#### Aboriginal Cultural Heritage Management Sub-Plan Jindabyne Education Campus



## **Appendix B Stakeholder Consultation**

The Registered Aboriginal Parties for this project are listed below. Please note this does not include the details of the six RAPs who did not want their details released. To obtain these details this consultation must go through the Project Archaeologist and/or permission granted to by these RAPs to have their details held confidentially by the Environmental Officer.

Organisation	Contact Name	Email
Ngarigo and Djiringanj people and Elders	John Dixon	begadel@yahoo.com
Wagonga Local Aboriginal Land Council	Cheryl Moreton	wlalc@bigpond.net.au wagongalandscouncil@gmail.com
Ngarigu Brajerak	Ellen Mundy	ngarigubrajerak@gmail.com
PD Ngunawal Consultancy	Tammy Muscat	pd.ngunawalconsultancy@gmail.com
Yurwang Gundana Cultural Heritage Services	Dean Bell	Yurwang.Gundana.C.H.S@outlook.com
Gulgunya Ngunawal Heritage Aboriginal Consultancy (GNHAC)	Glen Freeman	gulgunyaNHAC@hotmail.com
Didge Ngunawal Clan	Lilly Carroll	didgengunawalclan@yahoo.com.au
Clive Freeman	Clive Freeman	clive.freeman@y7mail.com
Ngunawal Heritage Aboriginal Corporation	Dean Deplonte	ngunawalhac@gmail.com
Ngarigo Nation Indigenous Corporation	Michelle Francis	ngarigonation@gmail.com
Muragadi Heritage Indigenous Corporation	Jesse Johnson	muragadi@yahoo.com.au
Murri Bidgee Mullangari Aboriginal Corporation	Darleen Johnson	murrabidgeemullangari@yahoo.com.au
Merrigarn Indigenous Corporation	Shaun Carroll	merrigarn@hotmail.com
Bega Local Aboriginal Land Council	Glenn Willcox	ceo_begalalc@commander.net.au
Wolgalu Umbe Traditional Custodians Corporation	Olivia Williams	Wolgaluumbe@outlook.com
Redacted Group #1	Not publicly available	Not publicly available
Redacted Group #2	Not publicly available	Not publicly available
Redacted Group #3	Not publicly available	Not publicly available
Redacted Group #4	Not publicly available	Not publicly available
Redacted Group #5	Not publicly available	Not publicly available

## Appendix C Salvage Methodology

#### C.1 Surface Collection

Each Aboriginal site with surface artefacts that cannot be avoided within the approved development footprint as listed in Section 7.6 of this sub plan will need to be salvaged via surface collection prior to construction works for the Project commencing at each site location. We would also take the opportunity to examine the immediate surrounds of the recorded sites to identify any other artefacts that may be present within the approved development footprint that are associated with the sites approved for impact. The salvage collection fieldwork would be carried out with representatives of the Aboriginal community as selected by the Head contractor and/or Principal. As a minimum and in line with the Development Consent the Bega LALC would be invited to participate.

The surface collection of the stone assemblage for each Aboriginal site within the approved development footprint as per the recommendations of the ACHAR and approved by the Development Consent, would be undertaken through the following process.

- All reasonable attempts would be made to relocate the originally recorded surface stone artefacts however it is acknowledged that changes in the visibility and standard taphonomy and other environmental factors may impede the relocation of all of the previously recorded stone artefacts.
- Walk across the site areas (within the approved development footprint), use 'pin' flags to identify and mark artefacts.
- Photograph site area.
- If considered necessary, construct a collection grid of 2 m x 2 m or 5 m x 5 m or similar as appropriate to the size of the site, only larger sites or sites with higher densities of artefacts will have this strategy.
- As an alternative, GPS plot artefacts if required, this is suitable for smaller sites (~<20).
- Collect artefacts. At each collection site the artefacts will be recorded, bagged and labelled in accordance with their collection position, that is either individual number and/or their collection grid.
- Recording of stone artefacts will be conducted in line with standard archaeological practice to include raw material, type, dimensions and any other characteristics considered relevant and in accordance with the Code of Practice. Photos of particularly rare items only or those asked to be photographed by the Aboriginal representatives onsite would be taken.
- The salvaged Aboriginal objects may be temporarily stored until the long-term management and relocation of the salvaged objects can occur.
- The site of the relocated salvaged Aboriginal objects would be noted by the submission of site cards to the Aboriginal Heritage Information Management System (AHIMS) as legally required.
- An Aboriginal Site Impact Recording Form must be completed and submitted to AHIMS following harm for each site collected or destroyed from salvage.

#### C.2 Salvage Excavation

The salvage excavation will be undertaken by hand excavation to retrieve a suitable sample of Aboriginal stone artefacts in up to two open areas which had the highest density of subsurface artefacts recovered from PAD 1 during the initial subsurface test excavations undertaken by NGH. Salvage excavation would occur in a minimum of one open area of 2m x 2m around the location of PAD 1 TP1 where the highest density of artefacts was recorded during the testing if impacts to this location cannot be avoided. Options for additional expansion or opening of a second area for salvage excavation (likely near PAD 1 Test Pit 5) if determined to be warranted by the archaeologist in consultation with the RAPs onsite has been provided as a provision in this methodology.

The excavation would aim to "follow" any high density artefactual presences to enable as much of a sample of stone artefacts to be recovered as possible prior to impacts for the site Jindabyne Campus AFT 1/PAD 1. The salvage excavation will occur in a minimum of one open excavation areas of a minimum 2m x 2m centred around the locations of PAD 1 TP 1 with the option to open an additional 2 x 2m area near TP 5 PAD1 within the approved disturbance footprint of the Jindabyne Education Campus (as shown in the figure below). All excavations and sieving should be undertaken with the assistance of a minimum of two representatives from the registered Aboriginal Parties (as selected by the Principal, Project Manager and/or Principal Construction company).

Where a sufficient number of artefacts continue to be recovered, excavation would continue up to a point where a maximum  $8m^2$  area is achieved across the site Jindabyne Campus AFT 1/PAD 1. Where artefacts were not found or where density numbers consistently drop below comparative pits, excavation would cease at the completion of the salvage providing a at least one area with a minimum of  $2m \times 2m$  area has been excavated within the site Jindabyne Campus AFT 1/PAD 1.

Soil samples and charcoal may be retained for analyses where it is considered warranted to answer questions about the taphonomy of the site and the relationship of cultural finds.

Hand excavation will proceed in the open area/s through the following standard excavation methodology:

- Set out grid of 1 m squares, excavation will proceed in one square metre units, each of which will be assigned an alpha-numeric identifier;
- All excavation will be carried out using manual hand tools including shovels, crowbar, mattocks and trowels.
- All excavation units will be in 10 cm spits down to either clay, a culturally sterile depth as determined by previous test excavation, the base of extant A horizon or until excavation is unable to continue deeper by hand (whichever occurs first).
- If encountered, charcoal and or other organic material deemed suitable for radiocarbon dating will be collected using best practice guidelines.
- Pit stratigraphy for each excavation unit will be recorded using standard recording forms, terminology and methods.
- Dry sieving or wet sieve, as deemed to be appropriate by an archaeologist, would be undertaken with all material processed through either a 5 mm or 3 mm sieve;
- Artefacts recovered from sieving will be retained in plastic zip lock bags and labelled with the appropriate provenance data
- Representative and otherwise notable soil profiles if present will be photographed and drawn to scale as the excavation progresses.

- Once completed a photographic record of the entire excavation will be made and an overall site plan produced;
- All excavation units if required will be backfilled upon completion of the salvage program if required to be warranted by the Principal, project manager, construction company and/or landowner. If backfilling after wet sieving (if undertaken) is warranted this would be facilitated by the Principal, project manager and/or construction company.
- Analyse finds in lab to confirm if Aboriginal artefacts and then fully record Aboriginal stone objects in line with standard archaeological practice and in accordance with the Code of Practice.



Location of test pit 1 and 5 in PAD1 which were recommended for salvage excavation.

#### C.3 Management of recovered material and Reporting

The salvaged objects may be temporarily held at secure locked cabinet at the NGH Canberra office for analysis and recording until an appropriate time as they can be arranged to be relocated and the long term management undertaken and/or implemented. The temporary storage of salvaged objects, if required, is not intended to exceed 24 months from the conclusion of the construction of the education campus.

If the long term management is determined to be burial of the material the relocation site for the Aboriginal objects salvaged and those recovered from the subsurface test excavation which are currently in temporary care of the NGH Canberra office would need to be agreed to by the Principal , Project Archaeologists and RAPs and be outside any areas of proposed future works. The site/s for the relocation of salvaged Aboriginal objects would be noted by submission of site cards to the Aboriginal Heritage Information Management System (AHIMS) as legally required.

An Aboriginal Site Impact Recording Form must be completed and submitted to AHIMS following harm for each site collected or destroyed from salvage and/or construction works. Representatives from the RAPs would be provided with the opportunity to assist the Project Archaeologist with the salvage programme and the relocation of the salvaged objects. Generally, a minimum of two representative from the RAPs would be invited to participate in the salvage programme and the relocation of the Aboriginal salvaged objects. If representatives from the RAPs are not available to participate and all reasonable opportunities have been afforded, the collection and relocation of Aboriginal objects, would continue as scheduled by the Project Archaeologist.

The recording and relocation of artefacts will be compliant with the Code of Practice for Archaeological Investigations <u>http://www.environment.nsw.gov.au/resources/cultureheritage/10783</u> <u>FinalArchCoP.pdf</u>

A brief salvage report will be prepared outlining the steps taken above. The report will also be provided as a minimum to Heritage NSW and the RAPs. The report would document the salvage program and its results. The report may also be used to inform the independent environmental audit, which would include Aboriginal heritage.

The salvage report would include, as applicable, the following:

- Introduction
- Purpose and objective
- Aboriginal involvement and consultation
- Surface collection salvage
  - Surface collection methodology
  - o Surface collection results
  - Surface collection Discussion
- Salvage excavation (if required)
  - Salvage excavation methodology
  - Salvage excavation results
  - o Salvage excavation discussion
- Relocation and burial of salvaged objects and/or temporary storage information
- Conclusions

## **Appendix D Unexpected Finds Protocol**

#### Introduction

This unexpected find protocol has been developed to provide a method for managing unexpected Aboriginal heritage items identified during the construction and operation of the Project. The unexpected find protocol has been developed to ensure the successful delivery of the Project while adhering to the NSW *National Parks and Wildlife Act 1974* (NPW Act) and the Development Consent.

All Aboriginal heritage objects are protected under the NPW Act Under Part 6 of the Act, though in a State Significant Development (SSD) Development Consent may be issued that allows for conditional harm to Aboriginal objects. However, there are some circumstances where despite undertaking appropriate heritage assessment prior to the commencement of works Aboriginal cultural heritage items are encountered that were not anticipated that may be of scientific and/or cultural significance.

Therefore, it is possible that unexpected heritage items may be identified during construction, operation, and maintenance works. If this happens the following unexpected find protocol will be implemented to avoid breaching obligations under the NPW Act. This unexpected find protocol provides guidance as to the circumstances under which finds may occur and the actions subsequently required.

#### What is an Unexpected Find?

An unexpected heritage find is defined as any possible Aboriginal heritage object or place, that was not identified or predicted by the Projects heritage assessment and is not covered by appropriate permits or development consent conditions. Such finds have potential to be culturally significant and may need to be assessed prior to development impact.

Unexpected Aboriginal heritage finds may include:

- Aboriginal stone artefacts, shell middens, modified trees, mounds, hearths, stone resources, rock shelters, rock art and stone arrangements; and
- Human skeletal remains.

#### Aboriginal Heritage places or objects

All Aboriginal objects are protected under the NSW *National Parks and Wildlife Act 1974* (NPW Act).

An Aboriginal object is defined as:

Any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with the occupation of that area by persons on non-Aboriginal extraction and includes Aboriginal remains.

All Aboriginal objects are protected, and it is an offence to harm or desecrate an Aboriginal object or place.

#### Unexpected find management protocol

In the event that any unexpected Aboriginal heritage places or objects are discovered during the Project, the following management protocols will be implemented. These protocols are in line with the unexpected finds protocol – Aboriginal heritage (condition C29 of the Development Consent). Note: this process does not apply to human or suspected human remains. Follow Section D.1 Human Skeletal Remains below if remains or suspected remains are encountered.

In the event that surface disturbance identifies a new Aboriginal object:

- 1. All works must halt in the immediate area of the heritage item to prevent any further impacts to the object(s). Personnel should notify their supervisor of the find, who will notify the project manager.
- 2. A suitably qualified archaeologist (or the Project Archaeologist) and the registered Aboriginal representatives must be contacted to determine the significance of the objects.
- 3. The site is to be registered in the Aboriginal Heritage Information Management System (AHIMS) and the management outcome for the site included in the information provided to AHIMS.
- 4. Aboriginal community representatives, the archaeologists and Heritage NSW must be consulted to develop and implement management strategies for all objects/sites
- 5. Works may only recommence with written approval of the Planning Secretary.

#### D.1 Unexpected Human Skeletal Remains

If any human remains or suspected human remains are discovered during any works, all activity in the area must cease immediately. The following plan describes the actions that must be taken in instances where human remains, or suspected human remains are discovered. Any such discovery at the activity area must follow these steps.

#### **Discovery:**

- If any human remains or suspected human remains are found during any activity, works in the vicinity **must** cease and the Project Manager must be contacted immediately.
- The remains must be left in place and protected from harm or damage. To protect the remains until their origins can be determined high visibility markers or temporary fencing which will not cause ground disturbance must be immediately placed a minimum of 10 m around the location of the human remains or suspected human remains by site personnel. A minimum no work buffer zone radius of 50 m must be implemented around the remains by taping off the area as an environmental sensitive zone.
- All personnel should then leave the fenced off area immediately.
- The Environmental Officer is responsible to ensure that these temporary measures are implemented onsite within 24 hours of identification.

#### Notification:

- The NSW Police must be notified immediately. Details of the location and nature of the human remains must be provided to the relevant authorities.
- If there are reasonable grounds to believe that the remains are Aboriginal, the following must also occur:

- a. Heritage NSW must be contacted as soon as practicable, and you must provide any available details of the remains and their location. Heritage NSW Environment Line can be contacted on 131 555.
- b. The relevant Aboriginal community groups must be notified immediately when the remains are confirmed to be Aboriginal, as advised by Heritage NSW.
- c. The relevant Project Archaeologist may be contacted to facilitate communication between the police, Heritage NSW and Aboriginal community groups.

#### Process:

- If the remains are considered to be Aboriginal by the Police and Heritage NSW no work can recommence at the particular location unless authorised in writing by Heritage NSW and the Planning Secretary
- Recording of Aboriginal ancestral remains must be undertaken by, or be conducted under the direct supervision of, a specialist physical anthropologist or other suitably qualified person.
- Archaeological reporting of Aboriginal ancestral remains must be undertaken by, or reviewed by, a specialist physical anthropologist or other suitably qualified person, with the intent of using respectful and appropriate language and treating the ancestral remains as the remains of Aboriginal people rather than as scientific specimens.
- If the remains are considered to be Aboriginal by the Police and Heritage NSW, an appropriate management and mitigation, or salvage strategy will be implemented following further consultation with the Aboriginal community and Heritage NSW.

## **Appendix E Sample registers**

### E.1 Ground disturbance permit - Heritage

Project: Jindabyne Education Campus		Project No:
Requested By:		
Start Date:	Expected Com	pletion Date:

**CLEARING LOCATIONS** – ATTACH DRAWINGS / SKETCHES IF NECESSARY

Location	Comme	nts
This section will be completed by either the Work Health, Safety and Environment Offic mapping.	e Health, Safety and Environmer cer (WHSE Officer), with referen	nt (HSE) Manager or the ce to constraints
Are there any recorded Aboriginal Herit (within 50 m) of the works?	age sites within the vicinity	🗌 Yes 🗌 No
Has salvage of the Aboriginal Heritage s (within 50 m) of the works previously be	sites within the vicinity een completed to date.	☐ Yes ☐ No ☐ N/A
State the AHIMS number of the site/s pr 50 m) of the works if not salvaged to da	resent in the vicinity (within te.	
Are the Aboriginal Heritage site/s listed as do not impact in the Development Consent for the Project?		☐ Yes ☐ No ☐ N/A
Has the site been appropriately buffered and delineated if it remains in <i>situ</i> ?		🗌 Yes 🗌 No 🗌 N/A
Have relevant workers been given toolbox talks about working near <i>in situ</i> Aboriginal Heritage sites and the heritage unexpected finds protocol?		☐ Yes ☐ No ☐ N/A
Is a site inspection of the work area req Officer (heritage sites within 50 m of the	uired by the HSE or WHSE e works)?	🗌 Yes 🗌 No
Is a sign-off of this form required once to (heritage sites within 50 m of the works)	works have been completed )?	🗌 Yes 🗌 No
Comments:		

#### APPROVALS

Site Inspection completed by HSE or WHSE Officer (if required): Signature Required	Date:
Approval by HSE or WHSE Officer: Signature Required	Date:

IS A SIGN-OFF (ONCE WORKS COMPLETED) REQUIRED		🗌 Yes 🗌 No
	Have the conditions of the permit been met if a sign off is required?	Yes No
	HSE or WHSE Officer Signature Required	Date:

Note: Sign off required if works within 50m of a heritage site or if other matters are raised.

AHIMS#	Site name	Development Consent for site	Site Status	Date status of site updated on AHIMS	Comments
62-1-0385	Jindabyne Campus AFT 1 / PAD 1	Subsurface and surface salvage prior to impact	Active		
62-1-0386	Jindabyne Campus AFT 3 / PAD 3	Surface salvage prior to impact	Active		
62-1-0387	Jindabyne Campus AFT 4	Surface salvage prior to impact	Active		
62-1-0392	Jindabyne Campus AFT 2	Outside Project Area. Establish 5m no-go zone to ensure no inadvertent impacts	Active		
62-1-0410	Jindabyne Campus PAD 2	No mitigation required prior to impact	Active		

### E.2 Heritage site status database example



A.10 Biodiversity Management Sub-plan (BMSP)

School Infrastructure NSW

November 2022

# Biodiversity Management Plan

Jindabyne Education Campus





# Question today Imagine tomorrow Create for the future

#### Biodiversity Management Plan Jindabyne Education Campus

School Infrastructure NSW

WSP Level 3, 51-55 Bolton St Newcastle NSW 2300 PO Box 1162 Newcastle NSW 2300

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REV	DATE	DETAILS
А	20/10/2022	Draft for review
В	21/10/2022	Final
С	03/11/2022	Final based on additional comments provided on 3/11/2022

	Name	Date	Signature
Prepared by:	Lucy Gill	21/10/2022	La.
Reviewed by:	Selga Harrington	21/10/2022	5. Har OF
Approved by:	Toby Lambert	03/11/2022	I Jambert.

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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# vsp

# Table of contents

Abbr	eviations iii
1	Introduction1
1.1	Purpose and objectives1
1.2	Conditions of consent1
1.3	Site location
1.4	Biodiversity Management Plan preparation2
2	Environmental requirements 3
2.1	Legislation3
2.2	Guidelines and standards4
3	Existing environment6
3.1	Site description
3.2	Vegetation and threatened ecological communities6
3.3	Threatened and migratory species6
3.4	Exotic species and weeds7
3.5	Impacts and offsets9
4	Mitigation measures10
4.1	Avoidance10
4.2	Mitigation measures10
5	Compliance and monitoring 14
5.1	Roles and responsibilities14
5.2	Training14
5.3	Inspections and monitoring14
5.4	Non-conformances 14
6	Review and improvement15
6.1	Continual improvement15
6.2	Plan update15

# vsp

### CONTENTS (Continued)

7	Limitations	16
7.1	Permitted purpose	16
7.2	Qualifications and assumptions	16
7.3	Use and reliance	16
7.4	Disclaimer	17
8	References	18

#### List of tables

Table 1.1	Conditions of Consent relevant to the Biodiversity Management Plan	1
Table 1.2	Personnel	2
Table 2.1	Principal legislation and regulation	3
Table 2.2	Guidelines and standards	4
Table 3.1	Threatened flora species	6
Table 3.2	Threatened fauna and migratory species	7
Table 3.3	Exotic and weed species recorded within project area	7
Table 3.4	Impacts to threatened ecological community	9
Table 4.1	Mitigation and management measures	10

#### List of figures

Figure 4.1	Impact avoidance	. 13
------------	------------------	------

#### List of appendices

Appendix A Clearing protocols Appendix B Unexpected Threatened Species Find protocols Appendix C Hygiene protocols for management of weeds and pathogens Appendix D Arrive clean, leave clean guidelines Appendix E Biodiversity inspection checklist

# **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 Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
FM Act	NSW Fisheries Management Act 1994
На	Hectares
MNES	Commonwealth Matters of National Environmental Significance
NSW	New South Wales
РСТ	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). This report 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 under B21 that are addressed within this BMP.

 Table 1.1
 Conditions of Consent relevant to the Biodiversity Management Plan

сос	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
Environment Protection and Biodiversity Conservation Act 1999	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.
NSW Environmental Planning and Assessment Act 1979	Provides for project environmental assessment and approval.
National Parks and Wildlife Act 1974	The Act and regulation provision for the protection and conservation of habitat, ecosystems, ecosystem processes, and biological diversity.
Biodiversity Conservation Act 2016	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> <li>damage habitat of threatened species or ecological community</li> <li>picking a plant that is a threatened or protected species, or part of a threatened ecological community</li> <li>harm animals that is a threatened or protected species, or part of a threatened ecological community.</li> </ul>
Biosecurity Act 2015	The Act and regulation provision to establish biosecurity zones within Australia to monitor, control and respond to pests and diseases.

Legislation and regulation	Relevance
Pesticides Act 1999	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:
	<ul> <li>use a pesticide that harms or damages a person or property, a non-target animal or plant</li> </ul>
	— use a pesticide that harms a threatened species or protected animal
	<ul> <li>possess or use an unregistered pesticide without a permit, or contrary to the approved label</li> </ul>
	— fail to comply with the label or permit while using a pesticide
	<ul> <li>keep a registered pesticide in a container without a label</li> </ul>
	<ul> <li>possess or use a restricted pesticide without authorisation</li> </ul>
	<ul> <li>EPA may make pesticide control orders which prohibit use or possession of restricted pesticides.</li> </ul>
	Removal and treatment of weeds within the project site must be in accordance
	with this act.

## 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 *Phytophtora cinnamomi*, 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 *Leucochrysum albicans subsp. Tricolor* (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 *Calotis glandulosa* (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 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

<b>F</b>			
Scientific name	Common name	BC Act status	EPBC Act status
Calotis glandulosa	Mauve Burr-daisy	Vulnerable	Vulnerable
Leucochrysum albicans var. tricolor	Hoary Sunray	_	Endangered
Prasophyllum petilum	Tarengo Leek Orchid	Endangered	Endangered
Swainsona sericea	Silky Swainson-pea	Vulnerable	-
Thesium australe	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 SAII entities that would be affected by the project.

Table 3.2Threatened fauna and migratory species

Common name	Scientific name	BC Act status	EPBC Act status	Likelihood
<b>Migratory Marine Bir</b>	ds			
Fork-tailed Swift	Apus pacificus	_	Marine, Migratory	Moderate
Migratory Terrestrial	Species			
White-throated Needletail	Hirundapus caudacutus	_	Vulnerable, Migratory	Moderate
Satin Flycatcher	Myiagra cyanoleuca	_	Migratory	High
Birds				
Gang-gang Cockatoo	Callocephalon fimbriatum	Vulnerable	Endangered	Moderate. Potential habitat available on site
Mammals				
Eastern Pygmy- possum	Cercartetus nanus	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	Bromus diandrus	Great Brome	<b>General Biosecurity Duty</b> – prevent, eliminate or minimise spread
Weeds	Crataegus monogyna	Hawthorn	<b>General Biosecurity Duty</b> – prevent, eliminate or minimise spread
	Rumex acetosella	Sheep Sorrel	<b>General Biosecurity Duty</b> – prevent, eliminate or minimise spread
	Hypericum perforatum	St Johns Wart	<b>General Biosecurity Duty</b> – prevent, eliminate or minimise growth
			<b>Regional Recommended Measure</b> – land managers should mitigate spread, plant should not be bought, sold, grown or released into the environment

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

Threatened ecological community	Area (ha) in development site
Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion	<ul><li>2.29 ha total consisting of:</li><li>0.80 ha of woodland</li></ul>
	— 1.49 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 as shown in Figure 4.1. Native vegetation clearing must be less than 2.29 ha total and consisting of:

- less than 0.80 ha of woodland
- less than 1.49 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
<ul> <li>Nest boxes will be provided to minimise habitat</li> <li>loss to hollow-bearing fauna (and species that may</li> <li>be living in the buildings) in accordance the</li> <li>following requirements:</li> <li>hollow-bearing trees will be marked/tagged</li> <li>and mapped in a pre-clearing survey</li> <li>the size, type, number and location of nest</li> <li>boxes required will be based on the results of</li> <li>the pre-clearing survey.</li> <li>Seventy per cent of nest boxes will be installed one</li> <li>month prior to any hollow-bearing vegetation</li> </ul>	Pre-construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B7) This Plan
removal, with all nest boxes to be installed within six months from the date of the commencement of clearing.			
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.	Pre-construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B7 and 8)

Mitigation measure (action)	Timing	Responsibility	Source of requirement
Construction workforce will be supplied with sensitive area maps (showing clearing boundaries and exclusion zones) including updates as required (Figure 4.1).	Construction	Site Supervisor or Site Environmental Officer	CoC B21c (BDAR reference B7 and B9)
<ul> <li>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:</li> <li>existence and requirements of this sub-plan</li> <li>relevant legislation</li> <li>flora and fauna mitigation and management measures</li> <li>procedure to be implemented in the event of an incident.</li> </ul>	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
<ul> <li>Implement hygiene protocols including:</li> <li>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</li> <li>weed and pathogen management (provided in Appendix C) to control spread of weeds or pathogens.</li> </ul>	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

Mitigation measure (action)	Timing	Responsibility	Source of requirement
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.



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# 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.

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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 soul, 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 doublecheck 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



# 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)