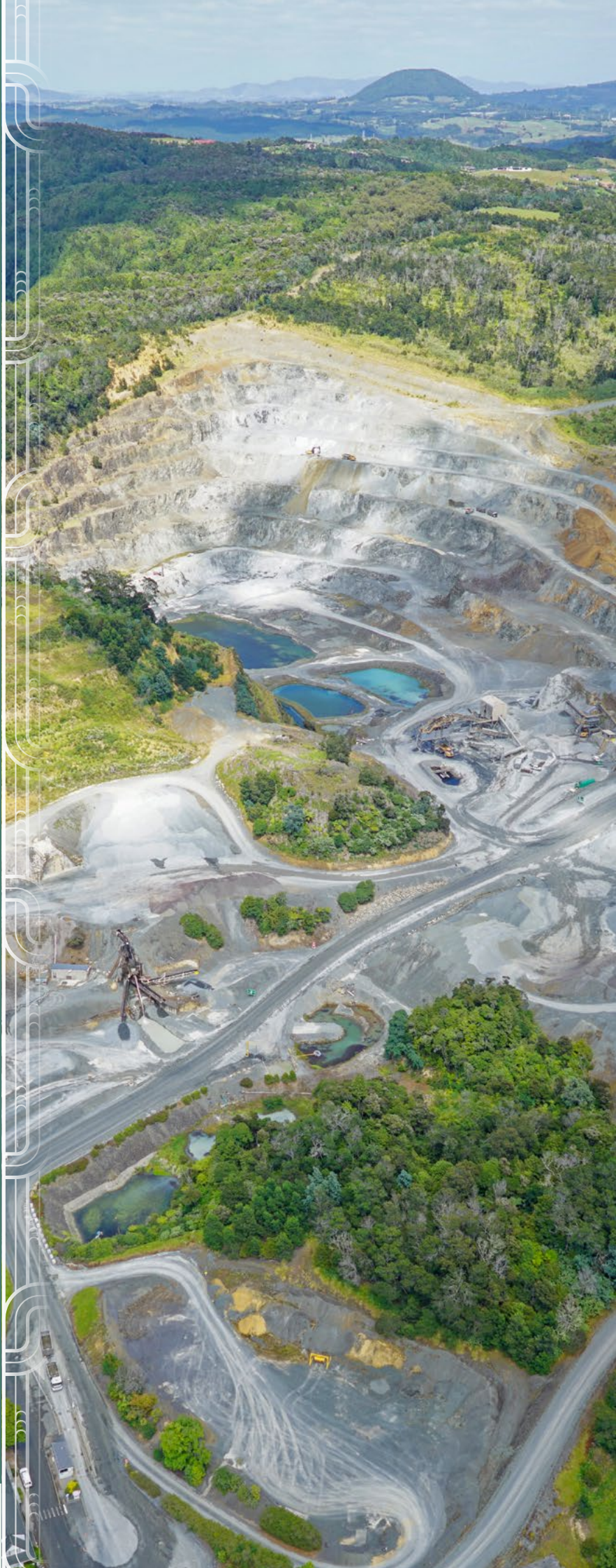




Kauri Ora: Quarry and Extraction Guidelines

Best practice actions for preventing the spread of the PA pathogen through quarrying, aggregate handling, transportation and storage



KA RAUHĪ TE TUPU O TE KAURI

GIVE KAURI SPACE TO GROW



Tiakina Kauri is an agency based within Biosecurity New Zealand that provides national direction for the achievement of the objectives of the National Plan for Kauri, through active partnership with mana whenua and collaboration with regional councils and the Department of Conservation.

For more information about protecting Kauri, visit www.kauriprotection.co.nz

About this guide

This guide provides best practice standards to mitigate the spread of PA, which causes kauri dieback disease, via quarry operations.

A precautionary approach is taken to manage the level of uncertainty around whether Kauri and the surrounding soil is infected or not.

For more information about protecting Kauri and the PA pathogen, visit www.kauriprotection.co.nz

The National Pest Management Plan for Kauri

In August 2022, a National Plan was launched to help protect Kauri from the *Phytophthora agathidicida* (PA) pathogen. The National Plan includes 10 rules that apply to anyone who grows Kauri, goes into Kauri forests, or lives or works around Kauri.

By following this guide and the rules of the National Plan, we can all help protect Kauri for generations to come.

For more information about the National Plan, visit www.kauriprotection.co.nz/national-plan

Unwanted Organism

PA is an unwanted organism in New Zealand. This means that knowingly moving, transmitting, releasing or spreading PA is an offence under the Biosecurity Act 1993, unless permission has been granted by a chief technical officer. If your operation is known to be, or likely to be, contaminated with PA, contact Tiakina Kauri or your Regional Council to seek advice. Information on handling unwanted organisms can be found here: www.mpi.govt.nz/biosecurity/how-to-find-report-and-prevent-pests-and-diseases/handling-unwanted-organisms

Key rules for quarries and extraction

Obligation to report

Land occupiers are obligated to report unhealthy Kauri to Tiakina Kauri, an authorised person or their regional council. **(Rule 1)**.

PA Risk Management Plans

If your quarry or surrounds is already infected with PA or has a high risk of being infected, Tiakina Kauri may ask you to develop a PA Risk Management Plan to help reduce the risk of the PA pathogen spreading on your property. **(Rule 4)**.

Earthworks PA Risk Management Plan

If you want to undertake any earthworks within a Kauri Hygiene Zone (KHZ) you must have an Earthworks Risk Management Plan. **(Rule 5)**.

A 'how to' guide and a template for creating this plan are available at www.kauriprotection.co.nz/resources for both PA risk and Earthworks Risk Management Plans.

Obligation to clean items

Any person entering a Kauri forest and anything that comes into contact with the ground must be clean before entering and when exiting the area. Risk item means an object that may come into contact with soil (other than gravel), track surfacing or plant matter. **(Rule 8)**.

Background

Many of the quarries that are used in the northern part of New Zealand are from hillsides that have native forest cover. These sites need to be cleared of this cover (or overburden) in order to access the quarry aggregate underneath. Given the risk of PA within catchments where quarrying activities may take place, these could pose a risk in spreading PA.

The guide provides best practice based on the current information and uses risk management principles to reduce the likelihood of spreading PA during operations. The following information in this guide is to be considered by quarry or pit operators, planners, land managers and contractors when planning any operations. Please contact your local council or land management agency if there are local policy or regulatory constraints.

There are a number of potential pathways associated with quarry activities that could spread PA. Existing, new quarries and extensions to existing quarries will need to meet **Rule 5** requirements should Kauri be removed as part of land clearing.

If you want to undertake any earthworks within a Kauri Hygiene Zone (3x the radius of the dripline of a Kauri tree canopy), you must have an Earthworks Risk Management Plan (**Rule 5**).



Active quarry near Kauri forest

About the PA pathogen

PA infects Kauri through their roots and restricts the trees' ability to transport water and nutrients between the roots and the leaves. This causes the fatal condition known as kauri dieback disease, which eventually starves the Kauri.

There is no proven way to cure an infected Kauri, and there are limited treatment options.

PA can remain viable and infectious in both soil and water for unknown periods of time. In soil, spores can survive and remain viable long after a tree dies. While PA has the capacity to survive in water, spread from open water sources has yet to be proven. Spread via waterways during flooding and spread via wastewater run-off is also possible.

As PA lives in the soil, the risk of unknown spread and introduction to new sites is high for aggregate and rock extraction operations and gravel pits as infected material can be accidentally used on roading construction and upgrades.

This has been proven globally to be a major contributor to the introduction and spread of *Phytophthora* species to new sites.

To stop PA from spreading, everyone must follow correct hygiene protocols when moving and working around Kauri.

PA can be spread by:

- vehicles and machinery
- footwear, clothing or equipment that touches the soil
- animals, including wild pigs and stock, that have walked through infected areas.



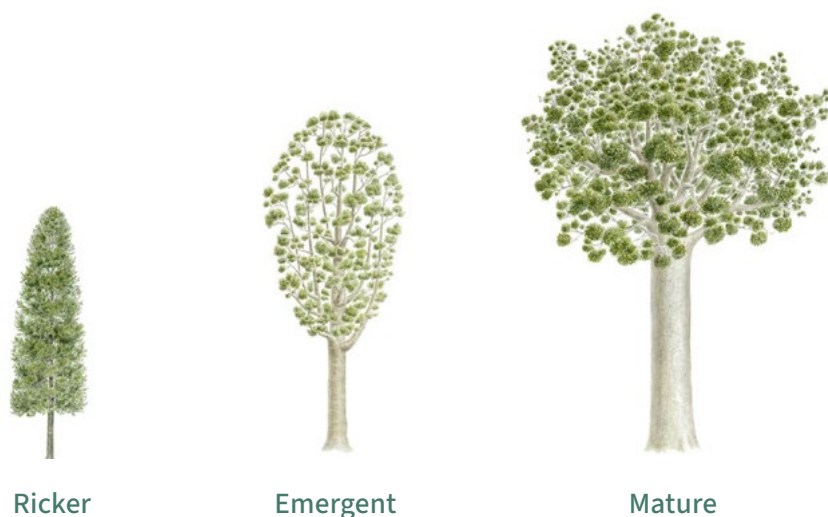
PA pathogen infection can cause bleeding gum



View of Kauri canopy with dead branches

Recognising Kauri

Figure 1: The illustration shows different life stages of Kauri.



Kauri Hygiene Zone

The best way to protect Kauri and avoid spreading PA through the movement of soil or dirt, is to avoid operations around Kauri Hygiene Zones and Kauri forests whenever possible.

A Kauri Hygiene Zone is the area about three times the radius of the canopy of the tree and is where their shallow and fragile roots extend too. To protect Kauri, it is also important not to damage or disturb their roots.

Figure 3: The illustration shows the Kauri Hygiene Zone for a single Kauri

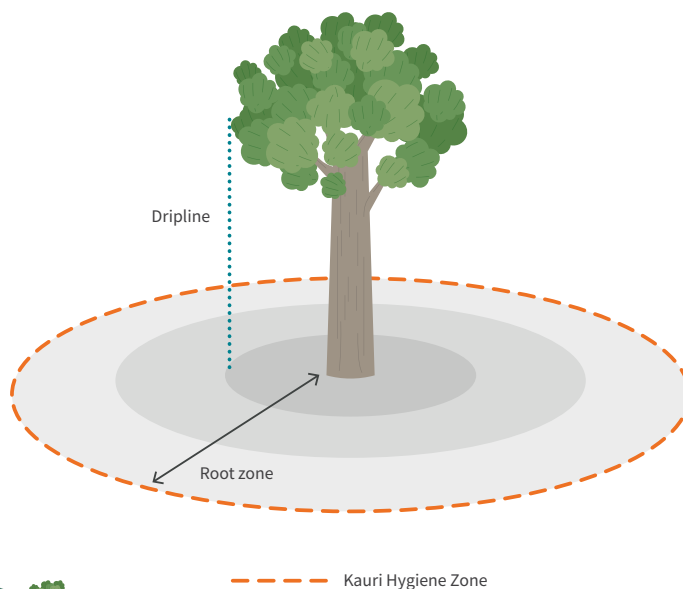
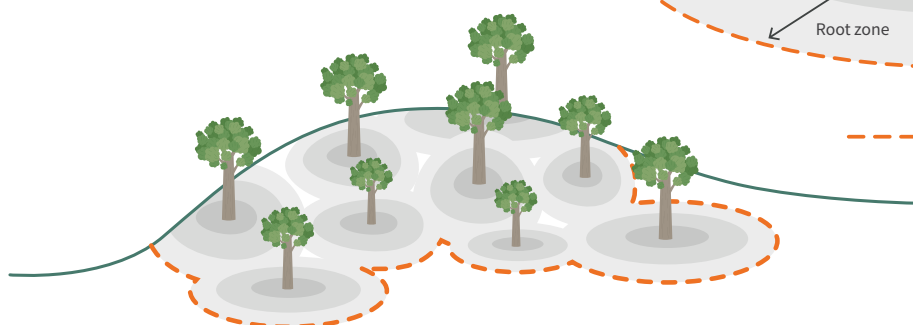
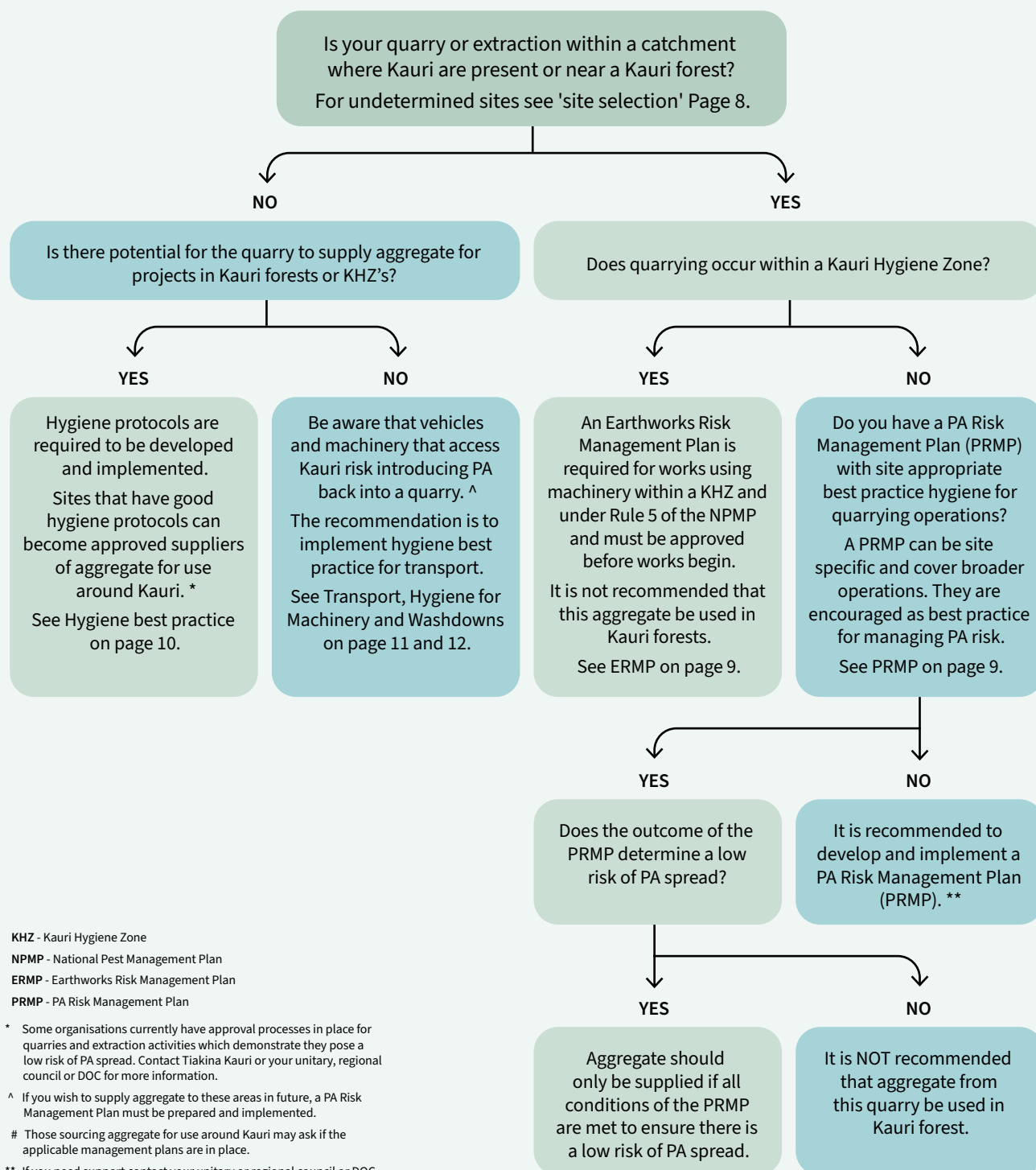


Figure 2: Avoiding Kauri Hygiene Zones



Decision tree for aggregate suppliers

The following applies to proposed sites and extension of existing quarries:



Site selection

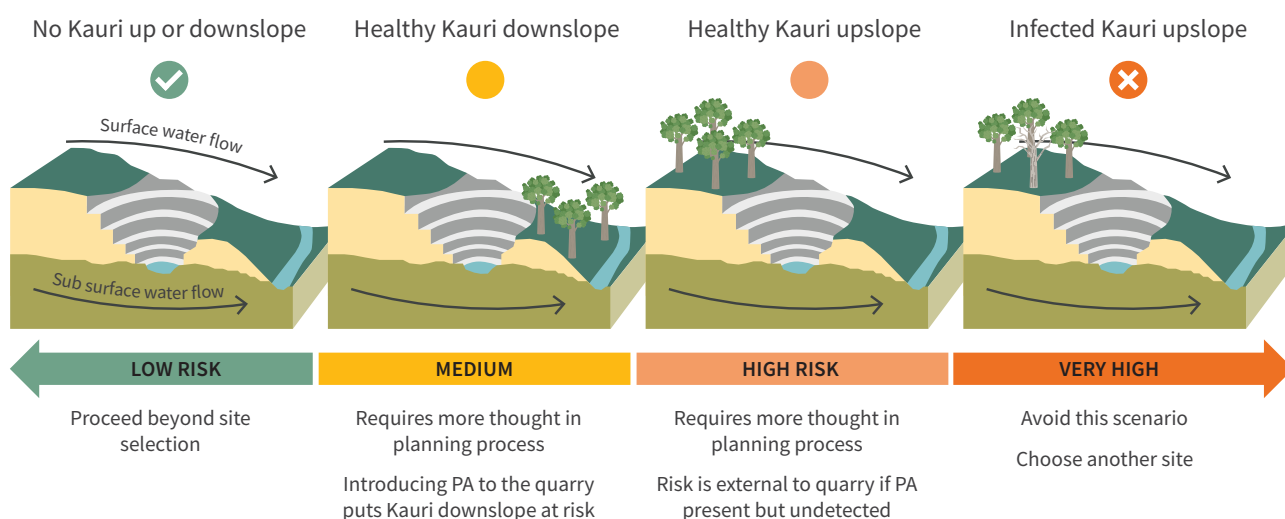
When selecting a site for new and expanding quarries and extraction pits take into consideration the proximity of Kauri or Kauri forest. The risk of PA presence or introduction is greater around Kauri. Kauri upslope of a quarry could mean the presence and movement of PA in soil and waterways.

It is recommended;

- to ask authorities (councils or the Department of Conservation) if Kauri and PA requirements are part of consent or permitting processes.
- the site be PA free.
- that all extraction activities be away from Kauri and Kauri forests.
- that if Kauri is present, to map and record locations where possible. Monitor any sick Kauri and report to Tiakina Kauri or your regional council to have it confirmed whether PA is present.
- to consider topography and hydrology of the wider catchment.
- that water sources and intended uses be considered as part of site selection.

For further information on site selection in relation to PA, contact Tiakina Kauri or your regional council.

Figure 4: Kauri in the landscape poses varying degrees of PA risk to quarrying. Absence of Kauri in the landscape is the best possible scenario when selecting sites. Kauri at different locations in the catchment will impact the level of risk. PA identified as being present upslope is the highest level of risk. These sites should be avoided.



PA Risk Management Plan

If there are Kauri nearby, there is a risk of spreading PA through pathways which need to be managed. The key recommendation is to develop and follow a PA Risk Management Plan (PRMP) for quarrying or extraction activities.

A PA Risk Management Plan is perpetual, and encompasses all potential site vector risks on an ongoing basis.

A PRMP identifies all the ways dirt can be moved within or around the quarry through various operations, and how to manage each one. The PRMP should be carried out with a person who is familiar with the quarry, its operational procedures and who can provide assurance that the aggregate can be provided with minimal risk of carrying PA.

A plan must be implemented correctly to reduce the risk posed by PA. A PRMP is recommended as best practice but may also be requested under **Rule 4** of the NPMP. An audit may be carried at any time. Your regional council may be able to help you develop a PRMP.

See the Tiakina Kauri website for the PRMP template and How To Guide.

www.kauriprotection.co.nz/resources.

If requested, you may need to develop a PA risk management plan in collaboration with Tiakina Kauri, an authorised person or your local council, if it is determined that such a plan is needed to help control the spread of – or limit the effects of – the disease caused by the PA pathogen on land you own, manage, or live on (**Rule 4**).

Earthworks Risk Management Plan

A Earthwork Risk Management Plan is required for earthworks carried out within a Kauri Hygiene Zone with a defined start and end date. For example, clearing vegetation, topsoil and overburden would require a plan.

For any earthworks carried out within Kauri Hygiene Zones an Earthworks Risk Management Plan (ERMP) must be prepared beforehand (**Rule 5**). The ERMP template is available on the Tiakina Kauri website.

www.kauriprotection.co.nz/resources.

Key components of an ERMP are as follows:

- procedures for cleaning vehicles, machinery, equipment, footwear and clothing so they are dirt-free and disinfected before and after going into or near Kauri areas.
- procedures for cleaning to prevent PA from being introduced to, or spread from, the site, including guidance about wash down areas, dirty machinery, and vehicle hygiene stations.

Hygiene best practice for quarrying and extraction

Hygiene best practice requires thoughtful planning and the establishment of clear protocols which limit the risk of introducing and spreading PA.

Quarries and extraction pits that implement PA management best practice may become preferred suppliers. Organisations like unitary, regional councils and the Department of Conservation may have approval processes in place to determine which quarries pose low risk for PA spread.

Here are key considerations for meeting those requirements and for filling out PA Risk Management Plans.

Clearing/soil and overburden removal

The clearing of vegetation and the removal and storage of soil and overburden must be done using machinery that has been cleaned to manage PA risk. Stockpiling is recommended to be away from operational areas and demarcated with restricted access particularly if material is required for future use in rehabilitation. Material known to be from an infected source is not recommended to be used in rehabilitation and must be stockpiled or buried on site away from operational areas and stockpiles than intend to be reused. Ensure machinery accessing and working in these areas are dirt free. Where possible, designate machinery for these areas.

Water management

A lot of water is used during quarry operations when extracting aggregate, so the surrounding soil is likely to be wet and muddy. This in turn causes potentially infected soil to stick to vehicles and equipment.

PA can move through soil in water, and it is likely that surface water runoff will spread it. There is also potential for contaminated water to be re-circulated.

Consider raising operational surfaces like quarry roads and hardstands, and stockpile areas to prevent mud and water pooling.

Water management and drainage must be set up in a manner so operational areas for crushing, moving and stockpiling rock and aggregate do not become wet and muddy. Drainage and run off around stockpiles must be managed to prevent PA movement via water source into or out of stockpile areas.

Blasting and crushing

Blast vibration is a critical part of the quarrying process where hard rock is broken apart from the ground. Crushing is taking the blasted material and crushing into the various sizes of rock and aggregate that is sold for various purposes.

PA does not live in rock and therefore the risk of moving PA is lower during these processes, however they may become contaminated if the crusher, loader or transport vehicles used are dirty. This can potentially spread infested dirt around the quarry with blasted or crushed rock.

Stockpiling

Consider creating clean areas within the quarry for crushing and stockpiling with stricter hygiene and water management protocols particularly if aggregate is going to Kauri forest areas.

Clean rock can be stored in clean areas and the machinery used for shifting and loading should be dirt free. Trucks used for transport are to be managed in a way as not to contaminate clean areas.

Transport

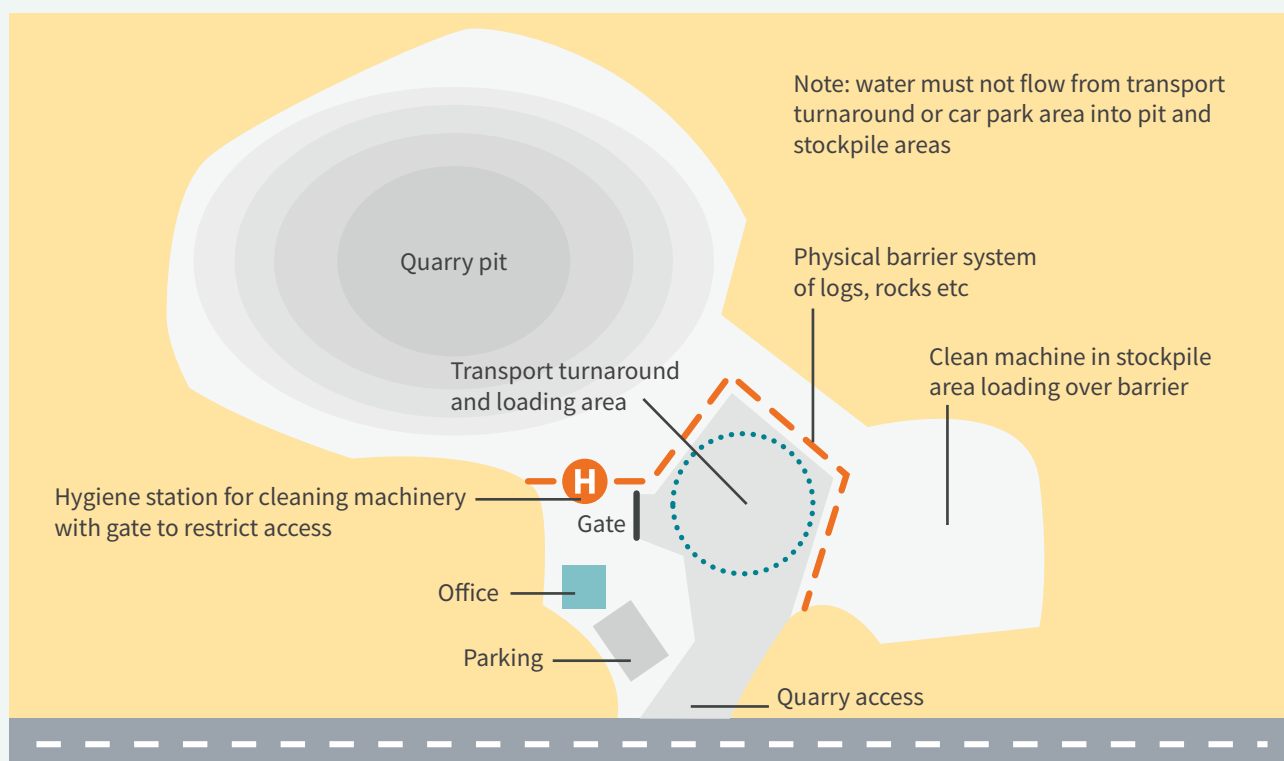
Contamination may occur when delivering aggregate to muddy sites with Kauri present, and PA could be transported back to the quarry.

Vehicles, equipment and machinery may require hygiene and the facilities to appropriately do so. These are described below and if implemented properly will lower the risk of spreading PA through dirt attached to machinery and vehicles.

Hygiene for machinery

To prevent the movement of PA through soil and dirt movement, machinery and trucks may need to be cleaned down prior to arriving or departing the quarry. Trucks may also need to be cleaned prior to arriving at site where works are being done around Kauri.

To manage PA risk, implement a physical barrier system which splits the areas from where potentially contaminated machinery operates from where clean machinery operates. This will help to prevent cross contamination and reduce the amount of machinery washing. It also protects the resource from becoming contaminated via external sources. All machinery will then only need to be cleaned once before entering a designated clean area. Reducing the amount of cleaning per machinery also reduces the risk of contamination from this cleaning/wash down process.



Rehabilitation

Rehabilitation is a continual process as operations move from one section of the quarry site to another over time. A rehabilitation plan is usually determined as part of the quarry approval process and often involves reshaping the land, managing watercourses and replanting native vegetation. It may also involve introducing clean or managed fill. It is recommended that rehabilitated areas around Kauri source fill from suppliers with biosecurity practices in place that can provide a pathogen free product. It is not recommended that Kauri be replanted unless PA risk has been managed properly as part of the quarrying and stockpiling processes and that pathogen free soil can be sourced. Machinery used in the rehab process must be clean and dirt free if working around Kauri.

Washdowns

Vehicle and machinery washdown are the best way to remove dirt and organic material but there are risks if runoff isn't contained or disposed of properly.

Washdown areas should be constructed on a hard standing area (concrete pad, grate or gravel area) that is mud-free, away from waterways, and has access to a supply of water. They should ideally be fitted with a sump, sediment trap or effluent disposal system to capture runoff.

The location of washdown areas (whether temporary or permanent) is critical to ensure that nearby Kauri or Kauri Hygiene Zones, including downslope of Kauri, are not impacted by any runoff.

Automated washdowns are more effective but cost more to set up and maintain.

Washdown areas should include:

- hard brushes and long-handled brooms for initial dry brushing
- water and scrubbing brushes to help remove more persistent mud and soil
- a crowbar (or similar) to dislodge large clods of mud
- a high-pressure hose and disinfectant in spray bottles or a pressurised spray unit

The systematic inspection and cleaning of a vehicle or machinery from the top down should include, but not be limited to, the following:

- **cabin:** floor and under the seats
- **body:** the underside, any crevices, ledges or gaps, footwells, tray, bumper bars, cab steps, and around the fuel tank
- **wheels (inside and outside):** between dual wheels if fitted, the spare wheel, and mud guards
- **tray:** chassis and hollow channel
- **attached or associated equipment:** buckets, blades - including teeth etc.

For more information about the requirements of washdown sites and hygiene procedures for vehicles and machinery, refer to the Vehicle and Heavy Machinery Hygiene Guideline and Earthworks Risk Management Plan (ERMP) on www.kauriprotection.co.nz.



This guide was updated in 2025 by Tiakina Kauri with the help and advice of:

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- Stuart Leighton (Auckland Council)
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For more information about protecting Kauri, visit www.kauriprotection.co.nz