Dieback
WORKING GROUP INC

Best Practice Guidelines for

Management of Phytophthora Dieback in the Basic Raw Materials Industries

2021

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DWG Inc. (DWG)

Disclaimer and Limitations

This report has been prepared by the Basic Raw Materials Sub-Committee of the Dieback Working Group Inc. on behalf of, and for the exclusive use of the Dieback Working Group Inc.

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Foreword

When I first heard about what was then termed Jarrah Dieback in my first-year botany class in the early 1970's it was seen as a disease of Jarrah. We learnt much about the life cycle of the introduced pathogen *Phytophthora cinnamomi* and heard from foresters that this disease threatened one of the world's great hardwood forests. It was alarming and convincing that without urgent action, our forests were destined for an uncertain future with the result of a comprehensive forest quarantine campaign.

Of course, if we had just thought about the origin of the name Phytophthora (literally 'plant eater'), we would have realised that its impact on Jarrah was the least of our worries.

Today this plant destroying pathogen is rampaging well beyond our forests and it's 'normal operating parameters' – this pervasive and insidiously persistent disease impacts woodlands, heathlands, dampland, and even the peak of our tallest mountain, Bluff Knoll. Now found over an extraordinary 1000km range the disease is unravelling the ecological fabric of some of our most precious ecosystems with dire knock-on effects.

Banksia woodlands, the primary food resource for our magnificent threatened Carnaby's cockatoo, is under siege from the pathogen. This is true of many other ecosystems in WA and across the nation. After the disease has done it's work, little is left of an ecosystem – just resistant rushes and sedges and a few shrubs and herbs remain with the ecology changed forever.

So that is why these BRM Guidelines are not only important; they are critical if we, as a community and responsible industry, are to stop the disease in its tracks. We have managed successfully with other biosecurity issues and we can do it with Phytophthora dieback. But we have to pull together. These guidelines do just that. They show in simple steps what every operator and business owner can do to help reduce the impact of this disease in our world renowned biodiversity hotspot. It may mean small changes to your business procedures, but Western Australians are adaptable, willing and a strong, united community.

I commend these Guidelines to you and hope you will join the fight to 'stop the rot' killing our plants and animals.

Professor Kingsley Dixon FLS FTSE

John Curtin Distinguished Professor

Executive summary

Basic Raw Materials (BRM) are materials such as sand, gravel, hard rock and limestone.[1] Approximately 22.5 million tonnes of sand, limestone, rock and gravel are extracted each year in Western Australia (WA) to produce building and construction materials such as cement, concrete, bricks, tiles, pavers, roads and support crucial infrastructure such as rail[2]. This industry is critical to the economy and future of our cities.

Phytophthora Dieback (dieback) is the name given to the death of many native plant species on sites infested with the introduced, soil-borne plant pathogen *Phytophthora cinnamomi*. It is a major plant disease of native vegetation in the south-west of WA; infested areas are known as dieback sites. Dieback is spread in soil and water and the BRM industry poses a significant risk of spreading this disease e.g. by using road building material sourced from infested pits. There is no risk of spreading this disease when BRM is used in manufactured products.

These best practice guidelines outline ways in which BRM producers and suppliers can minimise the spread of Phytophthora Dieback. They are not intended to be prescriptive but illustrate the best practice management techniques used by many companies in the BRM industry in the south-west of WA. These techniques will also minimise the spread of pests, other pathogens and weeds in BRM sourced from agricultural sites.

These guidelines provide advice on general considerations such as Hygiene/Dieback Management Plans, Green Card Training, Contractors, and Sales and Marketing. They provide specific guidance for all stages in the operation of a mine or quarry.

A risk table for each activity identifies the likelihood of spreading dieback and explains how these risks can be mitigated.

These guidelines update and complement the Extractive Industry Dieback Guidelines[3].

Image: Hanson

1 Department of Planning Lands and Heritage (DPLH), Basic Raw Materials Guidelines, October 2018
2 Concrete Cement Aggregates Australia (CCAA) Website, 2018
3 Management of Phytophthora dieback in extractive industries, 2005. www.dwg.org.au

Glossary and abbreviations

Glossary:

Phytophthora Dieback Interpreter (Interpreter) – refers to an individual evaluated and registered by DBCA to undertake dieback interpretation and mapping on lands managed by the department. See Appendix 1.

Phytophthora Dieback (dieback) – plant disease that results in the death of many species of native plants on sites infested by the introduced, microscopic, soil-borne plant pathogen *Phytophthora cinnamomi.*

Dieback-free – see Uninfested.Dieback-free BRM – BRM which has been sourced from a site assessed as uninfested by an Interpreter, and the site has been managed and monitored since assessment to maintain the uninfested status.

Dieback map - map prepared by an Interpreter which shows infested areas (shaded pink to red), uninfested areas (shaded green), uninterpretable areas (shaded purple). See Appendix 1.

Hygiene Activities Processes – to prevent the spread of plant diseases. See Appendix 2.

Hygiene/Dieback Management Plan – Management plan developed by a quarry or mine to minimise the spread of pests, pathogens (including dieback) and weeds during the life of the quarry or mine.

Infested – area where *P. cinnamomi* is present as determined by an Interpreter through assessment of the signs and symptoms of dieback at the site and targeted sampling.

Interpreter – see Phytophthora Dieback Interpreter. Dieback – see Phytophthora Dieback. Uninfested – area where *P. cinnamomi* is not present as determined by an Interpreter through site assessment and targeted sampling.

Abbreviations:

BRM	Basic Raw Materials
COE	clean on entry
COEx	clean on exit
DBCA	Western Australian Department of Biodiversity, Conservation and Attractions
DIDMS	Dieback Information Delivery and Management System, http://didms.gaiaresources.com.au/)
DWG	Dieback Working Group Inc.
PoW	Programme of Works
WA	Western Australia

Figure 1. Left: Healthy vegetation in the Stirling Range WA. **Right:** The same area affected by dieback.

Introduction

Western Australian Basic Raw Materials industry

Basic Raw Materials (BRM) are materials used in the construction industry such as sand, hard rock, gravel and limestone that are either used in their raw, un-processed state or are crushed and screened. There is no separation, refining or purification. The BRM Industry comprises of companies and Government agencies which extract this range of materials on either crown or freehold land. In Western Australia (WA) alone, approximately 22.5 million tonnes of sand, rock and gravel are extracted each year[4].

The BRM industry and its extractive activities pose a significant risk for the spread of Phytophthora Dieback. In particular, activities such as the transferring of infested soils across site/s, or machinery traversing across unmapped/infested areas with no clean down protocols, can be detrimental to the surrounding environment and compromise future topsoil management. Activities through the whole life of the mine or quarry can be a potential risk to spread dieback to unmapped and dieback-free sites if not appropriately managed.

The BRM industry is responsible for the environmental management of its sites. Whilst there are various guidelines that cover general hygiene management for Phytophthora Dieback, none specifically outline the management practices for the BRM industry. These guidelines cover information on correct hygiene management protocols for a number of activities such as Exploration, Clearing and Stripping, Extraction, Loading and Transport, and Mine Closure.

Background and impact of Phytophthora Dieback (dieback)

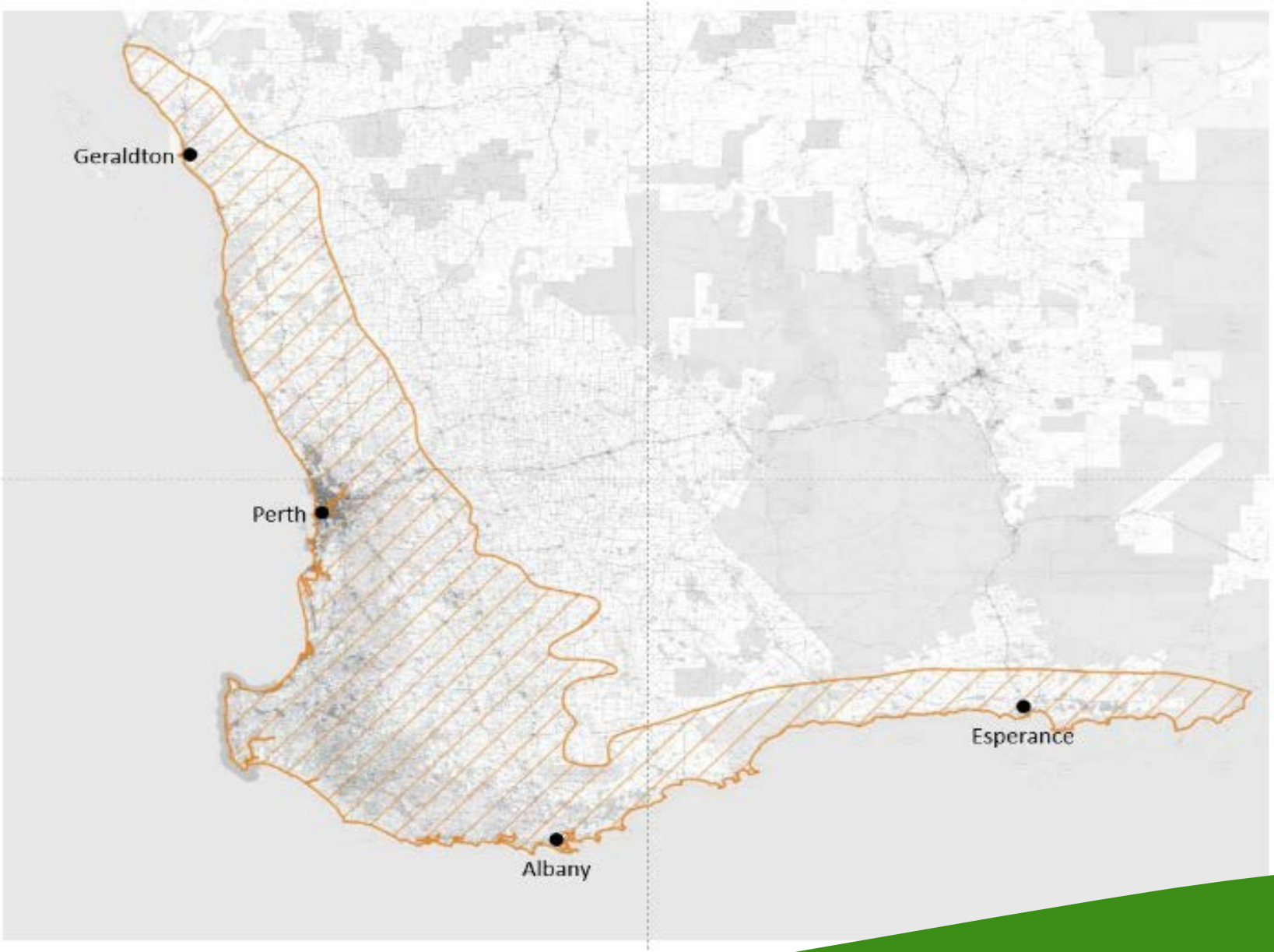
Phytophthora Dieback (dieback) is the name given to a plant disease that causes the deaths of many species of native plants on sites infested by the introduced, microscopic, soil-borne plant pathogen *Phytophthora cinnamomi.* It is a major plant disease in areas of natural vegetation such as native forests and nature reserves in the south-west of WA. Infested areas are known as dieback sites. Many native plants are affected and the Department of Biodiversity, Conservation and Attractions (DBCA) have developed a way of mapping the distribution of the dieback pathogen, to try and minimise its spread (Appendix 1 - Dieback Mapping; Appendix 2 - Hygiene).

The impact of Phytophthora Dieback in native vegetation starts with death of structurally dominant species, such as banksias. It is widely understood that areas of infested native vegetation may never recover to their previous state, and the impacts of dieback are therefore long-term (Fig. 1).

The best protection is to prevent the introduction of dieback into dieback-free areas of the south-west of WA. The nominal inland boundary of this vulnerable zone is the 400 mm isohyet (Fig. 2).

4 Basic Raw Material Mining Proposal Guideline – Western Australia. 2018. Cement Concrete & Aggregates Australia

Figure 2. The inland boundary of the vulnerable zone corresponds to the 400 mm isohyet derived from rainfall data captured by the Bureau of Meteorology up to 1979. Image: DBCA



Spread of dieback

Dieback is spread in soil and water and by root to root contact. The BRM industry and its extractive activities pose a significant risk for its spread, e.g. by using road building material such as gravel and sand sourced from infested pits. As a result, many dieback sites are along roads which have been infested either during construction, grading or repair. There will be no risk of spreading dieback in BRM if these raw materials are used in manufactured products such as bricks and cement, however, if they are used in road construction, landscaping, rehabilitation or potting compost, they will spread the disease.

The industry's activities also pose a significant risk for spreading dieback within its sites, e.g. by transferring infested soils across sites, or by machinery traversing unmapped or infested areas with no clean down protocols. This can be detrimental to the surrounding environment and will compromise future topsoil management. Activities through the whole life of the mine or quarry can and will be a potential risk to unmapped and dieback-free sites.

Dieback-free BRM

Customers may request dieback-free material from BRM suppliers[5]. DBCA's standard for dieback-free BRM are only recognised as being dieback-free if it meets the following criteria:

- It is sourced from a site that was assessed as uninfested by an [registered Phytophthora Dieback] Interpreter;
- The site has been managed and monitored since assessment to maintain the uninfested status (including hygienic excavation and transport of the BRM to the site of use).[6]

In other words, the only way dieback-free BRM can be assured is if it is sourced from an area of native vegetation which does not have symptoms of dieback, and is managed carefully to maintain its dieback-free status. Such material is scarce and a valuable commodity.

BRM sourced from agricultural areas cannot be classified as 'dieback-free' just because these areas are free of native vegetation. Such sites are classed as uninterpretable.

Purpose of these guidelines

The BRM industry is responsible for the environmental management of its sites. Whilst there are various guidelines that cover general hygiene management for dieback, none specifically outline the management practices for the BRM industry. These guidelines cover information on correct hygiene management protocols for activities such as Exploration, Clearing and Stripping, Extraction, Loading and Transport, and Mine Closure. These guidelines update and complement the Extractive Industry Dieback Guidelines[7].

5 Appendix 3 – Frequently asked Questions about Basic Raw Materials, DWG 2019
6 Department of Biodiversity, Conservation and Attractions, 2020, Phytophthora Dieback Management Manual (FEM079), October 2020, Department of Biodiversity, Conservation and Attractions, Perth
7 Management of Phytophthora dieback in extractive industries, 2005. www.dwg.org.au

Image: Hanson

Best practice techniques for minimising the spread of dieback

General principles

The sections below outline the areas of interest that should be covered by a practitioner focussed on the management of dieback.

Green Card Training

DWG Green Card Training™ has been developed specifically for dieback in WA. It is a 1-day training course which covers biosecurity and hygiene principles for stakeholders, both when planning activities and in the field. If staff are undertaking any on-ground works and have not undergone DWG Green Card Training™, it is recommended they complete the course prior to commencing. Recommended trainers are listed at DWG Inc. website (www.dwg.org.au).

Contractors

Contractors visiting a site, even when they are not conducting any work, must always be accompanied by company staff, and must adhere to site requirements as specified in their induction. Contractors and sub-contractors are required to be made aware of any areas that have clean on entry (COE) points and are to be shown how to adequately clean down their vehicle if required.

Sales and Marketing

It is recommended that those working in sales and marketing undertake DWG Green Card Training™. It is important they understand what dieback is and its impact on the environment. Sales employees will be able to provide context in tenders and be able to explain to customers/clients the impact of this pathogen, how the company manages the issue and what material the company can recommend for the customer's project.

Hygiene/Dieback Management Plan

This should include:

- Entry and exit points
- Appropriate area fencing (where practical)
- Signage
- Mapping of infested and uninfested areas which has been done within the past year
- Clean down zones
- Clean down procedures for wet and dry soil conditions. N.B. activities should always take place in dry soil conditions where practical.

The following sections outline the risks of each stage of BRM activity for each resource type, and how those risks can be mitigated. This is inclusive of Exploration, Clearing and Stripping, Extraction, Loading and Transport, and Mine Closure.

Exploration

Exploration is an integral part of the mining process. It has the potential to significantly increase the spread of dieback if the risks are not addressed. This table can be used to help identify the level of risk that exploration activities pose for each resource type, how these risks can be mitigated, and which hygiene measures to implement to minimise the risk of spreading dieback across the site.

Exploration Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Sand	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • Exploration activities are undertaken in dry soil conditions. • Drill rig can stay on already-established paths. • Type of equipment is less invasive (i.e. vacuum drill) so minimal or no spread/ contamination of material from hole to hole. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped but mapping is not current (>1 year old). • Exploration activities are undertaken in dry soil conditions. • Drill rig has some disturbance across drill area but cannot stay on all tracks. • All appropriate hygiene measures are undertaken as per a Hygiene/ Dieback Management Plan.	• Area has been mapped as infested or no mapping has been completed. • Area is uninterpretable therefore risk is high due to lack of disease information. • Activities are undertaken in moist or wet soil conditions. • Drill rig has to venture off paths or no paths are present. • Drilling along infested areas and then transferring infested material to uninfested areas. • No Hygiene/Dieback Management Plan for site.
Hard Rock/ Aggregate	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • Exploration activities are undertaken in dry soil conditions. • Drill rig can stay on already established paths. • Drill rig has minimal disturbance across area. • All appropriate hygiene measures are undertaken as per Hygiene/Dieback Management Plan.	• Area has been mapped but mapping is not current (>1 year old). • Exploration activities are undertaken in dry soil conditions. • Drill rig has some disturbance across drill area but cannot stay on all tracks. • All appropriate hygiene measures are undertaken as per a Hygiene/ Dieback Management Plan.	• Area has been mapped as infested or no mapping has been completed. • Area is uninterpretable therefore risk is high due to lack of disease information. • Activities are undertaken in moist or wet soil conditions. • Drill rig has to venture off paths or no paths are present. • Drilling along infested areas and then transferring infested material to uninfested areas. • No Hygiene/Dieback Management Plan for site.

Exploration Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Gravel/ Clay	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • No organic matter present. • Exploration activities being undertaken in dry soil conditions. • Drill rig can stay on already-established paths. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped but mapping is not current (>1 year old). • Minimal organic matter present. • Exploration activities are undertaken in dry soil conditions. • Drill rig has some disturbance across drill area but cannot stay on all tracks. • All appropriate hygiene measures are undertaken as per a Hygiene/ Dieback Management Plan.	• Area has been mapped as infested or no mapping has been completed. • Organic matter present • Area is uninterpretable therefore risk is high due to lack of disease information. • Exploration activities undertaken in moist or wet soil conditions. • Drilling along infested areas and then transferring infested material to uninfested areas. • No Hygiene/Dieback Management Plan for site.
Limestone	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • No organic matter present. • Exploration activities being undertaken in dry soil conditions. • Drill rig can stay on already-established paths. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped but mapping is not current (>1 year old). • Minimal organic matter present. • Exploration activities are undertaken in dry soil conditions. • Drill rig has some disturbance across drill area but cannot stay on all tracks. • All appropriate hygiene measures are undertaken as per a Hygiene/ Dieback Management Plan.	• Area has been mapped as infested or no mapping has been completed. • Organic matter present. • Area is uninterpretable therefore risk is high due to lack of disease information. • Exploration activities undertaken in moist or wet soil conditions. • Drilling along infested areas and then transferring infested material to uninfested areas. • No Hygiene/Dieback Management Plan for site.

Exploration Risk Mitigation

Good planning is the most important way to minimise the risks. The steps below are recommended hygiene measures, as any activities may spread pests, pathogens and weeds as well as dieback. They should be part of any Site survey/Surface Sampling campaign, Drilling, or Programme of Works (PoW).

Mapping (see Appendix 1)

Determine whether there is public dieback mapping available on DIDMS (Dieback Information Delivery and Management System, http://didms.gaiaresources.com.au/).

If there is no mapping in the proposed area of exploration, liaise with an Interpreter to undertake a dieback assessment and mapping. Contacts are available on the DWG Inc. website (www.dwg.org.au).

Entry point

Identify an appropriate entry point for the exploration. This should be into uninfested native vegetation. Ensure that the vehicle and drill rig is clean on entry (COE). Work initially within an uninfested area and then move to an infested area. Do not go from infested to uninfested. By following this principle infested soil will not be transferred into uninfested native vegetation.

Clean down (see Appendix 2)

Activities should always take place in dry soil conditions where practical. No water should be used if soils are already dry, to reduce any chance for contamination or spread.

Cleaning down vehicles in the field is difficult, and the necessity for this can be minimised by planning initial exploration work in dry soil conditions and working from uninfested areas then moving to infested areas.

Exit point

Identify an appropriate exit point for the exploration. This should be from infested native vegetation where applicable. Clean the drilling rig and vehicle on exit (COEx) to ensure potentially infested soil is not tracked on the route home.

Contingency plans and Triggers

Ensure there is a contingency plan if hygiene measures are breached. Examples are given below:

Trigger	Contingency
Wet weather conditions	• Postpone/reschedule works.
Machinery arrives visibly muddy	• Turn away machinery, to be cleaned offsite. New Machine and Vehicle Inspection Checklist to be signed off prior to coming on site.

Image: Hanson

Clearing and Stripping

Clearing and stripping have the potential to significantly increase the spread of dieback if the risks are not addressed. This table can be used to help identify the level of risk that clearing and stripping activities pose for each resource type, how these risks can be mitigated, and which hygiene measures to implement to minimise the risk of spreading dieback across the site.

Clearing and Stripping Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Sand	• Area has been mapped as uninfested or 'dieback not detected' and is current (<1 year old). • Activities, including on access roads to area, are undertaken in dry soil conditions. • Clear uninfested areas first then move into infested areas – not the other way around. • Temporary COE and COEx points installed and maintained for duration of activity. • Vegetative material and topsoil/ overburden is either stockpiled (<3 months) or directly transferred to an uninfested area. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Mapping/sampling data present but not current (>1 year old). • Area looks somewhat degraded. • Area is close to an uninterpretable or known infested area from previous mapping. • Temporary COE and COEx points installed and maintained for duration of activity. • Vegetative material including topsoil/ overburden stockpiled in appropriate quarantine area for >3 months. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped as infested or no mapping has been completed. • Area is uninterpretable therefore risk is high due to lack of disease information. • Activities undertaken in wet soil conditions. • Vegetative material and topsoil/ overburden stockpiled in an infested area. • Area shows evidence of frequent unauthorised access (i.e. 4WD). • No COE or COEx points in place or not properly constructed. • No Hygiene/Dieback Management Plan for site.

Clearing and Stripping Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Hard Rock/ Aggregate	• Area has been mapped as uninfested or 'dieback not detected' and is current (<1 year old). • Activities, including on access roads to area, are undertaken in dry soil conditions. • Clear uninfested areas first then move into infested areas – not the other way around. • Temporary COE and COEx points installed and maintained for duration of activity. • Vegetative material and topsoil/ overburden is either stockpiled (<3 months) or directly transferred to an uninfested area. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Mapping/sampling data present but not current (>1 year old). • Area looks somewhat degraded. • Area is close to an uninterpretable or known infested area from previous mapping. • Temporary COE and COEx points installed and maintained for duration of activity. • Vegetative material including topsoil/ overburden stockpiled in appropriate quarantine area for >3 months). • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped as infested or no mapping has been completed. • Area is uninterpretable therefore risk is high due to lack of disease information. • Activities undertaken in wet soil conditions. • Vegetative material and topsoil/ overburden stockpiled in infested area. • Area shows evidence of frequent unauthorised access (i.e. 4WD). • No COE or COEx points in place or not properly constructed. • No Hygiene/Dieback Management Plan for site.

Clearing and Stripping Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Gravel/ Clay	• Area has been mapped as uninfested or 'dieback not detected' and is current (<1 year old). • No organic matter present. • Activities, including on access roads to area, are undertaken in dry soil conditions. • Clear uninfested areas first then move into infested areas – not the other way around. • Temporary COE and COEx points installed and maintained for duration of activity. • Vegetative material and topsoil/ overburden is either stockpiled (<3 months) or directly transferred to an uninfested area. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Mapping/sampling data present but not current (>1 year old). • Minimal organic matter present. • Area is close to an uninterpretable or known infested area from previous mapping. • Temporary COE and COEx points installed and maintained for duration of activity. • Vegetative material including topsoil/ overburden stockpiled in appropriate quarantine area for >3 months. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped as infested or no mapping has been completed. • Organic matter present. • Area is uninterpretable therefore risk is high due to lack of disease information. • Area shows evidence of frequent unauthorised access (i.e. 4WD). • No COE or COEx points in place or not properly constructed. • Activities undertaken in wet soil conditions. • Vegetative material and topsoil/ overburden stockpiled in infested area. • No Hygiene/Dieback Management Plan for site.

Clearing and Stripping Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Limestone	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • No organic matter present. • Activities, including on access roads to area, are undertaken in dry soil conditions. • Clear uninfested areas first then move into infested areas – not the other way around. • Vegetative material and topsoil/ overburden is either stockpiled (<3months) or directly transferred to an uninfested area. • Temporary COE and COEx points installed and maintained for duration of activity. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Mapping/sampling data present but not current (>1 year old). • Minimal organic matter present. • Area is close to an uninterpretable or known infested area from previous mapping. • Vegetative material including topsoil/ overburden stockpiled in appropriate quarantine area for >3 months. • Temporary COE and COEx points installed and maintained for duration of activity. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped as infested or no mapping has been completed. • Organic matter present. • Area is uninterpretable therefore risk is high due to lack of disease information. • Area shows evidence of frequent unauthorised access (i.e.4WD). • Activities undertaken in wet soil conditions. • Vegetative material and topsoil/ overburden stockpiled in infested area. • No COE and COEx points in place or not properly constructed. • No Hygiene/Dieback Management Plan for site.

Clearing and Stripping Risk Mitigation

Good planning is the most important way to minimise the risks. The steps below are recommended hygiene measures, as these activities may spread pests, pathogens and weeds as well as dieback.

Mapping (see Appendix 1)

Determine whether there is public dieback mapping available on DIDMS (http://didms.gaiaresources.com.au/).
If there is no mapping available, liaise with an Interpreter to undertake a dieback assessment and mapping. Contacts are available on the DWG Inc. website (www.dwg.org.au).

Entry point

Identify an appropriate entry point for the clearing. This should be in uninfested native vegetation. Work initially within an uninfested area and then move to an infested area. **Do not** go from infested to uninfested. This will ensure infested soil will not be spread into uninfested native vegetation.

Clean down (see Appendix 2)

Activities should always take place in dry soil conditions where practical. No water should be used if soils are already dry, to reduce any chance for contamination or spread.
Cleaning down vehicles in the field is difficult, and the necessity for this can be minimised by undertaking clearing in dry soil conditions and working from uninfested areas then moving to infested areas.
Ensure that all vehicles are COE.

Exit point

Identify an appropriate exit point for the clearing. This should be from infested native vegetation. Clean the vehicles on exit (COEx) to ensure potentially infested soil is not tracked on the route home.

Contingency plans and triggers

Ensure these are put in place if hygiene measures are breached. Examples are given below:

Trigger	Contingency
Wet weather conditions	• Postpone/reschedule works.
Machinery arrives visibly muddy	• Turn away machinery to be cleaned offsite. New Machine and Vehicle Inspection Checklist to be signed off prior to coming on site.
Mapping indicates infested areas	• Install new COE or COEx points.

Image: Hanson

Extraction

Extraction processes are focussed on the raw mineral material. Any organic material which is present can increase the spread of dieback if not managed properly. This table can be used to help identify the level of risk that extraction activities pose for each resource type, how these risks can be mitigated, and which hygiene measures to implement to minimise the risk of spreading dieback across the site.

Extraction Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Sand	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • All organic material has been removed/screened out of product. • Extraction activities being undertaken in dry soil conditions. • Stormwater sumps/drains directed away from uninfested areas. • Sampling of raw products have been declared as dieback not detected. • Products stockpiled in a sterile area/ environment. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped but not current (>1 year old). • Most organic material has been removed from product. • Extraction activities being undertaken in dry soil conditions. • Stormwater sumps/drains directed away from uninfested areas. • Sampling of raw products have been declared as dieback not detected. • Product loaded directly from face to truck. • Appropriate hygiene measures are undertaken as per Hygiene/Dieback Management Plan.	• Area has been mapped as infested/ uninterpretable or no mapping has been completed. • Activities are undertaken in moist or wet soil conditions. • Organic matter still present in product. • No stormwater sumps/drains that direct away from uninfested areas. • Dieback has been detected in raw product samples. • Products not stockpiled in a quarantined area. • No Hygiene/Dieback Management Plan for site.

Extraction Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Hard Rock/ Aggregate	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • All organic material has been removed. • Extraction activities being undertaken in dry soil conditions. • Product has been processed and excess material washed away from rock. • Sampling of raw products have been declared as dieback not detected. • Products stockpiled in a sterile area/ environment. • All appropriate hygiene measures are undertaken as per a Hygiene/Dieback Management Plan.	• Area has been mapped but not current (>1 year old). • Most organic material has been removed from product. • Extraction activities being undertaken in dry soil conditions. • Product has not gone through a washing process. • Sampling of raw products have been declared as dieback not detected. • Product stockpiled in sterile area/ environment. • Appropriate hygiene measures are undertaken as per Hygiene/Dieback Management Plan.	• Area has been mapped as infested/ uninterpretable or no mapping has been completed. • Activities are undertaken in moist or wet soil conditions. • Organic matter still present in product. • Dieback has been detected in raw product samples. • Products are not stockpiled in a quarantined area. • No Hygiene/Dieback Management Plan for site.
Gravel/ Clay	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • No organic matter present. • Extraction activities being undertaken in dry soil conditions. • Stormwater sumps/drains directed away from uninfested areas. • All appropriate hygiene measures are in place as per a Hygiene/Dieback Management Plan.	• Area has been mapped but not current (>1 year old). • Minimal organic matter present. • Extraction activities being undertaken in dry soil conditions. • Stormwater sumps/drains directed away from uninfested areas. • All appropriate hygiene measures are in place as per a Hygiene/Dieback Management Plan.	• Area has been mapped as infested/ uninterpretable or no mapping has been completed. • Organic matter present. • Area is uninterpretable therefore risk is high due to lack of disease information. • Extraction activities undertaken in moist or wet soil conditions. • No stormwater sumps/drains that direct away from uninfested areas. • No Hygiene/Dieback Management Plan for site.

Extraction Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Limestone	• Area has been mapped as uninfested or 'dieback not detected' and mapping is current (<1 year old). • Extraction activities being undertaken in dry soil conditions. • Stormwater sumps/drains directed away from uninfested areas. • All appropriate hygiene measures are undertaken as per a Hygiene/ Dieback Management Plan.	• Area has been mapped but not current (>1 year old). • Extraction activities being undertaken in dry soil conditions. • Stormwater sumps/drains directed away from uninfested areas. • Appropriate hygiene measures are undertaken as per Hygiene/ Dieback Management Plan.	• Area has been mapped as infested/uninterpretable or no mapping has been completed. • Activities are undertaken in moist or wet soil conditions. • No stormwater sumps/drains that direct away from uninfested areas. • No Hygiene/Dieback Management Plan for site.

Extraction Risk Mitigation

There are many risks of spreading dieback during the extraction phase which can be detrimental to the surrounding environment and future topsoil management. Activities through the whole life of the mine or quarry can and will be a potential risk to unmapped and/or dieback-free sites.

Such activities that increase the risk of spreading dieback include but are not limited to:

- Dirty machinery/vehicles when clearing vegetation.
- Uncontrolled access into infested and uninfested sites.
- Transferring of infested material into/through uninfested areas.
- Incorrect hygiene practices or having clean down bays in the wrong location.
- Clearing activities undertaken in wet soil conditions/wrong time of the year.

Good planning, resource allocation and correct hygiene management strategies are key to ensuring that the above risks are minimised during both the clearing and extraction stages.

Contingency plans and triggers

Ensure these are put in place if hygiene measures are breached. Examples are given below:

Trigger	Contingency
Wet weather conditions	• Restrict machine and vehicle access to reduce risk of transferring infested materials throughout site.
Machinery arrives visibly muddy	• Turn away machinery to be cleaned offsite. New Machine and Vehicle Inspection Checklist to be signed off prior to coming on site.
Stockpile becomes infested	• Quarantine area by ensuring machinery and/or vehicles coming into contact with infested material are cleaned down prior to moving to other stockpiles or areas of the mine.

Image: Hanson

Loading and Transport

Loading and transport are high risk activities so it is essential dieback management is integral in how they operate. This table can be used to help identify the level of risk that loading and transport activities pose for each resource type, how these risks can be mitigated, and which hygiene measures to implement to minimise the risk of spreading dieback across the site.

Load and Transport Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
All resource types	• Trucks and/or machinery arriving on site are free from soil and debris. • Truck tray washed out prior to coming to site or being loaded. • Trucks and/or machines stay on haul roads. • Unsealed haul roads consisting of uninfested/sterile material. • Haul roads kept well maintained even during high rainfall events. • Heavy machinery undertaking appropriate hygiene measures prior to traversing to another area. • All appropriate hygiene measures are in place as per a Hygiene/ Dieback Management Plan.	• Trucks and/or machinery arriving on site are free from soil and debris. • Truck tray washed out prior to being loaded. • Truck or machine do not stay on haul roads. • Truck or machine cross over to different areas on site. • Unsealed haul roads consisting of uninfested/sterile material. • Haul roads are maintained occasionally. • Heavy machinery undertaking appropriate hygiene measures prior to traversing into another area. • All appropriate hygiene measures are in place as per a Hygiene/ Dieback Management Plan.	• Trucks and/or machinery arriving on site covered in mud. • Truck tray not washed out prior to coming to site or being loaded. • Trucks and/or machines not staying on haul roads. • Unsealed haul roads consisting of material where dieback status is unknown. • Haul roads not being maintained, especially after high rainfall event and/or high traffic movement. • Heavy machinery traversing from infested areas into uninfested areas without undertaking appropriate hygiene measures. • No Hygiene/Dieback Management Plan for site.

Load and Transport Risk Mitigation

It is expected that trucks arriving to site will be free from soil and debris so as not to potentially contaminate the BRM being loaded. Any machinery arriving to site should be accompanied by a Machine and Vehicle Inspection Checklist (Appendix 2) and inspected by the Site Supervisor or Quarry Manager. Machinery that does not arrive clean, should be turned away.

Heavy machinery such as Front End Loaders and light vehicles are to use limestone tracks or sealed roads when moving around the site. They should not leave the designated haul road, limestone tracks or sealed roads to avoid bringing in weeds and dieback to the loading face.

Clean Down Zones

Every operational pit should have at least one clearly marked clean down zone, and staff should be instructed on when and how to use them (Fig. 3). Hygiene management procedures and clean down will apply as per the site's Dieback Management Plan should heavy machinery and light vehicles need to leave the limestone track or sealed road.

Contingency plans and triggers

Ensure these are put in place if hygiene measures are breached. Examples are given below:

Trigger	Contingency
Wet weather conditions	• Postpone/reschedule works.
Machinery or truck arrives visibly muddy	• Turn away machinery to be cleaned offsite. New Machine and Vehicle Inspection Checklist to be signed off prior to coming on site.
Machinery did not use designated haul roads	• Stop machine from traversing further. Inspect machine to see if any material is on wheels/ undercarriage. Assess path taken and assess risk of potential spread of material. Ensure machine is sent to nearest COE point to clean down and sign off Machine and Vehicle Inspection Checklist prior to resuming load/hauling activities.
Stockpile becomes infested	• Quarantine area by ensuring machinery and/or vehicles coming into contact with infested material are cleaned down prior to moving to other stockpiles or areas of the mine.

Figure 3. Vehicle being cleaned down at a Clean on Entry point. Image: Hanson.

Mine Closure

Mine closure plays just as important a role as every other stage in the mining process. All the hygiene measures which have been implemented during mining will ensure the risk of spreading dieback is as low as possible. This table can be used to help identify the level of risk that mine closure activities pose for each resource type, how these risks can be mitigated, and which hygiene measures to implement to minimise the risk of spreading dieback across the site.

Mine Closure Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Sand	• Area to be rehabilitated was previously mapped as uninfested or 'dieback not detected'. • Uninfested topsoil/overburden available for rehabilitation. • Spreading of topsoil/overburden for rehabilitation undertaken in dry soil conditions. • Organic material including soil, vegetative material and mulch originating from an uninfested area or if coming from off site, is sourced from a NIASA accredited nursery and /or mulch is to Australian Standard AS 4454-2012. • Areas that have been rehabilitated are fenced/blocked off to prevent unauthorised access. • Machinery undertaking rehabilitation and/or other mine closure commitments comply with the Hygiene/Dieback Management Plan.	• Area to be rehabilitated was previously mapped as uninfested or 'dieback not detected'. • Limited uninfested topsoil/overburden available for rehabilitation. • Spreading of topsoil/overburden for rehabilitation undertaken in dry soil conditions. • Organic material including soil, vegetative material and mulch originating from an uninfested area or if coming from off site, is sourced from a NIASA accredited nursery and /or mulch is to Australian Standard AS 4454-2012. • Areas that have been rehabilitated are not blocked off to prevent unauthorised access. • Machinery undertaking rehabilitation and/or other mine closure commitments comply with the Hygiene/Dieback Management Plan.	• Area to be rehabilitated was previously mapped as infested. • Topsoil/overburden used for rehabilitation came from an uninterpretable or infested area. • Organic material sourced externally such as soil, vegetative material and mulch has no certification and dieback status is unknown. • Site is susceptible to frequent unauthorised access from the public. • Areas of rehabilitation located in low lying/wet environments near the water table. • No Hygiene/Dieback Management Plan for site, or Machinery used does not comply with hygiene measures.

Mining Closure Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Hard Rock/ Aggregate	• Benches rehabilitated using uninfested topsoil/overburden. • Spreading of topsoil/overburden for rehabilitation undertaken in dry soil conditions. • Organic material including soil, vegetative material and mulch originating from an uninfested area or if coming from off site, is sourced from a NIASA accredited nursery and /or mulch is to Australian Standard AS 4454-2012. • Machinery undertaking rehabilitation and/or other mine closure commitments comply with the Hygiene/Dieback Management Plan.	• Previously infested areas rehabilitated using infested and/or uninterpretable topsoil/overburden. • Spreading of topsoil/overburden for rehabilitation undertaken in dry soil conditions. • Organic material including soil, vegetative material and mulch originating from an uninfested area or if coming from off site, is sourced from a NIASA accredited nursery and / or mulch is to Australian Standard AS 4454-2012. • Areas of rehabilitation are separate from those with uninfested topsoil/ overburden. • Areas that have been rehabilitated are not blocked off to prevent unauthorised access. • Machinery undertaking rehabilitation and/or other mine closure commitments comply with the Hygiene/Dieback Management Plan.	• Area to be rehabilitated was previously mapped as infested. • Topsoil/overburden used for rehabilitation came from an uninterpretable or infested area and is adjacent to uninfested areas. • Organic material sourced externally such as soil, vegetative material and mulch has no certification and dieback status is unknown. • Site is susceptible to frequent unauthorised access from the public. • Machinery used for mine closure objectives traversing without complying with hygiene measures in Hygiene/Dieback Management Plan.

Mining Closure Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Gravel/ Clay	• Area to be rehabilitated has been mapped as uninfested or 'dieback not detected'. • Uninfested topsoil available for rehabilitation. • Spreading of topsoil/overburden for rehabilitation undertaken in dry soil conditions. • Organic material including soil, vegetative material and mulch originating from an uninfested area or if coming from off site, is sourced from a NIASA accredited nursery and /or mulch is to Australian Standard AS 4454-2012. • Areas that have been rehabilitated are fenced/blocked off to prevent unauthorised access. • Machinery undertaking rehabilitation and/or other mine closure commitments comply with the Hygiene/Dieback Management Plan.	• Area to be rehabilitated was previously mapped as uninfested or 'dieback not detected'. • Limited uninfested topsoil/ overburden available for rehabilitation. • Spreading of topsoil/overburden for rehabilitation undertaken in dry soil conditions. • Organic material including soil, vegetative material and mulch originating from an uninfested area or if coming from off site, is sourced from a NIASA accredited nursery and /or mulch is to Australian Standard AS 4454-2012. • Areas that have been rehabilitated are not blocked off to prevent unauthorised access. • Machinery undertaking rehabilitation and/or other mine closure commitments comply with the Hygiene/Dieback Management Plan.	• Area to be rehabilitated was previously mapped as infested. • Topsoil/overburden used for rehabilitation came from an uninterpretable or infested area. • Organic material sourced externally such as soil, vegetative material and mulch has no certification and dieback status is unknown. • Site is susceptible to frequent unauthorised access from the public. • Areas of rehabilitation located in low lying/wet environments near the water table. • No Hygiene/Dieback Management Plan, or Machinery used does not comply with hygiene measures.

Mining Closure Risk Identification

Resource Type	Low Risk	Medium Risk	High Risk
Limestone	• Area to be rehabilitated was previously mapped as uninfested or 'dieback not detected'. • Uninfested topsoil/overburden available for rehabilitation. • Spreading of topsoil/overburden for rehabilitation undertaken in dry soil conditions. • Organic material including soil, vegetative material and mulch originating from an uninfested area or if coming from off site, is sourced from a NIASA accredited nursery and /or mulch is to Australian Standard AS 4454-2012. • Areas that have been rehabilitated are fenced/blocked off to prevent unauthorised access. • Machinery undertaking rehabilitation and/or other mine closure commitments comply with the Hygiene/Dieback Management Plan.	• Area to be rehabilitated was previously mapped as uninfested or 'dieback not detected'. • Limited uninfested topsoil/ overburden available for rehabilitation. • Spreading of topsoil/overburden for rehabilitation undertaken in dry soil conditions. • Organic material including soil, vegetative material and mulch originating from an uninfested area or if coming from off site, is sourced from a NIASA accredited nursery and /or mulch is to Australian Standard AS 4454-2012. • Areas that have been rehabilitated are not blocked off to prevent unauthorised access. • Machinery undertaking rehabilitation and/or other mine closure commitments comply with the Hygiene/Dieback Management Plan.	• Area to be rehabilitated was previously mapped as infested. • Topsoil/overburden used for rehabilitation came from an uninterpretable or infested area. • Organic material sourced externally such as soil, vegetative material and mulch has no certification and dieback status is unknown. • Site is susceptible to frequent unauthorised access from the public. • No Hygiene/Dieback Management Plan, or Machinery used does not comply with hygiene measures.

Mine Closure Risk Mitigation

Rehabilitation – Topsoil

Many BRM operations have obligations to rehabilitate progressively for the life of the quarry. Regeneration is most successful if available topsoil is used immediately after clearing[8]. Therefore, tracking the movement of topsoil and vegetation is critical to maximise and utilise uninfested topsoil material. If there are no protocols in place there is a greater chance that rehabilitation will be unsuccessful and remediation will be required. For large areas, this is an expensive exercise.

It is important to maintain historical records of the operation so as any movement and location of infested and uninfested material is known. This is applicable to all types of BRM.

Rehabilitation – No Topsoil

As many BRM quarries are found in areas around Perth that were previously Pine Plantations, there is often no available topsoil to use and the material is classed as uninterpretable. If this is the case, it is recommended to quarantine this material and manage it as if it were infested topsoil to ensure that no cross-contamination occurs.

On-Ground Monitoring

Boot cleaning stations should be located somewhere central (such as the weighbridge) so visitors, contractors and staff who will be traversing the operation by foot, can clean down prior to walking through vegetated areas.

We recommend the use of a Boot Cleaning Station known as a 'Phyto-fighter' (Figure 4).

Alternative end land uses

Mine closure requirements may vary depending on site location, tenure and approvals. For example, the site may be part of future urban or residential development which may require fill materials; or perhaps the site is required to be rehabilitated with local provenances of plant species. This is why it is important for the sales and operations team to be aware of what material may be required.

Irrespective of end land use, dieback/infested soil will need to be actively managed to minimize the risk of spread. It might also mean that if rehabilitation needs to occur as part of the mine closure process, that could include utilizing alternative plant species known to be resilient to the pathogen or quarantining the infested topsoil from the uninfested topsoil to help with minimizing the spread and increasing the likelihood of the rehabilitation being successful.

8 Stevens, JC et al. 2016. Banksia Woodlands: a Restoration Guide for the Swan Coastal Plain. Crawley, WA: UWA Publishing

Figure 4: Phytophyter in use. Image: Hanson

Appendix 1 Dieback mapping

It is essential to know where Phytophthora Dieback (dieback) is in the landscape to minimise its spread. The process of detecting, diagnosing and mapping dieback is referred to as interpretation and DBCA has had a dieback interpretation program since the early 1980s[9]. DBCA administers a system for evaluating and registering individuals to undertake interpretation on lands managed by the department and refers to them as Phytophthora Dieback Interpreters (Interpreters).

Interpreters assess areas of native vegetation for the signs and symptoms of dieback. Their assessment is supported through targeted sampling of soil and plant tissues, which are sent for laboratory analysis. The results of the field assessment and sampling enable the Interpreter to produce a dieback map and report. These documents underpin dieback management planning for a site.

An Interpreter will provide a report and map of a site with the information on three main dieback categories:

- Infested areas (pink to red shading) i.e. dieback present
- Uninfested areas (green shading) i.e. dieback not detected
- Uninterpretable areas (purple shading) i.e. unknown if dieback is present due to insufficient evidence.

This information will enable a plan to be developed to manage the dieback risks at the site and for the operation. An Interpreter may also be able to advise on dieback management objectives and a dieback management plan for the operation.

A list of DBCA registered Interpreters can be found at www.dwg.org.au

9 Phytophthora Dieback Interpreter's Manual for lands managed by the department FEM047 March 2015 (Interpreter's Manual). Department of Biodiversity, Conservation and Attractions. Perth

Appendix 2 Hygiene

Hygiene is a major tool in preventing the spread of plant diseases including dieback, pests, and weeds. In relation to dieback this refers to the cleaning of 'carriers' before entering natural areas such that they are completely free of:

- mud, clods or slurry of soil, and
- plant material.

A carrier is anything with the potential to pick up and 'carry' soil infested with dieback therefore acting as a vector of disease. Carriers include but are not restricted to machinery, vehicles, equipment (from hand tools to tent pegs), motorbikes, bicycles, footwear and horses' hooves.

Clean on Entry (COE) is a requirement that carriers must be clean before passing a designated point (Figure 5). If the dieback status of an area is uncertain, it is recommended to take a precautionary approach of being COE, and clean on exit (COEx) to minimise the spread of potentially infested soil in an area.

Figure 5. Dieback Protection Area sign. Image: DBCA

Dry clean down

When working under dry soil conditions it is preferable to use dry cleaning methods e.g. air compressor or brushes for vehicles, or use a stiff brush or stick to clean shoes. Collect the mud and soil removed and place in a bucket or bag for later disposal at an infested site, or in an area with no native vegetation. Dust and grime on vehicles have low risk of spreading dieback.

Wet clean down

Cleaning will be easier and more effective if completed at a depot or designated cleaning area. However, if it has to be done in the field, follow these guidelines:

- Clean down on a hard, well-drained surface (e.g. road) that is well away from native vegetation. Any washdown effluent should be collected on-site and must not be allowed to drain into native vegetation.
- Minimise water use to remove soil and mud from equipment/vehicles. This can be achieved by preferentially using dry cleaning techniques e.g. stiff brushes.
- Washdown on ramps if possible.
- Prevent mud and slurry from entering uninfested or uninterpretable native vegetation. Soil and waste can be collected for disinfection (see guidelines for disinfecting below).
- Pay particular attention to mudflaps and tyres.
- Do not drive through effluent generated from cleaning when exiting the washdown facility.

Guidelines for disinfecting

- Disinfection will only be effective if it follows the complete removal of soil.
- Disinfection of equipment, footwear and vehicle tyres can be used to take an extra precaution.
- • Spray methylated spirits on small hand tools and footwear covering all surfaces.
- Spray diluted bleach (sodium hypochlorite) onto equipment and footwear allowing a few minutes before rinsing the bleach off using water. Dilute bleach so that solution contains 1% active ingredient sodium hypochlorite. Be sure to follow any of the manufacturer's safety instructions provided on the bleach container.
- The spray Phytoclean® can be used in footbaths, washdown facilities and during the cleaning of equipment. See the manufacturer's details for directions.

MACHINERY AND VEHICLE INSPECTION CHECK SHEET

_____ *(Insert Company Name)* recognise its vital role to minimize and manage the risk of introducing or spreading Phytophthora (Dieback or Weeds) in the planning and operation of basic raw materials (BRM) extraction areas. This document provides manageable actions in regards to Hygiene Protocols for the associated Quarry/Site.

It is important that earthmoving machinery is in an acceptable condition before it enters any site, all machinery will be cleaned down prior to coming to site and signed off by the supplier. This form will be returned to Site Supervision prior to the machine arriving. During clearing/construction activities this form will be returned to Site Supervision at the end of each day that the activity occurs.

Note*The equipment will be cleaned of the following: Soil, Vegetation, Seeds and Hydrocarbons

Inspection Date:	**Driver/Operator Name:**
Company/Contractor:	**Type of Machine (Make & Model):**
Clean on Entry (COE) point #:	
Method used to clean down the equipment (Circle): **Brush Down** **Washdown** **N/A**	
General condition of vehicle on arrival or prior to inspection:	

All vehicles and machines	N/A	Compliant	Non Compliant	Comments	Initial
Wheels: (tyres, tread and inside wheels)					
Tracks					
Fenders: Mud flaps, wheel arches					
Undercarriage (diff, axel, chassis, belly plate)					
Outside (towbar, bullbar. Bumper, grill, all panels)					
Bucket, blade, forks, tines					
Inside - floor mats, between cab and tray					
OTHER - Weeds and seeds check					

It is important that earthmoving machinery is in an acceptable condition before it enters any site and/or between areas where the status (protectable/dieback free, and dieback infested) of the area changes.

All Vehicles and Machinery need to be inspected and signed off before the Machine leaves the designated COE area.

SIGN-OFF			
Driver (signature)	**Inspector (name & signature)**	**Date**	**Time**

Appendix 3 FAQs

Basic raw materials (BRM) are materials such as gravel, sand, limestone and hard rock that are usually used in their unprocessed state. The use of BRM poses a significant risk of spreading Phytophthora Dieback (dieback) if it comes from an infested pit.

Dieback-free BRM is a valuable resource with very limited availability. Its most appropriate use is within or adjacent to areas of native vegetation that have high conservation significance, and warrant long-term protection from dieback.

What does 'dieback-free' BRM mean?

Answer: BRM that is not infested with *Phytophthora* (the plant pathogen that causes dieback).

Question: Who decides if BRM is dieback-free or not?

Answer: When government agencies refer to dieback-free BRM they are generally referring to the Department of Biodiversity, Conservation and Attractions (DBCA) standard which states that dieback-free BRM has been hygienically extracted from a site that was assessed by a registered Phytophthora Dieback Interpreter as uninfested i.e. dieback-free.

Question: What is 'certified' dieback-free BRM?

Answer: 'Certified' suggests that there is a system that enforces standards across the extractive industries around exploration, extraction and transport to ensure that BRM is dieback-free. Unfortunately, no such system has ever existed but the term and misconception has persisted for many years.

Question: I am a customer - can't I just buy dieback-free BRM from a supplier?

Answer: You may find a supplier who offers 'certified' dieback-free BRM or BRM that comes with a dieback-free 'certificate'. However, as there is no system for certifying BRM, there is no guarantee that the product you purchase will actually be dieback-free. **DBCA does not accept 'certificates' as proof that BRM is dieback-free.**

Question: I am a quarry owner – can't I just get someone to assess my quarry for dieback?

Answer: In most cases assessing the dieback status of an existing quarry is not possible because quarries are generally devoid of vegetation making them uninterpretable. In terms of sampling to determine the status of the status of the resource: Phytophthora is difficult to detect through random sampling and it **cannot** be concluded that an entire site or an entire BRM stockpile is uninfested from a single or a small number of negative samples.

Question: Where can I source dieback-free BRM? Is there a listing of suppliers?

Answer: Firstly, there is no list of suppliers of dieback-free BRM.

However, there is high confidence that BRM is dieback-free when:

1. It is sourced from a site that was originally assessed as dieback-free by a registered Phytophthora Dieback Interpreter (Interpreter)
2. When the site is maintained and monitored with a rigorous dieback management plan
3. When the BRM is extracted and transported hygienically to the site of use.

Question: Does screened gravel still present a risk of spreading Phytophthora?

Answer: Yes, it may still contain a small amount of organic matter where dieback spores persist.

Statement prepared by the BRM sub-committee of the DWG Inc.
August 2019

Dieback
WORKING GROUP INC

dwg.org.au

www.dwg.org.au/basic-raw-materials/

DWG BASIC RAW MATERIALS
BEST PRACTICE GUIDELINES

Image: Hanson