

School Infrastructure NSW

May 2023

Biodiversity Management Plan

Jindabyne Education
Campus

wsp



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Biodiversity Management Plan Jindabyne Education Campus

School Infrastructure NSW

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REV	DATE	DETAILS
A	20/10/2022	Draft for review
B	21/10/2022	Final
C	03/11/2022	Final based on additional comments provided on 3/11/2022
D	24/5/2023	Revised BMP based on approved modification 1

	Name	Date	Signature
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Reviewed by:	Selga Harrington	24/5/2023	
Approved by:	Toby Lambert	24/5/2023	

WSP acknowledges that every project we work on takes place on First Peoples lands. We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Abbreviations

BAM	Biodiversity Assessment Method
BC Act	NSW Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BMP	Biodiversity Management Plan
BOS	NSW Biodiversity Offset Scheme
CEMP	Construction Environmental Management Plan
DPE	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
EPA	NSW Environment Protection Authority
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	NSW <i>Fisheries Management Act 1994</i>
Ha	Hectares
MNES	Commonwealth Matters of National Environmental Significance
NSW	New South Wales
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
TEC	Threatened Ecological Community

1 Introduction

1.1 Purpose and objectives

This Biodiversity Management Plan (BMP) is a sub-plan of the Construction Environmental Management Plan (CEMP) for the Jindabyne Education Campus project (the Project). Construction of the Jindabyne Education Campus comprises a new primary school and a new high school at Jindabyne.

The purpose of this BMP is to describe how impacts on flora and fauna associated with the project will be managed throughout the duration of the construction of the project. Works are to be implemented in accordance with the mitigation measures and management strategies contained within this sub-plan.

The project's likely potential impacts to flora and fauna have been assessed within the Biodiversity Development Assessment Report (BDAR) (WSP 2022) and in assessment of modification 1. The BDAR and assessment of modification 1 confirmed the likely potential for impacts to flora and fauna to occur during the project's construction. However, it concluded that providing the identified mitigation and management strategies are implemented, any residual impacts related to the proposed works would not be significant. This sub-plan applies to all aspects of flora and fauna management for the project, during the construction phase of the project.

The objectives of the BMP sub-plan include:

- ensure controls and procedures are implemented during construction activities to avoid, minimise or manage potential adverse impacts to flora and fauna within and adjacent to the project
- to describe the measures to be implemented to minimise flora and fauna impacts
- ensure appropriate measures are implemented to address the relevant Conditions of Consent (CoC)
- ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 4 of this plan.

1.2 Conditions of consent

Table 1.1 outlines the conditions of consent for the project (SSD-15788005-Mod-1) under B21 that are addressed within this BMP.

Table 1.1 Conditions of Consent relevant to the Biodiversity Management Plan

CoC	Condition	Associated management procedure
CoC B21a	Be prepared by a suitably qualified and experienced person/s	This Plan, Section 1.4
CoC B21b	Identify areas of land where impacts on biodiversity are to be avoided as outlined in the Biodiversity Development Assessment Report (BDAR) prepared by WSP Australia Pty Ltd and dated July 2022 and set out how these areas will be protected from construction impacts	This Plan, Section 4.1
CoC B21c	Set out the measures identified in the BDAR to minimise, mitigate and manage impacts on biodiversity, including timing and responsibility for delivery of the measures	This Plan, Section 4.2

1.3 Site location

The site of the proposed new education campus at Jindabyne is located within the western extent of the existing Jindabyne Sport and Recreation Centre at 207 Barry Way (101 DP1019527). The site is located within the Snowy Monaro Regional local government area and is approximately 2.2 km south of the Jindabyne town centre.

The majority of the site is undeveloped and contains maintained grasslands and scattered trees. Much of the surrounding land comprises remnant grassland, woodland and agricultural land.

1.4 Biodiversity Management Plan preparation

This Biodiversity Management Plan has been prepared based on the Biodiversity Development Assessment Report (WSP 2022) by personnel as outlined in Table 1.2.

Table 1.2 Personnel

Name	Role	Qualifications
Toby Lambert	Technical Executive, Ecology Team Leader – technical review	Bachelor of Environmental Science Accredited BAM Assessor
Selga Harrington	Regional Team Manager, Ecology South – report preparation including technical review.	Bachelor of Science (Hons) Accredited BAM Assessor
Lucy Gill	Graduate Ecologist – report preparation	Bachelor of Environmental Science and Management (Hons)

2 Environmental requirements

2.1 Legislation

Legislation relevant to flora and fauna management includes:

- Environment Protection and Biodiversity Conservation Act 1999
- NSW Environmental Planning and Assessment Act 1979
- National Parks and Wildlife Act 1974
- Biodiversity Conservation Act 2016
- Biosecurity Act 2015
- Pesticides Act 1999.

Relevant provisions of the above legislation that applies to ecological management and conservation are detailed in Table 2.1.

Table 2.1 Principal legislation and regulation

Legislation and regulation	Relevance
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Under the EPBC Act, a person must not take an action that has, or will have, or is likely to have a significant impact on any matter of national environmental significance (MNES) without approval from the Federal Minister.
<i>NSW Environmental Planning and Assessment Act 1979</i>	Provides for project environmental assessment and approval.
<i>National Parks and Wildlife Act 1974</i>	The Act and regulation provision for the protection and conservation of habitat, ecosystems, ecosystem processes, and biological diversity.
<i>Biodiversity Conservation Act 2016</i>	This Act provides framework to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity. Under this Act, it is an offence to: <ul style="list-style-type: none"> — damage habitat of threatened species or ecological community — picking a plant that is a threatened or protected species, or part of a threatened ecological community — harm animals that is a threatened or protected species, or part of a threatened ecological community.
<i>Biosecurity Act 2015</i>	The Act and regulation provision to establish biosecurity zones within Australia to monitor, control and respond to pests and diseases.

Legislation and regulation	Relevance
<i>Pesticides Act 1999</i>	<p>This Act promotes the protection of human health, environment, property and trade in relation to the use of pesticides. It is an offence under the Act to:</p> <ul style="list-style-type: none"> — use a pesticide that harms or damages a person or property, a non-target animal or plant — use a pesticide that harms a threatened species or protected animal — possess or use an unregistered pesticide without a permit, or contrary to the approved label — fail to comply with the label or permit while using a pesticide — keep a registered pesticide in a container without a label — possess or use a restricted pesticide without authorisation — EPA may make pesticide control orders which prohibit use or possession of restricted pesticides. <p>Removal and treatment of weeds within the project site must be in accordance with this act.</p>

2.2 Guidelines and standards

Table 2.2 lists the non-statutory guidelines, standards and recovery plans that are relevant to this plan.

Table 2.2 Guidelines and standards

Guidelines and standards
Codes of Practice
NSW Department of Planning, Industry and Environment. 2018. Code of Practice for injured, sick and orphaned macropods.
NSW Department of Planning, Industry and Environment. 2021. Code of Practice for injured, sick and orphaned possums and gliders.
Office of Environment & Heritage (OEH). 2011. Code of Practice for injured, sick and orphaned protected fauna.
Disease
NSW Government, Department of Planning, Industry and Environment. Saving our Species (SoS). 2020. Hygiene guidelines – protocols to protect priority biodiversity areas in NSW from <i>Phytophthora cinnamomi</i> , myrtle rust, amphibian chytrid fungus and invasive plants.
Relevant recovery plans, priority action statements and best practice guidelines
BirdLife Australia. 2020. Temperate Woodland Bird Conservation Action Plan.
Department of Agriculture and Water Resources. 2017. Australian Pest Animal and Weed Strategy 2017–2027.
Department of Agriculture, Water and the Environment. 2021. Conservation advice for <i>Leucochrysum albicans subsp. Tricolor</i> (Hoary Sunray).
Department of Climate Change, Energy, the Environment and Water. 2007. Introducing the NSW threatened species priorities action statement (PAS), DECC NSW.
Department of Climate Change, Energy, the Environment and Water. 2008. Approved Conservation Advice for <i>Calotis glandulosa</i> (Mauve Burr-daisy).

Guidelines and standards

Department of Environment, Climate Change and Water. 2010. National recovery plan for *Prasophyllum petilum*. DECCW (NSW), Hurstville.

Invasive Plants and Animals Committee. 2016. Australian Weeds Strategy 2017 to 2027, Australian Government Department of Agriculture and Water Resources, Canberra.

National Parks and Wildlife Service. 2003. Management of native birds that show aggression to people.

Sinclair, S.J. 2010. National Recovery Plan for the Hoary Sunray *Leucochrysum albicans* var. *tricolor*. Department of Sustainability and Environment, Melbourne.

3 Existing environment

The following section is a summary of that described in detail in the BDAR (WSP 2022).

3.1 Site description

The site of the proposed new education campus at Jindabyne is located within the western extent of the existing Jindabyne Sports and Recreation Centre at 207 Barry Way (101 DP1019527). The site is located within the Snowy Monaro Regional local government area and is approximately 2.2km south of the Jindabyne town centre. The majority of the site is undeveloped and contains maintained grasslands and scattered trees. Much of the surrounding land comprises remnant grassland, woodland and agricultural land.

3.2 Vegetation and threatened ecological communities

Only one Plant Community Type (PCT) occurs in in the subject land, Snow Gum – Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion (PCT 1191).

This PCT is part of the Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion as listed as Critically Endangered under the BC Act. This Threatened Ecological Community (TEC) is identified as a threatened entity at risk of a Serious and Irreversible Impact (SAII).

Trees may be absent from this TEC as a consequence of tree removal under pastoral management and grazing by domestic stock. As such, areas of derived native grassland corresponding to PCT 1191 within the subject land are considered to be part of this TEC.

There were also areas of non-native vegetation that were classed as Miscellaneous ecosystems (exotic trees/shrubs). A list of exotic species and weeds recorded on site is provided in Table 3.3 in Section 3.4.

3.3 Threatened and migratory species

3.3.1 Flora

Table 3.1 outlines the threatened plant species have potential habitat on site (PCT1191) and may be present:

Table 3.1 Threatened flora species

Scientific name	Common name	BC Act status	EPBC Act status
<i>Calotis glandulosa</i>	Mauve Burr-daisy	Vulnerable	Vulnerable
<i>Leucochrysum albicans var. tricolor</i>	Hoary Sunray	–	Endangered
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	Endangered	Endangered
<i>Swainsona sericea</i>	Silky Swainson-pea	Vulnerable	–
<i>Thesium australe</i>	Austral Toadflax	Vulnerable	Vulnerable

3.3.2 Fauna

No threatened fauna species were detected on site, however the site contains a number of hollow-bearing trees which provide important habitat for fauna including threatened species. Threatened species that may use these hollows and migratory species that may occur on site are outlined in Table 3.2.

The project area does not contain any large stick nests that would be appropriate for use by raptor species. However, there is a Little Eagle nest located outside the project area, approximately 220 metres to the north-west.

There are no threatened fauna species SAI entities that would be affected by the project.

Table 3.2 Threatened fauna and migratory species

Common name	Scientific name	BC Act status	EPBC Act status	Likelihood
Migratory Marine Birds				
Fork-tailed Swift	<i>Apus pacificus</i>	–	Marine, Migratory	Moderate
Migratory Terrestrial Species				
White-throated Needletail	<i>Hirundapus caudacutus</i>	–	Vulnerable, Migratory	Moderate
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	–	Migratory	High
Birds				
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	Vulnerable	Endangered	Moderate. Potential habitat available on site
Mammals				
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	Vulnerable	–	Moderate. Potential habitat available on site

3.4 Exotic species and weeds

Exotic species and High Threat Weeds were present within the project area. A total of 24 introduced species of plant were recorded within the project area, including 5 species of High Threat Weeds (Table 3.3).

Table 3.3 Exotic and weed species recorded within project area

Status	Scientific name	Common name	Biosecurity duty
High Threat Weeds	<i>Bromus diandrus</i>	Great Brome	General Biosecurity Duty – prevent, eliminate or minimise spread
	<i>Crataegus monogyna</i>	Hawthorn	General Biosecurity Duty – prevent, eliminate or minimise spread
	<i>Rumex acetosella</i>	Sheep Sorrel	General Biosecurity Duty – prevent, eliminate or minimise spread
	<i>Hypericum perforatum</i>	St Johns Wart	General Biosecurity Duty – prevent, eliminate or minimise growth Regional Recommended Measure – land managers should mitigate spread, plant should not be bought, sold, grown or released into the environment

Status	Scientific name	Common name	Biosecurity duty
	<i>Pyracantha</i> sp.	Firethorn	General Biosecurity Duty – prevent, eliminate or minimise spread
Exotic species	<i>Bromus hordeaceus</i>	Soft Brome	Due diligence – prevent spread where possible
	<i>Petrorhagia nanteuilii</i>	–	Due diligence – prevent spread where possible
	<i>Echium plantagineum</i>	Paterson’s Curse	General Biosecurity Duty – prevent, eliminate or minimise spread
	<i>Avena barbata</i>	Bearded Oats	Due diligence – prevent spread where possible
	<i>Arenaria leptoclados</i>	Lesser Thyme-leaved Sandwort	Due diligence – prevent spread where possible
	<i>Verbascum thapsus</i>	Great Mullein	Due diligence – prevent spread where possible
	<i>Hirschfeldia incana</i>	Shortpod Mustard	Due diligence – prevent spread where possible
	<i>Trifolium arvense</i>	Haresfoot Clover	Due diligence – prevent spread where possible
	<i>Vulpia myuros</i>	Rat’s Tail Fescue	Due diligence – prevent spread where possible
	<i>Taraxacum officinale</i>	Common Dandelion	Due diligence – prevent spread where possible
	<i>Hordeum leporinum</i>	Wall Barley	Due diligence – prevent spread where possible
	<i>Hypochaeris radicata</i>	Flatweed	Due diligence – prevent spread where possible
	<i>Cirsium vulgare</i>	Spear Thistle	General Biosecurity Duty – prevent, eliminate or minimise spread
	<i>Erodium cicutarium</i>	Common Stork’s-bill	Due diligence – prevent spread where possible
	<i>Plantago lanceolata</i>	Ribwort Plantain	Due diligence – prevent spread where possible
	<i>Potentilla recta</i>	Sulphur Cinquefoil	Due diligence – prevent spread where possible
	<i>Lolium perenne</i>	Perennial Ryegrass	Due diligence – prevent spread where possible
	<i>Salvia coccinea</i>	Scarlet Sage	Due diligence – prevent spread where possible
<i>Marrubium vulgare</i>	Horehound	General Biosecurity Duty – prevent, eliminate or minimise spread	

3.5 Impacts and offsets

Direct impacts on biodiversity identified for the project include:

- clearing of native vegetation, consistent with Critically Endangered Ecological Community (Table 3.4)
- clearing of fauna habitat and areas connecting threatened species habitat, such as movement corridors
- impacts to fauna from vehicle strikes.

Table 3.4 Impacts to threatened ecological community

Threatened ecological community	Area (ha) in development site
Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion	2.2 ha total consisting of: <ul style="list-style-type: none">— 0.75 ha of woodland— 1.46 ha of derived grassland.

In addition to the direct impacts of the project, a number of indirect impacts were identified including:

- reduced viability of adjacent habitat due to edge effects
- reduced viability of adjacent habitat due to noise, dust or light spill
- transport of weeds and pathogens from the site to adjacent vegetation
- loss of breeding habitat provided by hollow bearing trees
- trampling of threatened flora species
- rubbish dumping
- wood collection
- removal and disturbance of rocks, including bush rock.

4 Mitigation measures

4.1 Avoidance

The Biodiversity Development Assessment Report (BDAR) assessed the impacts to biodiversity and provided credit calculation to offset the project. An application for payment into the Biodiversity Conservation Fund was submitted to fulfil the offset obligation for the project.

Clearing of native vegetation must not occur outside the area assessed for clearing in the BDAR and modification 1 as shown in Figure 4.1. Native vegetation clearing must be less than 2.2 ha total and consisting of:

- less than 0.75 ha of woodland
- less than 1.46 ha of native derived grassland.

The land where impacts on biodiversity are to be avoided are shown in Figure 4.1. Temporary construction fencing is required around these areas to protect biodiversity during construction.

4.2 Mitigation measures

The environmental management approach has been developed to be consistent with the regulatory requirements for management of biodiversity impacts, identified as likely to be encountered during the construction and operational phases of the project. Specific measures and requirements to address impacts on flora and fauna are outlined in Table 4.1.

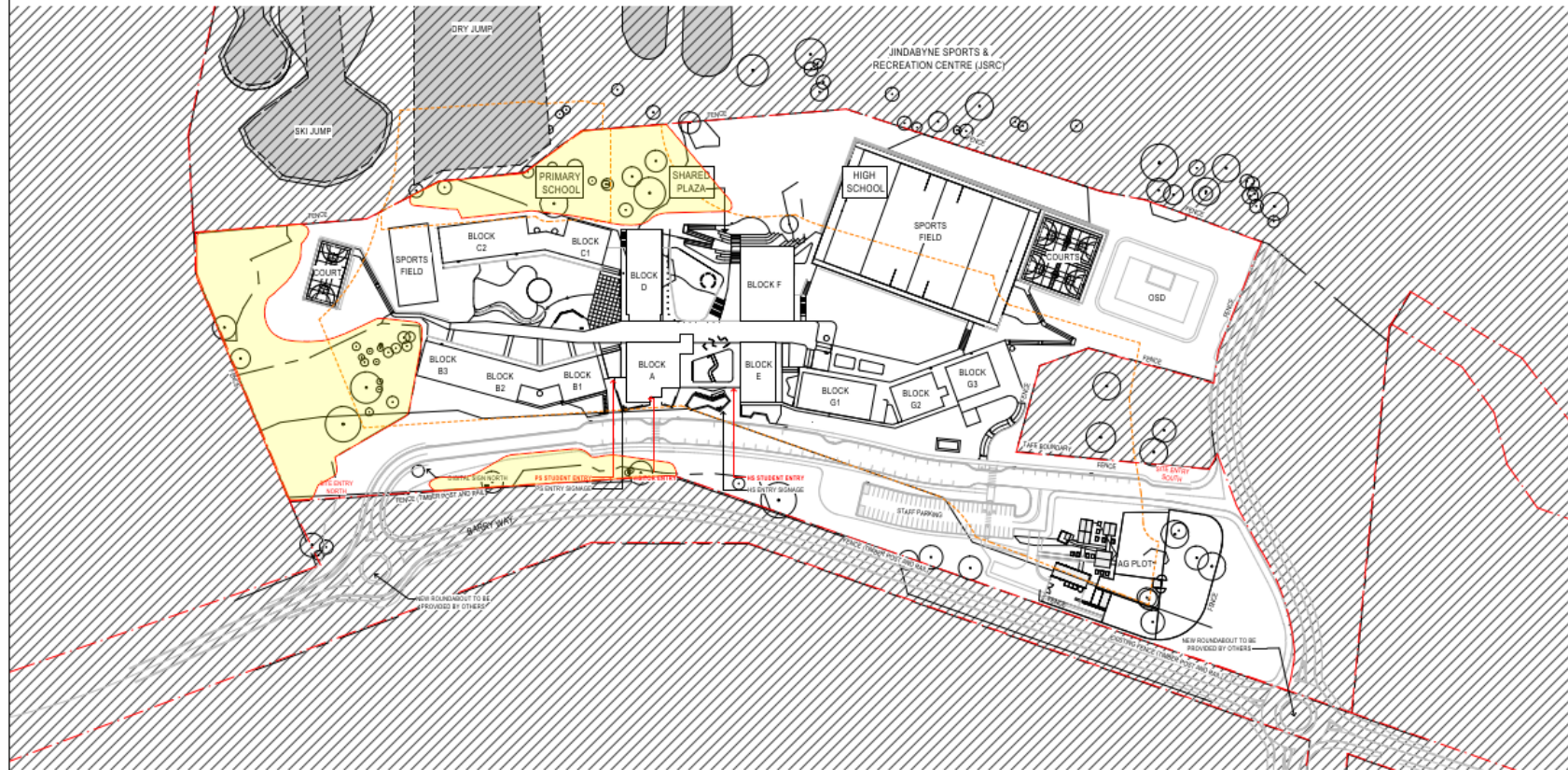
Table 4.1 Mitigation and management measures

Mitigation measure (action)	Timing	Responsibility	Source of requirement
<p>Nest boxes will be provided to minimise habitat loss to hollow-bearing fauna (and species that may be living in the buildings) in accordance the following requirements:</p> <ul style="list-style-type: none"> — hollow-bearing trees will be marked/tagged and mapped in a pre-clearing survey. — the size, type, number and location of nest boxes required will be based on the results of the pre-clearing survey. <p>Twenty-seven hollow-bearing trees were identified within the modified development footprint. A minimum of seventy per cent of nest boxes will be installed prior to any hollow-bearing vegetation removal, with all nest boxes to be installed within six months from the date of the commencement of clearing.</p>	Pre-construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B7) This Plan
<p>Biodiversity exclusion zones (temporary fencing) for retained vegetation (Figure 4.1), will be clearly identified on the ground by a suitably qualified ecologist prior to the commencement of construction. Fencing will remain in place for the duration of the project, and only removed upon completion of the project.</p>	Pre-construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B7 and 8)
<p>Construction workforce will be supplied with sensitive area maps (showing clearing boundaries and exclusion zones) including updates as required (Figure 4.1).</p>	Construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B7 and B9)

Mitigation measure (action)	Timing	Responsibility	Source of requirement
<p>All employees and contractors working on site will undergo site induction training relating to flora and fauna management issues. The induction training will address elements related to flora and fauna management including:</p> <ul style="list-style-type: none"> — existence and requirements of this sub-plan — relevant legislation — flora and fauna mitigation and management measures — procedure to be implemented in the event of an incident. 	Construction	Site Environmental Officer	CoC B21c (BDAR reference B9)
Clearing of native vegetation will be monitored against the approved clearing (see Section 5.3).	Construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B10)
The threatened species unexpected finds protocol (Appendix B) will be implemented if threatened flora and fauna species, not assessed in the biodiversity assessment, are identified in the disturbance area.	Construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B12) Appendix B
Relocate habitat features (e.g., fallen timber, hollow logs) from the development footprint to adjacent retained vegetation where practicable.	Construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B13) This Plan
<p>Implement hygiene protocols including:</p> <ul style="list-style-type: none"> — vehicles and other equipment to be used during clearing phases in the construction zone and general construction equipment (such as excavators, graders etc.) are to be visibly free of soil, seeds and plant material before entering the site to prevent the introduction of weeds and pathogens. — weed and pathogen management (provided in Appendix C) to control spread of weeds or pathogens. 	Construction	All site staff Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B14) Appendix C Arrive Clean, Leave Clean Guidelines (Department of Environment 2015; provided in Appendix D)
Prepare a vegetation management plan to regulate activity in vegetation and habitats adjacent to the school. The plan may include controls on rubbish disposal, wood collection, rock collection, fire management, and disturbance to nests and other niche habitats.	Operation	School Infrastructure NSW Grounds keeper / Maintenance contractor	CoC B21c (BDAR reference B15) This Plan
Provide for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation and habitat on, or adjacent to, the development to industry best practice and standards.	Operation	School Infrastructure NSW Grounds keeper / Maintenance contractor	CoC B21c (BDAR reference B16)

Notes: BDAR mitigation measure B11, which requires timing of works to avoid critical life cycle events (i.e. breeding and nursing) of threatened species, has been removed from this list of mitigation measures due to the absence of threatened species on site. In the instance of an unexpected find, this condition would be reconsidered. BDAR mitigation measures 1-4 apply to design phase and have not been included as part of the construction sub-plan.

BIODIVERSITY EXCLUSION ZONE - SENSITIVE AREA MAP



**DO NOT ENTER EXCLUSION ZONES
REPORT ANY ACTIVITY WITHIN THESE AREAS TO HY STAFF IMMEDIATELY**

Figure 4.1 Biodiversity exclusion zone sensitive area map

5 Compliance and monitoring

5.1 Roles and responsibilities

The organisational structure and overall roles and responsibilities will be outlined within the CEMP. Specific responsibilities for the implementation of biodiversity controls are outlined in Section 4 of this plan.

5.2 Training

All employees and contractors working on site will undergo site induction training relating to flora and fauna management. The induction training will address the following aspects of flora and fauna management:

- existence and requirements of this sub-plan
- relevant legislation and guidelines, as stated in Section 2 of this plan (Table 2.1 and Table 2.2)
- flora and fauna mitigation measures, as stated in Section 4 of this plan (Table 4.1)
- procedure to be implemented in the event of an accident.

Provision and development of training is the responsibility of the site environment officer. Further details regarding staff induction and training will be outlined in the CEMP.

5.3 Inspections and monitoring

Regular monitoring for flora and fauna will assess the effectiveness of mitigation measures implemented for the flora and fauna present (or potentially present) on site. Inspections and monitoring will include daily (informal) visual inspections, documented weekly inspections by site environment officer to ensure mitigation measures and environmental controls are working effectively.

Inspections of biodiversity aspects will occur during the construction phase of the project and include:

- site environmental fencing
- vegetation clearance extents
- weed monitoring
- erosion and sediment controls.

A biodiversity inspection checklist is provided in Appendix E. The details of additional environmental monitoring protocols and procedures will be outlined within the CEMP.

5.4 Non-conformances

Any non-conformances (i.e. not meeting nominated environmental objectives or targets, not complying with environmental legislation or other requirements) will have corrective and/or preventative actions identified and implemented.

6 Review and improvement

6.1 Continual improvement

Continual improvement of this plan will be achieved by the ongoing evaluation of environment management performance against the proposed mitigation and management strategies, environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continual improvement process will be designed to:

- identify areas of opportunity for improvement of environmental management and performance
 - determine the cause or causes of non-conformances and deficiencies
 - develop and implement a plan of corrective and preventative action to address non-conformances and deficiencies
 - verify the effectiveness of the corrective and preventative actions
 - document any changes in procedures resulting from process improvement
 - make comparisons with objectives and targets.
-

6.2 Plan update

Pending the processes described in the CEMP, this may result in the need to update or revise this sub-plan. This will occur as needed.

Only the site environmental representative, or delegate, has the authority to change any of the environmental management documentation. In terms of approval of updates or amendments to this sub-plan, this is to be carried out by the environmental representative who will verify that the amendments are consistent with the project approval.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure, which will be outlined within the CEMP.

7 Limitations

This Report is provided by WSP Australia Pty Limited (*WSP*) for School Infrastructure NSW (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 18 March 2021 and agreement with the Client dated 7 October 2022 (*Agreement*).

7.1 Permitted purpose

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (*Permitted Purpose*).

7.2 Qualifications and assumptions

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (*Conclusions*) are based in whole or in part on information provided by the Client and other parties identified in the report (*Information*), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

7.3 Use and reliance

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Appendix A

Clearing protocols



A1 Clearing protocols

To prevent injury and mortality of fauna during the clearing of vegetation, an experienced and licensed wildlife carer and/or ecologist will be present to capture and relocate fauna where required. The Vegetation clearing protocol as outlined below will be followed.

A1.1 Mark hollow-bearing trees

Clearly mark all trees containing hollows which are to be removed based on hollow bearing tree survey and mapping.

Signage and flagging will be erected around the trees until they are deemed as 'cleared' by a qualified ecologist and can be removed.

A1.2 Clearing

A chainsaw is preferable to heavy machinery to remove native vegetation in any areas where there would only be partial clearing. Clearing will be undertaken using the 'two stage process', specifically:

Stage 1 – Non habitat tree removal

When vegetation, that may provide habitat for native fauna, is proposed to be removed the area will be surveyed immediately (proceeding night & day of clearing) prior to clearing, to:

- obtain updated information on fauna and fauna habitat resources present; and
- capture and relocate non-mobile fauna, such as reptiles and frogs and key habitat features such as active bird nests or scare animals away.

Following clearing, re-check after clearing to ensure no animals have become trapped or injured during clearing operations.

Stage 2 – Habitat tree removal

Any habitat trees (hollow –bearing or with nests) proposed to be felled will be 'bumped and shaken' and remain for up to 24–48 hours or as per Ecologist(s) recommendations as to allow any potential fauna time to relocate from the tree.

When removing hollow-bearing trees:

- an ecologist/wildlife handler (spotter) should be present at each tree to be removed to look for signs of animal movement in the tree to be cleared. The spotter should be able to communicate directly with plant operators
- the operator will be skilled in removing habitat trees and the two-stage clearing procedure. The ecologist will discuss the method of felling (i.e. orientation, equipment etc.) with the operator to ensure animal welfare is considered
- prior to clearing hollow-bearing trees, an excavator or loader is to hit the trunk as high up the tree as possible several times. Wait at least 30 seconds. Repeat this process several times
- where possible, habitat trees are to be knocked with an excavator bucket or other machinery used for clearing to create only enough disturbance to encourage any remaining fauna to move from the tree, or at least show themselves prior to felling. Excessive knocking of the tree must not take place
- the tree is to be left for several minutes before being felled as gently as possible
- once the hollow-bearing limb or hollow-bearing tree is on the ground, it will be inspected carefully by an ecologist and fauna would be captured, processed and, if healthy, relocated. before the next limb/tree is removed
- if taking the tree down in stages, remove non-hollow-bearing limbs first. Then remove hollow-bearing limbs.
- injured fauna will be taken to a local vet for treatment or WIRES or similarly-qualified and licensed personnel will be contacted to collect and treat any injured individuals.

Handling wildlife:

- direct contact with any wildlife should be avoided wherever possible
- fauna mortality as well as rescued and relocated fauna will be recorded
- if the animal is not injured or stressed, it may be released nearby in an area that is not to be disturbed by the Project construction, in accordance with the following:
 - sites identified as suitable release points by the Project Ecologist or WIRES rescuer
 - release will be into similar habitat as close to the original area as possible
 - if the species is nocturnal, release will be carried out at dusk; and
 - release would generally not be undertaken during periods of heavy rainfall.

Appendix B

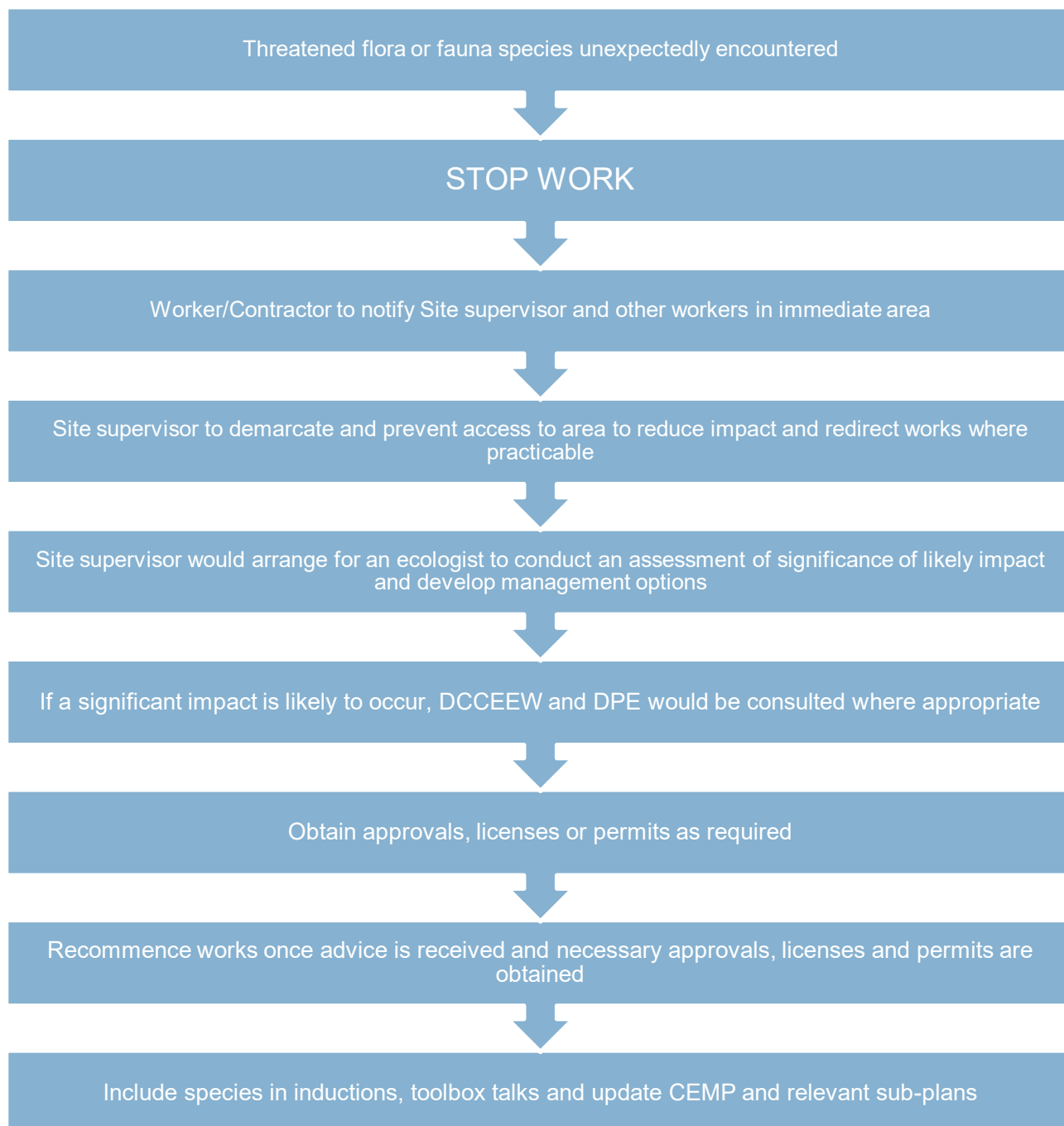
Unexpected Threatened Species Find
protocols



B1 Unexpected Threatened Species Find protocols

In the event an unexpected threatened species is encountered during site works, the protocol outlined below must be followed.

B1.1 Protocol



B1.2 Reporting

A record of the unexpected finds should be maintained by the contractor and should include the following details:

- date, time and location of unexpected find
- details regarding assessment by the Environment Manager, site supervisor (and advice from suitably qualified ecologist or specialist)
- actions undertaken before work recommenced.

Appendix C

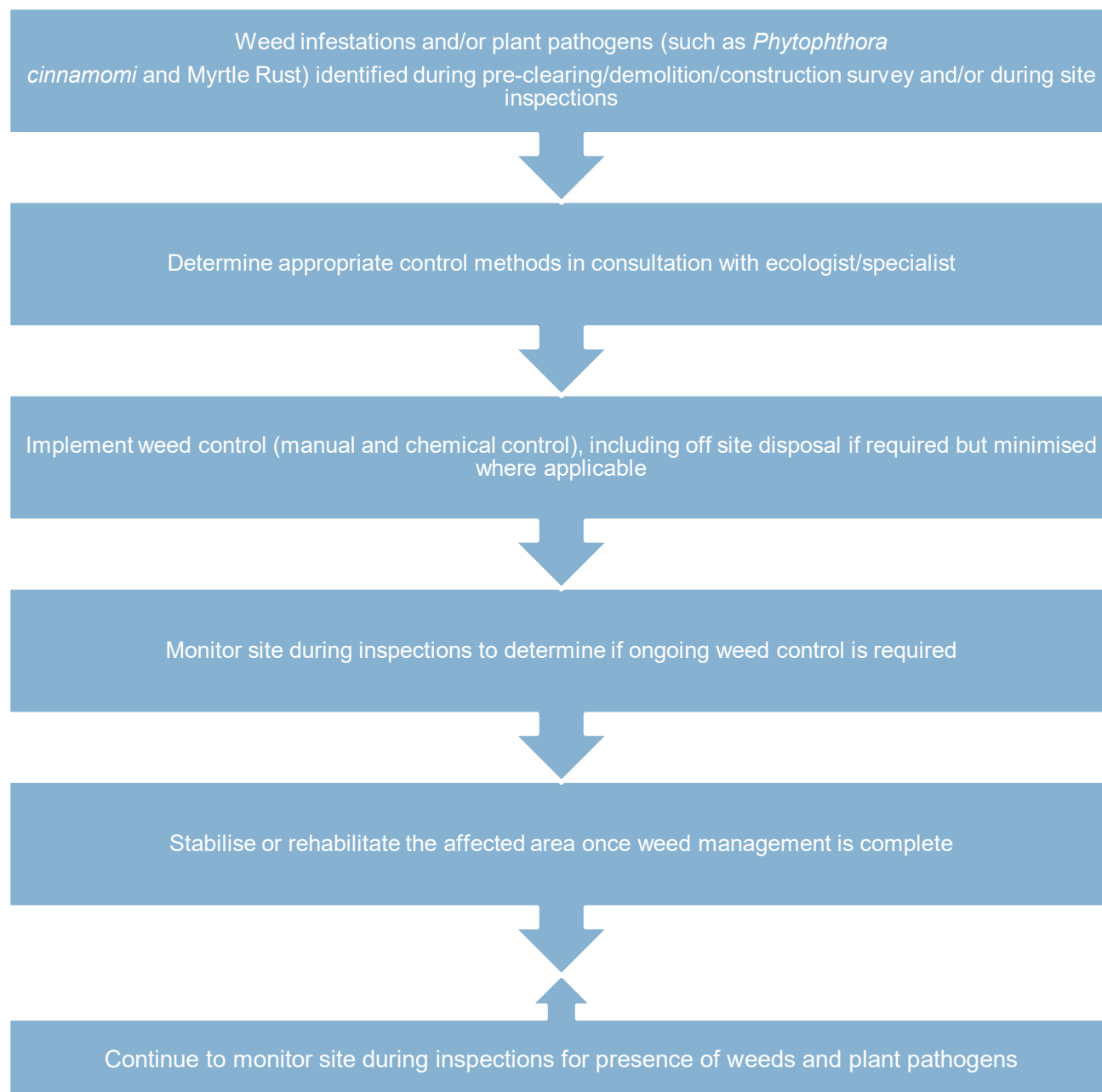
Hygiene protocols for management of weeds
and pathogens



C1 Hygiene protocols

This protocol describes the weed and pathogen management and control strategies to be implemented during site works.

C1.1 Protocol



C1.2 Weed and pathogen control methodology

Weeds within the site would be controlled according to control plans and measures recommended in the *NSW Weed Control Handbook* (DPI 2018). If weeds or pathogens are introduced to the site by the project, the aim would be eradication from the site.

C1.2.1 Manual control

- Weeds requiring hand or mechanical removal, including contaminated topsoil, would require disposal by encapsulation (deep burying) or to an approved waste management facility.
- Carry out mechanical means of control (such as mowing or slashing) where feasible in proximity to waterways and aquatic environments.
- Machinery involved in weed management activities require deep cleaning to remove any plant material or soil, prior to commencement of construction.

C1.2.2 Chemical (pesticide) control

- Only pesticides registered for use near water may be used near waterways and aquatic environments.
- Avoid applying pesticides:
 - on hot days when plants are stressed
 - after the seed has set
 - within 24 hours of rain or when rain is imminent
 - when winds will cause drift of pesticides into non-target areas.
- Keep a record of pesticide application. This must be maintained by the contractor and must include the following:
 - who applied the pesticide
 - date of pesticide application
 - details of pesticide used (full product names)
 - where the pesticide was applied (to what weed and in what location)
 - amount of pesticide used (total amount use, rate of application, area covered)
 - weather conditions during pesticide application.

C1.2.3 Minimising spread of weeds and pathogens

The following three steps should be followed to reduce spread of weeds and/or pathogens

1 Check

- Check personnel, clothing, footwear, backpacks and equipment for soil, plant material and other debris.
- Check exterior and interior of vehicles and machinery for soil, plant material and other debris.

2 Clean

- Remove all soil, plant material and other debris using a brush and clean water.
- If dirty, wash hands with soap and water.
- Remove seeds from clothing, footwear, tools and equipment by hand. Seeds that are difficult to remove can sometimes be scraped off clothing with a sharp tool but use caution. Where possible, have a co-worker double-check that you have removed all seeds.
- Remove all soil, plant material and other debris from the interior of vehicle and machinery using vacuum or dustpan and brush. Place debris in a bag and dispose of at an offsite licensed facility.
- If Myrtle Rust is detected on site, disinfect equipment and exterior of vehicles with disinfectant.

3 Dry

- Where practical, ensure hands, clothing, footwear, vehicles, machinery and equipment are dry before proceeding.

C1.2.4 Disposal of weeds

- All weed plant material and topsoil containing weed plant material should be disposed of at an offsite licensed facility.
- Securely cover loads of weed-contaminated material to prevent weed plant material falling or blowing off vehicles between site and disposal location.

Appendix D

Arrive clean, leave clean guidelines





Australian Government
Department of the Environment

Arrive Clean, Leave Clean

Guidelines to help prevent the spread of invasive plant diseases and weeds threatening our native plants, animals and ecosystems



The Department acknowledges the traditional owners of country throughout Australia and their continuing connection to land, sea and community. We pay our respects to them and their cultures and to their elders both past and present.

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Images

(front cover) John Baker and the Department of the Environment

(back cover) Nick Rains

Arrive Clean, Leave Clean

Help prevent the spread of invasive plant diseases and weeds threatening our native plants, animals and ecosystems

When working in the bush, it's important to remember:

- Any activity in the bush has the potential to spread invasive species, including environmental restoration activities such as weeding and revegetation.
- Revegetation carries a particularly high risk as it involves the introduction of plants and soil. This risk increases through the use of dirty tools and equipment or plants and materials that are not certified to be free of pathogens and weeds.
- Clothing, hats, footwear, tools, equipment, machinery and vehicles can transport invasive species like *Phytophthora cinnamomi*, myrtle rust (*Puccinia psidii*), insects and weeds into our bushland.
- Even your skin and hair, as well as glasses, phones, watches, wallets and other pocket items can carry myrtle rust spores.
- Once these pathogens and weeds invade our bushland, eradication is often impossible. Follow these guidelines to help prevent their spread.



Photos: (left) Wildflowers on Mondurup Peak, Stirling Range before *Phytophthora dieback* (Robert Olver), (right) Mondurup Peak, Stirling Range after *Phytophthora dieback* (Department of Parks and Wildlife WA)

Phytophthora cinnamomi

What is *Phytophthora cinnamomi*?

Phytophthora cinnamomi is a soil-borne plant pathogen that attacks the roots of susceptible plants—destroying the root system and reducing the ability of the plant to absorb water and nutrients. This causes symptoms referred to as ‘dieback’ which can lead to plant death.

Under favourable conditions *Phytophthora* spp. can spread easily and quickly, destroying plants and plant communities. These guidelines to help minimise the risk of spreading *Phytophthora cinnamomi* also apply to other species of *Phytophthora* present in Australia, as the management of those species is similar.



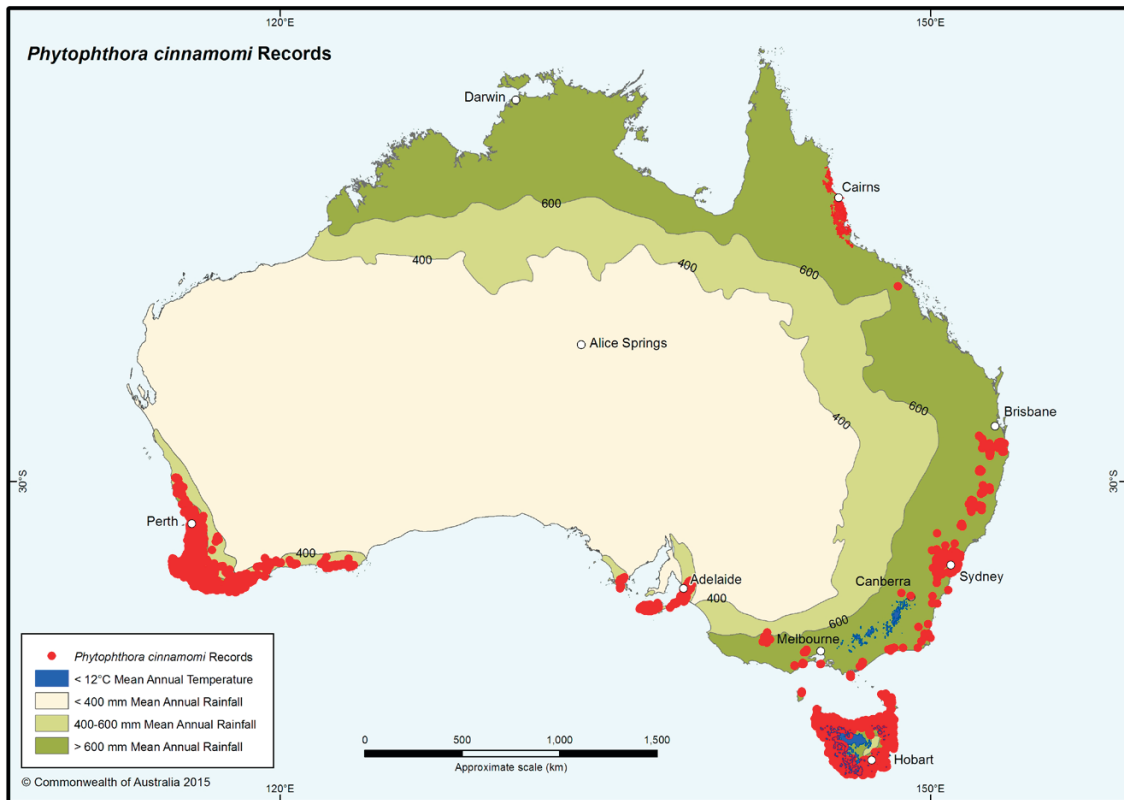
Photo: Impact of *Phytophthora cinnamomi* at Dwellingup, WA (Department of Parks and Wildlife WA)

What does *Phytophthora cinnamomi* threaten?

Thousands of Australian native plant species are susceptible to *Phytophthora cinnamomi*, and several of those species may be at risk of extinction due to its impacts. The dramatic impact of *Phytophthora* spp. infestations on plant communities may also lead to major declines in some insect, bird and animal species due to the loss of shelter, nesting sites and food sources.

Where is *Phytophthora cinnamomi* found?

Phytophthora cinnamomi thrives in warm, moist conditions with temperatures between 15°C and 30°C, and with rainfall greater than 400 millimetres a year. Its impact is greatest in Western Australia, Victoria, Tasmania and South Australia. The Northern Territory remains the only jurisdiction unaffected, as its environmental conditions are generally unfavourable to the pathogen.



Map: *P. cinnamomi* isolations, records of impact and broad climatic envelope of *P. cinnamomi* susceptibility in Australia.

This map was published in the *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi* in 2014. It does not represent the precise distribution of the pathogen in Australia and is for general information only.

How does *Phytophthora cinnamomi* spread?

Phytophthora cinnamomi spreads through soil, water and organic matter. It can remain dormant for long periods during dry weather and is impossible in most situations to eradicate from infested areas, which means limiting further spread is critical. Any activity that moves soil, water or plant material can spread the disease. This includes soil on tools, footwear and vehicles.

To help to prevent the spread of this plant disease:

- arrive clean, leave clean: ensure all clothing, hats, footwear, tools, equipment, machinery and vehicles are free of mud, soil and organic matter before entering and exiting bushland
- ensure any soil, plants or other materials entering the site are certified free of weeds and pathogens. You can do this by purchasing from Nursery Industry Accreditation Scheme Australia (NIASA) accredited businesses, and by ensuring that materials conform to Australian Standards—for example, *AS3743–2003 Potting mixes* or *AS4454–2012 Composts, soil conditioners and mulches*.

Myrtle rust

What is myrtle rust?

Myrtle rust is a disease caused by the fungus *Puccinia psidii*, initially identified as *Uredo rangelii*. It affects trees and shrubs in the Myrtaceae plant family—attacking young, soft, actively-growing leaves, shoot tips and young stems, as well as fruits and flower parts.

The first signs of rust infection are tiny raised spots or pustules on infected leaves. After a few days, the pustules erupt into distinctive bright yellow spore masses. Left untreated, the disease can cause deformed leaves, heavy defoliation of branches, dieback, stunted growth and plant death.

What does myrtle rust threaten?

Plants susceptible to myrtle rust are those in the Myrtaceae family, which includes bottle brush (*Callistemon* spp.), tea tree (*Melaleuca* spp. and *Leptospermum* spp.), lilly pillies (*Syzygium* spp.) and eucalypts (*Eucalyptus* spp., *Angophora* spp. and *Corymbia* spp.). The Myrtaceae family in Australia is ecologically important, accounting for about 10% of Australia's native flora, with many Australian plant communities dominated by myrtaceous species.

Knowledge of the impacts of myrtle rust on Australian biodiversity is still limited. Myrtle rust infection may cause significant mortality among younger plants and therefore reduce the number of plants capable of maturing and reproducing. This may contribute to the decline of species, including threatened species, leading to potential impacts on the structure and function of ecosystems dependent on Myrtaceae. At the time of writing, nearly 350 native species are known to be susceptible to myrtle rust infection, some severely. The host list (see **References and resources** below) is expected to grow. However, all Myrtaceae are potentially susceptible and potential hosts for the disease.



Photo: Myrtle rust pustules on scrub turpentine (*Rhodamnia rubescens*) fruit (R.O. Makinson)



Photo: Myrtle rust pustules on scrub turpentine (*Rhodamnia rubescens*) leaves (R.O. Makinson)

Where is myrtle rust found?

Myrtle rust was first detected in Australia in 2010 on the New South Wales central coast. It is now established along the east coast of Australia from southern New South Wales to far north Queensland, mostly east of the Great Escarpment. It is also present in Victoria, mainly at production nurseries and wholesale outlets in and around metropolitan Melbourne. The first detection of myrtle rust in Tasmania was in February 2015 at a property near Burnie on the north-west coast. At the time of writing, myrtle rust has not been detected in the Australian Capital Territory, the Northern Territory, South Australia, Western Australia or on Lord Howe Island or Christmas Island, but moister regions and vegetation types in all these jurisdictions are at risk of myrtle rust establishment. Domestic import restrictions apply for non-infested jurisdictions.

How does myrtle rust spread?

Myrtle rust spores can spread easily via contaminated clothing, hats, footwear, equipment or vehicles. It can also be spread by infected plant material, insects and other animals, or the wind. Even your skin and hair, as well as watches, wallets and other pocket items can carry myrtle rust spores. It is impossible to eradicate myrtle rust from infested bushland, so limiting further spread is critical.

To help to prevent the spread of myrtle rust:

- arrive clean, leave clean:
 - Wash all clothing, hats and gloves between site visits—using warm or hot machine wash with detergent.
 - Ensure all clothing, hats, footwear, tools, equipment, machinery and vehicles are free of mud, soil and organic matter before entering and exiting bushland.
 - Use a solution of 70% ethanol or methylated spirits in 30% water to disinfect items that may be contaminated (including hats, footwear, tools, equipment, machinery, vehicles, walking sticks, tent pegs, phones, glasses, watches, wallets and other personal items).

- ensure any soil, plants or other materials entering the site are certified free of weeds and pathogens. You can do this by purchasing from Nursery Industry Accreditation Scheme Australia (NIASA) accredited businesses, and by ensuring that materials conform to Australian Standards—for example, *AS3743–2003 Potting mixes* or *AS4454–2012 Composts, soil conditioners and mulches*.
- monitor plants carefully as nurseries and plant maintenance facilities may provide ideal conditions for myrtle rust (see Australian Nursery Industry myrtle rust management plan 2012 in **References and resources** below).



Photo: Myrtle rust spores on clothing after chance contact with an infected shrub (R.O. Makinson)

Weeds

What is a weed?

A weed is any plant that has a negative impact on our economy, environment, health and surroundings. Weeds are generally species which are not native to Australia. However, some native species growing outside of their native range can also become invasive. Many weeds are species which have escaped cultivation and become naturalised—that is, they have begun reproducing without human assistance.

What do weeds threaten?

Many weed species are able to invade natural areas and cause disturbance to bushland ecosystems. They can alter plant and animal community composition, cause changes to nutrient cycles, change natural fire regimes, outcompete native species for resources, impact threatened species and threaten biodiversity.

Where are weeds found?

The diversity of weed species recorded in Australia means that most terrestrial and aquatic ecosystems are vulnerable to weed invasion. Weeds have characteristics that help them grow well in many environments—from our towns and cities through to our coasts, deserts and alpine areas.

How do weeds spread?

Weeds typically spread easily by producing large numbers of seeds or reproducing vegetatively. They are often excellent at surviving and reproducing in disturbed environments and are commonly the first species to colonise and dominate in these conditions. Seeds and other plant material can spread into natural and disturbed environments via wind, animals, waterways and people (including contaminated clothing, hats, footwear, tools, equipment, machinery and vehicles).

To help to prevent the spread of weeds:

- arrive clean, leave clean: ensure all clothing, hats, footwear, tools, equipment, machinery and vehicles are free of weed seeds, mud, soil and organic matter before entering and exiting bushland.
- ensure any soil, plants or other materials entering the site are certified free of weeds and pathogens. You can do this by purchasing from Nursery Industry Accreditation Scheme Australia (NIASA) accredited businesses, and by ensuring that materials conform to Australian Standards—for example, *AS3743–2003 Potting mixes* or *AS4454–2012 Composts, soil conditioners and mulches*.
- if revegetating, select indigenous plants that occur naturally in your local area. Undertake weed control work well in advance to minimise the weed seed bank before you start planting. At the very least, slash the flower heads of weed species before they go to seed.

Before beginning a project

Undertake a risk assessment:

- Identify any planned activities with the potential to spread pathogens and weeds. This includes movement of people, equipment, vehicles and materials to/from/through infested or potentially infested areas.
- Determine the project site's pathogen and weed risks through liaison with land managers (for example government agencies, traditional owners, Indigenous Protected Area managers etc.).
- Consult sources of advice and expertise for contingent risks (for example state/territory departments of primary industry, pathology/weed identification services at botanic gardens).

Develop a hygiene management plan:

- Use your risk assessment to determine which hygiene procedures are necessary to prevent the spread of pathogens and weeds, and how and where to apply them.
- Ensure all materials taken onto the site—such as seedlings, mulch, soil, gravel, rock and sand—are certified free of weeds and pathogens. You can do this by purchasing from Nursery Industry Accreditation Scheme Australia (NIASA) accredited businesses, and ensuring materials conform to Australian Standards—for example, *AS3743–2003 Potting mixes* or *AS4454–2012 Composts, soil conditioners and mulches*.
- Create a checklist of hygiene procedures for project managers and participants to use.

Consider the following during project planning:

- Limit the number of sites you visit to one per day. If this is not possible, visit clean sites before infested sites.

- Provide training or briefing to all participants on the risks of spreading pathogens and weeds and risk mitigation strategies. If available, provide maps to participants with the location of infested and clean areas and wash-down points.
- Ensure that rigorous inspections and quality checks are built into the management of the entire supply chain for materials and plant material when carrying out revegetation or translocation activities where pathogens are a potential concern (see Australian Nursery Industry myrtle rust management plan 2012 in **References and resources** below). This is particularly important when working in areas where threatened species and threatened ecological communities are found.
- Where there is the risk of Phytophthora dieback (a plant disease caused by the pathogen *Phytophthora cinnamomi*), schedule activities for the dry season as it spreads more easily in wet and muddy conditions. If necessary, postpone activities and reschedule for a day when the soil is dry and doesn't stick to footwear, equipment and tools.
- If working in a weedy area, try to schedule activities for when the weed species are not in seed.
- Avoid taking vehicles into bushland. If a vehicle is necessary, ensure it is clean and dry on entry and exit, and restrict movement to hard, dry surfaces, formed roads and designated parking areas—avoid driving through puddles and mud. Where myrtle rust is a risk, avoid parking near myrtaceous plants—for example bottle brushes, tea trees, lilly pillies and eucalypts—and thoroughly clean vehicles inside and out between site visits.
- Avoid polystyrene boxes and tools with wooden or cracked handles. Use equipment that can be cleaned easily and thoroughly.
- Minimise the number of personal items you carry. Where myrtle rust is a risk, clean all items—such as GPS devices, glasses, phones, watches, wallets and other items kept in your pockets—with alcohol wipes before entering and leaving sites.

One site per day

Before entering or leaving a site

- Be aware of what plants look like when infected with myrtle rust and *Phytophthora* dieback (see images above).
- Remove all weed seeds, mud, soil and organic matter from clothing, footwear, tools, equipment, machinery, vehicles, boxes, backpacks, walking sticks, tent pegs and anything else that touches plants or the ground. Stay as clean as possible while in the bush.
- If you are entering clean bushland or have come from an area that is infested with *Phytophthora* spp. or myrtle rust, ensure everything with you is cleaned and disinfected with a solution of 70% ethanol or methylated spirits in 30% water. This includes footwear, tools, equipment, machinery, vehicles, backpacks, walking sticks, tent pegs and personal items.

Disinfecting clothing, footwear, equipment and other personal items

- i. Carry a hard brush and a spray bottle of disinfectant—made up of a solution of 70% ethanol or methylated spirits in 30% water. If you are able to carry more, assemble a simple hygiene kit—see Appendix A.
- ii. Set up a wash-down area for participants to wash and dry their face and hands and clean their footwear before entering and exiting the site.
- iii. To clean footwear, first use a hard brush or stick to remove as much mud, soil and organic matter as possible before disinfecting with a solution of 70% ethanol or methylated spirits in 30% water—applied through a spray bottle or a footbath.

- iv. Seal all personal rubbish in a bag and spray the outside of the bag with a solution of 70% ethanol or methylated spirits in 30% water before responsible disposal offsite.
- v. Collect all removed mud, soil and organic matter in a bag or bucket, and keep it out of clean bushland.

Disinfecting vehicles and machinery

- i. Use a wash-down facility for vehicles and machinery if available, or wash-down on a hard, well-drained surface, for example a road, and on ramps if possible. See **References and resources** below for links to online wash-down guidelines.
- ii. Pay particular attention to cleaning mud flaps and tyres.
- iii. Dispose of wash-down water so that it drains back into a low area of the infested zone away from waterways. If this is not possible, empty it into a waste container for responsible disposal offsite.
- iv. Don't allow wash-down water to drain into clean bushland.
- v. Don't drive through wash-down water.



Photo: Wash-down point (Department of Parks and Wildlife WA)



Photo: Truck undercarriage wash-down (South Coast Natural Resource Management, WA)

Additional considerations where myrtle rust is present

- Disposable overalls and caps may be worn over clothing upon entering a site, and removed when leaving the site. However, in high-risk cases, also shower and change into clean clothes (including hats, gloves and footwear).
- Wash all clothing, hats and gloves between site visits using warm or hot machine wash with detergent.
- Do **NOT** remove any plant material from sites infested with myrtle rust. Dispose of plant waste by burial on site. If this is not possible, seal the waste in a plastic bag, seal the bag in a second bag and spray the outside of the bag with a solution of 70% ethanol or methylated spirits in 30% water before responsible disposal offsite.

Revegetation

Where weeds and other disturbances are controlled, natural regeneration can assist the bushland to revegetate over time. Where revegetation activities are necessary, the following steps will help stop the spread of invasive species:

- Arrive clean, leave clean—ensure all clothing, hats, footwear, tools, equipment, machinery and vehicles are free of weed seeds, mud, soil and organic matter before entering and exiting bushland.

- Liaise with land managers and relevant plant specialist stakeholders (for example Australian Network for Plant Conservation, Greening Australia, Landcare groups, botanic gardens, seed banks etc.) to collaborate on the revegetation strategy.
- Select indigenous plants that occur naturally in your local area wherever possible.
- Avoid species with the potential to become weeds of the environment or agriculture.
- If the site is infested with *Phytophthora* spp. or myrtle rust, select species resistant to the disease, or seed from more tolerant individuals of susceptible plant species.
- Consult the Australian Network for Plant Conservation translocation guidelines 2004 (see **References and resources** below). These focus on threatened species but many of the techniques and considerations also apply to non-threatened species.
- Consider a combination of revegetation techniques such as seed production areas, direct sowing and enhancement of natural sites to assist natural regeneration. Many of these will be lower risk than the use of seedlings.
- If using seedlings, purchase them from a supplier that can guarantee high standards of hygiene—such as NIASA-accredited businesses. For added certainty, ensure the supplier allows testing of a random sample of seedlings and soil for *Phytophthora* spp. 3–6 weeks before acceptance of the seedlings. If the pathogen is present, the batch must be rejected.
- Check plants on receipt and at intervals during any holding period. Seek specialist advice if any suspect symptoms appear (for example coloured pustules, leaf necrosis).
- If propagating, maintain high standards of hygiene—see the section on propagation below.
- Plant when the soil is moist but not wet.
- Use mains or disinfected water to irrigate plants.
- If you are aware of a plant pathogen infestation, begin revegetation in the clean part of the bushland before moving to the infested area. Ensure all clothing, hats, footwear, tools, equipment, machinery and vehicles are clean before leaving the infested area.

Weed management

When conducting weed management activities, the following steps will help stop the spread of invasive species:

- Arrive clean, leave clean—ensure all clothing, hats, footwear, tools, equipment, machinery and vehicles are free of weed seeds, mud, soil and organic matter before entering and exiting bushland.
- Schedule weeding for dry soil conditions where possible.
- Use techniques that minimise soil disturbance. For example, mow or slash or use an appropriate herbicide in preference to digging or grading.
- Ensure transport and disposal of plant material does not introduce weeds to new areas. In sites free of myrtle rust, place weeds into a bag or container immediately for removal. Always cover trailers when transporting plant material to prevent anything from falling off. Some weeds can reproduce vegetatively—from leaves, bulbs or other plant material—while others use seeds, and some may require heat or cold treatment before composting, mulching or disposal.
- If a site is infested with myrtle rust, do **NOT** remove any plant material. Dispose of plant waste by burial on site. If this is not possible, seal the waste in a plastic bag, seal the bag in a second bag and spray the outside of the bag with a solution of 70% ethanol or methylated spirits in 30% water before responsible disposal offsite.
- If you are aware of a plant pathogen infestation, begin weeding in the clean part of the bushland before moving to the infested area. Clean all clothing, hats, footwear, tools, equipment, machinery and vehicles before leaving the infested area.

Propagation

The following steps will help stop the spread of invasive species during propagation activities:

- Ensure all benches, equipment, pots and containers are clean and disinfected.
- While using implements such as cutting knives or secateurs, wash them regularly with a solution of 70% ethanol or methylated spirits in 30% water.
- Steam-air pasteurise soil mixes for 30 minutes at 60°C, or select materials that conform to Australian Standard *AS3743–2003 Potting mixes* or *AS4454–2012 Composts, soil conditioners and mulches*. These standards require the materials to be free from plant pathogens, pests, harmful chemicals and weeds.
- Avoid bringing soil on boots and equipment into the nursery areas.
- If possible, keep pots on raised wire-mesh benches at least 30 centimetres off the ground. Otherwise, keep them on free-draining blue metal.
- Keep the whole nursery area clean and free of dead plant material and rubbish.

References and resources—general

Guidelines for the translocation of threatened plants in Australia— Second edition	2004	Vallee L, Hogbin T, Monks L, Makinson B, Matthes M and Rossetto M; Australian Network for Plant Conservation, Canberra	https://www.anbg.gov.au/anpc/publications/translocation.html
Leave no trace Australia	Web resources		www.lnt.org.au/resources/biosecurity/bio-security.html www.lnt.org.au/resources/skills-ethics-series.html

References and resources—wash-down procedures

Vehicle and machinery checklists— clean-down procedures	2014	Biosecurity Queensland, Department of Agriculture, Fisheries and Forestry; State of Queensland	https://www.daff.qld.gov.au/__data/assets/pdf_file/0011/58178/IPA-Cleandown-Procedures.pdf
Weed out the seeds— How to clean down your vehicle and machinery to help prevent the spread of weed seeds	2011	Biosecurity Queensland, Department of Agriculture, Fisheries and Forestry; State of Queensland	https://www.youtube.com/watch?v=dTNDcjTVfi
A guide for machinery hygiene for civil construction	2011	Civil Contractors Federation, State of Victoria, Department of Primary Industries, Department of Sustainability and Environment, VicRoads and the Association of Land Development Engineers	www.civilcontractors.com/Uploads/files/LR%20CCF%20Machinery%20Hygiene%20Bklt%2040pp.pdf
Keeping it clean: A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens	2010	NRM South, Tasmania	dpipwe.tas.gov.au/Documents/15130802_52keepingitcleanspreadswe.pdf
Biosecurity videos		NRM South, Tasmania	www.nrmsouth.org.au/biosecurity/
Field hygiene kits for landholders or community groups in Tasmania— available for purchase		NRM South, Tasmania	Landholders www.nrmsouth.org.au/wp-content/uploads/2014/08/Biosecurity-kits-sales-flyer-2015-Landholders.pdf Community groups www.nrmsouth.org.au/wp-content/uploads/2014/08/Biosecurity-kits-sales-flyer-2015-community.pdf

References and resources—seed production areas

Sowing seeds: bridging the gap between ex situ collections and reintroduction	2012	Guja L, North T, Taylor D and McAuliffe J; Australasian Plant Conservation 21(3)	www.anbg.gov.au/anpc/apc/21-3_guja.html
Developing seed production areas for native plants—Corangamite region guidelines	2008	Heyes S, Butler M, Gartlan C and Ovington A; Corangamite Seed Supply and Revegetation Project	www.florabank.org.au/files/documents/seedproductionareas/Corangamite%20Seed%20Production%20Area%20Guidelines08%20P1.pdf
Introducing seed production areas: an answer to native seed shortages	2008	Vanzella B; Greening Australia	www.florabank.org.au/files/newsattachments/SPA%20handout_%20master%20GACR%20Bindi%20Vanzella%20March08.pdf

References and resources—*Phytophthora cinnamomi*

Managing Phytophthora dieback—Guidelines for local government	2000	Dieback Working Group	https://www.dwg.org.au/images/dieback_publications/Managing_Phytophthora_Dieback_guidelines.pdf
Managing Phytophthora dieback in bushland—A guide for landholders and community conservation groups	2008	Dieback Working Group	https://www.dwg.org.au/images/dieback_publications/Managing_Phytophthora_Dieback_in_Bushland.pdf
Resistant native plant species—A list of resistant native plant species from Western Australia from the Centre of Phytophthora Science and Management at Murdoch University		Dieback Working Group	https://www.dwg.org.au/images/dieback_publications/Western_Australian_Natives_Resistant.pdf
Susceptible native plant species—A list of susceptible native plants species from Western Australia from the Centre of Phytophthora Science and Management at Murdoch University		Dieback Working Group	https://www.dwg.org.au/images/dieback_publications/Western_Australian_natives_susceptible.pdf

Management of <i>Phytophthora cinnamomi</i> for biodiversity conservation in Australia: Part 1—A review of current management.	2005	O’Gara E, Howard K, Wilson B and Hardy GEStJ—a report by the Centre for Phytophthora Science and Management, Murdoch University, Western Australia funded by the Australian Government Department of the Environment and Heritage	www.environment.gov.au/biodiversity/invasive-species/publications/management-phytophthora-cinnamomi-biodiversity-conservation
Management of <i>Phytophthora cinnamomi</i> for biodiversity conservation in Australia: Part 2—National best practice guidelines. Appendix 1— <i>Phytophthora cinnamomi</i> Appendix 2—The rationale of current management options Appendix 3—Areas vulnerable to disease caused by <i>Phytophthora cinnamomi</i> Appendix 4—The responses of native Australian plant species to <i>Phytophthora cinnamomi</i>	2005	O’Gara E, Howard K, Wilson B and Hardy GEStJ—a report by the Centre for Phytophthora Science and Management, Murdoch University, Western Australia funded by the Australian Government Department of the Environment and Heritage	www.environment.gov.au/biodiversity/invasive-species/publications/management-phytophthora-cinnamomi-biodiversity-conservation
Management of <i>Phytophthora cinnamomi</i> for biodiversity conservation in Australia: Part 3—Risk assessment for threats to ecosystems, species and communities: A review	2005	Wilson B, Howard K, O’Gara E and Hardy GEStJ—a report by the Centre for Phytophthora Science and Management, Murdoch University, Western Australia funded by the Australian Government Department of the Environment and Heritage	www.environment.gov.au/biodiversity/invasive-species/publications/management-phytophthora-cinnamomi-biodiversity-conservation
Management of <i>Phytophthora cinnamomi</i> for biodiversity conservation in Australia: Part 4—Risk assessment models for species, ecological communities and areas.	2005	Centre for Phytophthora Science and Management—a report by the Centre for Phytophthora Science and Management, Murdoch University, Western Australia funded by the Australian Government Department of the Environment and Heritage	www.environment.gov.au/biodiversity/invasive-species/publications/management-phytophthora-cinnamomi-biodiversity-conservation

Threat abatement plan for disease in natural ecosystems caused by <i>Phytophthora cinnamomi</i>	2014	Australian Government Department of the Environment	www.environment.gov.au/resource/threat-abatement-plan-disease-natural-ecosystems-caused-Phytophthora-cinnamomi
Background: Threat abatement plan for disease in natural ecosystems caused by <i>Phytophthora cinnamomi</i>	2014	Australian Government Department of the Environment	www.environment.gov.au/resource/threat-abatement-plan-disease-natural-ecosystems-caused-Phytophthora-cinnamomi
Response of selected South Australian native plant species to <i>Phytophthora cinnamomi</i>	2012	Kueh KH, McKay SF, Facelli E, Facelli JM, Velzeboer RMA, Able AJ, Scott ES	onlinelibrary.wiley.com/doi/10.1111/j.1365-3059.2012.02593.x/full
Infection of native plants by <i>Phytophthora cinnamomi</i> —key threatening process listing	2002	New South Wales Government Office of Environment and Heritage	www.environment.nsw.gov.au/determinations/PhytophthoraKTPListing.htm
Stamp out the spread of <i>Phytophthora dieback</i>		Royal Botanic Gardens Sydney	www.rbgsyd.nsw.gov.au/__data/assets/pdf_file/0008/106937/Phytophthora_brochure.pdf
Are you a carrier? <i>Phytophthora dieback</i> is a silent plant killer		Royal Botanic Gardens Sydney	www.rbgsyd.nsw.gov.au/__data/assets/pdf_file/0007/106936/Phytophthora_flyer.pdf
Management of <i>Phytophthora cinnamomi</i> in production forests	2009	Tasmanian Government Forest Practices Authority	www.fpa.tas.gov.au/__data/assets/pdf_file/0004/58054/Flora_technical_note_8_Phytophthora.pdf
Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects	2011	NSW Roads and Maritime Services	www.rms.nsw.gov.au/documents/about/environment/biodiversity_guidelines.pdf
Guide 7: Pathogen management			

References and resources—myrtle rust

Look out for myrtle rust	2010	New South Wales Department of Primary Industries	www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/364870/myrtle-rust-brochure.pdf
Identification of myrtle rust	2010	New South Wales Department of Primary Industries	www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/337374/identification-myrtle-rust.pdf
Preventing spread of myrtle rust in bushland	2010	New South Wales Department of Primary Industries	www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/362096/preventing-spread-Myrtle-Rust-bushland.pdf
New South Wales Department of Primary Industries myrtle rust resources page		New South Wales Department of Primary Industries	www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust/resources
Australian Nursery Industry myrtle rust management plan	2012	Nursery and Garden Industry Australia	www.ngia.com.au/Folder?Action=View%20File&Folder_id=135&File=Myrtle%20Rust%20Management%20Plan%202012%20Final%20V2.pdf
Myrtle rust—current information including national and international host lists; bibliography.	2014	The Australian Network for Plant Conservation	https://www.anbg.gov.au/anpc/resources/Myrtle_Rust.html
Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects	2011	NSW Roads and Maritime Services	www.rms.nsw.gov.au/documents/about/environment/biodiversity_guidelines.pdf
Guide 7: Pathogen management			
Current Biosecurity Threats		Biosecurity Tasmania, Department of Primary Industries, Parks, Water and Environment	dpirwe.tas.gov.au/biosecurity/current-biosecurity-threats

References and resources—weeds

Australian Weeds Strategy—A national strategy for weed management in Australia	2006	Natural Resource Management Ministerial Council, Australian Government Department of the Environment and Water Resources	www.environment.gov.au/biodiversity/invasive/weeds/publications/strategies/pubs/weed-strategy.pdf
Weeds in Australia web pages		Australian Government Department of the Environment	www.weeds.gov.au
Weeds of National Significance (WoNS) web pages		Australian Weeds Committee	www.weeds.org.au
Vehicle and machinery checklists—clean-down procedures	2014	Biosecurity Queensland, Department of Agriculture, Fisheries and Forestry; State of Queensland	https://www.daff.qld.gov.au/__data/assets/pdf_file/0011/58178/IPA-Cleandown-Procedures.pdf
Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects	2011	NSW Roads and Maritime Services	www.rms.nsw.gov.au/documents/about/environment/biodiversity_guidelines.pdf
Guide 6: Weed management			

Appendix A

Example checklists

Risk assessment checklist

Determine all risks associated with the potential transfer of pathogens or weeds to/from/through the project site (consider all participants handling plant material and equipment, from collection to site through to on-site works and clean-up).

Liaise with the project site's land managers to determine the presence of:

- Phytophthora* spp.
- Myrtle rust
- Weeds

Liaise with the project site's land managers to determine the presence of:

- Vulnerable native plant communities
- Species susceptible to *Phytophthora* spp. or myrtle rust
- Threatened species or communities listed under Commonwealth or state/territory legislation

Identify any planned activities with the potential to introduce or spread pathogens or weeds:

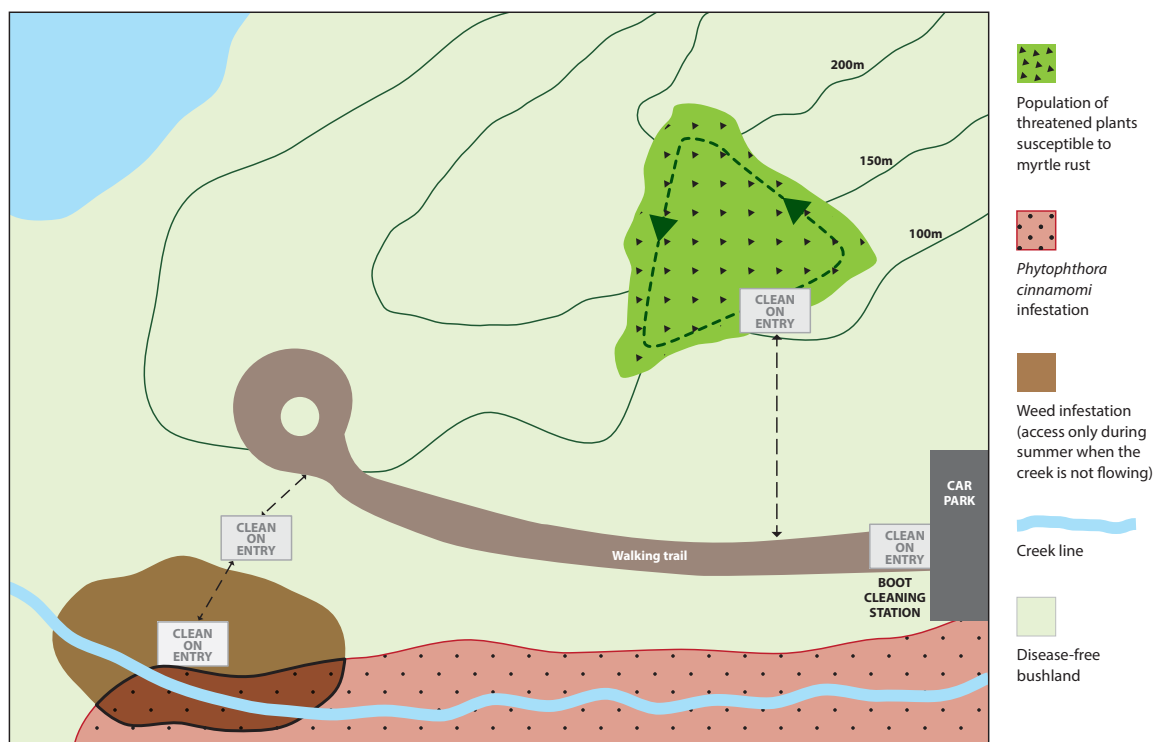
- Introduction of plant material to a site (seedlings, seeds, mulch etc.)
- Introduction of other materials to a site (soil, gravel, rock, sand etc.)
- Vehicle or machinery access to a site
- Any potential soil disturbance

Hygiene management plan checklist

To prevent the risks having an impact:

- Plan to visit only one site per day
- Schedule activities for the right conditions
- Use equipment that can be cleaned easily and thoroughly
- Minimise personal items that can carry pathogens
- Include training sessions so participants are aware of why hygiene is necessary, how to arrive clean, stay clean and leave clean
- Establish access controls including routes of access and timing on a management map
- Establish hygiene controls including hygiene procedures, hygiene infrastructure, clean on entry locations and wash-down points on a management map
- Maintain wash-down facilities and hygiene infrastructure
- Record and monitor site for any accidental spread of pathogens or weeds

Example hygiene management map



A large area within the project site is disease-free bushland, including a population of threatened plants susceptible to myrtle rust. This population must be monitored regularly during and after the project for any indications of disease.

There is an infestation of the weed arum lily (*Zantedeschia aethiopica*) limited to a small area on either side of the creek. Part of this area is also infested with *Phytophthora cinnamomi* which is present along much of the creek line. To avoid the spread of *Phytophthora cinnamomi*, all weed control activities should be scheduled during the dry season when the creek is not flowing.

'Clean on entry' access to the site is via a boot cleaning station at the car park entrance. From the walking trail there is one pathway of access to the population of threatened plants and another to the arum lily population. At both of these 'clean on entry' points there will be hygiene kits containing hard brushes, spray bottles of disinfectant and alcohol wipes.

Biosecurity hygiene kit: assemble a simple kit with the following items:

- Plastic tub with a lid (to carry items and to use as a footbath)
- Stiff brush
- Newspaper to cover the footwell of a vehicle (replace with clean newspaper regularly)
- Dustpan and brush; possibly also a long-handled broom
- Plastic bag for sweepings and dirty newspaper
- Drum of water and some disinfectant, for example a solution of 70% ethanol or methylated spirits in 30% water; or 20% household bleach (with 5% active ingredient) in 80% water; or quaternary ammonium disinfectant diluted according to manufacturer's directions.
- Spray bottle with a solution of 70% ethanol or methylated spirits in 30% water
- Alcohol wipes or gel for hands and personal items



Photo: Biosecurity hygiene kit (Department of Parks and Wildlife WA)



Appendix E

Biodiversity inspection checklist



E1 Biodiversity inspection checklist

Inspected by:	
Date of inspection:	
Time:	

Biodiversity protection measure	Compliance		Description of action (if required)	Action risk rating				Completion sign off
	Yes	No		1	2	3	4	
General site and erosion management								
The site is generally in a tidy condition	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Areas of localised soil erosion have been identified and appropriate preventative measures implemented	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stockpiles are less than 2 m in height	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sediment fence is installed correctly and there are no gaps	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
All materials and equipment are contained within the project boundary	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stockpiles are sited in low-hazard areas clear of watercourses	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Biodiversity protection measure	Compliance		Description of action (if required)	Action risk rating				Completion sign off
	Yes	No		1	2	3	4	
Vegetation management								
Clearing limits and work boundaries are established and well defined	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Exclusion fencing around trees and sensitive areas is intact	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Clearing extent and total areas is within approved clearing	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Clearing works are undertaken in accordance with clearing protocols	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No visible weed infestation	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Equipment and vehicles arriving on site are clean (spot check)	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sensitive area maps (showing clearing boundaries and exclusion zones) are available and accessible for all site staff	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Habitat features (e.g., fallen timber, hollow logs) from the development footprint have been relocated to adjacent retained vegetation	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Biodiversity protection measure	Compliance		Description of action (if required)	Action risk rating				Completion sign off
	Yes	No		1	2	3	4	
Other observations								

Action risk rating

Action risk rating	Risk level	Priority	Examples
1	Extreme	Immediately – must be closed out on the day of inspection	<ul style="list-style-type: none"> — Any actual or potential non-compliance with any environmental approval conditions — Adverse weather conditions are predicted that may result in above if controls are not adequate
2	High	Within 24 hrs	<ul style="list-style-type: none"> — Critical controls are damaged and need to be reinstated before a rain event
3	Medium	Within 3 working days	<ul style="list-style-type: none"> — Sensitive area mapping not accessible for site staff
4	Low	Within 5 working days	<ul style="list-style-type: none"> — Stockpiles need to be stabilised — Relocation of habitat features hasn't occurred

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