued under one of two pieces of legislation. There is a compliance team operating in the Regional Park who educate visitors and refer episodes of non-compliance to Council and MPI for further action.

CAN

As mentioned above, the CAN places a restriction on soil movement. Non-compliance can result in a fine of up to \$50,000 and/or 3 months imprisonment for an individual. Note though that the compliance team will first issue warnings and are able to use sensible judgement in terms of practicability of cleaning and risk assessments. The CAN penalties apply to soil movement on open tracks and points of entry.

Public Safety and Nuisance Bylaw

Fines of up to \$20,000 apply. This bylaw applies to unauthorised access to closed tracks and off track areas.

1.6. Rāhui

Mana whenua Te Kawerau ā Maki have placed a rāhui over the Waitākere forest (Te Wao nui a Tiriwa), defined broadly as the forested area of the Waitākere Ranges Heritage Area, in order to protect the forest from kauri dieback disease for future generations. A rāhui is a form of tapu restricting use of or access to an area or resource by unauthorised persons. A rāhui can be placed by the mana whenua of the land, who hold kaitiakitanga (guardianship) responsibilities.

Only managed organisations and people doing critical weed and pest management who are authorised by Te Kawerau ā Maki (via a warrant) are able to enter the rāhui area. The Ark in the Park was granted a warrant in 2017.

1.6.1. Cultural safety protocols:

Authority to enter Rāhui area	The rāhui is a form of tapu restricting access and certain activities. The rāhui applies to the spiritual as much as the physical and could impact those who enter without authorisation. Only those persons given express written permission via a warrant or accompanied by Te Kawerau Iwi Settlement Trust representatives can enter. This does not include private land, beaches (or open land adjacent to beaches), roads, or the Arataki Visitor Centre.
Consumption of food	Except for private land, beaches, the Arataki Visitor Centre or public roads, the consumption of food and liquids (other than water) within the forest should be restricted where practicable and safe.
Reporting requirements	Managed organisations authorised to operate within the rāhui area are required to provide Te Kawerau Iwi Settlement Trust a monthly update/briefing report of their activities, land coverage, personnel, and any issues or observations. Any serious health and safety incidents should be communicated to Te Kawerau Iwi Settlement Trust as soon as possible.

(Source: Te Kawerau a Maki Tribal Authority)

1.7. Auckland Council Kauri Dieback SOP

As landowner of the WRRP Auckland Council have developed standard operating procedures (SOP), last updated March 2021. This was developed for anyone undertaking activities on Auckland Council owned and managed land.

The purpose of the SOP for Kauri Dieback is to reduce the risk of spread of kauri dieback disease. The underlying goal for the SOP is to stop the movement of soil and other infected material via footwear, machinery, equipment and vehicles working in the vicinity of kauri. It has 4 key principles:

1. Avoid working in kauri hygiene areas (area equal to 3x the maximum radius of the canopy dripline of a kauri).
2. Avoid working in wet conditions.
3. Scrub, spray, stay. All footwear and equipment is scrubbed every time an area with kauri is entered or left to remove soil, followed by disinfecting. Staying on the track (and off kauri roots) should be practiced whenever possible.
4. Any person working or undertaking activities on land where kauri are present should have two clearly marked sets of footwear – one to be used in Contaminated Areas (known dieback presence) only, and one for all other areas.

The following AiP kauri dieback SOP was developed based on the Auckland Council SOP, with adaptations to ensure relevance to AiP personnel and activities.

2. Ark in the Park Procedures

AiP policy reflects Auckland Council's SOP. All equipment, including footwear, back packs, hand tools, clothing, and any other field equipment must be completely cleaned of soil and vegetative matter before entering and before leaving the Waitākere Ranges. **This will be achieved via the requirement that all AiP workers come to the volunteer base after completing fieldwork in order to make use of the AiP cleaning station, unless explicitly authorised by AiP staff and provided with a personal kauri dieback kit.** AiP workers are responsible for ensuring that they commence fieldwork with clean and disinfected boots and equipment.

Note that this applies to soil on native and pest plants also. No potted native plants are to be brought in to, or taken out, of the Waitākere Ranges. Pest plants are to be disposed of in the approved skip bin near the Cascade Kauri Rangers Station only.

2.1. AiP operations around kauri

AiP field operations are planned with reference to Auckland Council maps with three main concepts:

1. High value kauri zones
Healthy kauri and high biodiversity ecosystems are present in these areas; they are small and very valuable. There are 3 areas currently described, only accessed by select workers. Extra precautions are taken, including changing shoes or donning shoe covers before entering. (Appendix: map 7.3).
2. Zones of operation
These larger areas are defined by hydrology catchments (water movement) and areas of known kauri health status (map: appendix 7.3). Work is planned so access is contained within one zone of operation. A full clean down with running water, and scrubbing & spraying with Sterigene is required before working in another zone.

However, some pest control lines, access lines, and tracks unavoidably cross zone boundaries. In these cases, a thorough scrub and spray with Sterigene must be undertaken at the zone boundary. The zone boundaries will be marked in the field.
3. Level of risk
Work is also planned to reduce risk - areas with known kauri dieback are the areas of the highest risk, while areas with no known kauri dieback are the lowest risk. If terrain allows for work to be completed in either direction along a line (baiting or trapping), work will be planned to move from the area of lowest risk to highest. This information will be shared with volunteers via instructions on activity description cards. **Note:** areas without known kauri dieback are not guaranteed to be free of the disease - lack of evidence is not evidence of absence.

2.2. Identification of AiP workers

AiP workers will be issued with ID cards to carry with them to show to any compliance officers encountered. These will be used as evidence of AiP workers' authorisation to be within rāhui, CAN and Public Safety and Nuisance Bylaw areas. AiP workers are to also wear hi vis vests, printed with 'Forest and Bird volunteer', and to share their car registration plate number with Ark staff so queries from compliance officers can readily be addressed by staff. When parking a vehicle on public roads identify your vehicle as being in use by an AiP worker by placing an **"AiP authorised vehicle" card** on your vehicle dashboard. These official cards are provided by the AiP office and you are recommended to keep one with you as your personal card.

2.3. Vehicle use

Soil/mud must not be transported via foot mats and pedals in vehicles. Take an extra pair of shoes and a plastic bag or tray large enough to contain your used boots, gaiters and any other outer gear which has been exposed to soil/mud. If your trousers have become muddy, remove as much as you can with the brush before getting in to the vehicle (**ideally bring a change of pants**).

When leaving the bush, but before getting into the vehicle, change into your clean shoes. Bring all used gear back to the AiP volunteer base for cleaning at the cleaning station.

AiP project cars

Protective mats and seat covers are used in the AiP cars used for fieldwork by AiP workers. These are cleaned regularly.

Personal vehicles

You may consider use of a washable car seat cover; these can be made easily with a tarpaulin (see photo to right; concept Ken Harrop).



2.4. Cleaning tools and methods

2.4.1. AiP cleaning station

There is a cleaning station at the AiP volunteer base (Cascades ranger station) comprised of a sink and a hose. Tools, clothing, backpacks, and footwear are to be cleaned with water and clean scrubbing brushes to remove all soil. All items will then be sprayed with Sterigene, then left to dry.

The rubbish bin in the storeroom goes to an approved landfill. All field rubbish (such as old pink tape and bait) must be put in this bin.

Cleaning at the AiP cleaning station ensures that ALL soil can be removed in order to achieve the highest level of hygiene.

2.4.2. Phytosanitary kits

When working in the field at the Ark **every worker is required to carry a phytosanitary kit** with them, carried in a clean plastic bag. Cleaning mud/soil off footwear and equipment requires use of two key components:

1. Hard scrubbing brush.
Using scrubbing brushes to remove mud before spraying is the most important part of the cleaning process. Brushes are provided at the AiP volunteer base and as part of personal portable phytosanitary kits. They are kept clean and replaced as soon as there are signs of wear and tear on bristles. Personal brushes must also be washed and sprayed with Sterigene after use, and before leaving the volunteer base.
2. Sterigene disinfectant (aka Trigene) and other approved disinfectants.
Sterigene should be in a 250mL (or larger) spray bottle, and be diluted to 2%. Sterigene is a non-corrosive, biodegradable disinfectant. When combined with scrubbing to remove mud, it helps to

minimise the spread of kauri dieback disease. **It does not penetrate through layers of mud**, unless left soaking for 30 minutes - removing all dirt before spraying is vital.

Most parts of the lifecycle of the spore are de-activated (killed) by Sterigene, however one part (the oospore) is not entirely de-activated. It is essential to spray, however scrubbing to remove as much soil/mud first is the most important part of the cleaning process.

Sterigene is obtained from the Cascades Ranger Station and diluted (to a 2% solution). **Diluted Sterigene has a shelf life of 6 months** so Sterigene older than this must not be used. A 20L container is maintained from which smaller bottles can be refilled. Sterigene is provided in 1L bottles for use at the volunteer base. It is also provided in 250ml bottles for workers to carry with them.

Volunteers are alerted through emails and signage at the Ark when a new batch of Sterigene has been prepared. Volunteers are advised to tip any Sterigene older than 6 months remaining in their personal bottles onto the grass or gravel area before refilling them with fresh Sterigene.

As alternatives to Sterigene, methylated spirits or household bleach may be used. Bleach should be diluted to a 25% solution (i.e 1 part bleach to 3 parts water). Note: these substitutes may be used at home only, not as part of personal phytosanitary kits when working in the field.

Cleaning method - both in the field and at the AiP volunteer base:

1. Use brush to thoroughly remove all soil/mud from footwear, gaiters, clothing or other equipment.
2. Spray generously with Sterigene (repeat scrubbing & spraying steps if needed).
3. Wait one minute for the Sterigene to act before moving on.

2.5. When to “Scrub, Spray, Stay”

Scrub with a brush, **spray** with Sterigene, then **stay** for one minute to let the Sterigene act.

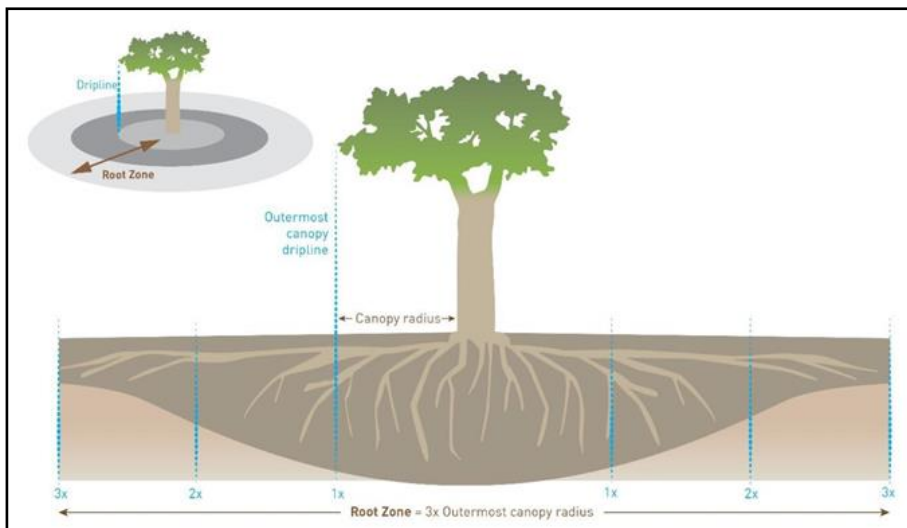
When scrubbing, make sure soil/mud removed remains in the area it came from - i.e. scrub boots in the bush before exiting onto a track. **Do this any time you change areas**, such as:

- When you leave the bush, for example to return to a vehicle or walk back to the Ark base.
- When you leave a main track to walk on an Ark access line, bait line or trap line.
- When you exit a bait line, a trap line or an access line.
- Before you cross a stream (ensure you are far enough away that the dirt/ removed won't enter the stream).
- When you move from one zone of operation to another. Note: work should be planned so movement between zones is minimised.
- At any other time you feel it is useful to protect kauri.

3. Working around kauri root zones

The area where soil is most likely to be infected around a kauri tree is based around the area occupied by the tree roots. The dripline is a term often used to describe the point where the branch tips extend to, see the diagram below. Roots of a kauri can extend outwards three times as far as the branch tips. This area is described as the root zone, or kauri hygiene zone in Auckland Council's SOP.

Because of the size of the root zone if a large kauri is close to, or on, the bait, trap or access line then you may be passing through the root zone and be at risk of spreading the disease.



Reference: Best practice guidelines - land disturbance activities around kauri. October 2017.
www.kauridieback.co.nz

4. Additional requirements and field tips

- **No pest control devices or way markings are to be attached to kauri.**
- Placement of traps and bait stations: where possible place traps and bait stations in drier, free draining or higher areas to avoid dips, bogs or water courses. This helps other workers avoid regularly accessing muddy areas when servicing traps or bait stations.
- When it is safe to do so (and the tree health status is known), complete the bait or trap line so that you travel from an area of healthy kauri to sick kauri, rather than the other way around.
- Portable phytosanitary kits (spray bottle of Sterigene and a scrubbing brush in its own plastic bag) must be carried and used, as prescribed. You can take more than one brush if the terrain is very muddy.
- To avoid the spread of dirt, adhere to the following tips:
 - Avoid sitting down on any exposed soil - use stable fallen logs or rocks instead.
 - Don't sit any packs on the ground/exposed soil - hang these from trees or wedge them between branches during breaks.

5. Training and refresher training

All new AiP workers are inducted with a training session and are issued with the Health and Safety Plan and this SOP. Training includes particular emphasis on adhering to kauri dieback hygiene procedures and includes demonstrations of scrubbing and spraying.

All new and existing AiP workers will be Safe Kauri Certified via an online training session and quiz. During each volunteer session reminders are given to all volunteers about cleaning gear, and this is supervised by staff or designated trained volunteers. Regular communication through email bulletins reinforces messages about kauri dieback management.

6. Summary of Ark in the Park kauri dieback SOP

Ark workers are granted access to undertake important work within the rāhui area, however, this privilege comes with responsibilities - all workers must read and remain familiar with this SOP.

- **Legislation:** the Ark in the Park is covered by:
 - The rāhui placed by mana whenua Te Kawerau ā Maki.
 - A Controlled Area Notice (CAN) enforced by the Ministry for Primary Industries.
 - The 'Public Safety and Nuisance Bylaw' which applies to unauthorised access to closed tracks and off track areas.
 - The 'Ark in the Park Standard Operating Procedures: Kauri dieback disease management' which is based on the Auckland Council's 'Kauri Hygiene Standard Operating Procedures' (version 3.0, March 2021).
- **Minimizing spread:** work is planned based on 'zones of operation', and 'high value kauri zones'.
- **Identification:** Ark in the Park workers are to carry their kauri dieback authorized ID cards with them in the field, wear Forest & Bird branded hi-vis, and place 'AiP authorized vehicle' cards on their dashboards.
- **Vehicles:** don't spread dirt/mud in cars - always bring spare shoes and a bin/bag for dirty boots, change pants if needed, and consider seat covers for personal cars.
- **Cleaning at base:** unless otherwise authorized, all workers must begin and end the field work at the AiP volunteer base to conduct thorough kauri dieback cleaning of all gear used.
- **Cleaning in the field: *Scrub, Spray, Stay.*** Scrub all dirt/mud off boots before changing areas, spray with Sterigene, repeat if needed until dirt is removed. Stay for one minute after final spray to allow Sterigene time to act. Scrub, spray, stay every time you change: from track to bait/trap/access line, before streams, when entering/exiting the bush, and any other time you feel it will help protect kauri.
- **Keeping kauri safe in the field:**
 - Kauri root zones/hygiene zones are 3 times the area of the drip zone (the furthest reach of the foliage) - avoid entering or working in these areas to protect kauri.
 - No pest control devices or way markings are to be attached to kauri.
 - Where possible place traps & bait stations in dry areas to avoid spreading dirt/mud, and outside of kauri root zones.
- **Training:** all volunteers undertake kauri dieback training as part of their induction, including the kauri dieback quiz. Reminders are provided by email in regular communications, and in person during volunteer sessions.

7. Appendix

7.1. Kauri identification



Above: kauri leaves and female cones.
Photo: Jeremy Painting.



Comparison: totara leaves. Note the more pointed tip on totara leaves compared to the more rounded kauri leaves.
Photo: Phil Bendle

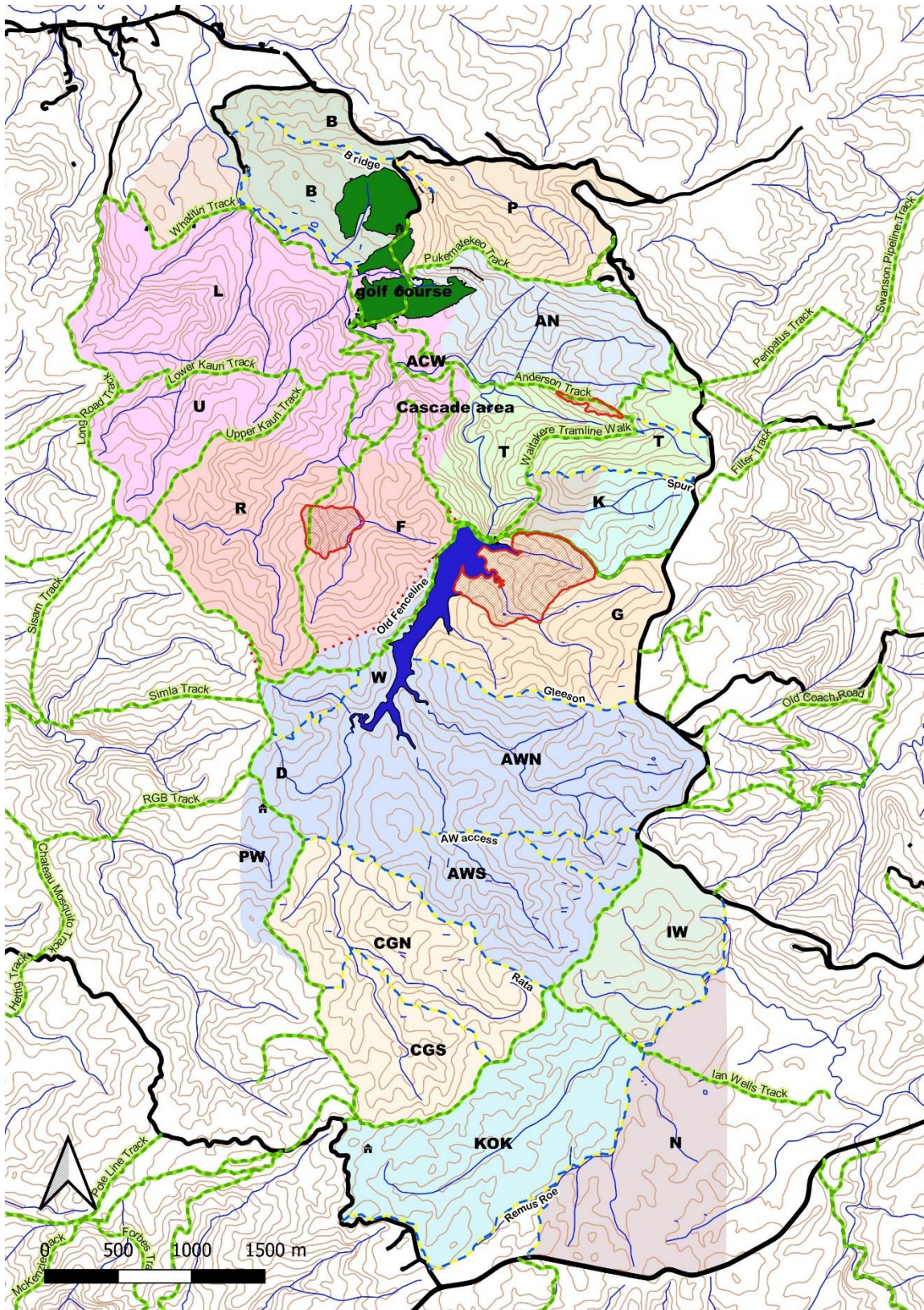


Kauri trunks and leaf litter. Photo: Chris Chadwick.

7.2. Version history

Version	Title	Author	Date	Reason for change
1.0	Appendix H Procedures for avoiding spread of weeds and kauri dieback disease.	S. Park S. Rogers G. Wadams	2014	Updated to reflect developments such as the rāhui and CAN.
2.0	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G. Wadams	2/05/2018	More detail added throughout.
2.1	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	10/05/2018	To incorporate review comments from Lee Hill and Richard Balm.
2.2	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	16/05/2018	Further clarification regarding the action of Sterigene.
2.3	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	17/05/2018	Details of CAN and Local Bylaw fines added.
2.4	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	22/05/2018	Amended tape height for kauri sections. Change to instructions regarding wearing shoe covers. Addition of meths and bleach as Sterigene alternatives. Change to requirement to come to the AiP volunteer base before undertaking field work.
2.5	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	30/05/2018	Addition of more information about drip lines, remove AiP trigene stations, remove bucket from AiP facilities.
2.6	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	1/06/2018	Incorporation of comments from volunteer reviewers.
2.7	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams and L. Bechet	8/06/2018	Incorporation of further comments from volunteer reviewers.
2.8	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	12/06/2018	Clarification regarding spraying with Sterigene in response to feedback. Insert contents page. Insert dashboard display requirement.
2.9	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	29/06/2018	Removal of shoe covers from use, change from marking kauri areas with pink tape to marking with white triangles. Add kauri identification section.
3.0	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	09/2018	Change from marking kauri to a focus on hydrology zones as per communication with Hugo Geddes, Lisa Tolich and Phil Brown.
4.0	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	11/2018	Zones of Operation map removed.
4.1	Ark in the Park Standard Operation Procedure: Kauri dieback disease management.	G.Wadams L. Bechet	12/2018	NA.
4.2	Ark in the Park Standard Operating Procedures: Kauri dieback disease management.	S. Lincoln	03/2022	Updated with current pathogen knowledge. Edits to structure and change from exclusion zones to high value zones.

7.3. Map of Zones of operation and high value kauri zones



Description:

- Each colour is a different Zone of Operation - work is planned to avoid crossing between zones.
- The 3 areas highlighted in red are high value kauri zones – see section 2.1.