

EAST ARM ROAD QUARRY, HILLWOOD

WEED AND PATHOGEN MANAGEMENT PLAN

MARCH 2023



9 Weddel Court, Laverton North VIC 3026

Contents

DEFINITIONS AND ACRONYMS.....	5
PART A – PLANNING AND OBJECTIVES	6
A.1 PURPOSE OF PLAN	6
A.2 AREA COVERED BY PLAN	6
A.3 PLAN OBJECTIVES	6
A.4 QUARRY OPERATOR AND OWNER	7
A.5 PLANNING FRAMEWORK	11
A.5.1 Permit Conditions	11
A.5.2 Weed Management Act 1999 and Regulations.....	11
A.5.3 Statutory Weed Management Plans	12
PART B – QUARRY BACKGROUND INFORMATION	13
B.1 LOCATION	13
B.2 LAYOUT	13
B.3 ACTIVITIES	13
B.4 WEEDS IN AND NEAR THE MINING LEASE	13
B.5 PATHOGENS	22
B.5.1 Phytophthora cinnamomi, PC.....	22
B.5.2 Myrtle Wilt.....	26
B.5.3 Myrtle Rust	26
PART C - ROLES AND RESPONSIBILITIES.....	27
C.1 OPERATOR	27
C.2 STAFF AND CONTRACTORS	27
PART D - IMPLEMENTATION	28
D.1 WEED SPRAYING PROGRAM	28
D.2 CLEAN MACHINERY AND EQUIPMENT POLICY	28
PART E - MONITORING AND REVIEW	29
E.1 CONTINUAL IMPROVEMENT	29
E.2 MONITORING	29
E.3 REVIEW OF WPMP	29
PART F - REFERENCES.....	30
APPENDIX A.....	31
‘GUIDELINE FOR SAFE AND EFFECTIVE HERBICIDE USE NEAR WATER’, DPIPWE.....	31
APPENDIX B.....	32
TEMPLATE - WEED SPRAYING PROGRAM SPREADSHEET – EAST ARM ROAD QUARRY, HILLWOOD	32
APPENDIX C.....	33
HYGIENE INSPECTION PROTOCOLS FOR VEHICLES AND HEAVY MACHINERY	33

APPENDIX D..... 34
MACHINERY AND EQUIPMENT INSPECTION RECORD SHEETS..... 34

DEFINITIONS AND ACRONYMS

In this Weed and Pathogen Management Plan, the following definitions and acronyms apply:

DNRET	Department of Natural Resources and Environment Tasmania
DPIPWE (now DNRET)	Department of Primary Industries, Parks, Water and Environment
EPA	Environment Protection Authority (Tas)
Equipment	The set of tools needed to achieve a goal is "equipment". Equipment includes for example cranes, generators, ablutions block, site office, compressors etc.
Machinery Hygiene Inspection Sheet	A form to be completed by a suitably qualified person for Machinery (machines) and Equipment prior to being floated to the Quarry to record that it is clean prior to entering the Quarry.
(the) Land	The spatial area to which the WPMP applies as identified in Figure 2 . The Land covers Mining Lease 1914P/M and part of Mining Lease 2077P/M.
Machinery	a collection or group of machines.
Machines	an apparatus using mechanical power and having several parts, each with a definite function and together performing a task. Machines include bulldozers, diggers, trenchers, heavy-trucks (with or without trailers), excavators and other earth-moving motorised apparatus.
Quarry	East Arm Road Quarry
vehicle	a motorised thing used for transporting people or goods. This includes 4WD vehicles, light trucks and passenger vans and cars.
Weed	means a declared weed as defined in the <i>Weed Management Act 1999</i> .
Weed And Disease Guidelines	means the document titled <i>Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania</i> , by the Department of Primary Industries, Parks, Water and Environment, dated March 2015, and any amendment to or substitution of this document.
WSP	Weed Spraying Program
WPMP	Weed and Pathogen Management Plan

PART A – PLANNING AND OBJECTIVES

A.1 PURPOSE OF PLAN

This Weed and Pathogen Management Plan (WPMP) has been developed to manage and control declared, and significant environmental weeds associated with the immediate working areas for East Arm Road Quarry at Hillwood (see **Figure 1**).

It outlines the objectives of weed and disease management and those measures which will be applied to manage the control of existing weed occurrences as well as respond to new weed occurrences if they arise.

The following documents have been specifically consulted to prepare the WPMP –

- *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania* prepared by DPIPW (2015);
- *Keeping it clean - A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens* written by Kaylene Allan, Simon Gartenstein and published by NRM South.
- *Tasmanian Quarry Code of Practice*, Environment Protection Authority (2017).

For the purposes of the WPMP, a *weed* in a broad sense is any plant that requires some form of action to reduce its effect on the economy, the environment, human health, and amenity. Some weeds have been listed for priority management or in legislation – these Weed species are relevant to this WPMP, and the subject of the permit conditions imposed by the EPA.

Weeds typically produce large numbers of seeds, assisting their spread. They are often capable of surviving and reproducing in disturbed environments and are commonly the first species to colonise and dominate in these conditions.

This WPMP **replaces** the East Arm Quarry, Hillwood, Weed Management Plan prepared by Van Diemen Consulting Pty Ltd in 2013.

A.2 AREA COVERED BY PLAN

This WPMP applies to the Land identified in **Figure 2**. The Land covers Mining Lease 1914P/M and part of Mining Lease 2077P/M.

A.3 PLAN OBJECTIVES

The objectives of this Weed and Pathogen Management Plan (WPMP) are to:

- Provide a mechanism to record and map the occurrence of Weeds and Pathogens, if present, within the quarry and associated work areas;
- Identify, document, and implement management measures within the quarry to –
 - 1) minimise the risk of spreading Weed propagules and Pathogens within the Quarry;

- 2) minimise the risk of spreading Weed propagules and Pathogens from the Quarry to other locations;
 - 3) control and/or eradicate Weeds within the quarry where practicable; and
 - 4) ensure that rehabilitation works are not compromised by the occurrence or growth of Weeds.
- Establish a process to monitor the results of on-ground actions and a mechanism to review these actions as required; and
 - Establish a process of review for the WPMP, including its objectives and implementation.

A.4 QUARRY OPERATOR AND OWNER

Entity name	East Arm Resources Pty Ltd
Registered address	Unit 2, 3-5 Gibbon Road, Winston Hills NSW 2153
Postal address	9 Weddel Court, Laverton North VIC 3026
ABN	41 636 993 783
ACN	636 993 783
Person responsible for quarry operation	Mr John Bell-Andrews, Director, East Arm Resources Pty Ltd 9 Weddel Court, Laverton North VIC 3026 0427 709 762; JBell-Andrews@csasphalt.com.au
Contact person's details	Mr Justin Bartlett, Director, East Arm Resources Pty Ltd 9 Weddel Court, Laverton North VIC 3026 0400 054 904; jbartlett@vsagroup.com.au



EAST ARM ROAD QUARRY

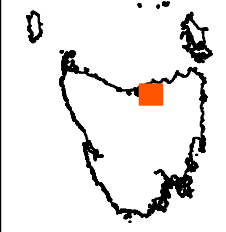
WEED AND PATHOGEN MANAGEMENT PLAN

FIGURE I: LOCATION OF THE EAST ARM ROAD QUARRY MINING LEASES

TASMAP:
BELL BAY
BEACONSFIELD

LGA:
GEORGE TOWN

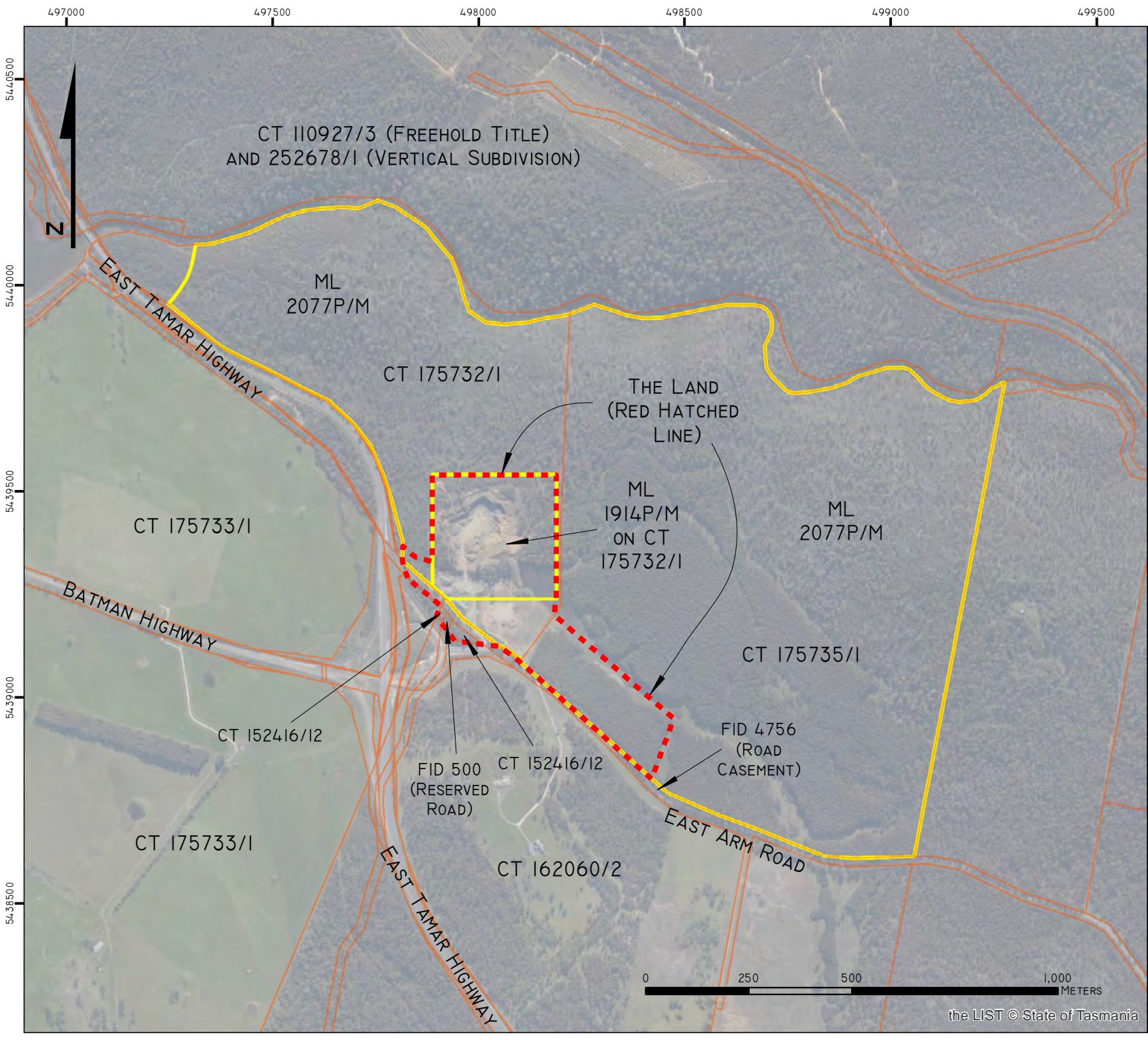
BASE DATA BY TASMAP. © STATE OF TASMANIA
BASE IMAGE © MICROSOFT CORPORATION



DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT: EAST ARM RESOURCES

DATE: 14 NOV 2022



EAST ARM ROAD QUARRY

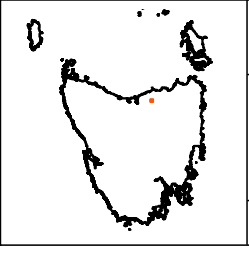
WEED AND PATHOGEN MANAGEMENT PLAN

FIGURE 2: THE ROAD NETWORK AND TITLES CONTAINING THE LAND

TASMAP: BEACONSFIELD

LGA: GEORGE TOWN

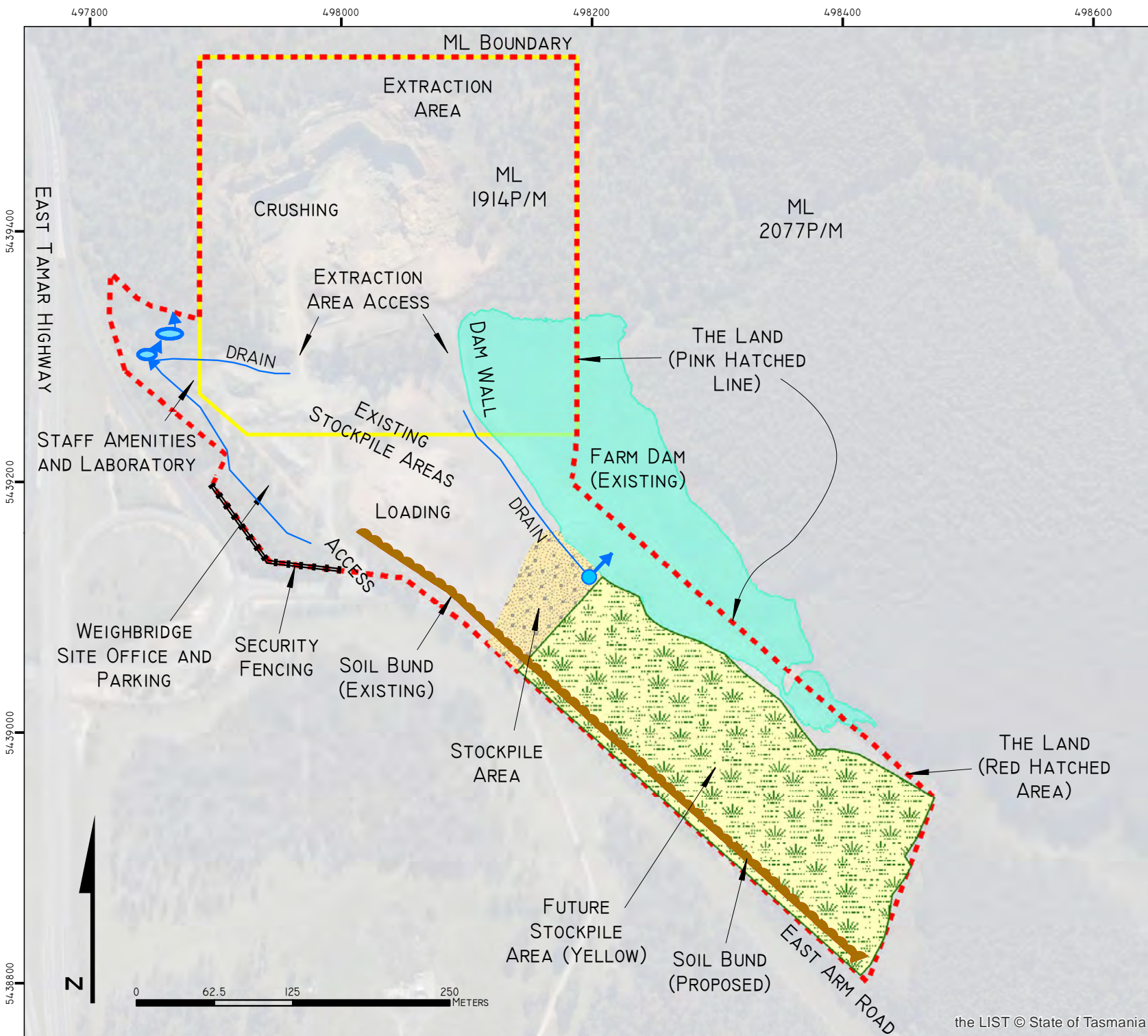
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CLIENT: EAST ARM RESOURCES

DATE: 14 NOV 2022



EAST ARM ROAD QUARRY

WEED AND PATHOGEN MANAGEMENT PLAN

FIGURE 3: SITE OVERVIEW INCLUDING STOCKPILE AREAS ON THE LAND

TASMAP: BEACONSFIELD

LGA: GEORGE TOWN

BASE DATA BY TASMAP. © STATE OF TASMANIA
BASE IMAGE © VDC (2/6/22)



DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT: EAST ARM RESOURCES

DATE: 14 NOV 2022

A.5 PLANNING FRAMEWORK

A.5.1 Permit Conditions

The quarry currently operates under planning approval DA2022/007 and its associated Permit Conditions Environmental No. 11114/1.

The relevant Conditions are:

OP1 Machinery washdown

Prior to entering The Land, machinery must be washed in accordance with the Weed and Disease Guidelines, or any subsequent revisions of that document.

OP2 Weed management

The Land must be kept substantially free of weeds to minimise the risk of weeds being spread through the transport of products from The Land.

OP3 Weed management

- 1** Within 3 months of the date on which these conditions take effect, or by a date otherwise specified in writing by the Director, a Weed & Disease Management Plan must be submitted to the Director for approval. This requirement will be deemed to be satisfied only when the Director indicates in writing that the submitted document adequately addresses the requirements of this condition to the Director's satisfaction.
- 2** The plan must be consistent with the Weed and Disease Guidelines, or any subsequent revisions of that document.
- 3** The person responsible must not implement the Weed Management Plan until the Director has approved the Plan. Once approved the person responsible must act in accordance with the approved Plan.
- 4** In the event that the Director, by notice in writing to the person responsible, either approves a minor variation to the approved plan or approves a new plan in substitution for the plan originally approved, the person responsible must implement and act in accordance with the varied plan or the new plan, as the case may be.

A.5.2 Weed Management Act 1999 and Regulations

The objectives of the *Weed Management Act 1999* (the 'Act') further the objectives of the Resource Management and Planning System (RMPS) of Tasmania. In particular, the Act provides for the control and eradication of weeds having regard to the need to -

- a) minimise negative effects of weeds on the sustainability of Tasmania's productive capacity and natural ecosystems; and
- b) promote a strategic and sustainable approach to weed management; and
- c) encourage community involvement in weed management; and
- d) promote the sharing of responsibility for weed management between government, natural resource managers, the community and industry in Tasmania.

Under the Act, the State Government may:

1. Prohibit the introduction of declared weeds into Tasmania.

2. Undertake the eradication of declared weed species.
3. Take action aimed at preventing the spread of declared weeds within Tasmania.
4. Require that action be taken against declared weed species where this is necessary to alleviate or prevent a particular problem.

The *Weed Management Regulations 2017* (the 'Regulations') are the statutory rules that underpin the Act.

This WPMP complies with the provisions and objectives of the Act and Regulations.

A.5.3 Statutory Weed Management Plans

Once declared the legislation requires that a Weed Management Plan (WMP) be prepared for the weed. A declaration cannot persist without such a plan. A period of 12 months is allowed to prepare such a plan. The development of this plan also requires a period of public consultation.

A WMP must include the name of the target weed, area of the State covered by the plan, distribution and extent of the weed, the reasons for declaring the weed and include restrictions and measures required to control, eradicate, or restrict the spread of a weed. Restrictions on import, distribution and sale are also included.

PART B – QUARRY BACKGROUND INFORMATION

B.1 LOCATION

East Arm Road Quarry is located at East Arm, north of Hillwood in the East Tamar region (**Figures 1 and 2**). Access is via East Arm Road which provides direct connection to both the East Tamar and Batman Highways.

B.2 LAYOUT

The following buildings and ancillary infrastructure have been or are proposed to be installed to support the Quarry –

- Office and weighbridge (4 pods joined by roof) that includes a meeting room, amenities, kitchen/lunchroom, and weighbridge office.
- Staff amenities, laboratory, solar panels and battery backup, and stores with genset (generator – backup power only). This includes a Wastewater system with on-site wastewater treatment and disposal including the irrigation area.
- Entrance gate, and parking at the office and staff amenities/meeting room.
- Diesel powered backup generator to supplement the solar-powered array and battery backup.
- Additional stockpile area for the storage and loading of final product (aggregates).
- Stockpile area to receive and store material post-production in the Pit.
- Signage (**Figure 2**).

B.3 ACTIVITIES

The quarry includes the following activities:

- surface site preparation by tree-felling and stockpiling/mulching,
- soil and overburden removal and stockpiling,
- excavation and ripping of material,
- drilling and blasting by licensed contractor,
- crushing and/or screening of material,
- stockpiling of material (processed and unprocessed), and the
- loading of trucks with processed material from the stockpile area.

B.4 WEEDS IN AND NEAR THE MINING LEASE

Several **Weeds** have been recorded within the Mining Lease during surveys, but none within the extraction area.

Table 1 provides a list of Declared Weed species that are known to occur in the site or may be present in the site (but have not yet been detected) or occur nearby but have not yet been confirmed in the Quarry. The weeds listed in Table 1 are the most important weeds to control, manage and/or eradicate from the Quarry if they are present now, or become present at some stage in the future.

Table 2 provides a list of significant weed species that are known to occur in the site or may be present in the site or nearby but have not yet been confirmed in the Quarry. The weeds listed are those that could potentially enter the Quarry if they are not already present and colonise disturbed ground. Their propagules may contaminate stockpiled material.

Some descriptions and images of selected weed species are provided below.

Very prickly leaves in rosette (left image), spreads by underground rhizome, purple daisy flowers (right image) followed by clusters of woolly seeds

Californian Thistle
Cirsium arvense



Scrambling woody vine – thicket that has compound dark green leaves with thorns and white rose-like flowers (left image), followed by clusters of blackberries (right image).

blackberry
Rubus furuticosus



Table 1. Declared Weeds of known or likely threat to the clean status of quarry produced materials as of November 2022

Common name <i>Scientific name</i>	Threat Level	On-site?	Distribution on site	Near site?	George Town objective*?
Californian thistle <i>Cirsium arvense</i>	HIGH	Yes	Sporadic near dam	Yes Prolific in region, especially damp areas including creeklines	B - Containment within municipal boundaries, protection of specified areas within municipal boundaries, prevention of spread to Zone A municipalities. This applies to all Zone B municipalities)
Datura <i>Datura stramonium</i>	HIGH	Yes	On embankment to the west of the office and weighbridge	Yes but very limited in its extent	A - Implement integrated control program for eradication and prevent future occurrences
Horehound <i>Marrubium vulgare</i>	HIGH	No		Yes, Hillwood area, Batman Highway	B - Containment within municipal boundaries, protection of specified areas within municipal boundaries, prevention of spread to Zone A municipalities. This applies to all Zone B municipalities.
Ragwort <i>Senecio jacobea</i>	HIGH	No	May be present, not observed during surveys.	Yes, Hillwood area, Batman Highway	A - Implement integrated control program for eradication and prevent future occurrences
Spanish heath <i>Erica lusitanica</i>	HIGH	Yes	Near entrance and office area	Yes, prolific along East Arm Road and East Tamar Highway	B - Containment within municipal boundaries, protection of specified areas

					within municipal boundaries, prevention of spread to Zone A municipalities. This applies to all Zone B municipalities.
Gorse <i>Ulex europaeus</i>	Moderate	No		Yes, along East Tamar Highway and East Arm Road	B - Containment within municipal boundaries, protection of specified areas within municipal boundaries, prevention of spread to Zone A municipalities. This applies to all Zone B municipalities)
Slender thistles <i>Carduus tenuiflorus</i> <i>C. pycnocephalus</i>	Moderate	Yes	Sporadic on disturbed ground, stockpiled soil, and bunds where grass is sparse	Yes, localised but prolific along East Tamar Highway and East Arm Road	
Fennel <i>Foeniculum vulgare</i>	Moderate	No		Yes, localised along East Tamar Highway	
African boxthorn <i>Lycium ferocissimum</i>	Low	No		Yes, occasional in degraded pastures and fencelines	
blackberry <i>Rubus fruticosus</i> agg.	Low	Yes	Very localised near entrance and along front fencelines	Yes, prolific in the landscape	
Montpellier broom <i>Genista monspessulana</i>	Low	No	May be present, not observed during surveys but likely to be present.	Yes, localised along East Tamar and Batman Highways	
Spanish broom <i>Cytisus scoparius</i>	Low	No		Yes, localised along East Tamar Highway	

Table 2. Other weeds of known or likely threat to the clean status of quarry produced materials as of November 2022

Common name <i>Scientific name</i>	Threat Level	On-site?	Distribution in the site	Near site?
Arum lily <i>Zantedeschia aethiopica</i>	Low	Yes	Localised near un-named tributary downstream of dam	No, but may be in the coastal vegetation strip downstream of the site
Weld <i>Reseda luteola</i>	Moderate	Yes	Sporadic across disturbed area in the site, especially on soil and overburden bunds	Yes, prolific in disturbed areas and roadsides.
Foxglove <i>Digitalis purpurea</i>	HIGH	No	No recorded on the site but may be present in small numbers along East Arm Road and the East Tamar Highway.	Common weed near Hillwood; common weed of roadside garden rubbish dumping sites.
Great mullein <i>Verbascum thapsus</i>	Moderate	Yes	Sporadic along the East Tamar Highway	Yes, locally prolific in disturbed areas and roadsides.
Twiggy mullein <i>Verbascum virgatum</i>	Moderate	No	Sporadic along the East Tamar Highway	Yes, locally prolific in disturbed areas and roadsides.
Thistles (exotic) Spear, variegated	Low	Yes	Sporadic near cattle camps, wombat burrows and disturbed ground	N
Capeweed <i>Arctotheca calendula</i>	HIGH	Yes	Present on some of the sandy soils at the western side of the site, roadside areas on East Arm Road and the retained coastal native forest.	Yes, sporadic, mainly on light soils, present in the Hillwood region mainly on light sandy soils in pastures and livestock damaged native vegetation

<p>Blue butterfly bush <i>Psoralea pinnata</i></p>	<p>HIGH</p>	<p>No</p>	<p>Weed absent from site but as a prolific seed producer there needs to be regular assessment of the site to ensure it has not and does not enter the site without being detected.</p>	<p>Yes, sporadic along the East Tamar Highway and Hillwood area; common garden weed and weed of roadside garden rubbish dumping sites</p>
<p>Tree lucerne <i>Chaemaecytisus palmensis</i></p>	<p>Low</p>	<p>No</p>	<p>Absent, but sporadic along the East Tamar Highway</p>	<p>Yes, sporadic in the Hillwood – Long Reach area, occasional as a planted shelterbelt tree and garden escape along roadsides</p>

Spanish heath

Erica lusitana

Soft green needle-shaped leaves on wiry woody stems (right image), with small bell-shaped white flowers that when mature become brown and shed hundreds of seeds (right image). Can be confused with some Tasmanian native heath species, such as common heath and ants delight.



Confusing native species:

Ants delight (left) and Common heath (right)



A mainly leafless thistle with light green stems and sharp prickles (left image). The daisy flowers are bright pink (right image) at the top of the stems.

Slender thistle

Carduus pycnocephalus



A mainly leafless shrub with dark green strappy stems. Flowers are bright yellow and pea-like (left image), while the fruits are dark brown pea-like pods (right image).

English broom

Cytisus scoparius



Shrub with very prickly green stems, bright yellow pea flowers.

gorse

Ulex europaeus



Light green feathery soft leaves with a licorice smell, and tall flower stems with small yellow flowers.

Fennel

Foeniculum vulgare



B.5 PATHOGENS

Pathogens and the diseases that result can be very difficult to eradicate, and once detected, containment may be the only practical management solution. Prevention is the most effective management strategy, and that can be best achieved by having strong biosecurity and hygiene measures in place.

B.5.1 *Phytophthora cinnamomi*, PC

Phytophthora dieback is an introduced pathogenic water mould. Water moulds were once included in the fungi kingdom and, as a result, *Phytophthora dieback* has been called a fungus in earlier interpretation literature. Its scientific name is *Phytophthora cinnamomi*, but it is also known by the names root rot, cinnamon fungus, jarrah dieback (Western Australia) and wildflower dieback.

It is one of the worst invasive plant pathogens in the world, and in Australia is recognised as a Key Threatening Process that severely degrades susceptible vegetation communities and kills susceptible plants. It is believed to have been introduced to Tasmania during early European settlement and is now well established in many areas of moorland, heathland, and dry Eucalypt forest in Tasmania. Some threatened plant species in Tasmania are known to be declining as a result of *Phytophthora dieback* and more threatened species could also be affected should the fungus be introduced to their populations. People can transport the pathogen into new areas in dirt adhering to vehicles, items they are carrying or footwear.

Biology and Identification

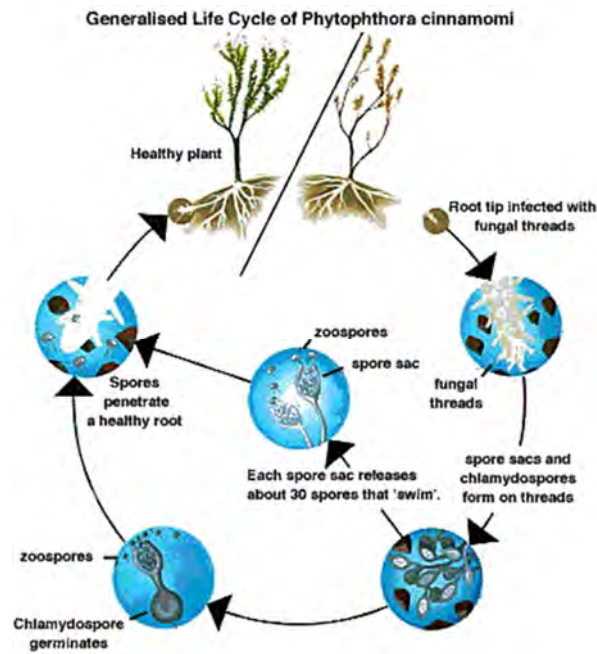
PC belongs to a group of micro-organisms known as water moulds – these have a motile or animal-like stage which fungi do not. Water moulds require moist conditions to thrive. Its food source is the root and basal stem tissue of living plants where PC grows as microscopic sized filaments (mycelium) in susceptible host plants. It consumes the host plant causing lesions (areas that appear rotten) which weaken or kill the plants by reducing or stopping the movement of water and nutrients within the plant. Infected plants often have dead new growth, or wilting tips of new foliage.

PC may reproduce through production of microscopic spores. Two types of spores, zoospores and chlamydospores, are most likely to be formed in Tasmanian habitats:

1. Zoospores are released in very large numbers under moist soil conditions. They have flagella (tails), which are used to propel the spore through the soil water towards other plant roots. The movement of water down slope, through or over the soil, can also passively disperse these spores over considerable distances. Zoospores are attracted by the root secretions of some plants. They then penetrate the root, germinate and the cycle repeats itself.
2. Chlamydospores are larger, long-lived spores with thick protective walls. These spores can withstand dry conditions for months, germinating when warm moist soil conditions re-occur. They are one of the mechanisms the fungus has developed to help it survive adverse conditions. These spores may survive being transported long distances in dry soil.

PC may also spread through mycelial growth along roots and spread between closely connecting plant roots within the soil. There are many diseases which occur in native vegetation and the majority of these are natural events which play an important ecological role. The patterns of disease expression in time and space as well as the species affected, and dieback symptoms need to be assessed to identify potential PC

infestations. Conclusive identification of PC as the cause of disease requires analysis of soil or root samples in a laboratory, but soil/root samples are pointless to have assessed if there are no plant host species present.



Source: DPIPWE.

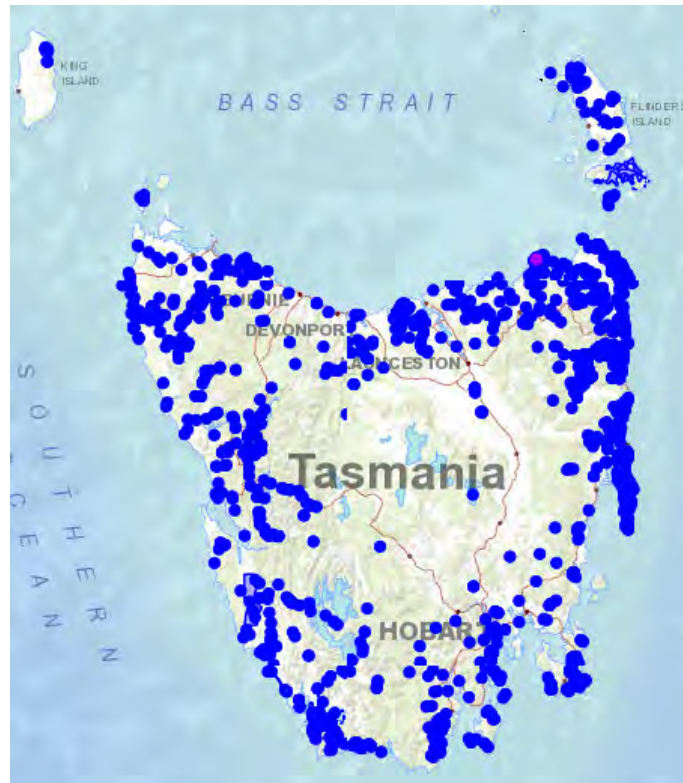
Good indicators for recent or active PC are:

- Death or disease in known susceptible species (note: not all individual plants will be attacked simultaneously in a diseased area),
- Diseased plants show discolouration of the foliage (especially new foliage), most commonly reds and yellows,
- Known resistant species remain healthy,
- There is a temporal sequence of disease across a site (e.g., the oldest death in the centre or towards the uphill end of infections on slopes), and
- Sharp disease fronts or boundaries between healthy and diseased vegetation may be present.

In the absence of plant host species (especially resistant species) it is likely that PC can disappear or become inactive at a site until a suitable host plant recolonises the PC affected area.

Distribution and impact

PC requires warm moist soils if it is to reproduce and spread which its distribution in Tasmania to areas that are generally below about 700 m in altitude and prevents it affecting low rainfall areas such as the Tasmanian midlands. The figure below provides an indication of the occurrence of PC in Tasmania (NVA held data). Cold soil conditions can also occur at altitudes below 700 metres where a dense forest canopy shades the ground. For this reason, wet forest and rainforest communities are not susceptible to PC in their undisturbed state.



The vegetation types most affected in Tasmania are heathland, moorland, dry sclerophyll forest. These vegetation types occur within the climatically susceptible areas and contain susceptible plant species. Moorland and heathland communities are perhaps the most severely affected as many of the shrub species present in these communities are susceptible to *P. cinnamomi*.

As a consequence of this management environment, the approach taken has been to focus on protecting plant species and communities that are most at risk, where goals are considered to be practicable and achievable in the long term. It is accepted that the disease epidemic will inevitably run its course in many areas through wildlife and water mediated spread. Preventing infestation of disease-free areas is the primary goal for managing biodiversity assets. The assets identified for management are threatened species that are susceptible to disease, large disease-free areas of susceptible native vegetation and highly susceptible communities.

The report *Conservation of Tasmanian Plant Species & Communities Threatened by Phytophthora cinnamomi* (Schahinger *et al.* 2003) identifies all the priority areas for management of the biodiversity assets at risk in Tasmania. These sites capture the large disease-free areas and biographically representative sites for the highly susceptible communities and at least three populations where possible for each PC susceptible threatened species.

Prescriptions that apply to prevent the introduction of Phytophthora root rot to uninfected areas include:

- managing developments and works that increase the risk of introduction e.g., roads and walking tracks,
- track rerouting, track hardening and drainage management, one-way tracks and access management sourcing materials to be used in management works from PC-free stock,

- sequencing and timing operations to reduce risk of introduction, and
- hygiene prescriptions such as washdown requirements.

Previous Information

The Natural Values Atlas holds no recorded locations for the East Arm Road area (i.e., observed symptoms and confirmed locations) which indicates PC is absent. East Arm Road Quarry is not within a *P. cinnamomi* Management Area¹ hence, the recommendations and management requirements stipulated in Schahinger *et al.* (2003) are not relevant to the Quarry or the receiving environment.

Vegetation

There is native forest vegetation adjacent to working areas. The vegetation is dry eucalypt dominated forest with a grassy to shrubby (some heathy) understorey which is generally not highly susceptible to PC in an undisturbed state². Very few of the shrub species present are susceptible to PC, with the primary species like *Banksia marginata*, *Hakea* species and *Hibbertia* species being absent or very sparse. No symptoms of PC were observed in any of the susceptible species present in the adjacent and surrounding vegetation.

The pit will be intermittently surrounded by bunds to direct external surface water away from the Quarry. The crushing/screening pad is to be bare rock with occasional patches of pasture grass which is a non-susceptible and non-host PC environment.

The vegetation in the area is not conducive to the establishment and proliferation of PC, nor is there any evidence that PC is present or has been present (i.e., a historical infection). No species were observed with any potential signs of infection; hence soil/plant root material samples were not collected.

Soil and Water

The pit will have bunds (made from rock and/or topsoil that will or may become vegetated with pasture grasses and some native trees) to direct pit external surface water away from the quarry. Some areas will not need bunds because the occurrence of the quarry at the top of a hill naturally drains surface water flows away from the pit. Water that falls from natural rainfall external to the pit and that associated with surface drainage are excluded from the pit. Hence, any PC potentially contaminated water is prevented from entering the pit. Water from natural rainfall that lands in the pit collects in the base of the void and is then to be pumped out to the sediment ponds or used in the quarry activity (e.g., dampening roads).

The crushing/screening pad is to be a hardstand surface without any soil present – it is a non-susceptible and non-host PC environment. It is very unlikely that PC would be introduced to the pit, or crushing/screening pad, from surface water flows given extraneous water sources are to be kept away from the pit and crushing/screening pad.

¹ Report on Conservation of Tasmanian Plant Species & Communities Threatened by *Phytophthora cinnamomi*. Copyright Government of Tasmania 2003. Written by Schahinger, R., Rudman T., and Wardlaw, T. J. (DPIWE). ISSN 1441-0680.

² Flora Technical Note No. 8: Management of *Phytophthora cinnamomi* in production forest. Version 2.4 August 2019

Aggregate generating processes

Rudman (2005) notes that crushed rock products from quarries are considered free of PC provided they are not contaminated with topsoil or gravel (in situ gravels). The Quarry will access a dolerite bedrock to produce aggregate by crushing and screening blast liberated material. Trucks will collect aggregate from the crushing/screening pad rather than enter the pit itself.

The crushing/screening pad is to be a hardstand surface, as too is the road network that accesses the quarry from Nubeena Road – hard road surfaces limit the risk of mud collecting on trucks and also provides opportunity for any clods of mud to fall from the trucks which may have been collected at the drop-off point. If trucks do become dirty, they are to be washed prior to re-entering the crushing/screening pad where they collect their next load of material. Equipment such as blasting equipment is to be brought to the site in a clean state.

It is very unlikely that PC would be introduced to the pit, or crushing/screening pad, from vehicles and machinery.

Conclusion

The risk assessment conducted indicates that the potential for PC to be present and/or active at the East Arm Road Quarry is negligible, and when considering the general paucity or complete lack of host and susceptible plant species in the vicinity of the quarry, the likelihood reduces further to ‘practically nil’.

No specific recommendations are made for the management of PC because quarry management measures (see section C.3), such as drainage control to the pit and crushing/screening pad, and vehicle/hygiene measures, are adequate to keep the risk to ‘practically nil’ levels.

B.5.2 Myrtle Wilt

Myrtle wilt, caused by a wind-borne fungus (*Chalara australis*), occurs naturally in rainforest where myrtle beech (*Nothofagus cunninghamii*) is present. The fungus enters wounds in the tree, usually caused by damage from wood-boring insects, wind damage and forest clearing. The incidence of myrtle wilt often increases forest clearing events such as windthrow and wildfire.

Nothofagus cunninghamii is not present within or adjacent to the East Arm Road Quarry, such that no special management is considered warranted.

B.5.3 Myrtle Rust

Myrtle rust is a disease limited to plants in the Myrtaceae family. This plant disease is a member of the guava rust complex caused by *Austropuccinia psidii*, a known significant pathogen of Myrtaceae plants outside Australia. Infestations are currently limited to NSW, Victoria, Queensland, and Tasmania (DPIPWE 2015).

No evidence of myrtle rust has ever been observed or formally recorded at or near East Arm Road Quarry.

PART C - ROLES AND RESPONSIBILITIES

C.1 OPERATOR

The operator is responsible for ensuring that:

- staff and contractors are briefed on the requirements of the WPMP and its importance to the overall success of mine operation;
- the WPMP is applied, and implementation monitored through regular assessments of the Land and liaison with staff and contractors; and
- variations to the WPMP are developed and approved prior to their implementation.

C.2 STAFF AND CONTRACTORS

All staff and contractors that work within the Quarry are responsible for:

- applying weed hygiene measures for which they have received training;
- reporting breaches of the WPMP to the Quarry owner as soon as practical, providing written details of the breach, and any measures that were immediately taken to reduce the likelihood of any environmental harm; and
- reporting new occurrences of Weeds to the Quarry owner within a reasonable timeframe of detection.

PART D - IMPLEMENTATION

D.1 WEED SPRAYING PROGRAM

The Quarry Owner or their nominated qualified weed spraying contractor/employee will implement a Weed Spraying Program (WSP). The WSP will be reviewed each year and updated as new information about the occurrence of weeds within the Mining Lease become available.

Weed spraying will occur at least once annually. The Weed Spraying Program carries with it the same responsibilities of implementation outlined in 'Role and responsibilities'.

The Plan each year will take the form of a Works Plan which will comprise the following –

1. A **map** showing the areas where weeds occur, what species they are and a works area number (to reference to the associated spreadsheet); and
2. A **spreadsheet** like that contained in Appendix B which will identify the works area, weed of concern and the management of that weed or group of weeds.

The spreadsheet will be updated electronically with a new worksheet for each Work Plan, thus maintaining a record of the works recorded and completed. The printed version of the Works Plan once implemented will be signed by the officer responsible for the works and filed at the quarry office for future reference.

The weed spraying program will be in accordance with the Rivercare 'Guideline for Safe and Effective Herbicide Use near Water' (**Appendix A**).

The Plan commences immediately with the first WSP scheduled for late spring into early summer (November to December 2022) when growing and weather conditions are suitable for weed spraying/control works.

D.2 CLEAN MACHINERY AND EQUIPMENT POLICY

Machinery will be brought into the Quarry in a clean condition; free of weed propagules, clods of dirt and vegetative matter.

The highest risk of transporting propagules is from heavy machinery, such as excavators, as these can carry large clods of dirt and mud in which seed propagules can be lodged. Transport trucks pose little risk to the transportation of weed propagules if they remain on the hard surface of the roads (even if they are unsealed) and loading area **and** that these areas are managed to exclude Weeds.

A **Machinery Hygiene Inspection Sheet** is to be used to record the machine/equipment brought into the Quarry, and from where it has been floated. The form is to be completed by a suitably qualified person prior to the Machinery or Equipment entering the Quarry. If the Machinery or Equipment fails to pass an inspection, it will be refused entry to the Quarry and sent away for further cleaning.

PART E - MONITORING AND REVIEW

This WPMP is intended to be flexible and allow changes to the focus of management actions, especially the weed spraying program, as the occurrence, extent, and severity of weed infestations change across the Land.

E.1 CONTINUAL IMPROVEMENT

The weed occurrence map developed through the implementation of this WPMP may be reviewed and modified from time to time as new data become available, especially following field surveys to identify, record and map new and current weed occurrences on the Mining Lease.

E.2 MONITORING

The early detection of any weeds that enter the Mining Lease is important to ensure that any control or eradication program has the highest likelihood of success.

A survey to identify new weed species within the Mining Lease should be conducted at regular intervals which coincide with the commencement of peak weed growth periods and/or the weed spraying season. This approach should enable early detection of weed species before they reach an extent where control and eradication is very costly and/or difficult to achieve.

The following survey regime will be applied during the life of the quarry operation:

1. Surveys and assessments by a suitably qualified person are to –
 - a. identify, record and map any new weed species not previously recorded;
 - b. assess and map the extent of known weed infestations to determine if they are becoming larger and/or more significant such that control measures can be modified; and
 - c. review/assess the weed control works that have been conducted and to provide advice, where necessary, on the management of weeds.
2. Areas where weed control/eradication works have occurred (eg spraying) will be assessed no more 12 months after the treatment occurred to determine if the measures implemented were successful. Where measures have proved unsuccessful, repetition and/or modification of the weed control technique(s) will be employed.

E.3 REVIEW OF WPMP

The objectives, responsibilities, and management actions within this WPMP will need to adapt to new information about the site as it becomes available.

The WPMP will be reviewed each year in or as needed (eg. when a significant infestation of a weed on the site is detected).

PART F - REFERENCES

Department of Primary Industries, Parks, Water and Environment (2015). Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania. (Eds.) Karen Stewart and Michael Askey-Doran. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

Environment Protection Authority (2017) Quarry Code of Practice 3rd Edition, EPA Tasmania, Hobart, Tasmania.

Podger F, Mummery DC, Palzer CR and Brown MJ (1990) Bioclimatic analysis of the distribution of damage to native plants in Tasmania by *Phytophthora cinnamomi*. *Australian Journal of Botany* **15**, 281-289.

Rudman T (2005). Interim *Phytophthora cinnamomi* Management Guidelines. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water and Environment, Hobart

APPENDIX A

'GUIDELINE FOR SAFE AND EFFECTIVE HERBICIDE USE NEAR WATER', DPIPWE



Photograph: Lynn Broos

Guidelines for Safe and Effective Herbicide Use Near Waterways

The control and management of weeds near waterbodies is a challenge faced by many landholders across Tasmania. Waterbodies are particularly sensitive to herbicide contamination, so the decision to apply herbicides in the vicinity must be taken with great care.

Weed control near waterbodies requires a long-term commitment to eradication, perhaps 5–10 years or more, as the seed banks of many 'woody' weed species (eg blackberries, gorse) may remain viable for decades. Weeds can also spread along watercourses, making their control difficult. A staged, planned approach to weed control, alongside a program to re-establish native riparian species, is necessary to ensure the safe restoration of riparian areas. Restoring native vegetation helps to reduce the presence of weed species, ensures the stability of banks, shades the waterway (which helps prevent future weed invasion), and provides habitat for local fauna.

Definitions

For the purposes of this guideline, the following definitions apply:

Riparian land	Any land that adjoins, directly influences, or is influenced by a body of water at any time of the year.
Waterbody	Includes natural watercourses (streams, creeks, rivers), natural wetlands, ponds, lagoons, constructed drainage channels, dams and ponds, reservoirs and lakes.
Permanently inundated/perennial	These areas have water all year round.
Occasionally inundated/intermittent	These areas have water some time of the year.
Rarely inundated/ephemeral	These are areas that rarely contain water (eg areas that flood on rare occasions).
Toxicity	The inherent poisonous quality/qualities of a substance, measured by what size dose is likely to cause harm (acute toxicity is measured by the amount of active ingredient - mg/kg live body weight - required to kill 50% of a test group of animals - this is called LD50).

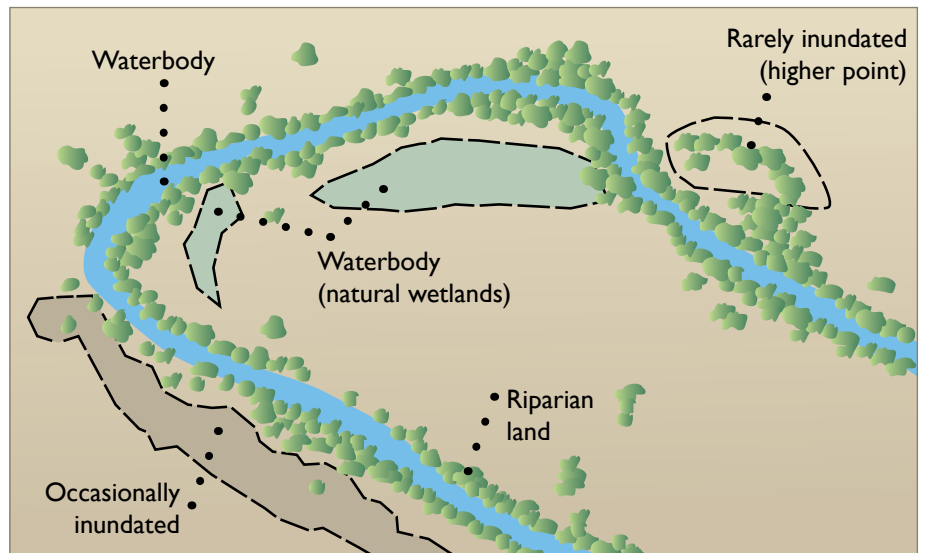


Figure 1: Appropriate and effective herbicide usage near water requires consideration of specific situations

A Planned Approach

Assess your site

What type of waterbody is it?

If your site is permanently inundated, you need to consider very carefully the choice of herbicide, recognising the risk to your aquatic ecosystem and the danger that the herbicide may pose to the surrounding environment. You also need to identify points of access to the site.

If your site is occasionally or rarely inundated, choose a time when the chance of rainfall is low and therefore the risk of runoff contaminated with herbicide is likely to be low. Figure 1 illustrates the different zones found in aquatic situations which may affect herbicide use.

What types of weeds are present?

Identify the species of weed and the extent of the infestation. Table 2 details the recommended herbicide control for a number of riparian weeds, the method and time of year for application. It also suggests alternatives to the use of chemicals.

Do the weeds have value at the site?

Consider whether the weeds are serving a useful purpose at the site. They may be acting as a buffer to control erosion, or as a filter to promote water quality. They may have a value to animal species as a source of food or shelter.

If you believe that you have native plants or animals that might be adversely affected by your proposed weed control, seek professional advice.

You may be able to stage the removal of weeds to minimise any impact on erosion or on animal life. You will almost certainly need to restore the habitat once weeds have been eradicated.

Are native species present at the site?

Identify any native plant species at your site. You may need to protect these species from overspray or mark them to prevent accidental spraying. These native plants will be the starting point to restoring the riparian zone.

Choose your control method

Landholders should always consider non-chemical solutions as a preferred option before deciding to use herbicides. These include biological control (eg by introduction of gorse mite, see photo below), slashing, mulching, controlled grazing (controlling timing, intensity and frequency), or hand removal. Often a combination of chemical and non-chemical methods is most appropriate. Whichever method or combination of methods is used, it is important to consider the potential negative impacts on the environment and limit these as much as possible.



Biological agents such as Gorse spider mite may be options for use near waterways, courtesy of Tasmanian Institute of Agriculture.

Understanding herbicides

Herbicides are designed to control and eradicate pest plants ('weeds'). However, it is important to realise that many herbicides have toxic effects in aquatic ecosystems. Native plants, invertebrates, frogs and fish may be harmed by herbicides. The inappropriate use of herbicides may also cause significant risks to human health where water is pumped from a bore for domestic use, or flows to reservoirs.

Herbicides can enter waterbodies either directly through spray or spray drift, or they can move into waterbodies via surface water run-off or leaching and sub-surface draining.

Herbicides can be broadly classified according to their chemical structures and modes of action. Table 1 shows the three major types of herbicide.

Table 1: Herbicide classification

Pre-emergent (residual)	These herbicides are designed to inhibit the germination of pest plants. They are therefore applied before the pest plant germinates and are often residual in the soil for long periods. They are generally not considered to be safe for use near waterbodies and are not recommended for use due to their persistence in the environment.
Knockdown non-selective	These herbicides are designed to be applied directly to the target pest plant, either through being sprayed onto foliage or applied directly to the cambium layer using any of the direct application methods described in Table 3. They may vary in mode of action and some may persist as residues in the environment.
Selective	Selective herbicides are designed to act on only one type of pest plant. Generally, selective herbicides will control either broadleaf (eg capeweed), grasses (eg phalaris) or woody weeds (eg broom). These herbicides are useful when the focus may be on controlling a particular weed species (eg phalaris amongst native shrubs). These herbicides may persist as residues in the environment.

Herbicides applied to the edge of a waterbody, or in wetted areas around its edge, must be registered for use in aquatic environments by the Australian Pesticides & Veterinary Medicines Authority (APVMA).

Consider the tools available to mitigate against offsite movement of your pesticide

PIRI-Tas

PIRI-Tas is a simple screen tool that predicts the off-site migration potential of pesticides into surface or ground-water. PIRI-Tas assesses both the likelihood of off-site-migration and the risk to different species based on the toxicity of the pesticide to a range of aquatic organisms.

PIRI-Tas is a risk indicator and uses a risk-based approach to decision making by taking into consideration a range of factors associated with site conditions, soil and environmental scenarios, pesticide properties, application rates and time of spraying as well as considering impacts on target species being protected by receiving environments. PIRI-Tas outputs can also be used to construct annual spray schedules to assist with future planning.

PIRI was first developed by CSIRO and is being used both nationally and internationally by a number of organisations. PIRI-Tas CD's and onsite training are available for free through the DPIPWE to key users of chemical pesticides, including those in the agriculture, forestry, amenity, glasshouse and municipal sectors.

Further information is available at <http://www.dpipwe.tas.gov.au/inter.nsf/WebPages/SSKA-7JA3N4?open>

Consider integrated pest management (IPM)

Integrated pest management (IPM) is a planned approach that coordinates environmentally acceptable methods of pest control with careful and minimal use of toxic pesticides. IPM programs are based on a comprehensive assessment of local conditions, including factors such as climate, season, the biology of the pest species, and government regulations.

Strategies employed may include the staged removal of weeds, biological control and re-planting of riparian areas with native species to discourage the regeneration of weeds.

Consult and plan

Draw up a calendar for action. The time of year when herbicides will be most effective on the weed should be a major influence on the make-up of this calendar. Herbicides are generally most effective during the growing season of the weed rather than when it is dormant or approaching dormancy. The staged removal of weeds over several seasons may be less disturbing to your aquatic environment and minimise any adverse impact on fauna.

Consult with neighbours who may be affected by your weed control operation, especially if you think there is any risk of spray drift to adjoining properties or downstream. You may also decide to seek advice from experts before taking further action, or approach commercial spray contractors to assess your particular situation.

If the work involves a significant length of river or multiple properties it is advisable to develop a plan that covers all aspects of the weed control work and restoration, including potential risks. You should also be mindful of:

- feasibility/practicability of the work
- physical characteristics of the job site
- optimal pest control method, including alternatives to herbicides
- characteristics of the herbicide (physical, chemical and environmental)
- buffer zones
- the possibility of spray drift and other off-target migration
- weather conditions.

Do you need to spray?

It is recommended that only trained, licensed contractors carry out spraying operations near waterbodies because of the sensitivity of these environments. Check that they have experience and an understanding of the issues around using herbicides near aquatic environments.

The following points are critical to the application of herbicides near waterbodies:

- Always follow the label
- When you are working near the edge of a waterbody, direct the spray away from the waterbody where possible.
- Spray only to the extent of covering foliage with droplets.
- Spray when weather is calm; strong winds may carry herbicide drift into waterbodies.
- Use a flat fan nozzle and a low pump/spray pressure to reduce the likelihood of spray drift.
- Do not spray when rainfall is forecast within four hours as herbicide can be washed off the pest plant and run off into aquatic ecosystems.

Appropriate herbicides and application

The type of weed problem will determine both the type of herbicide and its application method. Table 2 shows recommended herbicide and application methods for some common weeds, along with alternatives to herbicide use. Table 3 illustrates application techniques and equipment need to undertake control works.

Uses described in this table are either covered by the respective product label or Off-label Permit No. 13160 issued by the Australian Pesticides and Veterinary Medicines Authority.

Table 2. Common weeds and recommended treatment and herbicides

Area	Weed	Permitted Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Recommended Herbicide Control Technique	Non-chemical Alternatives
Permanently inundated/ perennial	Submerged and partially submerged plants				
	Parrot's feather (<i>Myriophyllum aquaticum</i>)	Glyphosate (registered for aquatic use only) Don't add surfactants!	Roundup Biactive® or Weedmaster Duo®	Foliar spray	Hand removal and excavation (with roots/rhizomes) can be used as part of a well planned approach. Care must be taken to avoid losing fragments
	Egeria (<i>Egeria densa</i>)				
	Canadian Pondweed (<i>Elodea canadensis</i>)				
	Cumbungi (<i>Typha</i> spp)				
	Glyceria (syn. Poa aquatica or reed sweet grass) (<i>Glyceria maxima</i>) NB Take extreme caution not to spread Glyceria seed through soil transport (eg on machinery)			Foliar spray (combine with dense local native species revegetation for long-term results through stream shading) Wiper	Clearance or drainage of growth area (combine with dense re-vegetation of local native species for long-term results through stream shading)
	Woody weeds				
	Blackberry (<i>Rubus fruticosus</i>)	Glyphosate (registered for aquatic use only) Don't add surfactants!	Roundup Biactive® or Weedmaster Duo®	Cut and paint with Roundup Biactive® or Weedmaster Duo®	Hand removal (small plants) Controlled grazing (goats or sheep only) can be effective Bio-control (eg gorse mite, blackberry rust) where other techniques are not suitable Gorse mulching combined with follow-up grazing and revegetation on mulched sites
	Gorse (<i>Ulex europaeus</i>)				
	Trees				
Hawthorn (<i>Crataegus monogyna</i>)	Glyphosate (registered for aquatic use only) Don't add surfactants!	Roundup Biactive® or Weedmaster Duo®	Cut and paint Drill or stem injection Axe or frill and paint Foliar spray hawthorn and crack willow (only spray to a height of 2m)	Hand removal (small plants) Controlled grazing can assist in limiting Hawthorn regrowth and thicket density	
Crack Willow (<i>Salix fragilis</i>)					
Sycamore (<i>Acer pseudoplatanus</i>)					


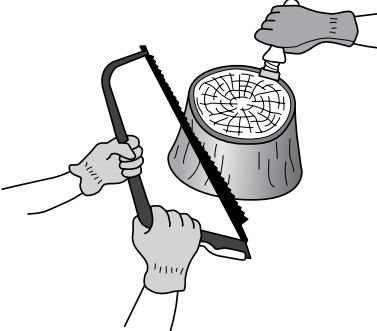
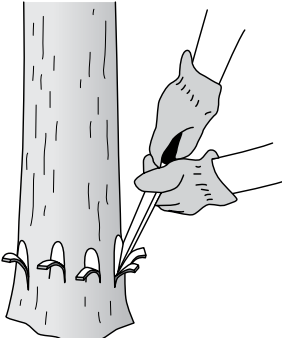
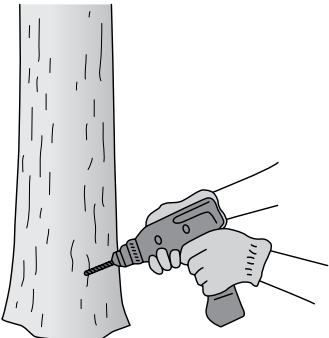
The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product does not imply endorsement by DPIPWE over any other equivalent product from another manufacturer.

Table 2. Common weeds and recommended treatment and herbicides continued

Area	Weed	Permitted Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Recommended Herbicide Control Technique	Non-chemical Alternatives
Occasionally or rarely inundated sites	Woody weeds				
	Blackberry (<i>Rubus fruticosus</i>)	Metsulfuron-methyl Triclopyr Triclopyr + Picloram	eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Foliar spray	Hand removal (small infestations) Controlled grazing by goats can be effective Bulldoze and deep cultivate (in suitable circumstances) Bio-control (a rust with limited impact)
	Gorse (<i>Ulex europaeus</i>)	Glyphosate (registered for aquatic use only) Triclopyr Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint Foliar spray, preferably Garlon 600®	Mulching/bulldozing/slashing combined with follow-up grazing and revegetate on mulched sites Bio-control (e.g gorse mite) where other techniques are not suitable
	English Broom (<i>Cytisus scoparius</i>)	Glyphosate (registered for aquatic use only). Metsulfuron-methyl Triclopyr herbicide Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint. Foliar spray, preferably Garlon 600® (only if under 2m in height)	Hand removal. Mechanical removal (eg rip or bulldoze) Mulching/bulldozing/slashing of hawthorn combined with follow-up grazing and revegetate on mulched sites
	Montpellier Broom (<i>Genista monspessulana</i>)				
	Trees				
	Hawthorn (<i>Crataegus monogyna</i>)	Glyphosate (registered for aquatic use only). Metsulfuron-methyl Triclopyr herbicide Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint Foliar spray, preferably Garlon 600® (only if under 2m in height)	Hand removal Mechanical removal (eg rip or bulldoze) Mulching/bulldozing/slashing of hawthorn combined with follow-up grazing and revegetate on mulched sites
	Sycamore (<i>Acer pseudoplatanus</i>)	Glyphosate (registered for aquatic use only)	eg Roundup Biactive® or Weedmaster Duo®	Stem injection, cut and paint (plus foliar spray for young plants)	Hand removal Bulldoze and revegetate Plough-in small plants
	Herbaceous plants				
	Ragwort (<i>Senecio jacobaea</i>)	MCPA Metsulfuron-methyl	eg MCPA 500 or L.V.E Agritone eg Associate or Brush-Off®	Foliar spray	Hand removal Controlled grazing (sheep) Ploughing/cultivation (combine with dense revegetation of local native plants for long-term results through shading)
Paterson's curse (<i>Echium plantagineum</i>)					
Thistles (eg <i>Cirsium arvense</i>)					

More information on weed identification and weed control can be found at www.dpipwe.tas.gov.au/weeds

Table 3. Herbicide application techniques

Illustration	Method	Type of weed	Equipment Required	Notes
	Foliar Spray	Herbaceous plants, Woody weeds	Knapsack Vehicle mounted tank Herbicide mix Personal protective equipment (see product label)	Ensure herbicide is being applied at right concentration and rate to cover the foliage of the pest plant with fine droplets and avoid run-off. A flat fan nozzle and low pump pressure will assist in reducing spray drift
	Cut and paint	Woody weeds, shrubs and trees	Saw, chainsaw, loppers Herbicide mix Personal protective equipment (goggles and gloves as a minimum) Brush/sponge for herbicide application	Ensure herbicide is applied quickly to cut stump (within 15 seconds in most cases) Apply during active growth period of plant for best results Do not apply herbicide to the point of run-off
	Frilling	Shrubs and trees	Axe, hatchet Herbicide mix Personal protective equipment (goggles and gloves as a minimum) Brush for herbicide application	Frill trunk thoroughly, also treat major surface roots where visible Expose sapwood and apply herbicide to it immediately For deciduous species, apply during active growth period
	Drill and poison	Shrubs and trees	Drill Application bottle, injection gun Herbicide Personal protective equipment (goggles and gloves as a minimum)	Drill to sapwood only and apply herbicide to drill hole immediately Drill and fill major surface roots where appropriate For deciduous species, apply during active growth period

Illustrations: Brett Littleton ILS Design Unit

After Spraying

Clean up

Equipment should always be cleaned in a safe location where spills can be contained and will not result in environmental harm. Using water to clean equipment will further dilute any residual herbicide to low levels, and the resulting solution is best sprayed onto a lawned area or bare ground taking the following precautions:

- Do not apply wash-water to the point of saturation so that run-off occurs.
- Do not apply wash-water along boundary fence lines as this will increase the chance of herbicides escaping from your property.
- Do not dispose of wastewater into areas where children play, or pets have access, as low levels of herbicide are still likely to be present.
- Do not deposit wastewater where it will run into waterways, drainage lines or stormwater systems.

Disposal

If you do happen to have surplus spray mix or herbicide waste, label it with the herbicide name, including any risk and safety information displayed on the original label. Store it safely until it can be disposed of appropriately. Contact a chemical collection organisation eg Chem Clear.

You must follow label directions for the disposal of wastes and herbicide containers. Only dispose of waste herbicides at authorised collection centres, such as licensed waste disposal centres.

Do not dispose herbicide waste:

- through sewerage systems, where it can interfere with the sewage treatment process
- down the drain or gutter; where it can pass through the stormwater system and into waterways
- to landfill via dumping or domestic waste, as it can contaminate soil and leach into groundwater and stormwater.

Monitor, evaluate and follow up

Monitor

Observe and keep records of your weed problems and the impact of any measures you take to control them. This could involve:

- the use of visual records, including property maps, aerial and other photography
- the use of a calendar or diary to record when actions were taken.

Evaluate

Evaluate the success of any weed control program by considering the current extent of the weed problem and reviewing your control measures. Important questions might include:

- Is my weed control work going to plan, or do my goals need reviewing?
- What is the appropriate weed control measure now?
- Is there a need for external (expert) assistance?

Follow up

Re-implement weed control actions following the results of your monitoring and evaluation. Continue to monitor this follow-up work, and so begin an ongoing cycle of weed management.

These guidelines have been updated by Kiowa Fenner and are based on guidelines prepared by Michael Noble and Janice Miller.

Important disclaimer

To the extent permitted by law, the Tasmanian Department of Primary Industries, Parks, Water and Environment (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this material (in part or in whole) contained in this publication



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CONTACT DETAILS

Invasive Species Branch

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www.dpipwe.tas.gov.au/weeds

APPENDIX B

TEMPLATE - WEED SPRAYING PROGRAM SPREADSHEET – EAST ARM ROAD QUARRY, HILLWOOD

Date -

East Arm Road Quarry, Hillwood
Weed Spraying Program Work Plan

Zones on Maps	Weeds Present	Actions required	Responsible person	Estimated start date	Estimated completion date	Tasks conducted	Date Completed	Signed

NOTES

Issued by -

East Arm Road Quarry, Hillwood
Weed Spraying Program Work Plan

Checked by -

APPENDIX C

HYGIENE INSPECTION PROTOCOLS FOR VEHICLES AND HEAVY MACHINERY

HYGIENE PROTOCOLS FOR VEHICLES AND HEAVY MACHINERY

The following protocols have been adapted from the *Tasmanian Washdown Guidelines for Weed and Disease Control: Machinery, Vehicles and Equipment* (DPIPWE, Edition 1, 2004) and *Flora Technical Note No. 8: Management of *Phytophthora cinnamomi* in production forests* (FPA 2006). For more information refer to the full guidelines at:

- DPIPWE website - www.dpipwe.tas.gov.au (then follow links to Weeds Pests and Diseases, Plant Diseases, Phytophthora, Phytophthora Publications, Washdown Procedures).
- Forest Practices Authority website - www.fpa.tas.gov.au (then search for Flora Technical Notes).

BACKGROUND

Passenger vehicles and heavy machinery (including trucks, tractors, mowers, slashers, trailers, backhoes, graders, dozers, excavators, skidders and loaders) are major vectors for the spread of soil borne fungal diseases such as *Phytophthora cinnamomi* (root rot) and terrestrial weeds.

As a minimum, apply the standard **Check Clean Dry** protocols (page 14) to all your clothing, footwear, equipment, vehicles and heavy machinery **before** going into the field.

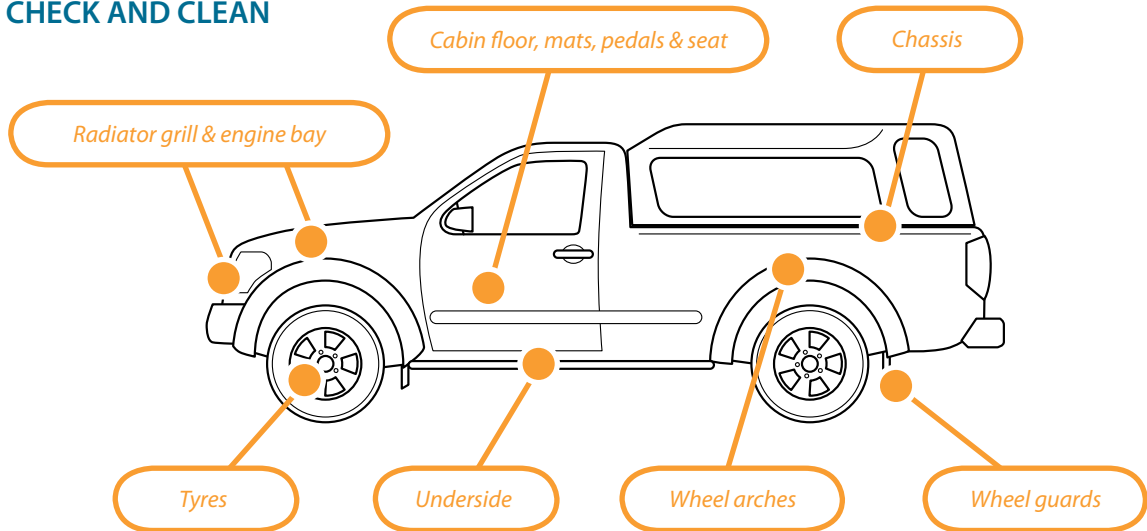
Vehicles and heavy machinery that stay on formed and sealed roads have a low risk of spreading disease and weeds and on-site cleaning is not essential. However on-site vehicle washdown is particularly important when using vehicles and machinery off (sealed) roads.

Apply rigorous planning and hygiene protocols that include **Disinfection** when working in Phytophthora Management Areas (refer to Appendix B), areas with endemic or threatened frog species (refer to Appendix D) or remote areas and where it is not possible to *thoroughly* dry vehicles, heavy machinery and equipment between sites. Ensure you **Check Clean and Disinfect before you arrive and between sites.**

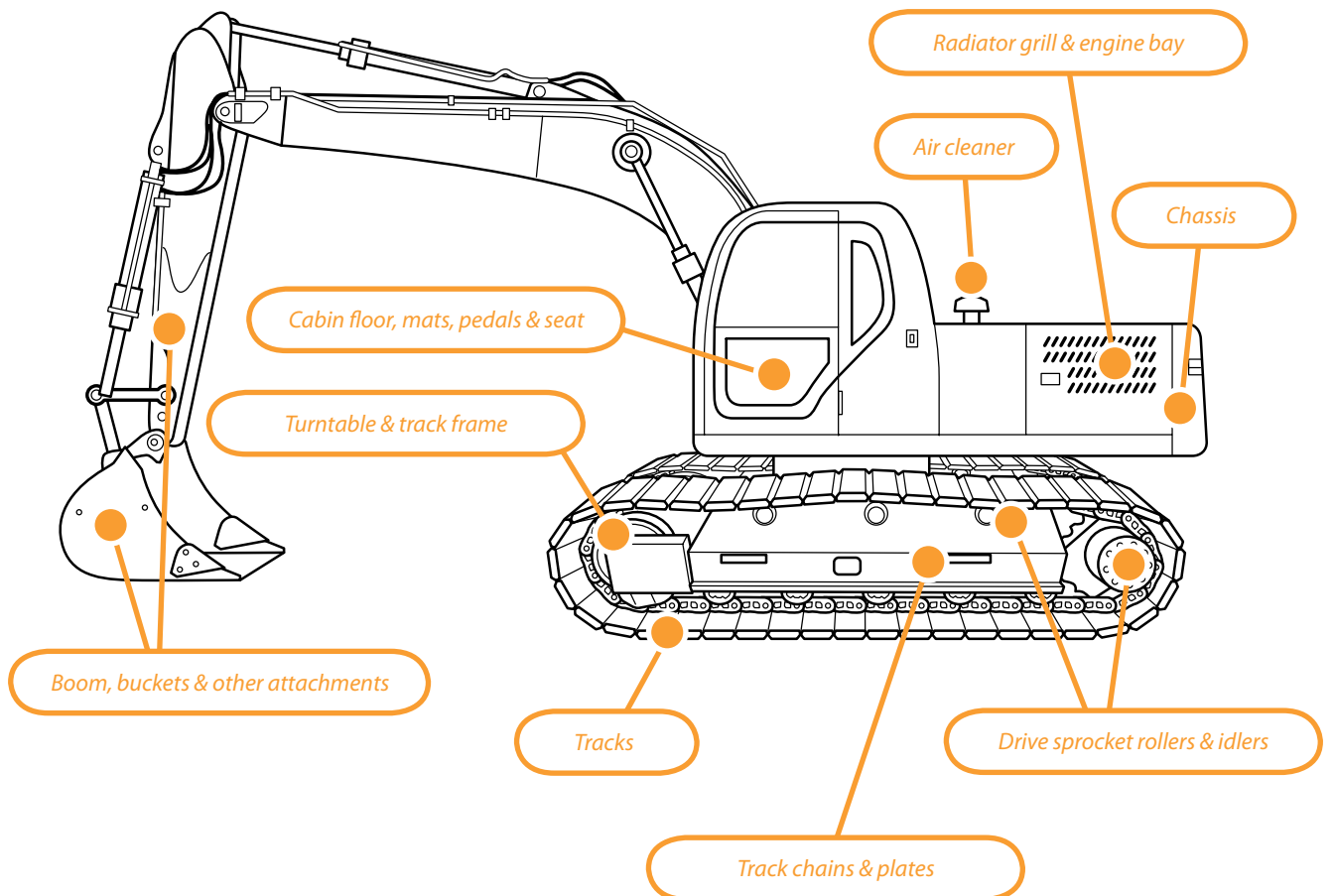
BEFORE GOING INTO THE FIELD

- Consult with the relevant land manager to identify any specific hygiene protocols that apply to vehicles and machinery.
- Inspect vehicles and heavy machinery for mud, soil, plant material and debris and ensure they are clean and dry. Pay particular attention to the underside, tracks, rollers, tyres, wheel arches, guards, blades, bucket, other attachments, spare tyres, chassis, engine bay, radiator and grill, tray, cabin, foot wells, pedals, mats and seats.

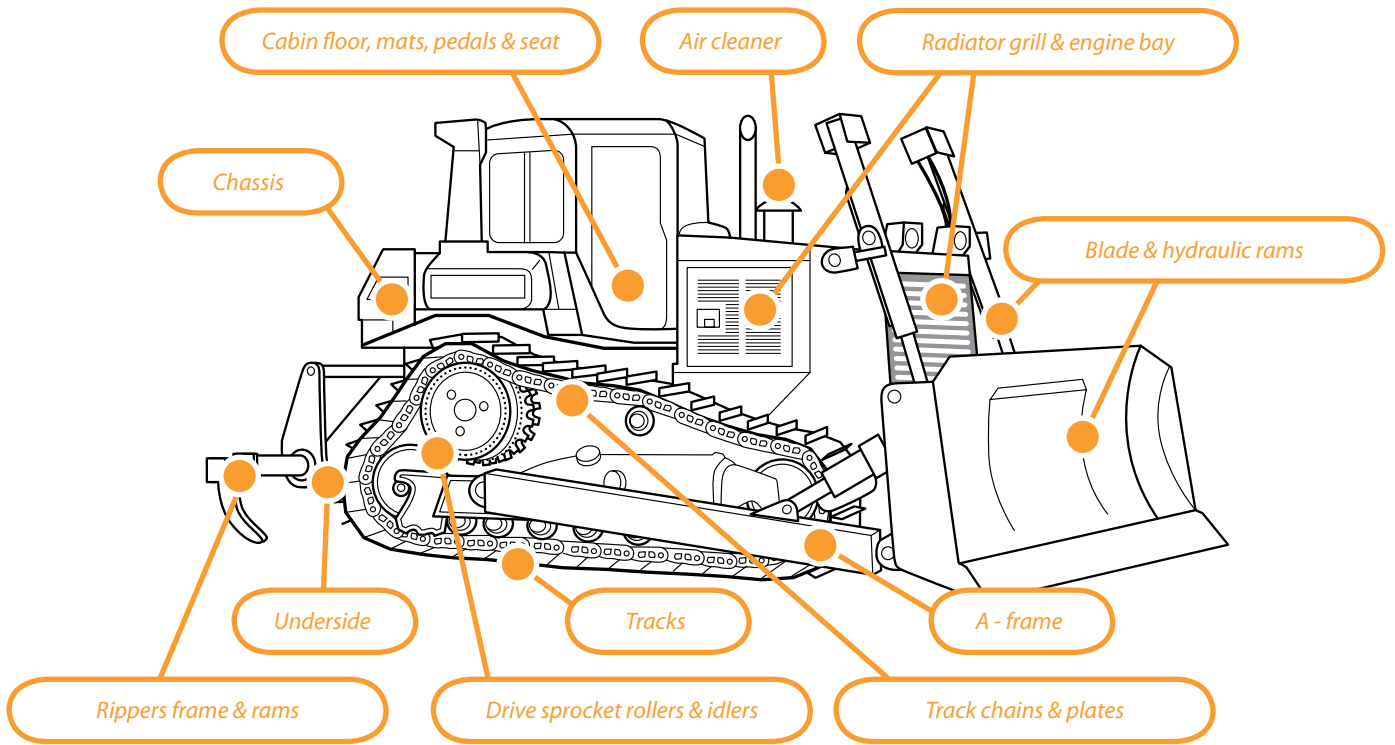
4WD VEHICLE WITH KEY SPOTS TO CHECK AND CLEAN



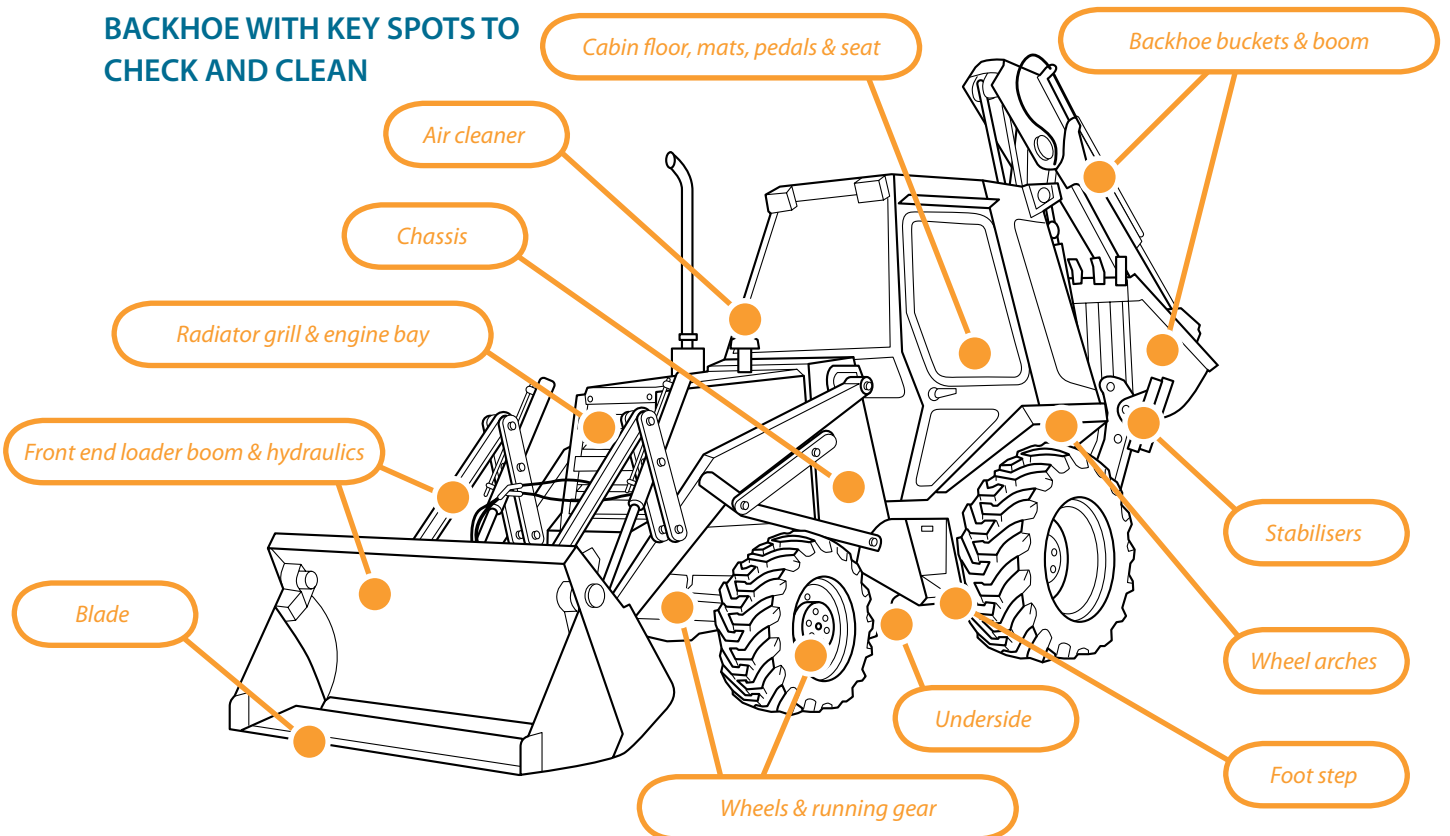
EXCAVATOR WITH KEY SPOTS TO CHECK AND CLEAN



BULLDOZER WITH KEY SPOTS TO CHECK AND CLEAN



BACKHOE WITH KEY SPOTS TO CHECK AND CLEAN



SELECTING A FIELD WASHDOWN SITE FOR VEHICLES AND MACHINERY

Vehicle/heavy machinery washdown is most effective where access can be controlled and entry points, roads or tracks are not open to general use. When selecting a washdown site, consider the following:

- Washdown should be done at the point of departure from a previous operation, preferably at a designated washdown facility with a well-drained hard surface.
- Where there are large quantities of effluent or there is a risk of extensive run-off (e.g. during road construction), the washdown area should be bunded i.e. an impervious spill area constructed.
- Washdown at the edge of (or near) any areas where pests, weeds or pathogens need to be contained. Ideally choose a site where the land slopes gently away from the washdown area and back into the potentially infected area, or into an adjacent area not susceptible to the problem (e.g. a paddock).
- Select a site where the run-off will not enter a watercourse, waterbody or roadside drain: A buffer of at least 30m is required.
- Select a mud-free site (e.g. well grassed, rocky, gravel, bark or timber corded).
- Avoid sensitive vegetation or wildlife habitat e.g. remnant native vegetation and areas with threatened species.
- Mark or record washdown sites for the land manager to enable subsequent monitoring and weed control.

GENERAL HYGIENE PROCEDURE

For general vehicle/machinery cleaning, the following standards apply.

- Elevate heavy machinery with boom arm to enable underside to be accessed. Tyres can be placed under equipment to allow underside to dry.
- Remove any guards, covers or plates that can quickly and easily be removed and replaced.
- Check the vehicle inside and out for any lodged mud, soil, seeds, algae, plant and other debris or substrate material.
- Knock off large clods of dirt with a crowbar or stiff brush.
- Clean with a high pressure hose and stiff brush or crowbar to further remove clods, starting from the top of the vehicle and working down to the bottom. Remember to clean undersides, tracks, rollers, tyres, wheel arches, guards, blades and buckets, chassis, engine bays, radiator and grill, tray, spare tyres and other attachments.
- When spraying with disinfectant solution be sure to only use the minimum amount of water needed to adequately disinfect all equipment and only add the amount of disinfectant required (see Appendix A). Before adding disinfectant to tank release any surplus water (present in tank).
- Allow the disinfectant solution to remain in contact with surfaces for at least 1 minute and wherever possible allow vehicles and equipment to drip dry.
- Avoid driving through any cleaning water/waste.

- Clean the interior (including floor, foot wells, mats, pedals, seats, under seats), air cleaners, radiator grills and engine bays with vacuum, compressed air device or brush off.

No clods of dirt or debris should be present after washdown. If smeared soil stains or soil lodged in difficult-to-access areas remain then ensure these areas have been thoroughly treated with disinfectant solution and allowed to drip dry.



After physical removal of soil and dirt a high pressure hose is used to further remove clods. Machinery has been elevated with boom arm to enable cleaning underside. Photo courtesy of Forestry Tasmania.



Removal of soil and dirt from bulldozer treads using crow bar. Photo courtesy of Forestry Tasmania.



Portable vehicle washdown unit is used to provide water with disinfectant. Note any surplus water present in the tank should be drained to limit the amount of disinfectant released into the environment. Photo courtesy of Forestry Tasmania.



After cleaning and disinfecting, bulldozer is left to dry. Maintaining elevation with tyres allows the underside to dry. Photo courtesy of Forestry Tasmania.

PORTABLE VEHICLE/MACHINERY WASHDOWN UNITS

Mobile washdown units and/or small self-assembled systems are one option. A pump and high pressure hose is the best means to remove all dirt and debris, particularly from places that are difficult to access. A shovel, crowbar and stiff brush are also needed to remove stubborn dirt. A blowdown device, compressor or portable blower can also be used along with a small brush to remove dry dirt (e.g. from air cleaner and radiators).

Refer to Appendix J for the prototype and specifications required for a mobile washdown unit.



Mobile washdown units with high pressure pump, hose and compressed air unit (for blow down of slasher decks, interior, air cleaners, radiator grills etc). Photo courtesy of NRM South/ Southern Tasmanian Councils Authority.

DESIGNATED WASHDOWN FACILITY

Purpose built wash bays are the best option for cleaning large vehicles or machinery. These washdown facilities should have a well drained hard surface and include effective effluent management systems to protect the environment. Commercial washdown facilities are available for vehicles and small trucks at most large towns. However on-site checking and cleaning of vehicles should be undertaken first, especially after working in contaminated areas (areas with known Phytophthora or Chytrid – refer to Appendices B and C).

APPENDIX D

MACHINERY AND EQUIPMENT INSPECTION RECORD SHEETS

CLEANING/INSPECTION LIST FOR UTILITY/4WD

Date:		Site:			
Vehicle:		Registration/ID:			
Area	Contamination point	Inspected	Cleaned	Method	
Engine bay	Front grill				
	Radiator and other cooling cores or fins				
	Grill or recess under wipers				
	Engine mounts				
	Top of gearbox				
	Battery recess/tray				
	Any recesses on engine or manifold				
	Air cleaner (including element)				
Cabin	Footwells				
	Carpets and mats				
	Seats				
	Tool boxes				
	Air vents				
Wheels and arches	Tyre treads				
	Rims and wheel caps				
	Wheel arches				
	Mud flaps and brackets				
	Brakes				
Tray	Body of tray (especially any recesses)				
	Mats and toolboxes				
	Around fuel tank caps				
Under carriage	Chassis rails				
	Struts and stabilisers				
	Steering components				
	Axels and differentials				
	Spare tyre and mounts				
	Guards				
	Fuel Tank				
Attachments	Bull bar				
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)					
Inspected by:		Signature:			
Cleaned by:		Signature:			

CLEANING/INSPECTION LIST FOR AN EXCAVATOR

Date:		Site:		
Vehicle:		Registration/ID:		
Area	Contamination point	Inspected	Cleaned	Method
Engine bay	Engine bay floor			
	Fan shroud and radiator cores			
	Air filters (shake/tap filters to determine if clean)			
	Glacier plate (near radiator)			
Cabin	Footwells			
	Carpets and mats			
	Seats			
	Tool boxes			
	Air vents			
Excavation body	Hollow section chassis channels			
	Channels for hydraulic hoses from driven motor			
	Counterweight void spaces			
	Removable track adjuster guards and lubrication points			
	Turret pivot area			
	Arms/booms - pivot points			
Bucket/Blade	Between teeth of adapters			
	Wear plates			
Rear blade (Stabiliser)	Wear plates			
	Hollow section arms			
	Hollow section blade			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		Signature:		
Cleaned by:		Signature:		

CLEANING/INSPECTION LIST FOR TRACK TYPE DOZERS

CLEANING/INSPECTION LIST FOR TRACK TYPE DOZERS				
Date:		Site:		
Vehicle:		Registration/ID:		
Area	Contamination point	Inspected	Cleaned	Method
Engine	Check radiator core and engine area for residues.			
	Remove and check the air filter/cleaner (these often require destruction where they are clogged with QRM).			
	Check carefully the void space between the oil and radiator cores.			
	Battery Box - Lift/remove the battery to check for contamination (battery box may be at side/rear or under seat).			
Drivers cab	Check externally under and around driver's cab.			
	Check under mats in cab.			
	Remove/lift seat; remove/lift floor pans to allow checking to top of transmission.			
	Check air conditioner filter (if fitted) – shake/tap filter to check if clean			
	Check externally under and around driver's cab.			
	Check under mats in cab.			
Body	Belly plates should be removed to allow inspection and cleaning			
	Rear plates at back of dozer should be removed to allow inspection and cleaning.			
	Hydraulic cover plates should be removed to allow inspection and cleaning.			
Tracks/track frame	Examine tracks carefully.			
	Ensure inspection/cover plates are removed to allow inside track area.			
	Check idler wheels (these support the tracks).			
Fuel cells	Are removable therefore dirt etc can pack between the tank and the frame.			
Blade	Ensure that edge of blade top/bottom is not split – this allows soil to be packed very tightly in the hollow.			
	Check cutter points/wear blades.			
	Check carefully the pivot points and adaptors at the rear of the front blade – these allow the blade to change height and angle. Sometimes soil has compacted and is difficult to dislodge.			

Area	Contamination point	Inspected	Cleaned	Method
	Check trunction arms			
	Check all hollow sections			
Ripper support frame is usually hollow	Check carefully if any contaminants have entered this section. The tynes may need to be removed.			
Tynes	Tynes need careful inspection. Contamination may often be removed by water blasting, but tynes may need to be removed in some cases.			
Ripper points	A pin holds on the ripper points. Dirt can compact under the ripper points.			
All areas	Check if any sections or channels are hollow and determine if there is a possible entry point for contamination. Check if plates are covering a compartment or space that may have collected dirt/trash.			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		Signature:		
Cleaned by:		Signature:		

