Prepared for
AGL Macquarie Pty Ltd
ABN: 18 1678 594 94

Stage 3 Bayswater Ancillary Works

Biodiversity Management Plan

15-Jul-2025

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Client: AGL Macquarie Pty Ltd

ABN: 18 1678 594 94

Prepared by

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Glossary and terms

Term	Description
AECOM	AECOM PTY Limited
AGL	AGL Energy Limited
AGLM	AGL Macquarie Pty Limited
AN	Author's Note
Bayswater	Bayswater Power Station
BAM	Biodiversity Assessment Method 2020
BAW	Bayswater Ancillary Works
BC Act	*Biodiversity Conservation Act 2016* (State)
BCS	Biodiversity, Conservation and Science
BCD	Biodiversity and Conservation Division
BDAR	Biodiversity Development Assessment Report
BMP	Biodiversity Management Plan
CEMP	Construction Environment Management Plan
CPHR	Conservation Programs, Heritage and Regulation
cm	Centimetre
DPHI	Department of Planning, Housing and Infrastructure
DCCEEW	Department of Climate Change, Energy, the Environment and Water (NSW)
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EP&A Act	*Environmental Planning and Assessment Act 1979* (State)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPL	Environment Protection Licence
GWh	Gigawatt hours
ha	Hectare
HTW	High Threat Weed
IBRA	Interim Biogeographic Regionalisation for Australia
Jacobs	Jacobs Australia Pty Limited
km	Kilometre
kV	Kilovolt
LBBAWP	Liddell Battery and Bayswater Ancillary Works Project
Liddell	Liddell Power Station
m^2	Square metres
MW	Megawatt
NEM	National Energy Market
NSW	New South Wales
PCT	Plant Community Type
Project	Stage 3 Bayswater Ancillary Works
RtS	Response to Submissions
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
SWMP	Soil and Water Management Plan

Term	Description
TEC	Threatened Ecological Community
WOAOW	Water and Other Associated Operational Work
WONS	Weed of National Significance

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by AGL Macquarie Pty Limited (AGLM) to prepare a Biodiversity Management Plan (BMP) for elements of the Stage 3 Bayswater Ancillary Works (hereafter referred to as “BAW” or “the Project”). The Project is to be undertaken at Bayswater Power Station (Bayswater) as part of the consented Liddell Battery and Bayswater Ancillary Works Project (LBBAWP). The Project will allow Bayswater to maintain supply to the National Energy Market (NEM) until its planned closure in 2035 and ultimately improve the environmental performance of the power station with no change to coal consumption. That is, electricity, emissions, and ash generation will remain consistent with current operations.

AGLM submitted an application for development consent for the LBBAWP in March 2021 (SSD 8889679). Development Consent was issued for the Project by the Department of Planning, Housing and Infrastructure (DPHI) on 8 March 2022.

The preparaiton of management plans for the delivery of the LBBAWP is being undertaken in a staged manner, as approved by DPHI on 18 October 2022.

This BMP relates only to certain aspects of the BAW, as described in the EIS. The key elements that this BMP relates to are outlined in in **Section 2.2**. A new or amended version of this BMP would be prepared to capture the remaining BAW components once they are further developed and ready to be implemented.

This BMP takes effect once the Planning Secretary has approved it. The requirements of this plan will remain in force until the completion of the construction of the BAW elements described in **Section 2.2**.

1.1 Background

AGLM owns and operates Bayswater Power Station, which is approved to generate up to 2,740 megawatts (MW) of electricity. AGLM also owns and operates the now retired (April 2023) 2,000 MW Liddell Power Station (Liddell), the 50 MW Hunter Valley Gas Turbines and ancillary infrastructure and systems associated with each.

AGL Energy Limited (AGL) has announced its intention to transition towards a low-carbon future in response to the changing requirements of the NEM and customers. As such, Bayswater is expected to operate through to 2035 and then retired. AGL has committed to closing all coal-fired generation assets in its portfolio by 2050.

As part of this transition and in light of the eventual retirement of Bayswater, AGLM is implementing the LBBAWP to facilitate the efficient, safe, and reliable continuation of operations at the Bayswater and Liddell sites. The LBBAWP involves the following:

- **Stage 1 - Decoupling Works:** Alternative network connection arrangements for the Liddell 33 kilovolt (kV) Switching Station that provides electricity to infrastructure required for the ongoing operation of Bayswater, associated ancillary infrastructure and third-party industrial energy users.
- **Stage 2 - Liddell Battery (the Battery):** The installation and operation of a grid-connected Battery Energy Storage System (BESS) with a capacity of up to 500 MW and 2 GWh.
- **Stage 3 - Bayswater Ancillary Works:** Works associated with the ongoing operation of Bayswater, including upgrades to ancillary infrastructure such as pumps, pipelines, conveyor systems, roads and assets to enable maintenance, repairs, replacement, expansion or demolition. The purpose of the BAW is to facilitate the ongoing operational and maintenance requirements of Bayswater.
- **Consolidated consents:** A modern consolidated development consent and associated conditions providing for the continued operation of Bayswater. This includes the voluntary surrender of various existing development consents and their consolidation into a single overarching consent.

1.2 Relevant approvals and conditions

1.2.1 Development consent

Development consent was issued for the LBBAWP (SSD 8889679) on 8 March 2022.

Due to the multiple components of the LBBAWP, the Planning Secretary has permitted that any strategies, plans and/or programs required by the consent be prepared and submitted on a staged basis.

As outlined above, this BMP relates to certain elements of the BAW only. These elements are outlined in **Section 2.2**.

1.2.2 Conditions of consent

This BMP has been prepared to address condition B8 of development consent SSD 8889679. This condition sets out the requirement for a BMP to be prepared to the satisfaction of the Planning Secretary prior to the commencement of construction.

Conditions B7 and B9 are also relevant to the preparation and implementation of the BMP and are reproduced alongside condition B8 in **Table 1-1**.

Table 1-1 Relevant conditions of consent for SSD 8889679

Consent requirement	Where addressed
B7. The Applicant must not clear any native vegetation or fauna habitat located outside the approved disturbance areas described in the EIS.	Management measure BIO6 in **Table 5-1** and management actions V1 to V4 in **Table 5-2**
B8. Prior to commencement of native vegetation clearance, unless otherwise agreed by the Secretary, the Applicant must prepare a Biodiversity Management Plan to the satisfaction of the Secretary. This plan must:	
(a) be prepared by a suitably qualified and experienced biodiversity expert/s;	**Section 1.5**
(b) be prepared in consultation with the Biodiversity, Conservation and Science (BCS);	**Section 6.0**
(c) describe the short, medium and long-term measures to be undertaken to manage vegetation and fauna habitat on the site;	**Section 5.0**
(d) describe measures to be implemented within the site to minimise:	
i. the amount of clearing, including investigation of design options to minimise disturbance of native vegetation for the battery energy storage system and decoupling works;	Management measures BIO1, BIO2 and BIO16 in **Table 5-1** and management actions V1-V6 in **Table 5-2**
ii. impacts on fauna, including undertaking pre-clearance surveys and maximising the salvage of resources for habitat enhancement;	Management measures BIO2, BIO3 and BIO4 in **Table 5-1** and management actions F1-F4 and H1-H2 in **Table 5-2**
iii. impacts on threatened flora and fauna species or ecological communities within the development footprint and its surrounds;	Management measure BIO1-16 in **Table 5-1** and all management actions in **Table 5-2**
iv. the spread of weeds and fungal pathogens;	Management measure BIO8-12 in **Table 5-1** and management actions W1-W4 in **Table 5-2**
v. the generation and dispersion of sediment to watercourses; and	Management measures BIO14 and BIO15 in **Table 5-1** and management actions E1-E2 in **Table 5-2**

Consent requirement	Where addressed
vi. light spill from night works; and	Management measure BIO13 in **Table 5-1** and management action F4 in **Table 5-2**
(e) include a program to monitor, evaluate and report on the effectiveness of the measures.	**Section 7.1**
B9. The Applicant must implement the Biodiversity Management Plan approved by the Planning Secretary.	This BMP will be provided to DPHI for approval by the Planning Secretary and will be implemented as outlined herein.

1.3 Scope, purpose and objectives

The scope of this BMP covers the construction of elements of the BAW.

The purpose of this BMP is to drive compliance with conditions B7-B9 of development consent SSD 8889679.

The objective of the BMP is to manage and minimise the following during construction:

- The clearing of native vegetation
- Impacts to native fauna and native fauna habitat
- Impacts to threatened species and ecological communities
- The spread of weeds and pathogens
- The generation and dispersion of sediment into watercourses
- Other direct disturbances such as light spill and noise.

1.4 Related reports and plans

This BMP has been prepared in reference to the following related documents:

- AGLM's Environmental Monitoring & Reporting Schedule (AGLM-HSE-FRM-008.10.1) (AGLM, 2017)
- LBBAWP Biodiversity Development Assessment Report (Jacobs, 2021a)
- AGLM's Land Management Plan (AGLM-HSE-PLN-009.01) (AGLM, 2021)
- Stage 3 BAW Environmental Management Strategy (Jacobs, 2023)
- AGLM's Health, Safety and Environmental Management System (HSEMS) for operations at Bayswater and Liddell Power Stations (AGLM, 2021).

1.5 Authorship

This BMP was originally prepared by Jacobs Australia Pty Limited (Jacobs). Following consultation with the Conservation Programs, Heritage and Regulation (CPHR) group within NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) (refer to **Section 6.0**), the plan was updated by AECOM to address responses received from CPHR.

The plan has been prepared by experienced environmental personnel and reviewed by appropriately qualified ecologists. The roles and qualifications of the personnel are provided in **Table 1-2**.

Table 1-2 Personnel roles and qualifications

Name	Title	Role in management plan preparation	Biography
Jamie McMahon	Technical Director	Report review	• B. Env. Sc (Hons) • FEIANZ

Name	Title	Role in management plan preparation	Biography
			• 23 years' experience in ecology and planning
Alana Mitchell	Senior Environmental Scientist	Report preparation	• B. Env. Sc • 6 years' experience in impact assessment and environmental planning

2.0 The Project

2.1 Development site

The Project is located within AGLM's existing landholding, which encompasses Bayswater, Liddell, the Ravensworth rehabilitation area, Lake Liddell and surrounding buffer lands. The AGLM landholding is located approximately 15 kilometres (km) southeast of Muswellbrook, 25 km northwest of Singleton, and approximately 165 km west-northwest of Sydney in NSW. The location of the AGLM landholding is shown in **Appendix C**.

For the purposes of this BMP, the development site relates to the area subject to disturbance as a result of the construction of the relevant elements of the BAW. The development site is located wholly within the AGLM landholdings and is shown in **Appendix C**.

2.2 Project description

Table 2-1 provides a summary of the relevant Project activities included within the scope of this BMP, and their staging. The location and maximum disturbance areas of each component is shown in **Appendix C**.

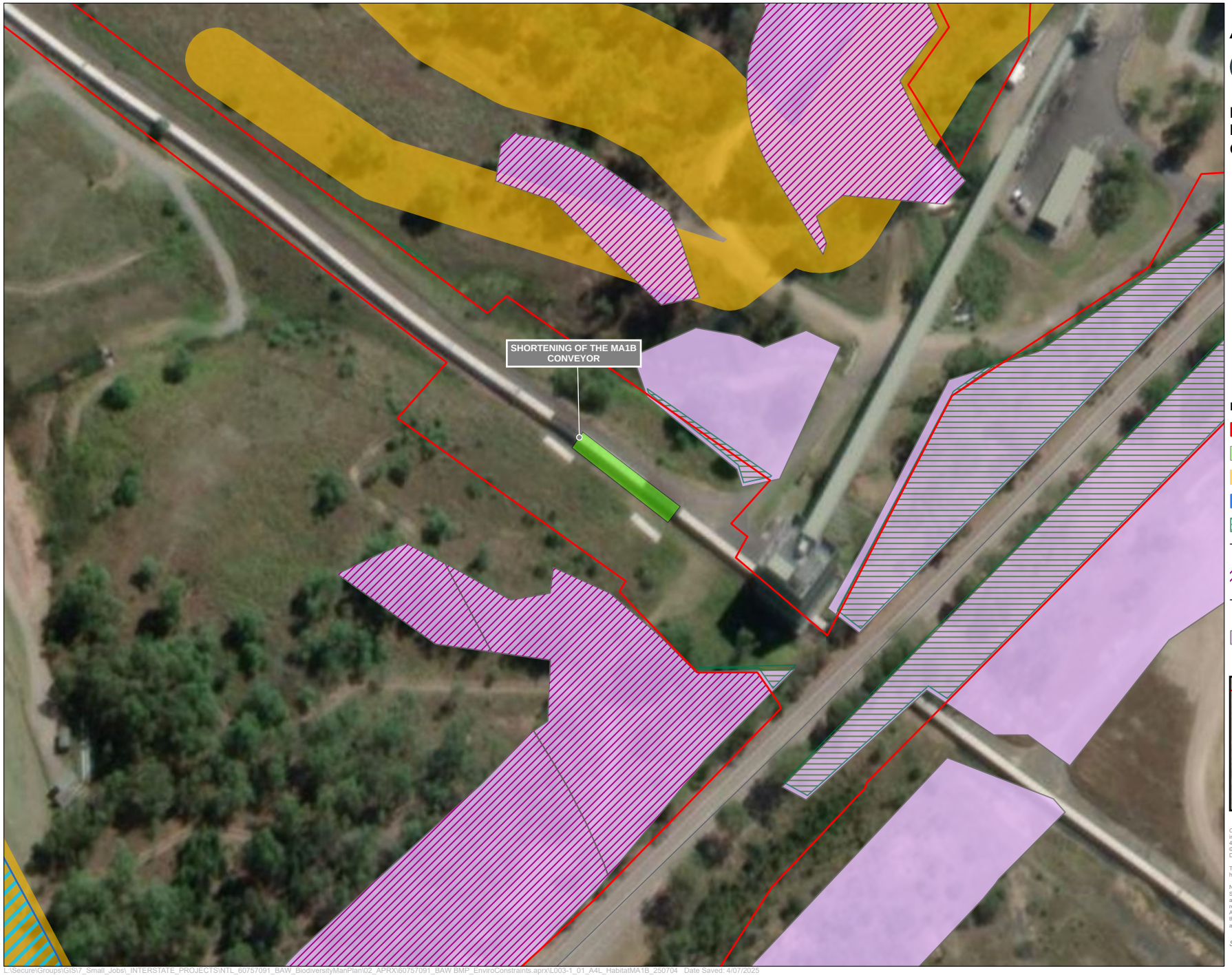
Table 2-1 Overview of the BAW elements associated with this BMP

Item and location	Justification	Scope	Construction timing and duration	Constraints and rehabilitation
Removal of 40 metres of the MA1B conveyor Located around 420 m to the northwest of the existing Bayswater PS (see **Figure 1**).	The conveyor is no longer required to transport coal from the Mt Arthur Coal Mine and can therefore be partially removed	• Removal of about 40 metres of redundant conveyor belts and associated conveyor stringer, purlins, idler rollers footing piers, electrical cabling, pull wires and roof sheeting.	Complete	Patches of Threatened Ecological Community (TEC) adjacent, located to the north and south of the development site, though these areas would not be affected by the works. Given only a small portion of the conveyor has been removed, no rehabilitation is proposed at this stage.
Refurbishment of ~2 km of River Road Located to the east of the existing Bayswater PS, from the junction with the Bayswater Access Road to the Bayswater tank farm (see **Figure 2**)	The bitumen running surface of River Road is reaching the end of its life and is no longer suitable to be repaired. Therefore, reconstruction of the road is required.	• Removal of the existing road surface • Repairs to the underlying road layers and levelling • Construction of the new road surface • No change expected to footprint of the current roadway.	Complete	Areas of TEC and potential Hunter Valley (HV) Delma (Striped Legless Lizard) habitat adjacent to northern portion of the road, though these areas would not be affected by the works. Existing road upgrade with no change to footprint, therefore no rehabilitation is proposed.

Item and location	Justification	Scope	Construction timing and duration	Constraints and rehabilitation
Placement of ~2 km of new brine concentrator return water pipeline Located to the south of the PS, connecting to the existing brine concentrator decant basin (see **Figure 3**)	The pipeline would be used to support the overall improvement in salt management being implemented across Bayswater.	• Install an additional HDPE plastic pipe of approximately 50 mm diameter. To be laid on earth surface, generally within 1 m of the existing pipeline within the existing maintained pipeline corridor • Construction access tracks may be required in some locations, though ~95% of the pipeline corridor is located adjacent to an existing access track i.e. no new access tracks would be required in these areas • Vegetation impacts would be limited to existing disturbed open grassland areas adjacent to the existing pipeline corridor	To be completed over a 1 month period within the FY25/26	A small section of pipeline traverses a patch of land identified as potential HV Delma habitat. However, the pipeline would only be placed on the ground within an existing disturbed/maintained pipeline corridor in this location and no new access tracks would be required. Another section crosses a riparian corridor, though this would utilise the existing high-level crossing, avoiding disturbance to the waterway beneath. Rehabilitation in the form of reseeding/hydro mulching is proposed at the end of construction where any new access tracks have been created.
Formalisation of contractor area Located immediately north of the existing contractor facilities (see **Figure 4**)	This area is required to support contractor activities during maintenance shutdowns of Bayswater PS.	• Formalisation of contractor area for use during maintenance shutdowns, including: - electrical works - earthworks - drainage improvements • establishment of temporary carparks and offices	To be completed over a 1 month period within the FY2025/26	Areas of potential TEC and potential HV Delma habitat are present within the contractor area. This vegetation includes mature tree plantings within traffic islands within the existing car park. No rehabilitation proposed as this location is proposed to remain as an operational area of the PS.

Item and location	Justification	Scope	Construction timing and duration	Constraints and rehabilitation
Replacement of the existing emergency power system Within the footprint of the main PS, immediately adjacent to the exhaust stack (see **Figure 5**)	Both the 1/2 and 3/4 end diesel generators are no longer operational. Containerised portable diesel generators have been installed to supply emergency power, however, the current configuration is temporary and does not constitute a long-term solution. Emergency power supply is critical for the Bayswater plant and personnel safety.	• Install three 415 V diesel generators: - two located outside the existing diesel generator building that would connect to the existing 6.6 kV network via 415 V / 6.6 kV step up transformers. - the third diesel generator would remain connected to the 1/2 end 415 V diesel generator switchboard via a change-over switch such that power can be supplied from the third diesel generator or via the 6.6 kV network. • The existing diesel generator building would have all redundant equipment removed, allowing the building to be repurposed.	To be completed over a 2 month period within FY2025/26	No biodiversity constraints as the works are within the operational area of the PS. No rehabilitation proposed, as this remain an operational area of the PS.
Waste storage area Located over the footprint of the existing waste storage area (see **Figure 5**)	The existing waste storage area is required to be upgraded to provide temporary storage for waste materials prior to their collection.	• Creation of a formalised waste storage area for hydrocarbons, oils, greases and inclusion of environmental controls such as bunding, runoff management and roofing	To be completed over a 8 month period within the FY2025/26	No biodiversity constraints present – location is an existing hardstand area. No rehabilitation proposed as this location is proposed to remain as an operational area of the PS..
Wash down facility Located within disturbed land to the south of the existing conveyor (see **Figure 5**).	Wash down facilities are required to prevent the spread of contamination, weeds, pests and/or plant/animal disease.	• Installation of washdown facilities, including car and equipment wash facilities	To be completed over a 8 month period within the FY2025/26	No biodiversity constraints present – location is an existing disturbed area used for car parking. No rehabilitation proposed as this location is proposed to remain as an operational area of the PS.

Item and location	Justification	Scope	Construction timing and duration	Constraints and rehabilitation
Administration building refurbishment works (see **Figure 5**)	Refurbishment of existing administration and social club building to accommodate ongoing management of the PS.	• Bayswater administration building and social club refurbishment, including redesign and upgrade of workspaces, kitchens and amenities.	Already commence. To be completed within the FY2025/26	No biodiversity constraints - location is an existing building. No change to building footprint. These works would not affect any vegetation, therefore no rehabilitation is proposed.



AECOM

N

0 10 20 m

FIGURE 1-
REMOVAL OF THE MA1B CONVEYOR

Legend

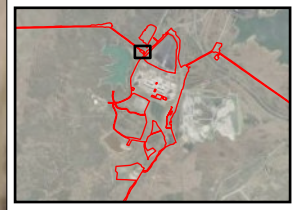
- Development Site
- Areas subject to Stage 3 BMP
- Riparian Corridoor
- Key Fish Habitat
- Hunter Valley Delma habitat

Threatened ecological communities (EPBC Act)

- Central Hunter Valley eucalypt forest and woodland CEEC

Threatened ecological communities (BC Act)

- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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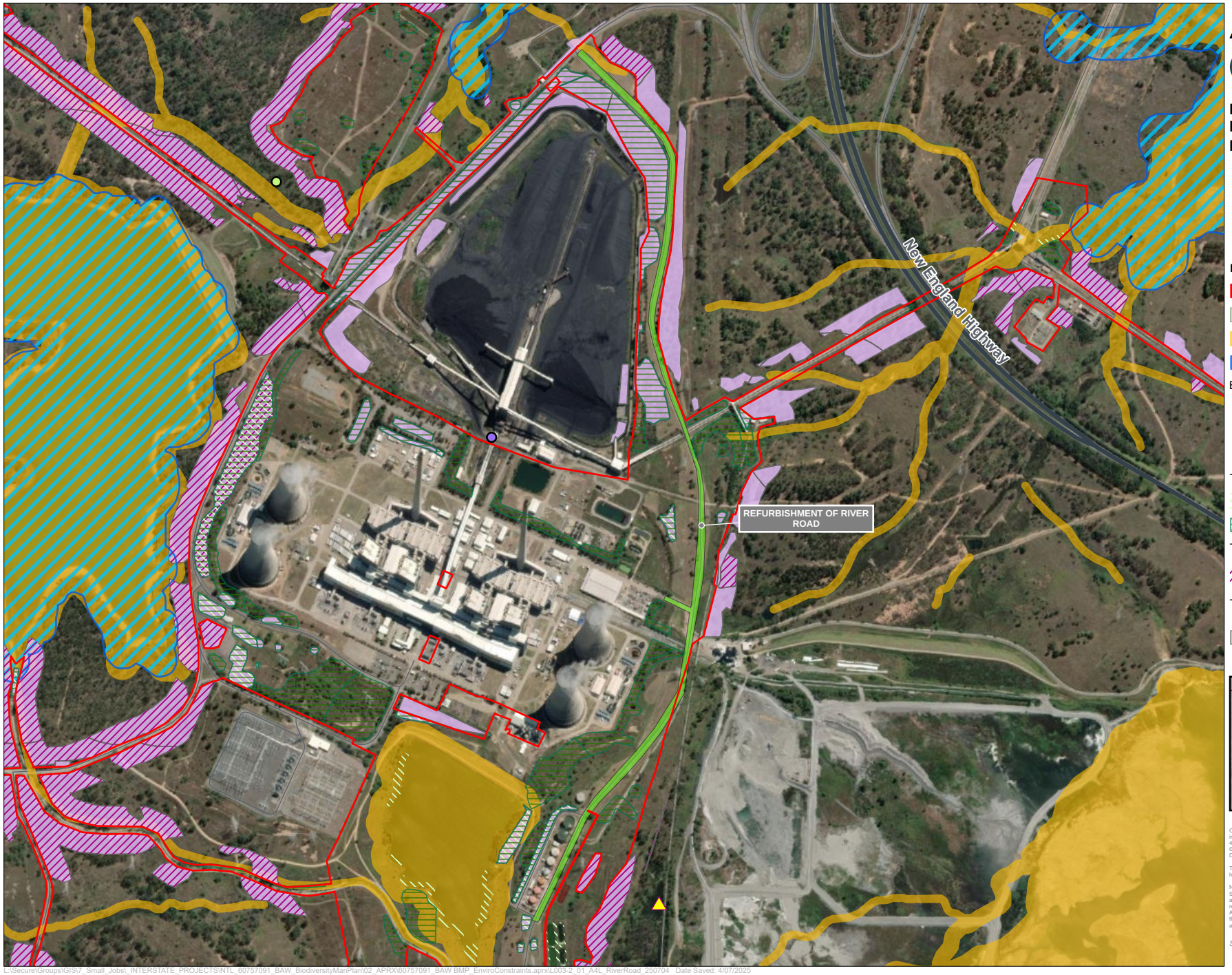

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0 130 260 m

FIGURE 2- REFURBISHMENT OF RIVER ROAD

Legend

- Development Site
- Areas subject to Stage 3 BMP
- Riparian Corridoor
- Key Fish Habitat

BioNet Atlas threatened species sightings

- Grey-headed Flying-fox
- Slaty Red Gum
- Southern Myotis record

Threatened species polygon

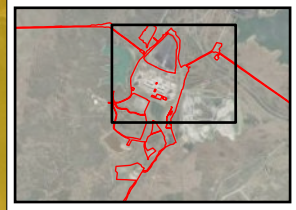
- Southern Myotis habitat
- Hunter Valley Delma habitat

Threatened ecological communities (EPBC Act)

- Central Hunter Valley eucalypt forest and woodland CEEC

Threatened ecological communities (BC Act)

- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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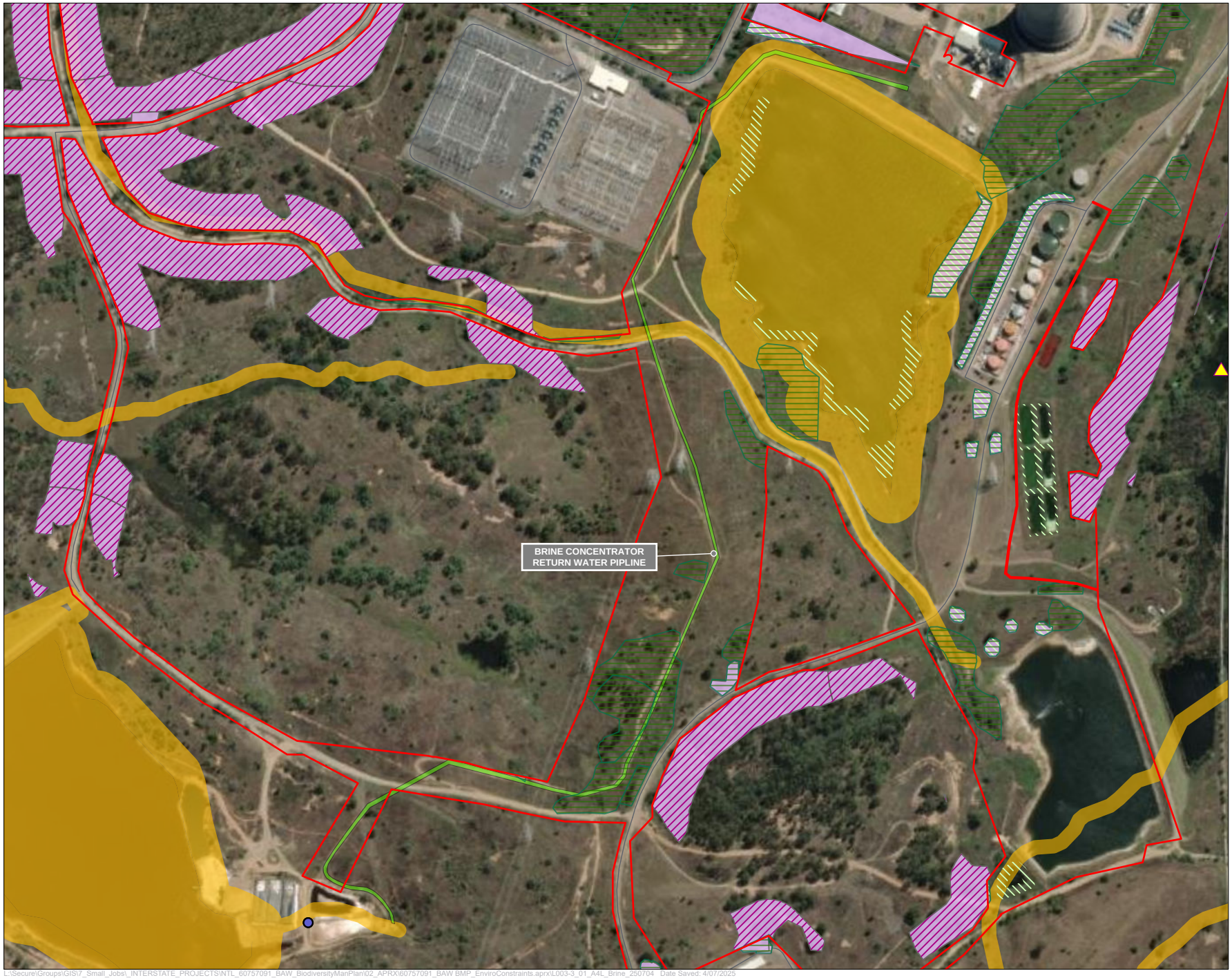

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0 70 140 m

FIGURE 3 -
BRINE CONCENTRATOR RETURN WATER PIPELINE

Legend

- Development Site
- Areas subject to Stage 3 BMP
- Riparian Corridor

BioNet Atlas threatened species sightings

- Grey-headed Flying-fox
- Little Lorikeet
- Southern Myotis record

Threatened species polygon

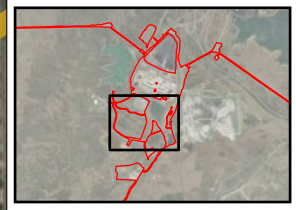
- Southern Myotis habitat
- Hunter Valley Delma habitat

Threatened ecological communities (EPBC Act)

- Central Hunter Valley eucalypt forest and woodland CEEC

Threatened ecological communities (BC Act)

- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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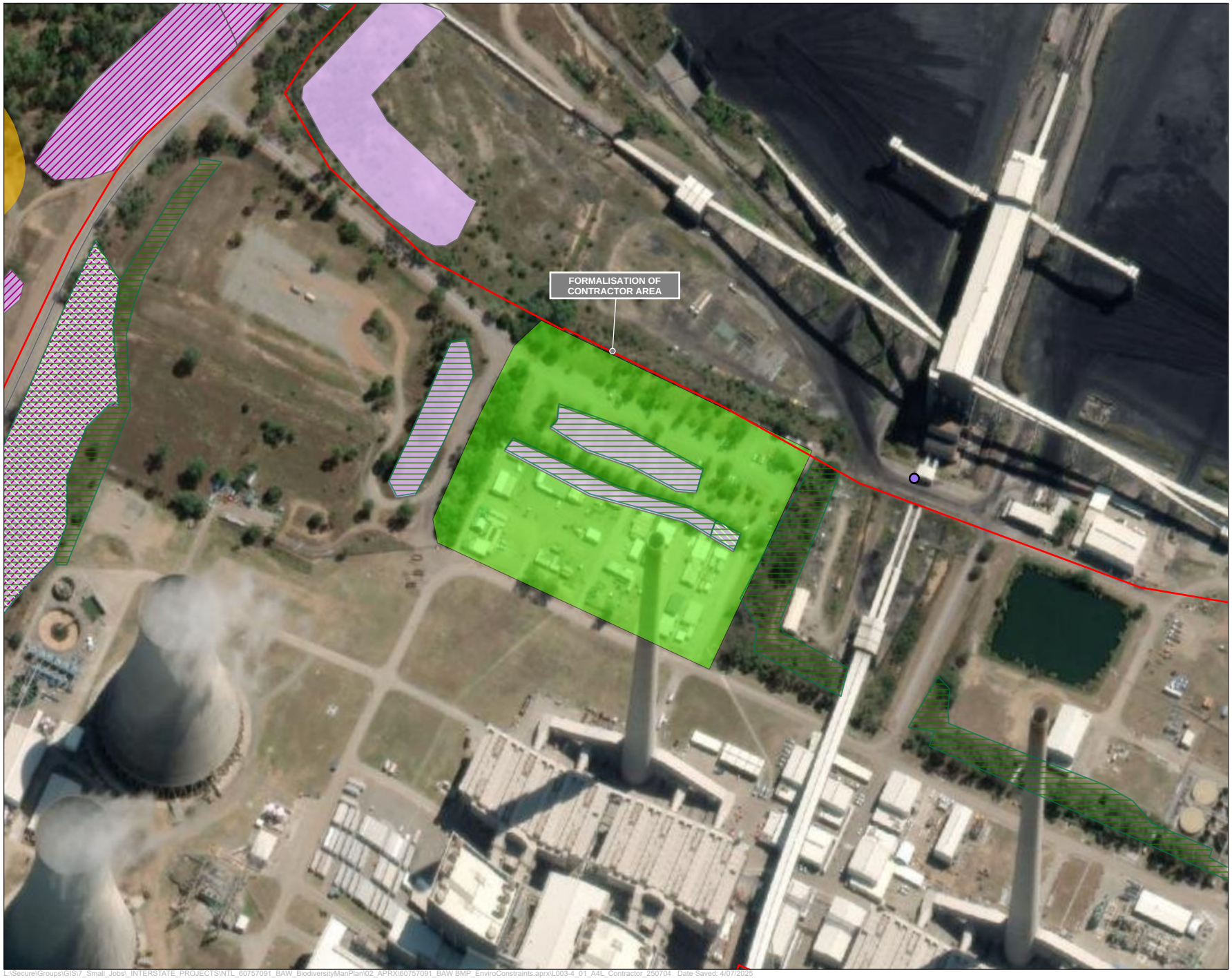

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0 30 60 m

FIGURE 4 - CONTRACTOR AREA FORMALISATION

Legend

- Development Site
- Areas subject to Stage 3 BMP
- Riparian Corridoor

BioNet Atlas threatened species sightings

- Grey-headed Flying-fox

Threatened species polygon

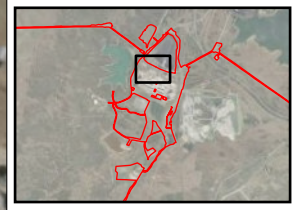
- Southern Myotis habitat
- Hunter Valley Delma habitat

Threatened ecological communities (EPBC Act)

- Central Hunter Valley eucalypt forest and woodland CEEC

Threatened ecological communities (BC Act)

- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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AECOM

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FIGURE 5 -
OTHER ITEMS WITHIN BAYSWATER

Legend

- Development Site
- Areas subject to Stage 3 BMP
- Riparian Corridor

BioNet Atlas threatened species sightings

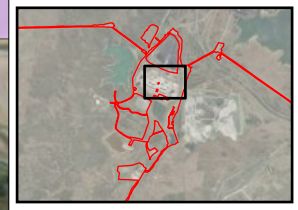
- Grey-headed Flying-fox

Threatened species polygon

- Southern Myotis habitat
- Hunter Valley Delma habitat

Threatened ecological communities (BC Act)

- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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3.0 Relevant policy and guidelines

3.1 Environmental Planning and Assessment Act 1979

The EP&A Act sets out a framework for the assessment of development within NSW at all levels, depending on the nature of the development and the proponent.

As outlined in **Section 1.0**, the LBBAWP was considered to be SSD by virtue of *State Environmental Planning Policy (State and Regional Development) 2011*[1]. As such, the LBBAWP was assessed under Part 4, Division 4.7 of the EP&A Act. This included the requirement to prepare an EIS according to the SEARs issued by DPE (now DPHI).

The EIS for the LBBAWP was lodged in March 2021 and the Project was granted development consent on 8 March 2022.

3.2 Biodiversity Conservation Act 2016 (BC Act)

The BC Act regulates the consideration of biodiversity matters relevant to development within NSW. In accordance with the BC Act, a BDAR was prepared to support the Project's EIS (Jacobs, 2021a). The BDAR also took into account the requirements of the *Fisheries Management Act 1994* and several other pieces of NSW environmental legislation.

The BDAR outlined the biodiversity impacts of the Project and provided mitigation measures to minimise these. Those measures, alongside the conditions of consent form the basis of the BMP.

3.3 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The Commonwealth EPBC Act provides the framework for the consideration and assessment of impacts relevant to Matters of National Environmental Significance, as specified by the Act.

The Act includes a process for a project to be referred to the Minister for the Environment and Water for a decision on the level of impact assessment required, known as a referral. A referral was made for the LBBAWP in 2020, resulting in it being deemed not to be a controlled action. As such, further assessment under the EPBC Act was not required, and the BDAR did not consider impacts upon matters listed in the EPBC Act. On this basis, this BMP responds to requirements at the state level only.

4.0 Roles and responsibilities

Key roles and responsibilities in relation to his BMP are outlined in **Table 4-1**.

Table 4-1 Roles and responsibilities

Role	Responsibility
AGLM Project Manager	• Provide adequate resources for the implementation of this BMP • Support the implementation of this BMP through the selection of suitable contractors and other operational staff • Communicate the importance of the implementation of the BMP to all relevant Project staff
AGLM General Manager	• Overall responsibility for the Bayswater Power Station site and the Project
AGLM Environment Manager - Bayswater Power Station	• Oversee the implementation of this BMP in conjunction with relevant contractors and other workers • Notify regulatory authorities and affected stakeholders of relevant incidents in accordance with this BMP • Co-ordinate periodic reviews of this BMP

[1] Repealed by *State Environmental Planning Policy (Planning Systems) 2021*

Role	Responsibility
	• Facilitate training of all employees and contractors in accordance with this BMP
Environment Advisor - Bayswater Power Station	• Assist the AGLM Environment Manager in the implementation of this BMP in conjunction with relevant contractors and other workers • Undertake and/or oversee investigations of environmental related incidents or complaints • Provide training to all relevant personnel in relation to the requirements of this BMP
Other AGLM Environment Staff	• Support the implementation of this BMP in conjunction with relevant contractors and other workers • Support the implementation of training related to biodiversity management • Assist with investigations into non-compliances, incidents or complaints
Site superintendent (contractor)	• Oversee the implementation of this BMP in conjunction with AGLM and other workers • Notify AGLM of relevant incidents in accordance with this BMP
Project Ecologist (contractor)	• Undertake specific requirements set out in this BMP
All Personnel (AGLM staff and contractors)	• Undertake works in accordance with the objectives and principles of this BMP • As relevant to role, participate in training on the implementation of this BMP.

5.0 Biodiversity management measures

5.1 Mitigation measures

Mitigation measures provided in the Project's EIS (Jacobs, 2021b) were revised as part of the Response to Submission (RtS) report (Jacobs, 2021c). **Table 5-1** outlines these revised mitigation measures. These measures provide the baseline commitments for AGLM in relation to biodiversity management within the development site, and are supplemented by the conditions of consent outlined in **Section 1.2.2**.

Table 5-1 outlines how the Project's mitigation measures relate to the specific management actions outlined by this BMP (see **Table 5-2**).

Table 5-1 Biodiversity management requirements outlined in the RtS (Jacobs, 2021c)

EIS Reference	Mitigation measure	Timing	Related management action(s) in Table 5-2
BIO1	Exclusion zones, or 'No-Go' zones, will be mapped in CEMP and mapping made available to all construction personnel.	Pre-construction	V3
BIO2	Woody debris (logs and mulch) produced during vegetation clearing will be re-spread over any cleared areas to protect the soil surface from erosion and to aid habitat restoration where appropriate.	During construction	H2
BIO3	An inspection of native vegetation to be impacted (within the construction footprint) will be conducted by an ecologist immediately prior	Immediately prior to vegetation	F1

EIS Reference	Mitigation measure	Timing	Related management action(s) in Table 5-2
	to vegetation clearing works (to confirm absence of fauna species). A Spotter/Catcher ecologist must supervise the proposed native vegetation to be cleared. In the unlikely event that fauna is present, works will cease until animals can be captured and removed from the construction footprint. Construction crews will be made aware that any native fauna species encountered must be allowed to leave site without being harassed. Trenches / holes will be inspected each morning and any trapped fauna removed or provide a mechanism for fauna to escape, such as a soil or timber ramp.	clearing / During construction	
BIO4	Vehicle movements on newly formed access tracks or construction zones will be limited to 20 km per hour speed limit implemented to reduce the risk of vehicle strike to fauna.	During construction	F4
BIO5	Where native vegetation is removed topsoil is to be retained from excavation areas within construction footprint (where possible). Topsoil stockpiles will be delineated and protected from machinery compaction and contamination during construction. Following construction and infill, topsoil will be re-spread over impacted native vegetation areas (to retain native seedbank and assist with natural revegetation). Avoid stockpiling in the vicinity of drainage lines.	During construction	E1, E2
BIO6	Accurately and clearly mark out the limits of the construction footprint (only where native vegetation exists). No activities including parking and turning of vehicles and plant/ equipment will occur beyond the construction footprint. The construction footprint will be demarcated prior to commencement of works in areas where native vegetation exists.	Pre-construction	V1, V2, V3, V4
BIO7	Materials, plant, equipment, work vehicles and soil/rock stockpiles to be placed to avoid damage to surrounding vegetation and will be outside tree drip-lines. Construction workers and vehicles will not access areas beyond delineated construction footprints.	During construction	E1, E2
BIO8	Where possible, avoid entering areas of significant weed infestations with machinery or personnel. Weed infestations are predominantly located in the exotic grassland areas, or the PCT 1691 ‘regrowth’ areas mapped within the development site.	During construction	W2
BIO9	If required, weed control will be undertaken by suitably qualified and/or experienced personnel. This may include: • Manual weed removal in preference to herbicides.	Pre-construction / During construction	W1, W2, W3, W4

EIS Reference	Mitigation measure	Timing	Related management action(s) in Table 5-2
	• Replacing non-target species removed/killed as a result of weed control activities. • Protecting non-target species from spray drift. • Using only herbicides registered for use within or near waterways for the specific target weed. • Not applying herbicide if it is raining or if rain is expected. • Mixing and loading herbicides and cleaning equipment away from waterways and drains. The CEMP will detail the procedures for management of weeds on the Project area (which will be in accordance with the requirements of the *Biosecurity Act 2015*).		
BIO10	During the clearing works, weeds will be disposed and managed appropriately to stop the spread of existing weed species.	During construction	W1
BIO11	Ensure vehicle and machinery hygiene measures are applied during construction and operation. Vehicle washdowns may be required for removal of mud and plant materials.	During construction	W2
BIO12	Pathogen management measures will be implemented to prevent introduction and spread of amphibian chytrid fungus, *Phytophthora cinnamomi* and Exotic Rust Fungi. The CEMP will provide a protocol for construction vehicles driving to and from site to prevent the spread or introduction of pathogens.	During construction	W3
BIO13	Avoid excessive noise and vibration during construction activity. Construction activities to be carried out during diurnal hours.	During construction	F4
BIO14	Erosion and sediment controls will remain in place until all rehabilitation has been completed. Drainage lines will be protected from runoff and stockpiling of spoil.	During construction	E1, E2
BIO15	Revegetation of slopes or exposed soil areas will be undertaken as soon as possible, in accordance with the CEMP. Landscaping of exposed surfaces using native indigenous species only. Soil loss will be prevented by immediate stabilisation of exposed surfaces (e.g. use of Jute mesh and/or soil binder).	During construction / Post construction	R1
BIO16	Patches of native vegetation which are located near larger patches of native vegetation would be prioritised for retainment.	Pre-construction	V1, V2, V3

5.2 Biodiversity management actions

Table 5-2 below outlines specific actions to manage biodiversity impacts during construction of the Project. These actions implement the commitments made in the EIS and RtS (**Table 5-1**), as well as the requirements of the conditions of consent (**Section 1.2.2**).

Table 5-2 Biodiversity management actions

Aspect	BMP reference	Management action	Person responsible	Timing/schedule
Vegetation clearing	V1	The need for vegetation clearing is to be further investigated and, where possible, reduced as part of the detailed design process. Further investigation will include a review of completed vegetation surveys, with preference for the retention of high value native vegetation and/or vegetation providing habitat for native fauna. Native vegetation and other sensitive biodiversity areas are shown in **Appendix C**.	AGLM Project Manager and AGLM Environment Manager	Detailed design (short term)
Vegetation clearing	V2	A ground and vegetation disturbance approval must be in place prior to any works that may disturb topsoil or vegetation. This includes the provision of a completed application form for sign-off by the AGLM Environment Manager prior to any such works taking place.	AGLM Environment Manager	Prior to ground disturbing works during construction (medium term)
Vegetation clearing	V3	All areas proposed to be cleared are to be fenced off with temporary fencing or tape to avoid unnecessary or accidental clearing and/or the movement of machinery, personnel or equipment into adjacent 'no go' zones. All land outside the limit of works identified in the detailed design for each scope element is deemed to be a no-go zone.	Site Superintendent and AGLM Environment Manager	Prior to and during construction (medium term)
Vegetation clearing	V4	Temporary frog proof/exclusion fencing is to be installed where vegetation clearing is proposed within 100 m of waterbodies to exclude amphibians from the clearing area. Where vegetation clearing is proposed. Artificial cover (e.g. tiles) are to be placed in advance of disturbance and checked for the presence of HV Delma prior to works commencing. Any native fauna located under the tiles is to be relocated to similar habitat nearby habitat and within AGLM owned land.	Site Superintendent and AGLM Environment Manager	Prior to and during construction (medium term)
Vegetation clearing	V5	All vegetative material derived from clearing is to be assessed and directed as appropriate by the Project Ecologist. This includes the separation of weed material and the reuse of vegetation with habitat	AGLM Environment Manager	During construction (medium term)

Aspect	BMP reference	Management action	Person responsible	Timing/schedule
		value within or near the development site, where possible, e.g. fallen logs or tree hollows.		
Vegetation clearing	V6	Vegetation clearance should be avoided in temperatures above 35°C where reasonable and feasible.	AGLM Environment Manager	During construction (medium term)
Fauna management	F1	The fauna management protocol (**Appendix B**) is to be implemented during vegetation clearing, including: • Scheduling of clearing outside of breeding periods (generally September to November) • Pre-clearance fauna and habitat surveys no more than 48 hours in advance of clearing • Identification of habitat features such as tree hollows for salvage and reallocation within the development site or surrounds • Inspection by a qualified ecologist and relocation of fauna outside of habitat proposed to be cleared • Protocols for staged felling of trees where habitat features are not able to be inspected prior • The relocation of potentially affected fauna on AGLM owned land, as close to their original location as practical and within similar habitat.	AGLM Environment Manager and Project Ecologist. All fauna handling to be undertaken by an experienced ecologist with an appropriate ethics licence.	Prior to commencement of vegetation clearing and during construction (short term)
Fauna management	F2	In the event of unexpected finds in relation to biodiversity (e.g. threatened species, fauna, nests, burrows or hollows) the Project Ecologist is to be informed as soon as practical. The Project Ecologist is to then decide the appropriate course of action depending on the situation, including notification of the Project Manager and the Planning Secretary, if necessary.	Site Superintendent, AGLM Environment Manager and Project Ecologist	During construction (medium term)
Fauna management	F3	All encounters with wildlife on site are to be managed in accordance with AGLM-HSE-PRO-009.01 Wildlife encounters.	AGLM Environment Manager and Project Ecologist	During construction (medium term)
Direct fauna disturbance	F4	Site activities are to be designed and executed to reduce the potential for direct disturbance to native fauna. This includes: • the minimisation of light spill into areas of adjacent vegetation by minimising the need for lighting, using directional lighting and using light shields where appropriate • minimising the potential for noise disturbance where possible through actions outline in the noise and vibration management plan	AGLM Environment Manager and Project Ecologist	Prior to construction (short term)

Aspect	BMP reference	Management action	Person responsible	Timing/schedule
		• design of new roads and access tracks to avoid the potential for vehicle strike as far as practicable, e.g. preferencing access tracks through already cleared areas.		
Fauna habitat	H1	Any hollows greater than 5 cm diameter in trees to be cleared for construction are to be retained. These are to be cut out of the felled tree and stored safely within the construction area for later reuse within the development site or nearby	Site Superintendent and AGLM Environment Manager	During early and late stages of construction (short term and medium term)
Fauna habitat	H2	Woody debris (logs and large branches) from areas of native vegetation required to be cleared for construction is to be retained. This material is to be stored for later re-spreading over the development site or nearby.	Site Superintendent and AGLM Environment Manager	During early and late stages of construction (short term and medium term)
Weed and pathogen management	W1	The monitoring of weed emergence is to be undertaken as per the requirements outlined in **Table 7-1**. Where emerging weed issues are identified, corrective action is to be taken, which may include the use of herbicide, direct removal or other means. The least disruptive method for appropriately dealing with weeds is to be preferred on a case-by case basis.	AGLM Environment Manager and Project Ecologist	During construction (medium term)
Weed and pathogen management	W2	Vehicles are to be monitored for the potential for introducing weeds into the site or transporting weeds out of the site as per the requirements outlined in **Table 7-1**.	AGLM Environment Manager	During construction (medium term)
Weed and pathogen management	W3	The potential for the introduction of pathogens such as Phytophthora, myrtle rust and chytrid fungus is to be managed on a risk basis based upon the specific activities taking place (e.g. transporting of vegetative material or movement of equipment from known or suspected area of infestation) (refer to **Appendix D**). In the event that such import or export of pathogens is suspected, vehicle, machinery and equipment washdowns are to take place using appropriate methods.	AGLM Environment Manager	During construction (medium term)
Weed and pathogen management	W4	Upon completion of construction, all areas of exposed soil or disturbance must be monitored for weed emergence or infestation as per the requirements and timing outlined in **Table 7-1**. More frequent control is to be undertaken if rapidly growing weed infestations are identified.	AGLM Environment Manager	Post-construction (long term)

Aspect	BMP reference	Management action	Person responsible	Timing/schedule
Erosion and sediment control	E1	The requirements of the soil and water management subplan will be implemented in full, with respect to the protection of biodiversity values within and around the site (e.g. frog habitat) and augmented as appropriate to avoid or reduce biodiversity impacts.	AGLM Environment Manager	Prior to construction and during construction (short and medium term)
Erosion and sediment control	E2	Where soil is proposed to be removed from areas of native vegetation, the topsoil will be reserved and stockpiled for later reuse within or near the development site. Stockpiles are to be located away from drainage lines and covered with a waterproof membrane until required.	Site Superintendent and AGLM Environment Manager	During construction (medium term)
Revegetation	R1	Revegetation of disturbed areas will occur following completion of construction activities within areas identified for revegetation in **Table 2-1**. This will be undertaken according to the following methodology: • Construction plant and equipment is demobilised from the site • Areas subject to earthworks are assessed for their potential to support vegetation. If areas are not suitable, stored topsoil is to be used to provide a planting layer • Operational or asset protection zone areas within or around the power station are to be revegetated back to grass, which may be hydromulched or direct seeded onto the site. A native groundcover seed mix will be used using species found in adjacent native vegetation • Any retained hollows from felled trees are to be reinstalled in mature trees nearby to restore arboreal habitat value.	Site Superintendent and AGLM Environment Manager	During late stages of construction (medium term)

6.0 Regulatory consultation

Condition B8 (b) of SSD 8889679 states that this BMP must be prepared in consultation with BCS (now restructured as CPHR). The draft BMP was submitted to CPHR for review on19 March 2025. A copy of CPHR's response, along with a table outlining how CPHR's comments have been addressed, is provided in **Appendix A**.

7.0 Compliance and reporting

7.1 Monitoring

During construction, monitoring will be undertaken as per **Table 7-1** below, including relevant reporting as required.

Table 7-1 Project monitoring requirements

Aspect	Item	Frequency	Success indicator	Person responsible	Reporting (if required)
Pre-clearance survey	An inspection of native vegetation to be impacted to confirm the absence of native fauna	Prior to vegetation clearance works	No native fauna species detected	Project Ecologist	Written notification will be provided to CPHR following implementation of pre-clearance and clearing protocols advising of any fauna observed or injured.
Vegetation clearing	Photo points are to be set up for areas where vegetation clearing greater than 0.5 ha is proposed.	Photos to be taken: • Prior to clearing, showing established no-go areas • Once during clearing showing activity • Once post-clearing	Clearing is shown to be within agreed limits	Project Ecologist	Log of all photos taken including their date. Environmental incident triggered if clearing outside of no-go areas is detected (see reporting protocol below).
Fauna inspections	Inspection of trenches/holes to be undertaken when trenching and excavation is being undertaken.	Each morning	No fauna detected	AGLM Environment Manager and Site Superintendent	Daily inspection signoff sheet.
General site inspections	Undertake site walkthrough to inspect ‘no-go’ zones, construction activities and any emerging issues.	At least weekly	All fencing is intact and no evidence of people, machinery or equipment encroaching no-go areas. Works are being carried out in	AGLM Environment Manager and Site Superintendent	Weekly inspection signoff sheet.

Aspect	Item	Frequency	Success indicator	Person responsible	Reporting (if required)
			accordance with this plan.		
Weeds and pathogens	Inspection of construction area, including laydown areas and stockpiles for emerging weeds	Weekly inspection of full site	Emerging weeds are identified as they arise	AGLM Environment Manager and Site Superintendent	Weekly inspection signoff sheet.
Weeds and pathogens	Inspection of vehicles for attached soil and other vectors for the transport of weeds and/or pathogens into and out of the construction area. Hygiene protocols should adhere to *Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomic, myrtle rust, amphibian chytrid fungus and invasive plants* (DPIE, 2020).	During the movement of vehicles, earthmoving machinery and other relevant equipment in and out of the site	New weeds or pathogens are not introduced to the site	AGLM Environment Manager and Site Superintendent	Log of all inspections undertaken including date, time, vehicle/machine and outcomes.
Weeds and pathogens	Inspection of all areas disturbed during construction for the emergence of weeds. Where weeds are identified, control is to be undertaken by a suitably qualified Bush Regeneration or Weed Management Contractor.	Monthly for the first 6 months post-construction and 6 monthly for the following 18 months thereafter	Weeds are adequately suppressed during the monitoring period	AGLM Environment Manager and Site Superintendent	Log sheet for all inspections detailing the locations inspected, their state and any improvement measures required.
Revegetation	Inspection of the success of the revegetation areas. This includes monitoring for weed growth, success of any revegetation and inspection of any restored habitat. Where necessary this will include rectification of issues e.g. removal of emerging weeds, replanting of any planted vegetation that has died off.	Monthly for the first 6 months post-construction and 6 monthly for the following 18 months thereafter	Disturbed areas become progressively revegetated i.e. revegetation is successful and habitat becomes established	AGLM Environment Manager and Site Superintendent	Log sheet for all inspections detailing the locations inspected, their state and any improvement measures required.

Aspect	Item	Frequency	Success indicator	Person responsible	Reporting (if required)
Training and inductions	The date, nature and person delivering all training, inductions and other workforce communications delivered in relation to this BMP will be recorded and maintained in a site database.	As and when training or inductions take place	Workforce is made aware of commitments and non-compliances are minimised	AGLM Environment Manager	Details of all inductions and training delivered to be outlined in an appendix to the post-construction monitoring report.

7.2 Incidents and reporting

7.2.1 Incidents

In the event of an environmental incident notification of the Planning Secretary will be undertaken as outlined by Appendix 4 of the Development Consent.

Should there be a concern that requirements of this BMP are not being met and/or unauthorised impacts are occurring, the following steps will be undertaken:

1. The Site Superintendent is to be notified
2. The Site Superintendent is to notify the AGLM Project Manager and ALGM Environment Manager as soon as possible
3. The AGLM Project Manager or ALGM Environment Manager will engage a suitably qualified and experienced person(s) to:
    a. investigate the potential non-compliance, and
    b. provide recommendations for remedial action(s), if required.
4. A report is to be prepared for all incidents deemed by the AGLM Project Manager to be actual non-compliances. In accordance with Appendix 4 of the Development Consent, this report must include:
    a. details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident)
    b. how the incident was detected
    c. when the Project team became aware of the incident
    d. any actual or potential non-compliance with conditions of consent
    e. what immediate steps were taken in relation to the incident
    f. further action(s) that will be or have been taken in relation to the incident; and
    g. the relevant Project contact for further communication regarding the incident.
5. Depending on the nature of the non-compliance, the Planning Secretary is to be notified of the incident as soon as possible and in accordance with Appendix 4 of the Development Consent
6. Non-compliances must also be recorded and managed in accordance with the AGLM Corrective and Preventative Actions Procedure (AGLM-HSE-PRO-007, or its latest version).

7.2.2 Pre-clearance reporting

A pre-clearance outcomes report is to be provided to the Planning Secretary after all pre-clearance activities have been undertaken. This will include and outline of:

- All actions taken to check habitat for native fauna and whether any rescues or relocation were required, and their detail (species, number, release locations)
- Identification of habitat resources to be salvaged (e.g. tree hollows, fallen logs etc) and the proposed management of these items during and post-construction
- Any fauna injuries sustained during Project activities, AGLM's response, and the outcome for the animal.

7.2.3 Post-construction reporting

At the completion of construction, a monitoring report is to be prepared by the AGLM Project Manager or ALGM Environment Manager to report on the outcomes and effectiveness of the BMP. This should:

- Provide evidence of the baseline environment in which the project was constructed. This is to be evidenced by photographs and site descriptions, with particular reference to the presence of intact native vegetation and weeds.

- Report on the implementation of all measures outlined in **Table 5-2**. This should outline the effectiveness of the actions implemented and whether any actions were not implemented. Evidence of the implementation of all actions must be presented, where feasible
- Report on the end state of the development site, including any elated ancillary sites. This is to be evidenced by photographs and site descriptions, with particular reference to locations where native vegetation was affected (e.g. where clearing occurred outside of established limits, where approved clearing was not necessary, any off-site impacts to native vegetation).
- Summarise all weed management activities undertaken and report on any new or enlarged weed infestations associated with the Project or occurring near the development site.
- Provide guidance on the ongoing management of the operational project with reference to BMP management actions e.g. focus on weeds that were noted to be particularly prevalent.
- Include photographs taken at each photo monitoring point.

This report should be further updated at the completion of the site management commitment period i.e. after 18 months post-construction. This update would be provided as an appendix to the main report and would provide further detail on the above elements as necessary. This appendix should also update the recommendations for ongoing management of the operational site, as necessary.

7.3 Complaints

Complaints and enquiries will be managed in accordance with the process outlined in the EMS (Section 6.3).

8.0 Audit and review

8.1 Independent environmental audit

This BMP will be audited as part of the Independent Environmental Audit in accordance with the Independent Audit Post Approval Requirements (2020, or its latest version) and Conditions C13 to C18 of the Development Consent (SSD 8889679).

The outcomes of the audit will be detailed in an audit report. The recommendations of the audit report will be implemented to the satisfaction of the Planning Secretary.

Non-compliances will also be managed in accordance with the Corrective and Preventative Actions Procedure (AGLM-HSE-PRO-007, or its latest version).

8.2 Review schedule

The suitability of this BMP will be reviewed within three months of:

- The submission of an incident report to the Planning Secretary
- The submission of an audit report
- The approval of any modification to the conditions of consent
- A direction of the Planning Secretary under condition of consent A3.

Where this review leads to a revision of the BMP, an updated version is to be submitted to the Secretary for approval within 4 weeks of the update being triggered. Once approved by the Planning Secretary the revised BMP is to be implemented.

9.0 Training and inductions

All employees, contractors and supervisors carrying out activities that may affect biodiversity values within the development site must undertake biodiversity awareness training package prior to the commencement of their work.

All employees, contractors and supervisors must be made aware of their legal responsibilities under the BC Act during the site induction process.

At least once fortnightly, workforce communication and toolbox talks must include discussion of the objectives and requirements of this BMP.

The date, nature and person delivering all training, inductions and other workforce communications delivered in relation to this BMP will be recorded and maintained in a site register. This register is to be retained for compliance management and audit purposes

References

AGL Macquarie (AGLM), 2021. Health, Safety and Environmental Management System (HSEMS) for operations at Bayswater and Liddell Power Stations.

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Department of Planning and Environment (DPHI), 2020. Biodiversity Assessment Method. Retrieved from: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf

Department of Planning and Environment (DPHI), 2022. Development Consent under Section 4.38 of the *Environmental Planning and Assessment Act 1979*. Liddell Battery and Bayswater Ancillary Works (SSD 8889679).

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Jacobs, 2021a. Liddell Battery and Bayswater Ancillary Works Project, Biodiversity Development Assessment Report (July 2021).

Jacobs, 2021b. Liddell Battery and Bayswater Ancillary Works Project, Environmental Impact Statement.

Jacobs, 2021c. Liddell Battery and Bayswater Ancillary Works Project, Environmental Impact Statement. Response to submissions.

Jacobs, 2023. Stage 3 BAW Environmental Management Strategy, SSD Post Approval Documentation.

Appendix A

Consultation with CPHR (B8(b))

Appendix A Consultation with CPHR (B8(b))

Bayswater Ancillary Works – Biodiversity Management Plan

Proposed response to CPHR comments, as received 10 April 2025 and 23 June 2025

Condition	Requirement	CPHR Recommendation 10April 2025	AGLM response May 2025	CPHR recommendation 23 June 2025	AGLM response 4 July 2025
Schedule 2 Condition B7	The Applicant must not clear any native vegetation or fauna habitat located outside the approved disturbance areas described in the EIS.	Condition not met. The BMP cross references a Construction Environmental Management Plan (CEMP) in a number of instances, CPHR requests that all actions required to meet the conditions of consent be detailed within the BMP and then referenced accordingly within the CEMP. For example, exclusion zones, or 'No-Go' zones are to be mapped and detailed within the BMP to delineate the total limit of impacts including the location of stockpiles, tree protection zones vehicle/ machine access etc. Otherwise, the CEMP should be provided so that CPHR can check that all relevant requirements have been met.	A figure showing 'vegetation to be retained' and 'no-go zones' has been provided in Appendix D. The CEMP is referenced in the management measures from the Response to Submissions (RtS), which have been included verbatim. Management actions to support these measures have been provided in Table 5-2 of the BMP.	No changes required.	An error was identified in mapping provided in Appendix B. New figures have been included in the BMP (Figure 1 to 5). All land outside the 'Areas subject to Stage 3 BMP' identified in these figures is deemed to be a no-go zone.
Schedule 2 Condition B8	Prior to commencement of native vegetation clearance, unless otherwise agreed by the Secretary, the Applicant must prepare a Biodiversity Management Plan to the satisfaction of the Secretary. This plan must: a) be prepared by a suitably qualified and experienced biodiversity expert/s	No changes required.	No change.	No changes required.	No change.
	b) be prepared in consultation with the CPHR.	No changes required.	No change.	No changes required.	No change.
Schedule 2 Condition B8	c) describe the short, medium and long-term measures to be undertaken to manage vegetation and fauna habitat on the site.	Condition not met. The BMP should clearly indicate the extent of environmental rehabilitation work to occur as part of each stage of works, the proposed management regime and provide performance measures for each rehabilitation area. The BMP must contain detail on how the management actions can be achieved and enable biodiversity values of the site be improved, restored, maintained. Provide further detail to inform the short, medium and long-term measures to be undertaken to manage vegetation and fauna habitat on site. Required amendments include:	Standard practice revegetation of disturbed areas will be undertaken. Management actions and monitoring requirements are included in Table 5-2 and Table 7-1 of the BMP. AGLM have broader rehabilitation requirements at a strategic and whole of site manner where these recommendations would be more appropriately addressed.	Condition not met for long term measures as per previous CPHR advice (DOC25/238840-2) The BMP should clearly indicate the extent of environmental rehabilitation work to occur as part of each stage of works, the proposed management regime and provide performance measures for each rehabilitation area. The BMP must contain detail on how the management actions can be achieved and enable biodiversity values of the site be improved, restored, maintained. Provide further detail to inform the short, medium and long-term measures to be undertaken to manage vegetation and fauna habitat on site. Required amendments include:	As outlined in the BMP, no areas subject to works covered by the Stage 3 BMP are proposed to be revegetated due to the operational nature and location of the activities proposed. Certain areas, such as temporary construction access tracks to the Brine Concentrator Return Pipe, will be reseeded or hydro mulched for stability purposes, but no midstorey or canopy revegetation is proposed, noting that no such vegetation is present in this area. Additional activities approved under this consent may be included in future staged management plans, and will include rehabilitation activities as appropriate to those activities and their location. The long term rehabilitation of the Bayswater PS site would be subject to a future Development Application and subsequent conditions of consent.
		Regeneration technique – The BMP should include detailed methodology to inform the management of vegetation, weeds, fauna habitat and threatened species on site, including timing and schedule. Planting lists are to reflect the appropriate Plant Community Types (PCT) for each zone. Seed/ seedlings obtained for revegetation works shall be sourced from areas of local provenance.	As above	Regeneration technique – The BMP should include detailed methodology to inform the management of vegetation, weeds, fauna habitat and threatened species on site, including timing and schedule. Planting lists are to reflect the appropriate Plant Community Types (PCT) for each zone. Seed/ seedlings obtained for revegetation works shall be sourced from areas of local provenance.	Please see response above.
		Timeframes are to apply to each stage of rehabilitation works. Prepare an appropriate work schedule indicating timeframes required for the completion of each task presenting the tasks in a logical sequence for implementation.	As above	Timeframes are to apply to each stage of rehabilitation works. Prepare an appropriate work schedule indicating timeframes required for the completion of each task presenting the tasks in a logical sequence for implementation.	Please see response above.
		Rehabilitation, maintenance, and monitoring is recommended to be undertaken for a minimum period of 5 years or each stage in all vegetation management zones (VMZs). Ongoing maintenance including weed management, watering, re-planting of dead plants with outcomes maintained in perpetuity. Emergency maintenance (such as following major storm events) are required as soon as practical. Section 7.1 discusses monitoring of a threatened ecological community	As above	Rehabilitation, maintenance, and monitoring is recommended to be undertaken for a minimum period of 5 years or each stage in all vegetation management zones (VMZs). Ongoing maintenance including weed management, watering, re-planting of dead plants with outcomes maintained in perpetuity. Emergency maintenance (such as following major storm events) are required as soon as practical. Section 7.1 discusses monitoring of a threatened	Please see response above.

Condition	Requirement	CPHR Recommendation 10April 2025	AGLM response May 2025	CPHR recommendation 23 June 2025	AGLM response 4 July 2025
		(TEC) patch adjacent to the project, baseline monitoring is to be undertaken within this area and presented within the BMP.		ecological community (TEC) patch adjacent to the project, baseline monitoring is to be undertaken within this area and presented within the BMP.	
		VMZs are to be established to reflect the proposed management activities and objectives across management areas. A description of these zones, PCT to be regenerated, and their objectives and management actions are to be provided and should be supported by a map showing the location and extent of the zones.	As above	VMZs are to be established to reflect the proposed management activities and objectives across management areas. A description of these zones, PCT to be regenerated, and their objectives and management actions are to be provided and should be supported by a map showing the location and extent of the zones.	Please see response above.
		The BMP must identify the specific methods of rehabilitation and restoration and fully address all identified issues relating to the restoration and maintenance of the area within each management zone and is to include: • A description of the area, PCT and the objective for this zone. • Descriptions of the issue e.g., erosion, weed species and cover. • Management strategies and methodology of the works to be implemented. • Measurable performance targets. • Define who is responsible for monitoring the rehabilitation.	As above	The BMP must identify the specific methods of rehabilitation and restoration and fully address all identified issues relating to the restoration and maintenance of the area within each management zone and is to include: • A description of the area, PCT and the objective for this zone. • Descriptions of the issue e.g., erosion, weed species and cover. • Management strategies and methodology of the works to be implemented. • Measurable performance targets. • Define who is responsible for monitoring the rehabilitation.	Please see response above.
		Long term management measures are to include further detail regarding the program to report the effectiveness of any management measures. Target outcomes are to be provided and must be measurable and linked to performance criteria or identify definitive outcomes for specific works that will be reported on. Performance criteria may include, but are not limited to: • The percentage of survival rate of plantings. • The percentage of weed species cover decreased. • The percentage that native species diversity and density has increase. • Amount of required planting density achieved.	As above	Long term management measures are to include further detail regarding the program to report the effectiveness of any management measures. Target outcomes are to be provided and must be measurable and linked to performance criteria or identify definitive outcomes for specific works that will be reported on. Performance criteria may include, but are not limited to: • The percentage of survival rate of plantings. • The percentage of weed species cover decreased. • The percentage that native species diversity and density has increase. • Amount of required planting density achieved.	Please see response above.
		Planting densities to be increased to the following quantities: • 1 x canopy species per 10m squared. • 1 x shrub species per 1m squared. • 4 x ground cover species per 1m squared.	As above	Planting densities to be increased to the following quantities: • 1 x canopy species per 10m squared. • 1 x shrub species per 1m squared. • 4 x ground cover species per 1m squared.	Please see response above.
	d) describe measures to be implemented within the site to minimise: i. the amount of clearing, including investigation of design options to minimise disturbance of native vegetation for the battery energy storage system and decoupling works. ii. impacts on fauna, including undertaking preclearance surveys and maximising the salvage of resources for habitat enhancement. iii. impacts on threatened flora and fauna species or ecological communities within the development footprint and its surrounds. iv. the spread of weeds and fungal pathogens. v. the generation and dispersion of sediment to watercourses. vi. light spill from night works.	Condition not met. The BMP details actions that will be undertaken prior to clearing. These actions are to be undertaken now and presented within the BMP to meet the conditions on consent:		Condition not met. Append to the BMP *Hygiene guidelines - Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants* (DPIE, 2020) as referenced in Table 5-2 W3	The Hygiene guidelines (DPIE, 2020) have been included in Appendix E of the BMP.
		• All habitat features and fauna record locations identified within the environmental impact assessment (EIA) should be detailed within the BMP and included within a corresponding map.	A figure showing habitat features and fauna record locations is included in Appendix C.	• Include mapping of habitat trees as part of habitat features.	No habitat bearing trees were identified within or near areas subject to development covered by the Stage 3 BMP. Should any previously unrecorded habitat trees or resident fauna be recorded during the activities covered by this BMP, the fauna holding protocol would be activated (see Appendix B).
		• All fauna management measures identified in the EIA and to be incorporated into the BMP.	All management measures have been included.		All management measures from the EIA have been included in the BMP.
		• Identification of release locations, which will be mapped prior to clearing. Specify in detail what will happen to displaced threatened fauna, and if it proposes relocation / translocation, then the BMP should provide what measures (e.g. monitoring) will be employed to minimise any detrimental effects on existing faunal populations and adjacent habitat.	Release locations will be at the discretion of the handler and be based on the following principles: • aim for release on AGLM owned land • aim for release as close to original location as practical, within similar habitat. Updated text has been included in Appendix B.		The potential for encountering fauna is expected to be very low. For any fauna that is rescued, the broader AGL-owned site at Bayswater provides numerous suitable locations for release. A decision on the location, timing and circumstances of such releases is intended to be left to the fauna rescuer at the relevant time, who can make the decision based upon relevant information such as weather, other construction activities, and the species' habitat preferences. Text has been further updated in Appendix B to include: • *any releases of HV Delma are to be only within areas identified within the BDAR as suitable HV Delma habitat.*

Condition	Requirement	CPHR Recommendation 10April 2025	AGLM response May 2025	CPHR recommendation 23 June 2025	AGLM response 4 July 2025
		• Comparative habitat assessments conducted on clearing sites and proposed release locations on AGLM owned land to ensure that habitat features are available in the released locations.	As above.	• Comparative habitat assessments conducted on clearing sites and proposed release locations on AGLM owned land to ensure that habitat features are available in the released locations	Please see response above. Additionally, a methodology for pre-clearance surveys and management of fauna interactions during construction has already been provided in the main body of the BMP and Appendix B. No further detail is warranted.
		• Release sites should be identified and mapped prior to clearing and all appropriate approvals granted by the landholders.	As above.	• Release sites should be identified and mapped prior to clearing and all appropriate approvals granted by the landholders.	Please see response above.
		• Identification and demarcation of habitat resources water bodies and habitat trees. (Note: habitat trees are those containing hollows, cracks or fissures and spouts, active nests, dreys or other signs of recent fauna usage. Other habitat features to be identified include fallen timber/hollow logs, burrows, and boulder piles/ rocks). Specific mitigation measures are to be proposed in different habitats.	Figures included in Appendix C and D.		No hollow bearing, habitat trees or other habitat features were identified within or near areas subject to development covered by this BMP (Jacobs, 2021). As such no additional mapping is necessary.
		• Identification of threatened species or habitat features that are suitable for translocation or salvage.	Habitat features that are suitable for relocation or salvage would be identified during preclearance surveys.		Habitat features or threatened species that are suitable for relocation would be identified during pre-clearance surveys and managed in accordance with the specifications of the BMP, including the fauna handling protocol in Appendix B.
		The preclearance survey protocol should be expanded and include the following: • No sooner than 48hrs prior to clearing, a suitably qualified ecologist will undertake preclearing surveys to identify fauna habitats present on site that will require attention during clearing works. Pre-clearing surveys are to identify and clearly demarcate important habitat features such as hollow bearing and habitat trees (HBTs) including trees with nests/ dreys, potential shelter sites, ground habitat debris piles, rocks, coarse woody debris, epiphytes, crevices and/ or standing dead trees.	Text is included in Tables 5-2 and Appendix B.		The protocol for preclearance activities is included in Table 5-2 and Appendix B of the BMP.
		The fauna habitat clearing protocol is to be expanded to include the following: • Immediately prior to clearing, a suitably qualified ecologist will undertake preclearing surveys. Habitat/ hollows identified above for removal is to be inspected by an ecologist immediately prior to clearing to determine if the features are being utilised by fauna. Any fauna located are to be trapped and relocated to adjoining areas not subject to development pressure prior to the tree being felled/ habitat removed. • Any hollow-bearing trees unable to be thoroughly inspected shall be felled in one to two metre sections, beginning at the top of the crown. Lengths cut from the trees shall be in a manner that shall preserve the hollows with each section inspected and appropriately treated to minimise impact to fauna. • Habitat trees are to be 'soft felled' by machinery (excavator or similar). The operator shall tap the tree barrel to alert any resident fauna, followed by a period of waiting/observation of no less than one minute. This is to be repeated as required by the supervising ecologist. • Best practice techniques will be used to minimise impact to the Hunter Valley (HV) Delma. This should include: - active searches immediately prior to clearing (e.g., rock rolling, searching the base of some tussocks) across the broader area. - the placement of artificial cover (e.g., placement of tiles to attract HV Delma) preferably four weeks prior to disturbance of areas where the HV Delma may occur. Four to five days prior to the day of clearing artificial cover should be checked, and any fauna released to an undisturbed nearby area. Note: Further CPHR and/ or expert advice may be required if translocation is proposed (i.e., a process that generally requires an approved translocation plan supported by a scientific license and translocation plan/risk matrix). For example, release areas would preferably be surveyed in accordance with requirements for the HV Delma as outlined in the DPE Threatened reptile BAM survey guidelines to ensure any impact to adjoining population does not occur. • No clearing is to occur at temperatures greater than 35°c to minimise impact to displaced fauna. • Works are to be scheduled outside breeding and torpor season for species likely to occur on site details of which are to be provided.	Text is included in Tables 5-2 and Appendix B.	• Best practice techniques will be used to minimise impact to the Hunter Valley (HV) Delma. This should include: - active searches immediately prior to clearing (e.g., rock rolling, searching the base of some tussocks) across the broader area. - the placement of artificial cover (e.g., placement of tiles to attract HV Delma) preferably four weeks prior to disturbance of areas where the HV Delma may occur. Four to five days prior to the day of clearing artificial cover should be checked, and any fauna released to an undisturbed nearby area. Note: Further CPHR and/ or expert advice may be required if translocation is proposed (i.e., a process that generally requires an approved translocation plan supported by a scientific license and translocation plan/risk matrix). For example, release areas would preferably be surveyed in accordance with requirements for the HV Delma as outlined in the DPE Threatened reptile BAM survey guidelines to ensure any impact to adjoining population does not occur. • Works are to be scheduled outside breeding and torpor season for species likely to occur on site details of which are to be provided.	The protocol for preclearance activities is included in Table 5-2 and Appendix B of the BMP. Appendix B has been updated to include: • *Habitat features or threatened species that are suitable for relocation would be identified during pre-clearance surveys.* Management action V4 from Table 5-2 has been updated to include the following in relation to the potential presence of HV Delma: • *Artificial cover (e.g. tiles) are to be placed in advance of disturbance and checked for the presence of HV Delma prior to works commencing.* Management action F1 from Table 5-2 includes: • *Scheduling of clearing outside of breeding periods (generally September to November).*

Condition	Requirement	CPHR Recommendation 10April 2025	AGLM response May 2025	CPHR recommendation 23 June 2025	AGLM response 4 July 2025
		• Temporary frog proof / exclusion fencing will be installed where near waterbodies to exclude amphibians. • Written notification will be provided to CPHR following implementation of preclearance and clearing protocols completed by the site ecologist advising of any fauna observed or injured fauna particularly of the HV Delma. • Reporting on the effectiveness of measures required under Condition B8 will be provided as part of independent environmental audit reporting requirements.			
	e) include a program to monitor, evaluate and report on the effectiveness of the measures.	To meet this target outcomes must be detailed, measurable and linked to performance criteria or identify definitive outcomes for specific works that will be reported on. Greater detail should be provided regarding monitoring and include specific methodologies and sampling units. Monitoring practices should include the following: Establishment of native revegetation areas including: • Percentage survival rate of plantings. • Overall floristic diversity including percentage cover and abundance. • Weed regrowth and outbreaks including: - Percentage cover of target species. - Identification of any new significant weed species present.		CPHR's previous comment remains outstanding: • Include a measure for overall floristic diversity including percentage cover and abundance in table 7-1 of the BMP	As outlined in the BMP, no areas subject to works covered by the Stage 3 BMP are proposed to be revegetated due to the operational nature and location of the activities proposed. Certain areas, such as temporary construction access tracks to the Brine Concentrator Return Pipe, will be reseeded or hydro mulched for stability purposes, but no midstorey or canopy revegetation is proposed, noting that no such vegetation is present in this area. As such the monitoring of floristic diversity, percent cover and abundance is unwarranted and unnecessary.
		The monitoring reports should include: • Summary of revegetation/weed control works undertaken. • Results of monitoring inspections, including comparison to previous inspections and site assessments, where applicable, and the performance criteria. • Progress of revegetation works. • Locations and extent of new weed infestations • Recommendations and management actions required to address any management issues identified within the conservation area, including planting of additional seedlings if plantings have failed, and target areas, and species, for weed control. • Photographs taken at each photo monitoring point.	Section 7.2.3 has been updated.		No changes required.
Condition 9	The Applicant must implement the Biodiversity Management Plan approved by the Planning Secretary.	N/A		No changes required.	No changes required.

Appendix B

Fauna handling protocol

Appendix B Fauna handling protocol

The purpose of this protocol is to provide guidance with regard to the effective management of native fauna encountered during construction. This protocol seeks to minimise harm to native fauna (e.g. being struck by plant, tools or vehicles) or contact with fauna, including species that may pose a threat to human safety, such as venomous snakes and spiders.

This guideline is designed to provide construction personnel with an understanding of how to avoid and/or minimise construction-related impacts on fauna and fauna habitat

Design considerations

Considering how the temporary and permanent design may affect fauna can significantly reduce detrimental impacts and provide benefits to fauna. 'Fauna friendly' features should be integrated into the design, and may include:

- avoiding impacts to habitat corridors to allow fauna movement
- provision of suitable habitat via landscaping species selection, retention of logs, drainage design etc
- protection of riparian zones
- maintaining fish passage in waterways
- features to facilitate safe fauna movement across, over or under construction or operational sites
- minimising direct disturbance, including lighting, noise and human presence.

Prior to construction

Prior to the commencement of construction, the following fauna management measures should be implemented:

- review the EIA to identify the location of potential fauna habitat and fauna sightings on or adjacent to the site
- incorporate construction fauna management measures identified in the EIA into the site induction, toolbox talk and pre-start meetings
- incorporate fauna management measures identified in the EIA into environmental management plans
- establish contracts with external specialists/agencies to attend the site and remove or relocate fauna. This may be a local suitably qualified fauna handler or an agency such as WIRES.
- protect vegetation not subject to clearing, which may provide habitat for fauna
- install signs clearly identifying areas of potential fauna habitat and preventing access by workers, equipment or materials
- plan construction works with consideration to habitat corridors (connectivity), fauna mobility and nesting times
- undertake fauna pre-clearance survey with the assistance of an ecologist where required.

Pre-clearance surveys

Where required by the EIA, an ecologist should conduct a survey of the area to be cleared before clearing any vegetation. The ecologist is to identify and mark (e.g. with coloured tape or spray paint) any vegetation with fauna habitat potential (ie hollow bearing and habitat trees including trees with nests/ dreys, potential shelter sites, ground habitat debris piles, rocks, coarse woody debris, epiphytes, crevices and/ or standing dead trees) within the clearing boundary and provide recommendations on how to minimise potential impacts to fauna. Habitat features or threatened species that are suitable for relocation would be identified during these surveys.

Such recommendations may include:

- retaining or partially retaining the habitat
- knock tree trunks 24 hours prior to removal to encourage fauna to relocate
- provision of nest boxes in an alternative location
- removal and relocation of fauna
- the need for the ecologist to be present during vegetation clearing, trimming or construction activities within or adjacent to sensitive habitat areas
- 'soft felling' of habitat trees
- salvaging potential fauna habitat, i.e. hollow logs from clearing where possible and reinstating in appropriate locations
- listing any threatened species or habitat trees to be protected and retained on an appropriate project register.

The time between the completion of these surveys and the commencement of works in and around the survey area should be no longer than 48 hours to ensure that the survey results accurately represent the area's habitat profile at the time of the works.

Fauna habitat clearing protocol

Fauna habitat/ hollows identified for removal are to be inspected by an ecologist immediately prior to clearing, to determine if the features are being utilised by fauna.

Any hollow-bearing trees unable to be thoroughly inspected shall be felled in one to two metre sections, beginning at the top of the crown. Lengths cut from the trees shall be in a manner that shall preserve the hollows with each section inspected and appropriately treated to minimise impact to fauna. All habitat trees (whether able to be fully inspected or not) are to be 'soft felled' by machinery (excavator or similar). The operator shall tap the tree barrel to alert any resident fauna, followed by a period of waiting/observation of no less than one minute. This is to be repeated as required by the supervising ecologist.

Any fauna located during pre-clearing inspections or during clearing activities are to be trapped (if possible) and relocated to adjoining areas not subject to development pressure. This should occur prior to the tree being felled/ habitat removed, wherever possible.

All handling of native fauna will be undertaken by an experienced ecologist or wildlife rescuer with an appropriate ethics licence. Release locations will be at the discretion of the handler and be based on the following principles:

- aim for release on AGLM owned land
- aim for release as close to original location as practical, within similar habitat
- any release of HV Delma are to be only within areas identified within the BDAR as suitable HV Delma habitat.

For the Stage 3 Project, particular attention shall be paid to minimising impacts to the Hunter Valley Delma. This should include active searches immediately prior to clearing (e.g., rock rolling, searching the base of some tussocks) across the development site and its immediate surrounds.

During construction

Measures to minimise potential impacts to fauna and fauna habitat as a result of construction activities are identified in the EIA and include the processes outlined above. Typical measures include:

- managing the site to minimise trap hazards and potential burrow/nest areas for fauna. For example, covering trenches, open pits and excavations, covering/stabilising unconsolidated materials and reducing the gradient of uncovered slopes
- implementing the protocol for encounters with fauna to minimise the potential of harm to fauna and site personnel

- providing photographs and information on site notice boards showing local fauna and pests known to occur in the area, particularly threatened fauna
- regularly inspecting the site to monitor compliance with fauna protection measures specified in the BMP
- providing ongoing training (e.g. toolbox talks and pre-start briefings) in response to fauna sightings, fauna-related incidents, or changing project conditions.

Management of encounters with fauna

Encounters with fauna should be managed to minimise potential harm to the fauna and site personnel. The following actions should be undertaken, depending on the nature of the situation:

- if there is potential for site activities to cause harm to the animal, immediately cease activities in the vicinity
- contact the environment manager and site supervisor immediately if fauna is spotted on site
- where an animal is traversing the worksite, avoid any contact, and allow it to exit the site without the need for further action
- no fauna is to be fed by any construction staff
- if the animal is potentially dangerous (e.g. poisonous snake or spider), cease activities and immediately advise all personnel to leave the area
- if the animal is trapped, injured or shows signs of distress or disease, or is potentially dangerous, contact the Project Ecologist or WIRES to remove and/or treat the animal
- veterinarian advice should be sought for any injured animals. If possible, keep the injured animal in a box in a quiet, warm, dark place until transferred to the care of the licensed handler. If the animal is dangerous section off the area and wait for a licensed handler to arrive
- any harm caused to an animal by construction activities or personnel, particularly threatened species, is an environmental incident requiring reporting and investigation.

Pest management

Pests compete with native fauna for food sources and habitat, may cause direct harm to native fauna through predation, and can cause health risks for humans. Early detection of pest incursions and rapid response is the most efficient form of control. The following actions should be implemented:

- ensure the site is maintained free from food waste, food containers and construction waste that may attract pests
- monitoring for the presence of pests and introduced fauna and contacting relevant specialists/agencies (e.g. local council) for removal, as required.

Habitat management

Native habitat, whether aquatic or terrestrial, provides shelter, food, protection from predators and breeding areas for native fauna. The management of habitat extends beyond minimising direct impacts on fauna and includes:

- protecting and managing vegetation within or near the development site
- managing weed species to prevent infestations
- locating hazardous material storage away from environmentally sensitive areas and waters and ensuring effective spill response
- preventing pollution and contamination through plant and equipment inspections, refuelling and maintenance in designated areas
- preventing water pollution through the implementation and maintenance of effective erosion and sediment controls

- managing bushfire risk by appropriately managing (and minimising) potential fuel sources, waste and excessive undergrowth in high-risk areas (refer to the bushfire management plan, where applicable).

Record keeping

Records of significant fauna interactions should be documented using the appropriate incident reports and project registers. A significant interaction includes the discovery, rescue and/or relocation of an injured animal, interactions with dangerous animals (e.g. snakes) or observations of threatened species within or adjacent to the project footprint.

Records of all fauna surveys and specific fauna management actions on site must be kept. This includes:

- Results of pre-survey clearance inspections including any fauna observed,
- Details of any relocations required, including species and release location
- Details of habitat features salvaged, and the fate of these features at the end of construction
- Any fauna injuries on site, whether or not caused by Project activities, including action taken and the outcome for the animal
- An outline of any environmental incidents that may have resulted in impacts to fauna, whether or not fauna was directly observed to be affected e.g. spills.

Reporting

Written notification will be provided to CPHR following implementation of pre-clearance and fauna habitat clearing protocols completed by the site ecologist advising of any fauna observed or injured fauna, particularly the Hunter Valley Delma.

Reporting on the effectiveness of measures required under Condition B8 will be provided as part of independent environmental audit reporting requirements.

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Appendix C

Biodiversity map

Appendix C Biodiversity map

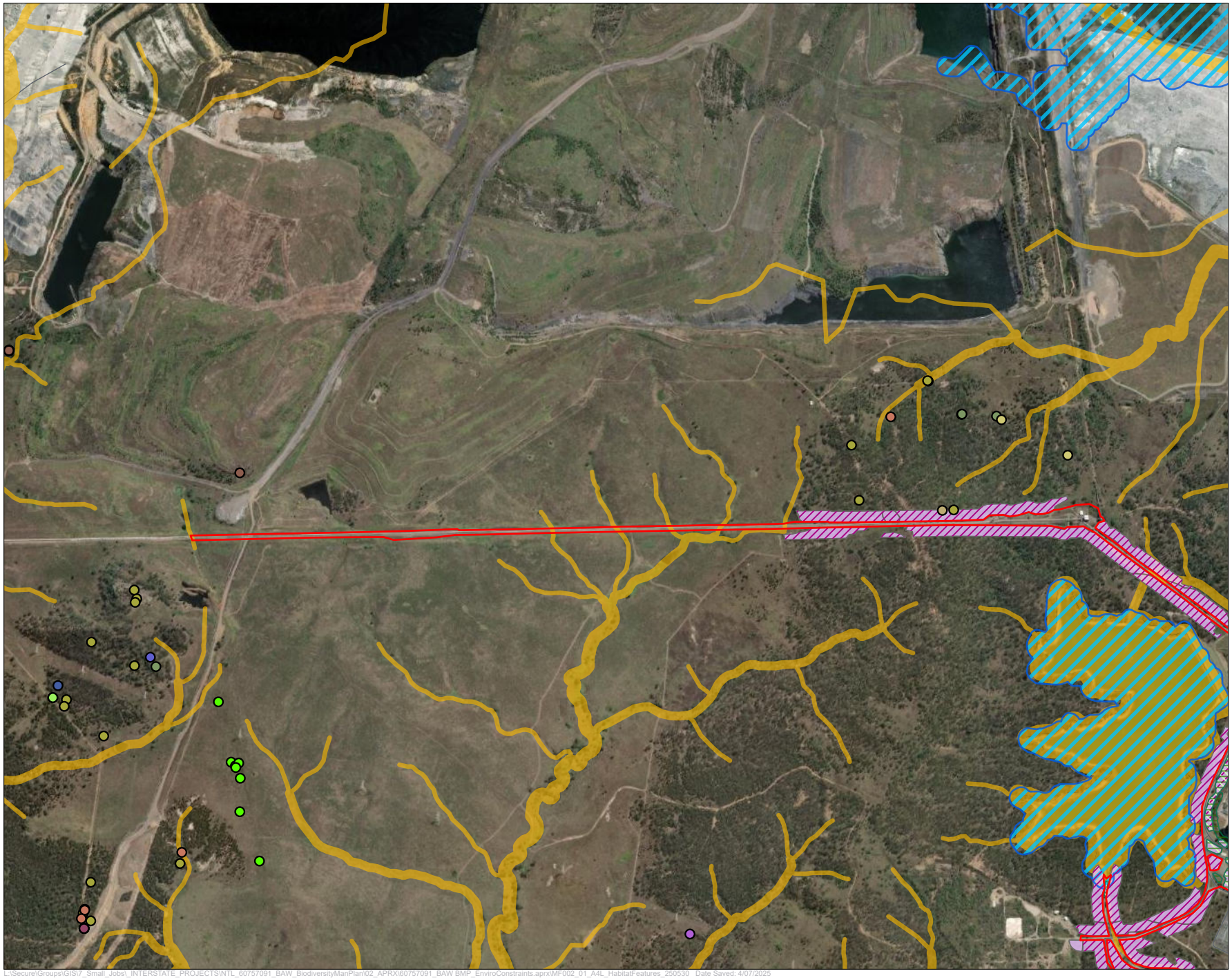

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FIGURE 2/ - HABITAT FEATURES

Legend

- Development Site
- Riparian Corridoor
- Key Fish Habitat

BioNet Atlas threatened species sightings

- Dusky Woodswallow
- Eastern Coastal Free-tailed Bat
- Eastern False Pipistrelle
- Flame Robin
- Greater Broad-nosed Bat
- Grey-crowned Babbler (eastern subspecies)
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Bent-winged Bat
- Little Lorikeet
- Painted Honeyeater
- Speckled Warbler
- Spotted-tailed Quoll
- Squirrel Glider
- Striped Legless Lizard
- Varied Sittella
- White-bellied Sea-Eagle
- Yellow-bellied Sheathtail-bat

Threatened species polygon

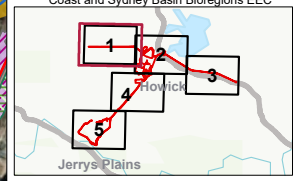
- Southern Myotis habitat
- Hunter Valley Delma habitat

Threatened ecological communities (EPBC Act)

- Central Hunter Valley eucalypt forest and woodland CEEC

Threatened ecological communities (BC Act)

- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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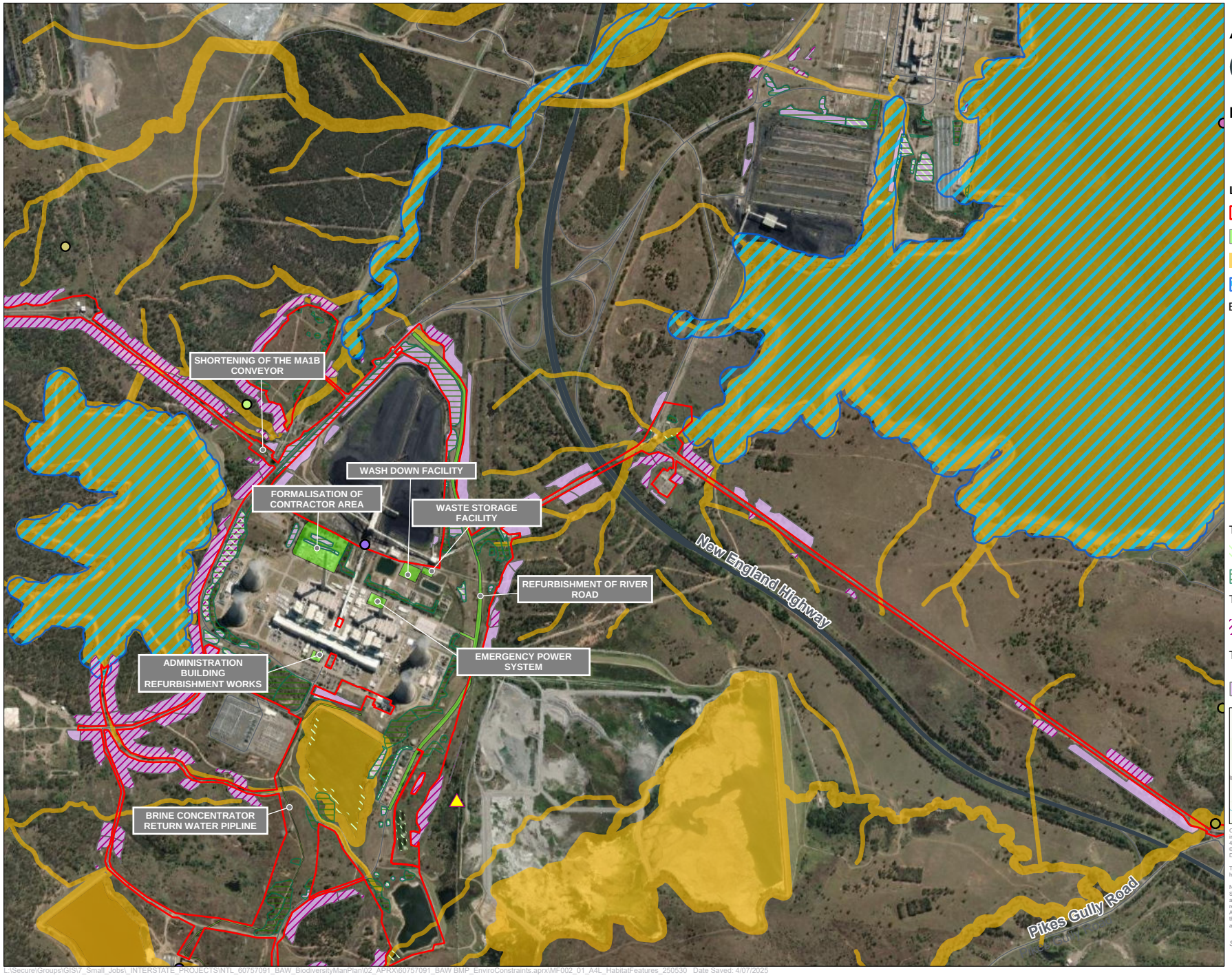

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FIGURE 2/2 - HABITAT FEATURES

Legend

- Development Site
- Areas subject to Stage 3 BMP
- Riparian Corridor
- Key Fish Habitat

BioNet Atlas threatened species sightings

- Freckled Duck
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Hooded Robin (south-eastern form)
- Little Lorikeet
- Slaty Red Gum
- Speckled Warbler
- Southern Myotis record

Threatened species polygon

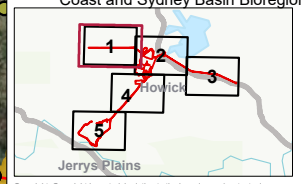
- Southern Myotis habitat
- Hunter Valley Delma habitat

Threatened ecological communities (EPBC Act)

- Central Hunter Valley eucalypt forest and woodland CEEC

Threatened ecological communities (BC Act)

- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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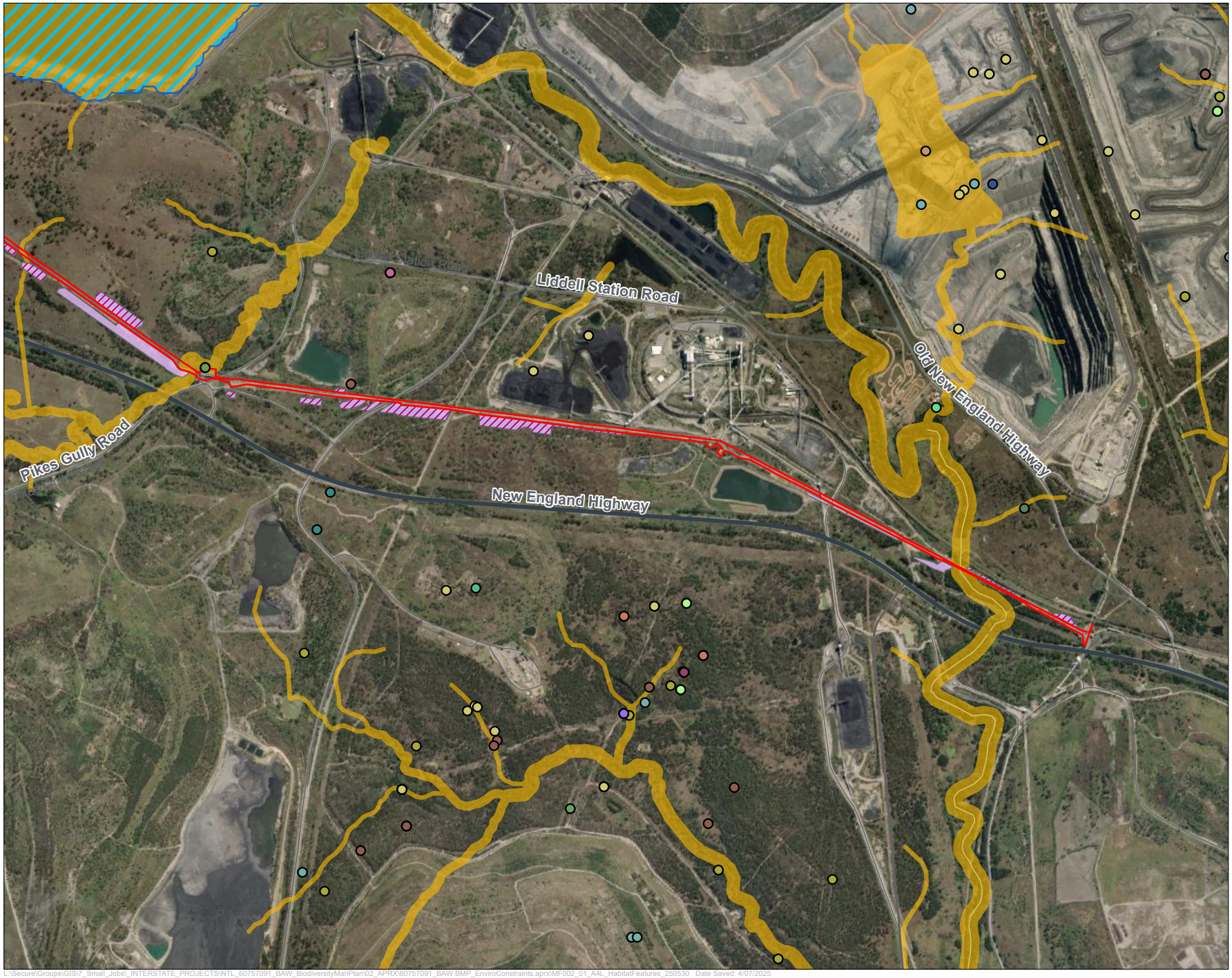

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FIGURE 2/3 - HABITAT FEATURES

Legend

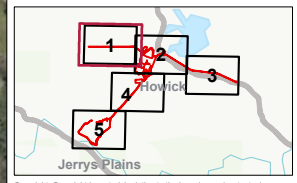
- Development Site
- Riparian Corridoor
- Key Fish Habitat

BioNet Atlas threatened species sightings

- Acacia pendula population in the Hunter catchment
- Black Falcon
- Blue-billed Duck
- Brown Treecreeper (eastern subspecies)
- Cymbidium canaliculatum population in the Hunter Catchment
- Eastern Cave Bat
- Eastern Coastal Free-tailed Bat
- Eastern False Pipistrelle
- Eastern Grass Owl
- Eucalyptus camaldulensis population in the Hunter catchment
- Greater Broad-nosed Bat
- Green and Golden Bell Frog
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Hooded Robin (south-eastern form)
- Large Bent-winged Bat
- Little Eagle
- Masked Owl
- Southern Myotis
- Speckled Warbler
- Spotted Harrier
- Spotted-tailed Quoll
- Varied Sittella
- White-bellied Sea-Eagle
- Yellow-bellied Sheathtail-bat
- Hunter Valley Delma habitat

Threatened ecological communities (EPBC Act)

- Central Hunter Valley eucalypt forest and woodland CEEC



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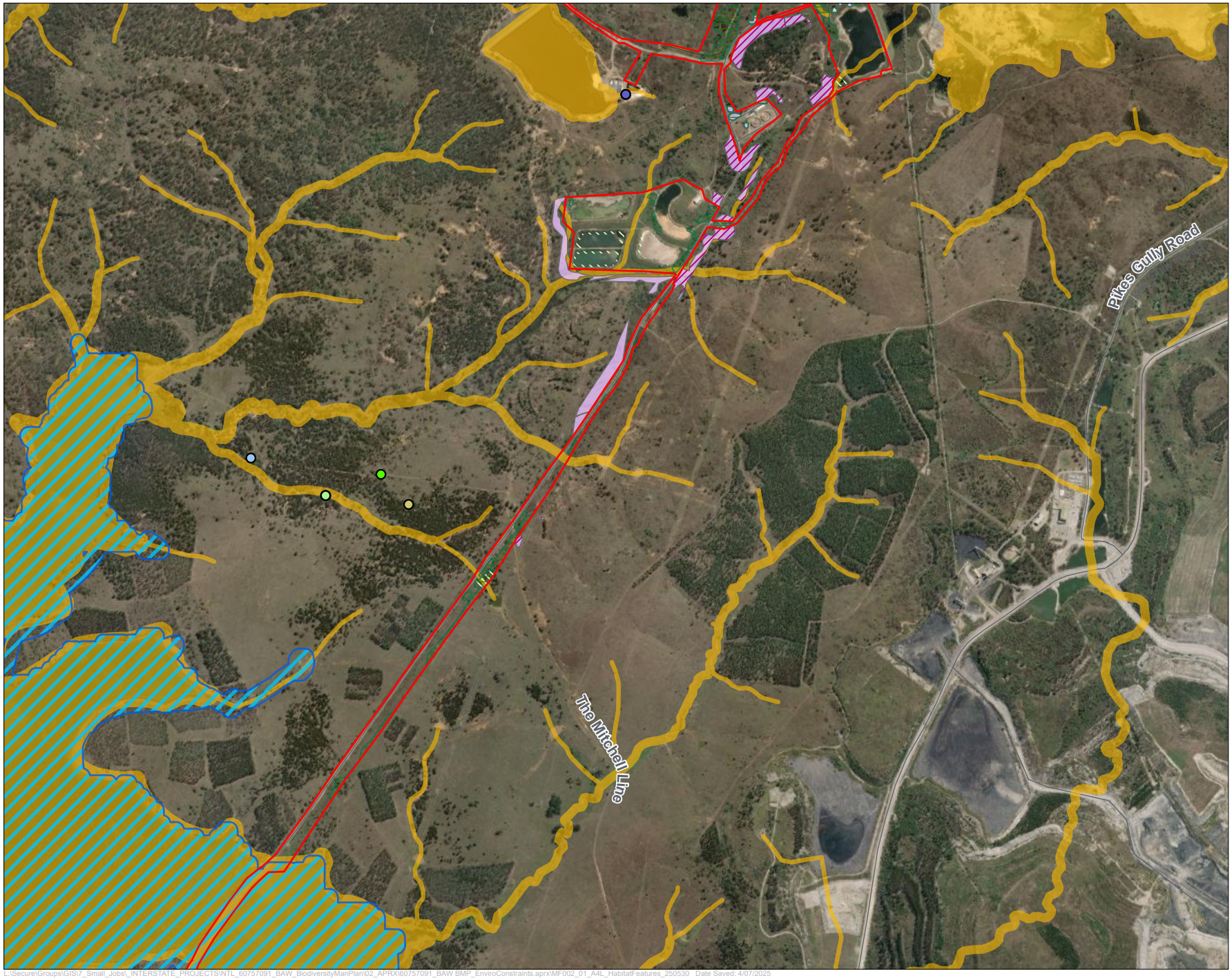

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FIGURE 2/ - HABITAT FEATURES

Legend

- Development Site
- Riparian Corridoor
- Key Fish Habitat

BioNet Atlas threatened species sightings

- Dusky Woodswallow
- Eastern Coastal Free-tailed Bat
- Eastern False Pipistrelle
- Flame Robin
- Greater Broad-nosed Bat
- Grey-crowned Babbler (eastern subspecies)
- Koala
- Large Bent-winged Bat
- Large-eared Pied Bat
- Little Bent-winged Bat
- Little Lorikeet
- Painted Honeyeater
- Speckled Warbler
- Spotted-tailed Quoll
- Squirrel Glider
- Striped Legless Lizard
- Varied Sittella
- White-bellied Sea-Eagle
- Yellow-bellied Sheathtail-bat

Threatened species polygon

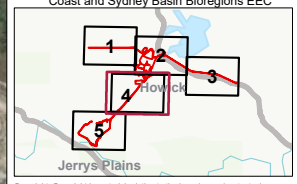
- Southern Myotis habitat
- Hunter Valley Delma habitat

Threatened ecological communities (EPBC Act)

- Central Hunter Valley eucalypt forest and woodland CEEC

Threatened ecological communities (BC Act)

- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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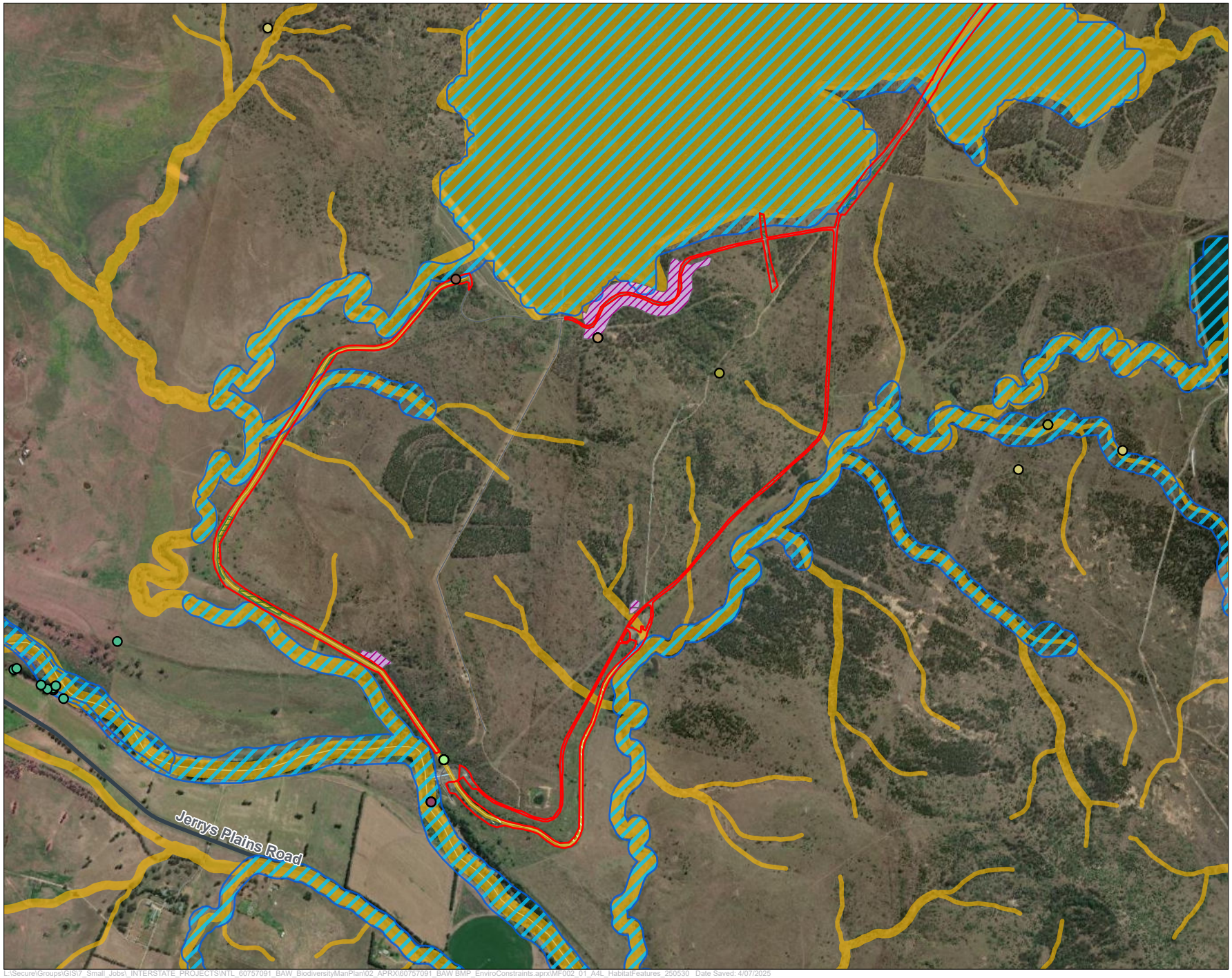

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FIGURE 2/ - HABITAT FEATURES

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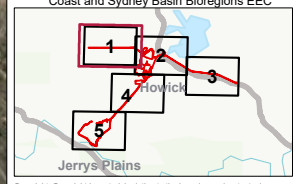
- Central Hunter Grey Box – Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions EEC



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Appendix D

Hygiene guidelines (DPIE, 2020)

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NSW GOVERNMENT

SAVING OUR SPECIES

Hygiene guidelines

Protocols to protect priority biodiversity areas in NSW from *Phytophthora cinnamomi*, myrtle rust, amphibian chytrid fungus and invasive plants

environment.nsw.gov.au/sos

Cover photo: Wollemi pine (*Wollemia nobilis*). Rosalie Nicolai/DPIE

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Foreword

This document sets out guidelines to reduce the risks of introducing pathogens (*Phytophthora cinnamomi*, myrtle rust and chytrid fungus) and invasive plants into new areas of New South Wales, especially those with susceptible threatened species, threatened ecological communities and areas of outstanding biodiversity value. The procedures in this document can also be applied to protect non-threatened species.

These guidelines promote the adoption of basic hygiene procedures into daily routines when working in the field. They are simple procedures to ensure potentially-contaminated material is not transferred to a new, susceptible area.

Under select circumstances, more strict hygiene procedures are recommended. These circumstances include when a general biosecurity eradication or containment effort is underway or when undertaking activities that could expose susceptible threatened species, threatened ecological communities or areas of outstanding biodiversity value to a new threat. Strict hygiene procedures are similar to the basic measures but include more thorough cleaning or disinfection.

These protocols and their application should be reviewed five years from the date of publication or if significant new information becomes available.

This document was developed as part of the NSW Government's *Saving our Species* program.

Who should use this guide?

This guide should be used by NSW Department of Planning, Industry and Environment (DPIE) employees, and contractors and volunteers undertaking works on behalf of DPIE, on public or private land.

This guide may also be used by private individuals or businesses working in conservation and revegetation, agriculture, construction, forestry, other primary industries or fields involving work in the agricultural or natural environments.

How to use this guide

Follow the steps below to determine which hygiene measures you should incorporate into your work plan. Clicking on an underlined word or phrase will take you to the relevant section of this document.

1. Read the section on planning considerations. This section provides information on what is likely to influence the risks a certain activity poses, but will not affect the level of hygiene recommended.
2. Read the section on determining your hygiene requirements, and review Appendix B and Appendix C to identify whether any species you are working with or near are susceptible to *Phytophthora cinnamomi* or myrtle rust infection. For *Phytophthora cinnamomi* and myrtle rust, use Decision tree 1 for Phytophthora and myrtle rust to determine which protocols are suitable for your work. If you are working on an island, use Decision tree 2 for visiting or working on islands. For invasive plants and amphibian chytrid fungus (*Batrachochytrium dendrobatidis*), there are set protocols that should be applied in all circumstances.
3. Incorporate the relevant procedure(s) into your work activities.

Useful tools in this document

A list of species known to be susceptible to *Phytophthora cinnamomi* infection can be found at Appendix B.

A list of species known to be susceptible to myrtle rust infection can be found at Appendix C.

Lists of significant invasive non-native plants can be found at Appendix A and Appendix D.

Additional advice for working with and handling amphibians can be found at Appendix E.

A template for a hygiene management plan can be found at Appendix F.

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Introduction

Purpose

This document provides guidance for people undertaking activities that have the potential to spread or introduce specific pathogens or invasive plant propagules in the natural environment of New South Wales. The protocols outlined in this document are recommended to ensure the risks of spreading pathogens and invasive plants are effectively managed to protect biodiversity in New South Wales.

Objective

The objective of these guidelines is to outline hygiene practices that can help avoid or minimise introduction of pathogens or invasive plants to areas in New South Wales with threatened species and threatened ecological communities. The guidelines were developed to address the following key threatening processes (KTPs) listed under the *Biodiversity Conservation Act 2016* (BC Act):

- infection of native plants by *Phytophthora cinnamomi*
- introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae (myrtle rust)
- infection of frogs by amphibian chytrid causing the disease chytridiomycosis (chytrid fungus).

These guidelines can also be applied to invasive plant-related KTPs (see Invasive plants) and invasive plants identified in National Parks and Wildlife Service branch pest management strategies. They may also have relevance to other disease and pest (including invertebrate and microbial pest) organisms, particularly those borne in soil or water, although these may require additional case-specific protocols (see Biosecurity Hotline contacts below).

The protocols in this document are also relevant to a number of KTPs listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Use of these guidelines may also reduce the risk from a number of pathogens and diseases yet to arrive in Australia, but assessed as being likely to do so and of high environmental risk (see Priority list of exotic environmental pests and diseases, last reviewed 4 February 2020).

For more general information on managing disease risks in wildlife, including hygiene recommendations, see the National Wildlife Biosecurity Guidelines (PDF 2.3MB) (Wildlife Health Australia 2018).

Scope and application

In New South Wales, the most practical, outcomes-based approach to hygiene is to focus on protecting areas that are: (1) not infested, (2) habitat for threatened species and threatened ecological communities, and (3) not subject to high visitation by people. The protocols in this document can help to achieve this for *Phytophthora cinnamomi*, myrtle rust, chytrid fungus and invasive plants. They may also be useful in reducing risks associated with other pathogens. In the latter case, further information about the risks of transmission will help determine when and where the protocols should be applied.

Some sites or projects may require a specific hygiene management plan. If a hygiene management plan has been developed for your site or project, that plan should take precedence. This document is a guide and should not replace the development of specific hygiene management plans for areas, sites and projects. A template for a hygiene management plan can be found at Appendix F. The template can be used to record the specific hygiene actions for your work.

Hygiene measures should be applied by people working in areas of high biodiversity importance across New South Wales, where appropriate (see Determining your hygiene requirements). People working with Bellinger River snapping turtles (*Myuchelys georgesi*) in the Bellinger River may need to take extra hygiene precautions due to the presence of Bellinger River virus. Those people should first contact the NSW Department of Primary Industries Aquatic Biosecurity Hotline on 02 4916 3877 or 131 555 or by email to confirm what hygiene precautions they should take.

This document does not:

- address biosecurity risks associated with handling animal biological samples, carcasses and waste (see the National Wildlife Biosecurity Guidelines (Wildlife Health Australia 2018) for general information on managing those risks)
- address the risks that native and pest animals play in transferring pathogens and invasive plants between locations, but acknowledges that control of pest animals may be important in reducing the spread of pathogens and invasive plants in some landscapes
- provide species-specific guidance for invasive plants
- replace the benefit or need for developing tailored landscape-, project- or site-specific hygiene management strategies for pathogens and invasive plants.

Pathogens

Pathogens are organisms that can cause disease, and they have the potential to cause significant declines in species and disrupt ecological communities. Preventing entry of pathogens is always the most cost-effective management strategy; however, when pathogens are detected, eradication should be the next option considered, followed by containment (when eradication is not feasible). When containment is not feasible, protecting susceptible threatened species, threatened ecological communities and areas of outstanding biodiversity value is of paramount importance.

Phytophthora cinnamomi

Phytophthora cinnamomi (Phytophthora) is a soil-borne water mould that attacks the roots of susceptible plants, destroying the root system and reducing the ability of the plant to conduct water and nutrients, which can sometimes kill the infected plant (Makinson 2018b).

Any activity that moves soil or plant matter can spread Phytophthora. Clothing, equipment, footwear and vehicles that can carry soil are potential vectors for transmission (NSW TSSC 2011). In most situations, Phytophthora is impossible to eradicate from infested areas, so the current approach to management aims to prevent its introduction to unaffected areas to protect threatened species and ecological communities that are most at risk.

The development of phytosanitary protocols to reduce risks of spreading Phytophthora is a strategic objective of the draft *Saving our Species* (SoS) Phytophthora KTP strategy. This document directly addresses that objective.

Other *Phytophthora* species (e.g. *P. aggregate*, *P. multivora*) are emerging as threats to biodiversity in New South Wales. They have similar dispersal characteristics to *P. cinnamomi* and so the application of hygiene measures outlined in this document will be effective in also containing their spread.

Myrtle rust

Myrtle rust is a disease caused by the fungus *Austropuccinia psidii* (Beenken 2017; Makinson 2018b). It affects trees and shrubs in the Myrtaceae family by attacking young, soft, actively-growing leaves, shoot tips, young stems, fruits and flower parts.

The primary vector of myrtle rust at local and intermediate scales is wind (Makinson 2018b; Pegg et al. 2014); however, myrtle rust spores can quickly spread via people on contaminated clothing, footwear, tools, vehicles and machinery, as well as on animals. While good hygiene practices cannot control the spread of myrtle rust by wind, they can help slow the spread by people to areas that are not yet infested.

The hygiene management approach outlined in this document is consistent with Action 2 of the Management plan for myrtle rust on the national parks estate (PDF 1.4MB) to limit the spread of myrtle rust from infested sites and limit the introduction of myrtle rust to non-infested sites (OEH 2015). No hygiene actions have been identified in the draft SoS myrtle rust KTP strategy; nevertheless, it is important to enact due diligence and ensure it is not spread to areas with susceptible species through poor hygiene. The protocols set out in this document are also consistent with the draft action plan for myrtle rust in Australia (Makinson 2018a).

Amphibian chytrid fungus

Amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) is a fungal pathogen that causes the disease chytridiomycosis, which has led to the decline and extinction of frog populations globally and in Australia (OEH 2018). Chytridiomycosis has been detected in over 40 species of native Australian frogs (DECC 2008).

The fungus is transferred by direct contact between frogs and tadpoles or via zoospores in infected water (OEH 2018). Humans can spread the disease by contaminated footwear and equipment and by (illegally) moving frogs from one area to another.

Batrachochytrium dendrobatidis is listed as prohibited matter under the *Biosecurity Act 2015*. Consequently, it is an offence to knowingly spread chytrid in New South Wales. Implementing the protocols detailed in this document will help people to carry out their general biosecurity duty to prevent, eliminate or minimise risk posed by chytrid fungus.

The protocols outlined in this document replace the *Hygiene protocol for the control of disease in frogs* (DECC 2008).

Invasive plants

Invasive plants are (generally) non-native to Australia and have an adverse effect on, or are suspected of having an adverse effect on, the environment, the economy or the community (Biosecurity Act). The financial impact of invasive plants in New South Wales on agriculture alone is approximately $4.3 million every year (DPI 2017). Impacts on the environment have not been quantified but are likely equal to or greater than those on agriculture. Many invasive plants can occupy natural areas and disturb ecosystems by altering plant and animal community composition, nutrient cycles and fire regimes (DoE 2015).

Invasive plants can be spread by dispersal of seed and vegetative material on wind, animals, waterways and people (via contaminated clothing, hats, footwear, tools, equipment, machinery and vehicles; DoE 2015). Although non-human vectors are difficult to control, the dispersal capacity of humans can be reduced by modifying behaviour. Implementing hygiene protocols will assist with controlling the spread of invasive plants by preventing the transportation of plant material that is capable of proliferating in new sites. The primary approach to preventing spread of invasive species is through effective project planning and cleaning of clothing, equipment and vehicles.

The following KTPs under the BC Act involve one or more invasive plant species:

- invasion and establishment of exotic vines and scramblers
- invasion and establishment of Scotch broom (*Cytisus scoparius*)
- invasion, establishment and spread of lantana (*Lantana camara* L. *sens*. *lat*.)

- invasion of native plant communities by African olive *Olea europaea* subsp. *cuspidata* (Wall. ex G. Don) Cif.
- invasion of native plant communities by *Chrysanthemoides monilifera*
- invasion of native plant communities by exotic perennial grasses
- loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

Some invasive plants may be subject to targeted eradication or containment programs and may have increased hygiene requirements. Outside of those programs, the procedures in these guidelines can be used to reduce the likelihood of spreading invasive plants to new areas.

Invasive plants in New South Wales are regulated under the *Biosecurity Act 2015*. The Biosecurity Act establishes the concept of a 'general biosecurity duty', which requires that any person who deals with (e.g. possesses, breeds, propagates, moves, displays, acquires) a plant and knows (or ought to know) of any biosecurity risks associated with the plant, has a duty to ensure the risk is prevented, eliminated or minimised, as far as is reasonably practical.

Some invasive plants are listed as 'prohibited matter' under the Biosecurity Act. Invasive plants that are prohibited matter are more heavily-regulated than other invasive plants. Any dealing with prohibited matter (including movement) in New South Wales is an offence. Any person who becomes aware of or suspects the presence of prohibited matter must notify the Department of Primary Industries immediately on 1800 680 244 or by email at weeds@dpi.nsw.gov.au. Visit NSW WeedWise for details of the biosecurity duties for each invasive plant species.

See Appendix D for a list of invasive non-native plants that are listed as prohibited matter. You can contact the Botanical Information Service (Royal Botanic Gardens and Domain Trust) at botanical.is@rbgsyd.nsw.gov.au to confirm plant identification and lodge voucher specimens in the National Herbarium of New South Wales.

Hygiene management

Hygiene refers to specific measures to prevent the spread of pathogens and invasive plant propagules by removing seeds, spores, contaminated soil, water, and organic materials from machinery, vehicles, equipment, footwear and clothing.

The appropriate level of hygiene (basic or strict) is dependent on whether the location is already infested and whether you are working near any susceptible threatened species, threatened ecological communities or declared areas of outstanding biodiversity value, as well as any non-listed species known to be highly susceptible to a pathogen or threat process (susceptible high-risk entities). A list of known susceptible high-risk entities can be found at Appendix B (for *Phytophthora cinnamomi*) and Appendix C (for myrtle rust).

Where a pathogen is not present at a site but there are susceptible animals or plants present, hygiene measures should be more stringent.

Maintaining good hygiene is consistent with the management principles for national parks, historic sites, state conservation areas, regional parks, karst conservation areas, nature reserves and Aboriginal land set out in the *National Parks and Wildlife Act 1974*. Those management principles include conserving natural values and conserving biodiversity, maintaining ecosystem function and maintaining natural landscapes.

Good hygiene standards are also consistent with the national standards for implementing ecological restoration activities (Standards Reference Group SERA 2017).

Planning considerations

Below is a list of factors that can decrease the likelihood of transmitting pathogens and invasive plants. It is not intended as a list of activities prescribed by this document for all circumstances (because they may be impractical in many cases) but can help readers recognise risk factors when planning and undertaking their work.

Factors that can reduce the risk of introducing or spreading pathogens or invasive plants include:

- scheduling work during dry weather (and not immediately following wet weather) to reduce adhesion of soil to footwear, clothing, equipment and vehicles
- (when working across multiple field sites) visiting known non-infested sites first, followed by sites with unknown infestation status and lastly sites known to be infested
- scheduling activities so they do not immediately follow warm, moist conditions (which are favourable for spore production) or during times of peak seed production by invasive plants
- restricting movement of soil and plant material to and from a site
- keeping vehicles, machinery and people to dry surfaces, formed roads and walking trails
- maintaining drainage to prevent flooding or pooling
- planning to use methods that minimise soil disturbance.

Additional planning considerations for fire management work

The primary focus of emergency bushfire operations is the protection of life and property. It is rarely practical to implement strict hygiene procedures under those circumstances; however, it is advisable to maintain a basic level of hygiene wherever practical to reduce the spread of plant pathogens.

For non-emergency fire management practices (e.g. prescribed burning, firebreak construction and maintenance), appropriate hygiene measures should be incorporated. We recommend using Decision tree 1 and/or Decision tree 2 (when relevant) to identify suitable hygiene measures before undertaking fire management activities.

There are additional fire management planning actions that can be considered to reduce risks of spreading plant pathogens and invasive plants. These include:

- avoiding construction of firebreaks near susceptible threatened species and threatened ecological communities, where practical and where it does not increase risk to life and property
- constructing firebreaks in areas with good drainage
- preferentially burning areas bound by well-formed hard surfaces.

Determining your hygiene requirements

During the project planning phase, it is important to determine whether basic or strict hygiene protocols are appropriate. For example, when working in areas unsuitable for establishment of a pathogen or invasive plants, it may not be necessary to implement strict hygiene measures. Basic hygiene protocols should always be applied at a minimum.

You can use the hygiene management plan at Appendix F to summarise the relevant risks and record the recommended hygiene measures for your project.

Phytophthora cinnamomi

Phytophthora cinnamomi (Phytophthora) establishment typically occurs in areas with warm conditions (optimal spore production occurs at 24–25°C under laboratory conditions; Nesbitt et al. 1979) and average annual rainfall of >500 millimetres (*Phytophthora* Technical Group 2006). In New South Wales, Phytophthora has established in the following Local Land Services regions:

- Greater Sydney (including the Greater Blue Mountains World Heritage Area; Newby 2014)
- Hunter
- North Coast
- Northern Tablelands
- Central Tablelands
- South East.

Phytophthora is also present in parts of the Central West, Riverina and Murray regions.

Strict hygiene measures are recommended at sites in these regions where:

- susceptible high-risk entities exist
- Phytophthora is not present
- there is no public access OR there is public access with hygiene measures already in place (e.g. boot-cleaning stations)
- environmental conditions are conducive to the establishment of Phytophthora.

The aim of this approach is to reduce the introduction of Phytophthora to non-infested areas.

Decision tree 1 can help you determine your hygiene requirements with respect to Phytophthora; however, if working on an island, see Visiting or working on islands.

Myrtle rust (*Austropuccinia psidii*)

There are varied reports of climatic preferences for myrtle rust spore germination (Makinson 2018b). For example, Kriticos et al. (2013) found that laboratory germination occurred between 8.8 and 29.7°C, but was optimal between 12 and 20°C. Ruiz et al. (1989) reported a thermal tolerance range of 5–25°C on a eucalypt host. Myrtle rust prefers moist environments and incidence tends to decrease during dry periods (Carnegie et al. 2016).

Myrtle rust has established throughout coastal New South Wales (including some areas of the lower Blue Mountains) and spores are likely to have spread throughout almost all moist terrestrial habitats in the region due to high dispersal capacity by wind (DPI 2015). Consequently, it is not always practical or cost-effective to implement strict hygiene procedures for myrtle rust in this region.

Hygiene measures can go some way to reducing the spread of myrtle rust to some non-infested areas such as potential habitat on or west of the Great Dividing Range in New South Wales and jurisdictions not yet affected by myrtle rust (e.g. South Australia and Western Australia). Before travelling to other states and territories not affected by myrtle rust, you should launder all of your fieldwork clothes if you have been working in an area infested with myrtle rust.

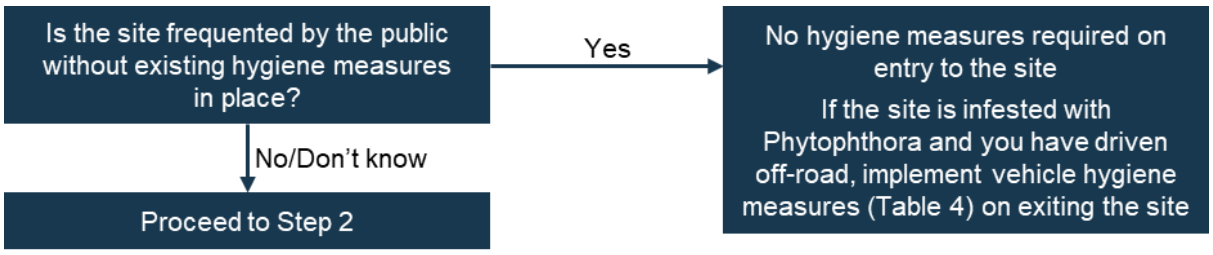
The far south-west of Western Australia contains approximately 40% of Australia's myrtaceous species (Makinson 2018b). Consequently, if introduced, myrtle rust has the potential to cause significant damage to the region. The continued exclusion of the pathogen from south-west Western Australia is a national biosecurity priority.

Decision tree 1 can help you determine your hygiene requirements with respect to myrtle rust; however, if working on an island, see Visiting or working on islands.

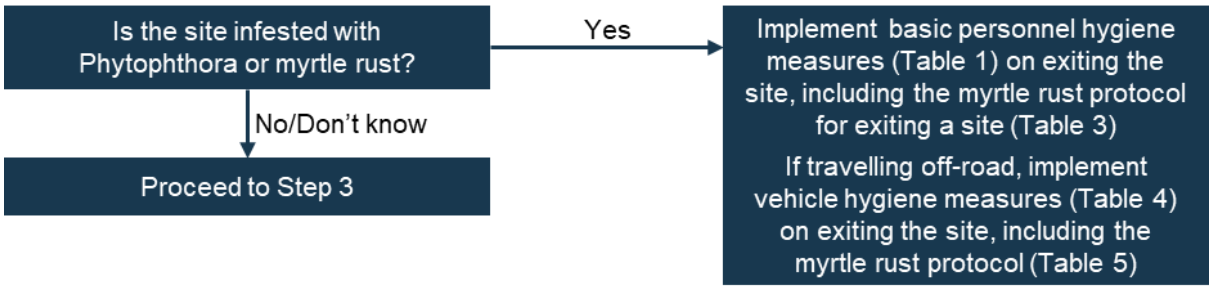
Decision tree 1: Phytophthora and myrtle rust

This decision tree should only be used when there is no site-specific hygiene protocol for the area you are visiting or working in.

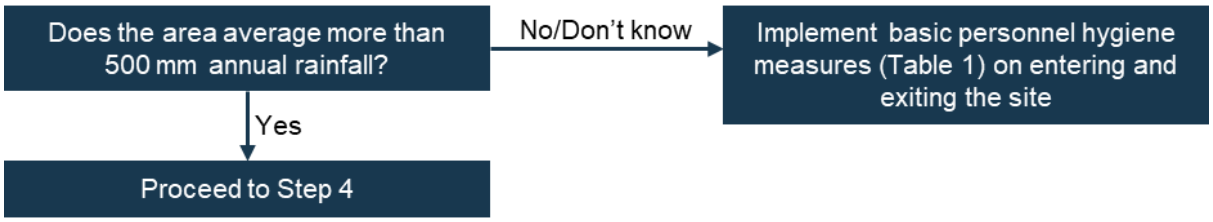
Step 1: Determine nature of public access



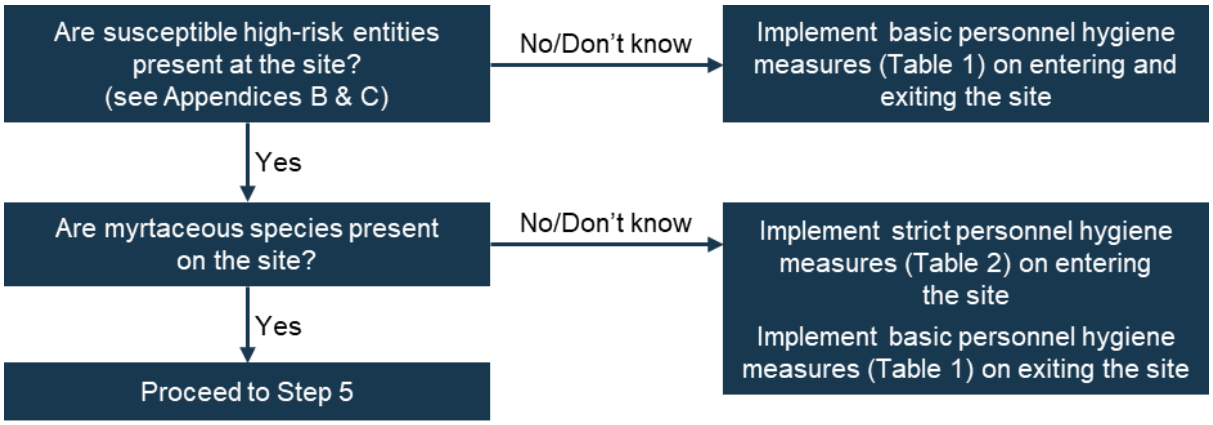
Step 2: Determine presence of Phytophthora or myrtle rust



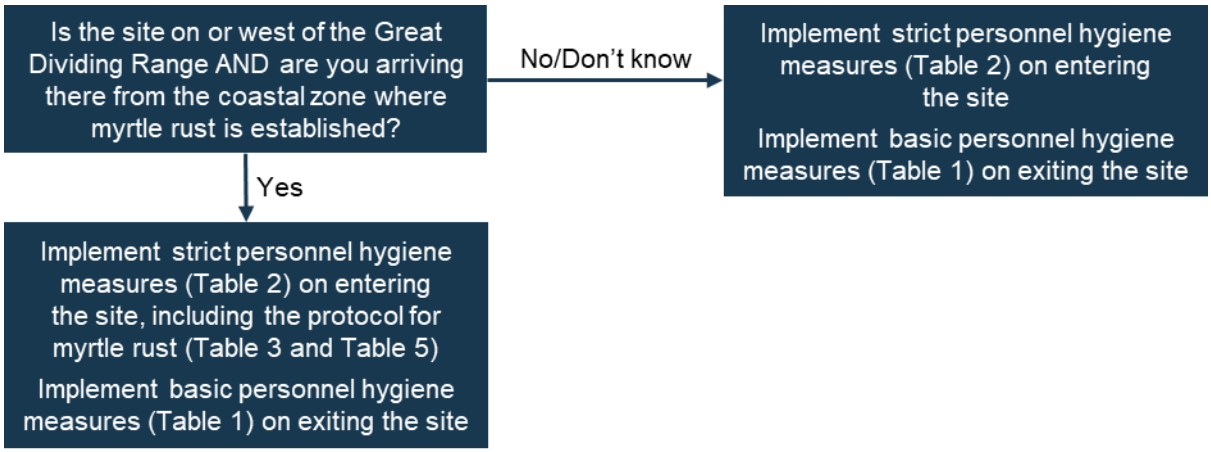
Step 3: Determine average annual rainfall



Step 4: Determine presence of susceptible entities and/or myrtaceous species



Step 5: Determine risk of spread of myrtle rust to or beyond the Great Dividing Range



Invasive plants

Appendix A and Appendix D list invasive plants listed as KTPs or prohibited matter under the BC Act and Biosecurity Act, respectively. It is recommended that hygiene measures are implemented whenever working with these species or in areas where these species occur.

The basic hygiene procedure (Table 1) and the vehicle hygiene procedure (Table 4) recommend checking and removing seed and plant debris from clothing, footwear, equipment and vehicles. These measures are sufficient to remove invasive plant propagules under most circumstances, but people should be particularly vigilant when checking and cleaning after work on sites with KTP-listed plants, weeds of national significance or regional priority invasive plants (see the NSW WeedWise website).

During peak seed production, consideration should be given to additional measures, such as designating site-specific shoes, clothing or equipment that are used only at a single site and are bagged prior to leaving that site. When operating heavy machinery that captures a lot of soil in an infested site, implement strict vehicle hygiene measures (Table 4).

Amphibian chytrid fungus (*Batrachochytrium dendrobatidis*)

Reducing the spread of amphibian chytrid fungus between sites and between frogs should be a central objective when working with or near amphibians or in habitats where amphibian chytrid fungus is pervasive. Consequently, strict hygiene should be practised under all circumstances for personnel, clothing, footwear, tools and equipment. See Table 6 for details; however, if working on an island, see Visiting or working on islands.

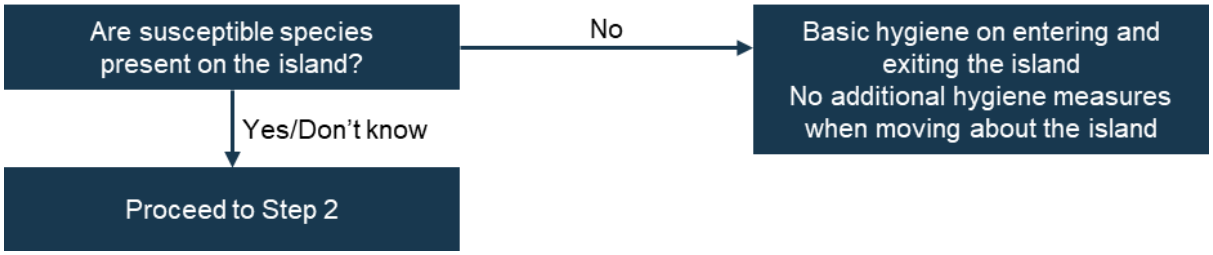
Visiting or working on islands

When visiting or working on islands, the recommended level of hygiene depends on whether or not the island is affected by pathogens and if so, to what extent. In some cases, this may be difficult to determine, so a cautious approach may be sensible. Decision tree 2 is a general guide to the 'when' and 'what' of hygiene on islands. It can be applied to Phytophthora, myrtle rust and amphibian chytrid fungus. For invasive plants, follow the advice above under Invasive plants.

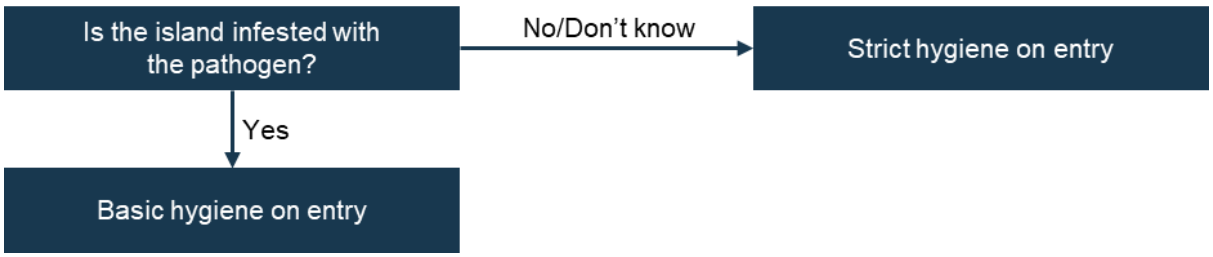
Where hygiene measures are recommended for moving about an island (see Step 3 below), it will be important to establish hygiene points at the boundary of the infested area(s).

Decision tree 2: visiting or working on islands

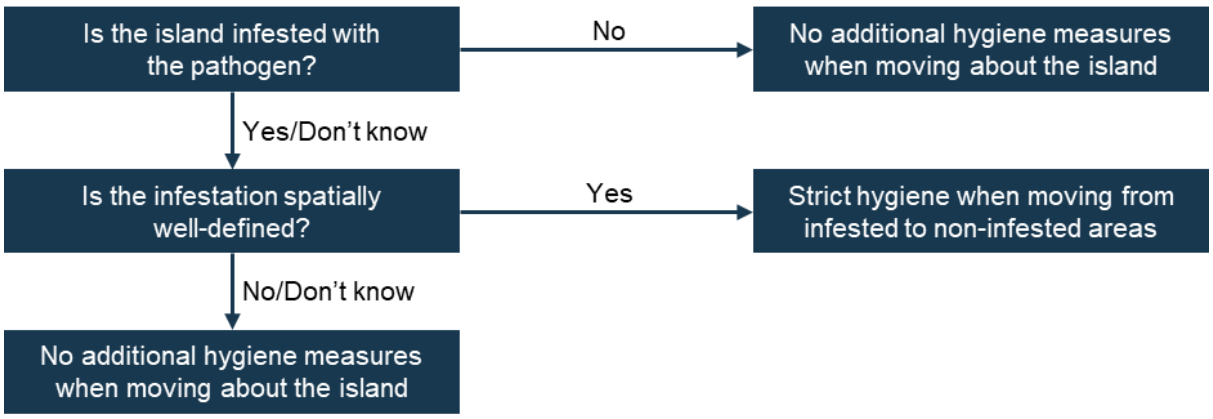
Step 1: Determine presence of susceptible species



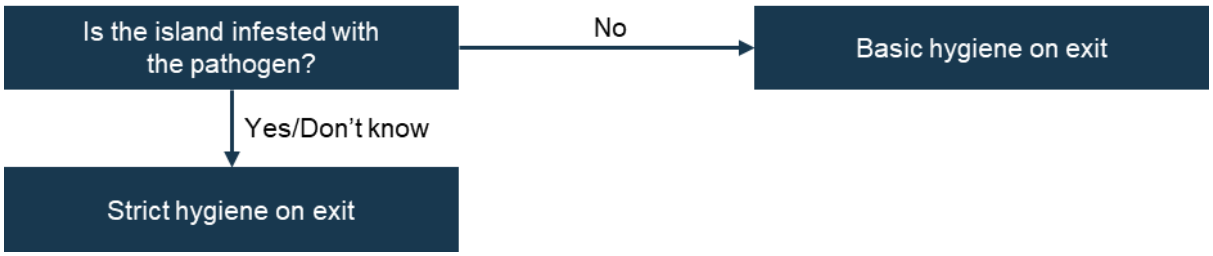
Step 2: Determine hygiene measures before entry to the island



Step 3: Determine hygiene measures for moving about the island



Step 4: Determine hygiene measures for exit from the island



Recommended hygiene protocols

Personnel, clothing, footwear, tools and equipment

Basic hygiene measures

Table 1 Basic hygiene protocol for personnel, clothing, footwear, tools and equipment

Step	Description
1. Check	• Check personnel, clothing, footwear, backpacks and equipment for soil, plant material/propagules and other debris.
2. Clean	• Remove all soil, plant material and other debris using a hard brush and (if required) clean water. • If dirty, wash hands with soap and water[1]. • 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 implement (e.g. a knife), but use caution. Where possible, have a co-worker double-check that you have removed all seeds.
3. Dry	• Where practical, ensure hands, clothing, footwear, and equipment are dry before proceeding.

Strict hygiene measures

Where possible, strict hygiene procedures should be implemented at a set hygiene point at the site boundary. The site boundary should be defined by the project or site manager. It could be the boundary of a national park. If not on-park, the boundary could be identified based on the distribution of the threatened entities at risk. Where a site boundary is unclear, it should be determined at the project or site manager's discretion.

Where possible, disinfectant should be applied and disposed of in a dry area that is at least 30 metres from a waterway or drainage channel, and where there is limited possibility of it running into a waterway or sensitive environmental area. The complete elimination of all spores on contaminated materials (e.g. boots, vehicles) is an unreasonable expectation, so the goal of disinfection is to *reduce* the spore load present.

Table 2 Strict hygiene protocol for personnel, clothing, footwear, tools and equipment

Project planning

Step	Description
1. Check	• Ensure you have a fully stocked hygiene kit, or easy access to one.
2. Select	• Where practical, select clothing, footwear, tools and equipment that are easy to clean (e.g. non-absorbent).
3. Clean	• Make sure all equipment is clean before use (routinely following this protocol will achieve this).

[1] For general information on hand hygiene, refer to the *National Wildlife Biosecurity Guidelines* (Wildlife Health Australia 2018).

Table 2, continued…

Protocols

Step	Description
1. Check	• Thoroughly check all clothing, footwear, backpacks tools and equipment for soil, water, organic material or other debris. Where possible, have a co-worker double-check for you.
2. Clean	• Remove all soil, water, organic material and debris using a hard brush and clean water. • Remove any residual seeds from clothing, footwear, tools and equipment by hand. Where possible, have a co-worker double-check that you have removed all seeds. • If dirty, wash hands with soap and water.
3. Disinfect	• Spray or soak potentially contaminated materials (e.g. footwear, equipment) with disinfectant (Table 7). Leave for 30 seconds before proceeding. • Where practical, rinse with clean water.
4. Dry	• Where practical, ensure all personnel, clothing, footwear, tools and equipment are dry before proceeding.

Myrtle rust

Decision tree 1 identifies when hygiene measures specifically for myrtle rust should be considered. Generally, this will only be after visiting a site that is infested with myrtle rust or when travelling from an infested area to a non-infested site.

Table 3 Myrtle rust hygiene protocol for personnel, clothing, footwear, tools and equipment

Step	Description
1. Disinfect	• Spray equipment and clothing with disinfectant.
2. Clean	• At the end of the day, launder all hats and clothing using detergent and warm or hot machine wash to kill residual spores. • At the end of the day, shower thoroughly to remove residual spores from skin and hair.

Vehicles and heavy machinery

Generally, protocols for vehicles and heavy machinery (Table 4) only need to be implemented when you have driven off-road. The myrtle rust protocol (Table 5) is an exception and should be implemented whenever you have driven in a site infested with myrtle rust, because spores can adhere to clothing and be transferred to the vehicle's interior.

Table 4 Hygiene protocol for vehicles and heavy machinery

Step	Description
1. Check	• Check the exterior and interior of vehicles and machinery for soil, plant material and other debris. Use Figure 2 as a guide for where to focus your attention.
2. Clean	• Remove large clods of dirt and soil using a stiff brush or crowbar. • Remove all soil, plant material and other debris from the interior using a vacuum or dustpan and brush. Focus on the cabin floor, floor mats and pedals. Place debris in a bag and dispose of in a commercial waste bin. • *If returning from a potentially-contaminated area*, wash vehicle and/or machinery as soon as possible (e.g. at a commercial carwash) before heading back to base. If a carwash facility is not available, spray tyres thoroughly with a disinfectant (Table 7). • *If leaving a potentially-contaminated area and travelling to a new site*, reassess your hygiene requirements using Decision tree 1 for Phytophthora and myrtle rust.
3. Dry	• Where practical, allow vehicle or machinery to dry before proceeding.

Myrtle rust

Table 5 Myrtle rust hygiene protocol for vehicles and heavy machinery

Step	Description
1. Disinfect	• Use 70% alcohol wipes or a spray bottle to apply disinfectant (Table 7) to the interior of vehicle (focus on seats, steering wheel, gear stick, pedals and floor). • Spray the exterior with disinfectant or hand pressure sprayer. Allow the disinfectant to remain in contact with the surface for at least 30 seconds before rinsing with clean water.

Amphibian fieldwork

Table 6 Strict hygiene protocols for undertaking amphibian fieldwork

Project planning

Step	Description
1. Select	• Where practical, select clothing, footwear, tools and equipment that are easy to clean (e.g. non-absorbent). • Where practical, when visiting multiple sites, pack separate sets of equipment (including shoes) for use at each site.

Before arriving at a site and on leaving a site

Step	Description
1. Check	• Thoroughly check all personnel, clothing, footwear and equipment for soil, water, organic material or other debris. Where possible, have a co-worker double-check for you.
2. Clean	• Remove all soil, water, organic material or other debris using a hard brush and clean water.
3. Disinfect	• Spray or soak potentially-contaminated materials with disinfectant (Table 7). Leave for 30 seconds before proceeding. Where practical, rinse with clean water.
4. Dry	• Where practical, ensure all clothing, footwear, tools and equipment are dry before proceeding.

When in the field

- Wear disposable, non-powdered gloves when handling amphibians.
- Use new gloves or a new bag for handling each individual amphibian.
- Wear well-rinsed (with water) vinyl gloves when handling tadpoles.
- If gloves are not available, wash hands with 70% alcohol between handling each animal. Make sure hands are dry before handling amphibians as alcohol exposure may be toxic to them. Rinse hands with potable water (if available) after disinfecting.
- Keep individual amphibians in separate containers. Dispose of containers after use.
- Where possible, keep tadpoles in separate containers. If necessary, tadpoles from the same pond or stream section can be grouped in one container but avoid overcrowding.
- Never mix amphibians from different sites.
- Amphibians should be released where they were captured.
- If using toe clipping or Passive Integrated Transponder (PIT) tagging, use disinfected instruments (preferably unused disposable instruments). Open wounds should be sealed using an appropriate tissue adhesive, followed by application of a topical anaesthetic disinfectant.

Hygiene tools

Hygiene kits

A simple hygiene kit should be kept in each field vehicle to allow staff to implement hygiene measures as required. At a minimum, hygiene kits should contain a stiff brush (for removing soil from boots, bags, etc.), a spray bottle and a container of disinfectant solution (with enough volume for several refills of the spray bottle).

A more comprehensive hygiene kit should include:

- stiff brush
- nail brush
- dustpan (for removing soil from vehicle interior)
- spray bottle
- container of disinfectant solution (enough for several refills of spray bottle)
- container of clean water (for disinfectant dilution and hand washing)
- disposable garbage bags for waste
- plastic tubs that can be used to carry items and for soaking equipment
- alcohol wipes or gel
- soap
- towel
- disposable gloves for handling disinfectant (long-arm waterproof gloves can further reduce risk of skin exposure when diluting disinfectant)
- non-powdered gloves (if working with amphibians).

Disinfectants

Disinfectants should be used for personnel, field equipment and tools, clothing, footwear, vehicles, machinery and personal items to reduce the number of residual spores and other pathogens. For disinfectants to be effective, all surfaces must first be cleaned of soil and organic matter.

All people must take reasonable care for their health and safety, and the health and safety of others, by following product safety instructions and wearing appropriate personal protection equipment when preparing and using disinfectants. Commercially-available fungicides should generally not be mixed with other chemicals (unless the manufacturer explicitly states it is safe to do so). This is especially important for chlorine-based compounds as these may produce toxic vapours when mixed with fungicides (Allan & Gartenstein 2010).

Table 7 Disinfectants

Disinfectant	Application	Notes
70% methylated spirits in water	Spraying absorbent and non-absorbent materials, including vehicle interiors. Can also be used to disinfect hands.	Store in a closed container to reduce evaporation. Solutions at lower or higher concentrations may be less effective or even completely ineffective. Can be used on clothing.
1% sodium hypochlorite in water	Soaking non-absorbent materials	Dilution of household bleach is sufficient. Use only in a well-ventilated area. Do not use on clothing. Bleach has a limited shelf life. Degradation increases with exposure to UV light and at higher temperatures. See manufacturer's details for further information.
Benzalkonium chloride (various concentrations)	Spraying or soaking materials (e.g. equipment, vehicles, boot-cleaning stations)	Some commercial fungicidal products are available (e.g. Phytoclean®). Use as per manufacturer's instructions. Avoid contact with skin or items likely to come into contact with skin (e.g. clothing).
Industrial strength detergent	Cleaning and disinfecting vehicle exteriors, shoes and equipment	There are several commercial products available. Use as per manufacturer's instructions.
Chloramine and chlorhexadine-based products	Disinfecting hands, footwear and equipment	Examples include *Halamid*®, *Halasept*® and *Hexifoam*®. Use as per manufacturer's instructions.
Alcohol wipes	Wiping down vehicle interiors	For multi-use packets, ensure the packaging is properly sealed between uses.
Alcohol gel	Disinfecting hands	

Boot-cleaning stations

Installation of boot-cleaning stations along popular walking trails can help to mitigate the risk of bushwalkers spreading Phytophthora and other soil-borne pathogens, as well as some invasive plant propagules. Where present, they are a suitable alternative to a stiff brush for cleaning boots. Boot-cleaning stations can vary in complexity from simple systems with fixed brushes that people can use to scrub their shoes (see Figure 1), or a bench with a hand brush attached by chain, to mechanisms that deliver disinfectant to footwear (O'Gara et al. 2005). Boot-cleaning stations accompanied by instructional material and signage about Phytophthora increase awareness and provide context for users, and may increase compliance (Massenbauer 2018).

It is recommended that disinfectant solutions in boot-washing stations are regularly monitored and replaced as necessary. Solutions may need to be replaced more frequently in high traffic areas.

Figure 1 Boot-cleaning station in Barrington Tops National Park

Photo: Peter Beard/DPIE

Vehicle and machinery cleaning checklist

When you are likely to drive off-road or use heavy machinery, it is useful to develop a cleaning checklist during the planning phase of the project. The checklist should include components of the vehicle or machinery that are likely to come into contact with soil or plant material, whether through direct contact (e.g. tyres) or by transfer (e.g. cabin floor, gear stick). An example illustrated cleaning checklist can be found at Figure 2.

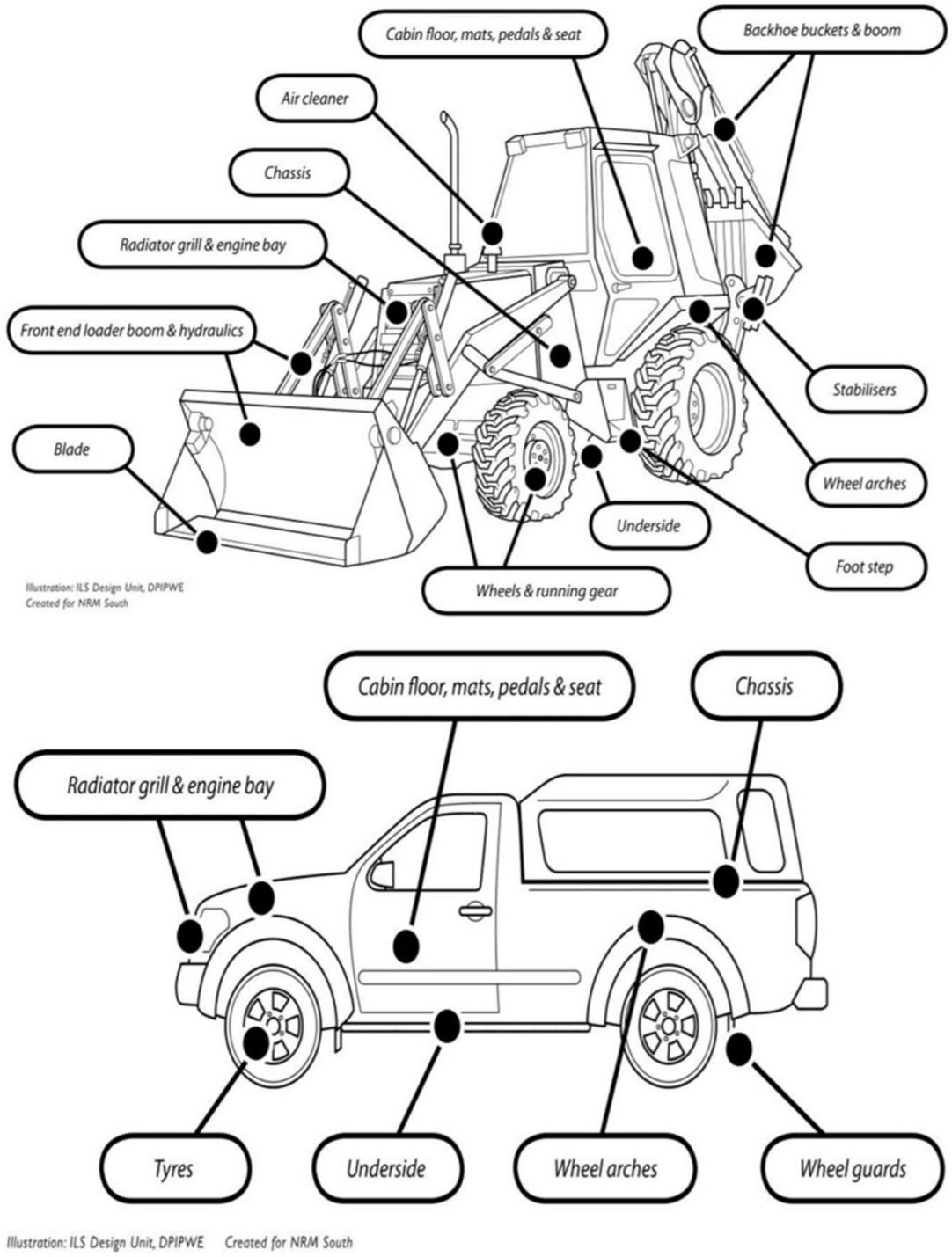


Figure 2 Example illustrated machinery and vehicle cleaning checklists

These are the parts of the vehicle that should be checked and cleaned. Reproduced from DPIPWE (2015) with permission. Original image credit: Allan and Gartenstein (2010).

Appendix A: Legislation

Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) is the primary piece of legislation that protects biodiversity in New South Wales. One of the purposes of the BC Act is to assess the extinction risk of species and ecological communities, and identify key threatening processes (KTPs), through an independent and rigorous scientific process (BC Act s.1.3(f)).

A threat may be listed as a KTP if, in the opinion of the Threatened Species Scientific Committee (NSW TSSC), it:

- adversely affects threatened species, populations of a species or ecological communities
- could cause species, populations of a species or ecological communities to become threatened.

There are several pathogen and weed-related threats that are listed KTPs under the BC Act, including:

- infection of frogs by amphibian chytrid causing the disease chytridiomycosis
- infection of native plants by *Phytophthora cinnamomi*
- introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
- invasion and establishment of exotic vines and scramblers
- invasion and establishment of Scotch broom (*Cytisus scoparius*)
- invasion, establishment and spread of lantana (*Lantana camara* L. *sens. lat*)
- invasion of native plant communities by African olive (*Olea europaea* subsp. *cuspidata* (Wall. ex G. Don) Cif.)
- invasion of native plant communities by *Chrysanthemoides monilifera*
- invasion of native plant communities by exotic perennial grasses
- loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

Division 6 of Part 4 of the BC Act establishes the Biodiversity Conservation Program, known as *Saving our Species* (SoS). The objectives of SoS are:

1. to maximise the long-term security of threatened species and ecological communities in nature and
2. to minimise the impacts of KTPs on biodiversity and ecological integrity.

This document helps to achieve the second objective of SoS by outlining means of reducing the introduction and spread of pathogens and invasive plants throughout New South Wales.

National Parks and Wildlife Act 1974

The main act governing the management of national parks and reserves in New South Wales is the *National Parks and Wildlife Act 1974* (NPW Act). The NPW Act contains provisions for the reservation of land as:

- a national park
- a historic site
- a state conservation area
- a regional park
- a karst conservation reserve
- a nature reserve
- an Aboriginal area.

The National Parks and Wildlife Service administers the NPW Act and is responsible for managing reserved land. Implementation of hygiene measures in national parks helps to meet the obligation to manage national parks in accordance with the management principles set out in Division 2 of Part 4 of the NPW Act, which include conserving biodiversity, maintaining ecosystem function and maintaining natural landscapes.

Biosecurity Act 2015

The *Biosecurity Act 2015* provides a framework for managing biosecurity risks in New South Wales while promoting that biosecurity is a shared responsibility between government, industry and the public. The Biosecurity Act establishes the general biosecurity duty (s.22), which requires any person who knows or ought to know about a biosecurity risk to (so far as is reasonably practical) ensure that risk is prevented, eliminated or minimised.

The Biosecurity Act also establishes prohibited matter, which includes certain plant and animal pests and diseases listed in Schedule 2 of the Act. Any dealing with prohibited matter throughout New South Wales is an offence. An additional biosecurity duty applies to some people who become aware of prohibited matter, including those in charge of premises on which the prohibited matter occurs, as well as consultants who become aware of prohibited matter during the provision of professional services. Those people also have a duty to notify the Department of Primary Industries of any biosecurity event. Additional details of affected people can be found in Divisions 3 and 4 of Part 2 of the Act.

Adopting hygiene into fieldwork routines is a way that people can manage their biosecurity risks and meet their general biosecurity duty under the Biosecurity Act.

Appendix B: NSW species that are susceptible to *Phytophthora cinnamomi*

Phytophthora cinnamomi (Phytophthora) is as a threat to several threatened species and ecological communities. Further surveys and species-susceptibility testing is required to identify additional species and ecological communities that are susceptible to Phytophthora in New South Wales. The research is ongoing and, therefore, the list below is likely to be incomplete. Staff should check the best available and most recent information on any species or ecological community of interest.

Table 8 NSW plant species that are susceptible (or suspected to be susceptible) to *Phytophthora cinnamomi*

NSW conservation status in parentheses: Protected (P), Vulnerable (V), Endangered (E), Critically endangered (CE), Extinct (Ex).

Species	Reference(s)	Species	Reference(s)
Acacia buxifolia subsp. *buxifolia*	NSW TSSC (2011)	*Angophora costata*	NSW TSSC (2011)
Acacia genistifolia	NSW TSSC (2011)	*Aotus ericoides*	Podger et al. (1990); Schahinger et al. (2003); Weste (2001)
Acacia siculiformis	NSW TSSC (2011)	*Astroloma humifusum*	NSW TSSC (2011)
Actinotus helianthin (P)	Fraser (1956)	*Banksia cunninghamii*	Weste (2001); McDougall and Summerell (2003b)
Acrotriche serrulata	NSW TSSC (2011)	*Banksia ericifolia*	NSW TSSC (2011)
Allocasuarina rigida	NSW TSSC (2011)	*Banksia marginata*	Pratt and Heather (1973); Podger et al. (1990); Lee and Wicks (1977); Vickery (1997); Schahinger et al. (2003); Weste (2001)
Allocasuarina verticillata	NSW TSSC (2011)	*Banksia serrata*	Pratt and Heather (1973); Podger et al. (1990); Schahinger et al. (2003); Weste (2001)
Amperea xiphoclada (Ex)	NSW TSSC (2011)	*Banksia spinulosa* var. *cunninghamii* (P)	NSW TSSC (2011)

Species	Reference(s)	Species	Reference(s)
Bauera rubioides	Podger and Brown (1989); Podger et al. (1990); Schahinger et al. (2003); Weste (2001)	*Daviesia mimosoides*	NSW TSSC (2011)
Boronia anemonifolia (P)	NSW TSSC (2011)	*Daviesia wyattiana*	McDougall and Summerell (2003b)
Boronia deanei (V)	NSW TSSC (2011)	*Dianella longifolia sens. lat.*	NSW TSSC (2011)
Bossiaea cinerea	Podger et al. (1990); Schahinger et al. (2003); Weste (2001)	*Dillwynia cinerascens*	Weste (2001)
Bossiaea obcordata	NSW TSSC (2011)	*Dillwynia glaberrima*	Podger et al. (1990); Weste (2001); Schahinger et al. (2003)
Bossiaea prostrata	Weste (2001)	*Dillwynia phylicoides*	NSW TSSC (2011)
Brachyloma daphnoides	Weste (2001)	*Dillwynia sericea*	NSW TSSC (2011)
Callitris preissii	NSW TSSC (2011)	*Dillwynia tenuifolia* (V)	NSW TSSC (2011)
Calytrix tetragona	Podger et al. (1990); Weste (2001); Schahinger et al. (2003)	*Diplarrena moraea*	NSW TSSC (2011)
Cassinia aculeata	NSW TSSC (2011)	*Dodonaea boroniifolia*	NSW TSSC (2011)
Conospermum taxifolium	NSW TSSC (2011)	*Dodonaea viscosa*	NSW TSSC (2011)
Correa reflexa	Podger et al. (1990); Weste (2001)	*Epacris hamiltonii* (E)	NSW TSSC (2011)
Crowea exalata (P)	NSW TSSC (2011)	*Epacris impressa*	Weste (2001)
Crowea saligna (P)	NSW TSSC (2011)	*Epacris paludosa*	NSW TSSC (2011)
Darwinia biflora (V)	NSW TSSC (2011)	*Epacris purpurascens* (V)	Fraser (1956)
Darwinia peduncularis (V)	NSW TSSC (2011)	*Epacris sparsa* (V)	NSW TSSC (2011)
Daviesia leptophylla	Weste (2001)	*Eriostemon myoporoides* (P)	NSW TSSC (2011)

Species	Reference(s)	Species	Reference(s)
Eucalyptus baxteri	NSW TSSC (2011)	*Grevillea irrasa* subsp. *irrasa*	McDougall and Summerell (2003b) (NSW TSSC (2011))
Eucalyptus camfieldii (V)	NSW TSSC (2011)	*Grevillea juniperina sens. lat.*	NSW TSSC (2011)
Eucalyptus imlayensis (CE)	NSW TSSC (2011)	*Grevillea lanigera*	NSW TSSC (2011)
Eucalyptus macrorhyncha	NSW TSSC (2011)	*Grevillea linsmithii*	NSW TSSC (2011)
Eucalyptus niphophila	NSW TSSC (2011)	*Grevillea molyneuxii* (V)	NSW TSSC (2011)
Eucalyptus obliqua	NSW TSSC (2011)	*Grevillea mucronulata*	NSW TSSC (2011)
Eucalyptus polyanthemos	NSW TSSC (2011)	*Grevillea oleoides*	McDougall and Summerell (2003b)
Eucryphia moorei	NSW TSSC (2011)	*Grevillea parviflora* subsp. *parviflora* (V)	NSW TSSC (2011)
Exocarpus cupressiformis	NSW TSSC (2011)	*Grevillea parviflora* subsp. *supplicans* (E)	NSW TSSC (2011)
Genoplesium rhyoliticum (E)	NSW TSSC (2011)	*Grevillea polybractea*	NSW TSSC (2011)
Goodenia hederacea subsp. *hederacea*	Weste (2001)	*Grevillea rivularis* (CE)	NSW TSSC (2011)
Goodenia humilis	Weste (2001)	*Grevillea rosmarinifolia*	NSW TSSC (2011)
Grevillea acanthifolia subsp. *paludosa* (E)	NSW TSSC (2011)	*Grevillea victoriae sens. lat.*	NSW TSSC (2011)
Grevillea acanthifolia subsp. *stenomera*	NSW TSSC (2011)	*Grevillea wilkinsonii* (E)	NSW TSSC (2011)
Grevillea alpina	NSW TSSC (2011)	*Hakea bakeriana*	NSW TSSC (2011)
Grevillea caleyi (CE)	NSW TSSC (2011)	*Hakea ulicina*	NSW TSSC (2011)
Grevillea granulifera	NSW TSSC (2011)	*Hakea dohertyi* (E)	NSW TSSC (2011)

Species	Reference(s)	Species	Reference(s)
Haloragodendron monospermum	NSW TSSC (2011)	*Leionema lachnaeoides* (E)	NSW TSSC (2011)
Helichrysum collinum	NSW TSSC (2011)	*Leionema ralstonii* (V)	NSW TSSC (2011)
Hibbertia calycina	NSW TSSC (2011)	*Leptospermum coriaceum*	NSW TSSC (2011)
Hibbertia circinate (CE)	Wan et al. (in prep.)	*Leptospermum juniperinum*	Lee and Wicks (1977); Vickery (1997); McDougall and Summerell (2003b)
Hibbertia cistiflora	Weste (2001)	*Leptospermum lanigerum* (P)	NSW TSSC (2011)
Hibbertia fasciculata	Weste et al. (2002)	*Leucopogon collinus*	NSW TSSC (2011)
Hibbertia marginata (V)	NSW TSSC (2011)	*Leucopogon confertus*	NSW TSSC (2011)
Hibbertia obtusifolia	NSW TSSC (2011)	*Leucopogon ericoides*	Podger et al. (1990); Weste (2001); Schahinger et al. (2003)
Hibbertia procumbens (E)	NSW TSSC (2011)	*Leucopogon esquamatus*	NSW TSSC (2011)
Hibbertia villosa	NSW TSSC (2011)	*Leucopogon exolasius*	NSW TSSC (2011)
Hibbertia virgata	NSW TSSC (2011)	*Leucopogon fletcheri* subsp. *fletcheri* (E)	NSW TSSC (2011)
Hovea linearis	Weste (2001)	*Leucopogon lanceolatus*	NSW TSSC (2011)
Isopogon fletcheri (V)	NSW TSSC (2011)	*Leucopogon maccraei*	NSW TSSC (2011)
Isopogon petiolaris (P)	NSW TSSC (2011)	*Leucopogon microphyllus* var. *pilibundus*	NSW TSSC (2011)
Kennedia prostrata	NSW TSSC (2011)	*Leucopogon virgatus*	Taylor (1974); Lee and Wicks (1977); Podger et al. (1990); Weste (2001)
Kunzea ambigua	NSW TSSC (2011)	*Lissanthe strigose*	Weste (2001)
Lasiopetalum joyceae (V)	NSW TSSC (2011)	*Lomatia fraseri*	NSW TSSC (2011)

Species	Reference(s)	Species	Reference(s)
Macrozamia communis	Pratt and Heather (1973); McDougall and Summerell (2003b)	*Persoonia glaucescens* (E)	NSW TSSC (2011)
Macrozamia johnsonii (E)	NSW TSSC (2011)	*Persoonia hindii* (E)	NSW TSSC (2011)
Melaleuca biconvexa (V)	NSW TSSC (2011)	*Persoonia hirsuta* (E)	NSW TSSC (2011)
Melaleuca squamea	NSW TSSC (2011)	*Persoonia juniperina* (P)	Weste (2001)
Melaleuca uncinate	NSW TSSC (2011)	*Persoonia marginata* (V)	NSW TSSC (2011)
Melichrus urceolatus	NSW TSSC (2011)	*Persoonia mollis* subsp*. maxima* (E)	NSW TSSC (2011)
Monotoca elliptica	Podger et al. (1990); McDougall and Summerell (2003b); Schahinger et al. (2003)	*Persoonia nutans* (E)	NSW TSSC (2011)
Monotoca scoparia	Taylor (1974); Weste (2001)	*Persoonia pauciflora* (CE)	NSW TSSC (2011)
Nematolepis rhytidophylla (V)	Wan et al. (accepted)	*Persoonia sylvatica* (P)	McDougall and Summerell (2003b)
Oxylobium ellipticum	Podger et al. (1990); McDougall and Summerell (2003a)	*Petrophile pulchella* (P)	NSW TSSC (2011)
Ozothamnus obcordatus subsp*. major*	NSW TSSC (2011)	*Phebalium phylicifolium*	NSW TSSC (2011)
Patersonia sericea	NSW TSSC (2011)	*Phebalium squamulosum* spp*. alpinum* (P)	Rigg et al. (2018)
Persoonia acerosa (V)	NSW TSSC (2011)	*Philotheca myoporoides* (P)	Taylor (1974)
Persoonia bargoensis (E)	NSW TSSC (2011)	*Phyllanthus hirtellus*	NSW TSSC (2011)
Persoonia cornifolia (P)	McDougall and Summerell (2003b)	*Phyllota humifusa* (V)	NSW TSSC (2011)

Species	Reference(s)	Species	Reference(s)
Pimelea linifolia subsp. *linifolia*	Weste (2001); Weste et al. (2002)	*Prostanthera ringens*	NSW TSSC (2011)
Podocarpus lawrencei	NSW TSSC (2011)	*Prostanthera saxicola* var. *montana*	NSW TSSC (2011)
Pomaderris delicata (CE)	Wan et al. (in prep.)	*Pultenaea altissima*	NSW TSSC (2011)
Pomaderris intermedia	NSW TSSC (2011)	*Pultenaea aristata* (V)	NSW TSSC (2011)
Prostanthera askania (E)	NSW TSSC (2011)	*Pultenaea baeuerlenii* (V)	NSW TSSC (2011)
Prostanthera cineolifera (V)	NSW TSSC (2011)	*Pultenaea benthamii*	McDougall and Summerell (2003b)
Prostanthera cryptandroides (V)	NSW TSSC (2011)	*Pultenaea daphnoides*	Pratt and Heather (1973); Podger et al. (1990); McDougall and Summerell (2003b); Schahinger et al. (2003)
Prostanthera cuneata	NSW TSSC (2011)	*Pultenaea flexilis*	NSW TSSC (2011)
Prostanthera decussata	Weste (2001)	*Pultenaea glabra* (V)	NSW TSSC (2011)
Prostanthera densa (V)	NSW TSSC (2011)	*Pultenaea humilis* (V)	NSW TSSC (2011)
Prostanthera discolour (V)	NSW TSSC (2011)	*Pultenaea mollis*	Barker and Wardlaw (1995); Weste (2001)
Prostanthera junonis	NSW TSSC (2011)	*Pultenaea parrisiae*	Wan et al. (in prep.)
Prostanthera lasianthos	NSW TSSC (2011)	*Pultenaea parrisiae* subsp. *elusa* (V)	NSW TSSC (2011)
Prostanthera marifolia (CE)	Wan et al. (accepted); NSW TSSC (2011)	*Pultenaea parrisiae* subsp. *parrisiae* (V)	NSW TSSC (2011)
Prostanthera ovalifolia	NSW TSSC (2011)	*Pultenaea parviflora* (E)	NSW TSSC (2011)
Prostanthera palustris (V)	NSW TSSC (2011)	*Pultenaea pedunculata* (E)	NSW TSSC (2011)

Species	Reference(s)	Species	Reference(s)
Pultenaea procumbens	NSW TSSC (2011)	*Tetratheca glandulosa* (V)	NSW TSSC (2011)
Pultenaea pycnocephala	NSW TSSC (2011)	*Tetratheca juncea* (V)	NSW TSSC (2011)
Pultenaea sp. Genowlan Point (CE)	Wan et al. (accepted)	*Tetratheca pilosa* (Ex)	Podger et al. (1990); Weste (2001)
Pultenaea subcapitata	NSW TSSC (2011)	*Tetratheca subaphylla*	McDougall and Summerell (2003b)
Pultenaea villifera var. *villifera*	NSW TSSC (2011)	*Triplarina nowraensis* (E)	NSW TSSC (2011)
Rulingia prostrata	NSW TSSC (2011)	*Westringia davidii* (V)	NSW TSSC (2011)
Sprengelia incarnata (P)	Podger and Brown (1989); McDougall and Summerell (2003b); McDougall et al. (2018)	*Westringia kydrensis* (E)	NSW TSSC (2011)
Stylidium graminifolium	NSW TSSC (2011)	*Wollemia nobilis* (CE)	Bullock et al. (2000)
Styphelia adscendens	Weste (2001); Schahinger et al. (2003)	*Woollsia pungens*	Fraser (1956)
Styphelia perileuca (V)	NSW TSSC (2011)	*Xanthorrhoea australis* (P)	Weste (2001); McDougall and Summerell (2003b)
Tasmannia glaucifolia (V)	NSW TSSC (2011)	*Xanthorrhoea glauca* subsp. *glauca* (P)	McDougall and Summerell (2003b)
Tasmannia lanceolata	NSW TSSC (2011)	*Xanthorrhoea resinifera* (P)	Weste (2001); McDougall and Summerell (2003b)
Tasmannia purpurascens (V)	McDougall and Summerell (2003a)	*Xanthosia dissecta*	Weste (2001); Weste et al. (2002)
Telopea mongaensis (P)	NSW TSSC (2011)	*Xanthosia tridentata*	Fraser (1956)
Telopea speciosissima (P)	Taylor (1974)	*Zieria adenophora* (CE)	NSW TSSC (2011)
Tetratheca ciliata	Weste (2001); Schahinger et al. (2003)	*Zieria baeuerlenii* (E)	NSW TSSC (2011)

Species	Reference(s)	Species	Reference(s)
Zieria buxijugum (CE)	NSW TSSC (2011)	*Zieria murphyi* (V)	NSW TSSC (2011)
Zieria covenyi (E)	NSW TSSC (2011)	*Zieria parrisiae* (CE)	NSW TSSC (2011)
Zieria formosa (CE)	NSW TSSC (2011)	*Zieria prostrata* (E)	NSW TSSC (2011)
Zieria laevigata	NSW TSSC (2011)	*Zieria tuberculate* (V)	NSW TSSC (2011)
Zieria lasiocaulis (E)	NSW TSSC (2011)		

Appendix C: NSW species that are susceptible to myrtle rust (*Austropuccinia psidii*)

Myrtle rust affects plants in the Myrtaceae family. There are over 300 native species known to be susceptible to myrtle rust (Makinson 2018b). The Myrtaceae family is ecologically important in Australia, accounting for about 10% of Australia's native flora, with many Australian plant communities primarily comprised of myrtaceous species. Consequently, there are also many species of native fauna, which depend on the Myrtaceae family, that are also indirectly threatened by the impacts of myrtle rust.

Table 9 NSW endemic species susceptible to myrtle rust (Makinson 2018b; Soewarto et al. 2019)
NSW conservation status in parentheses: Protected (P), Vulnerable (V), Endangered (E), Critically endangered (CE), Extinct (Ex).

Species	Species	Species
Angophora costata subsp. uncertain	*Backhousia subargentea* (Synonym: *Choricarpia subargentea*)	*Callistemon salignus* (Synonym*: Melaleuca salicina*)
Angophora floribunda	*Baeckea gunniana*	*Callistemon sieberi (*Synonym*: Melaleuca paludicola)*
Angophora subvelutina	*Baeckea linifolia* (P)	*Callistemon* sp. 'Rock of Gibraltar' (LM Copeland 3618)
Archirhodomyrtus beckleri [southern chemotype]	*Callistemon citrinus* (Synonym: *Melaleuca citrina*)	*Callistemon viminalis* (Synonym*: Melaleuca viminalis*)
Austromyrtus dulcis	*Callistemon linearifolius* (Synonym: *Melaleuca linearifolia*) (V)	*Calytrix tetragona*
Austromyrtus tenuifolia	*Callistemon linearis* (Synonym: *Callistemon rigidus*)	*Corymbia citriodora* subsp*. citriodora* and subsp. uncertain
Backhousia leptopetala (Synonym: *Choricarpia leptopetala*)	*Callistemon pachyphyllus* (Synonym: *Melaleuca pachyphylla*)	*Corymbia citriodora* subsp*. variegata*
Backhousia myrtifolia	*Callistemon pallidus* (Synonym: *Melaleuca pallida*)	*Corymbia gummifera*
Backhousia sciadophora	*Callistemon pinifolius* (Synonym*: Melaleuca linearis* var*. pinifolia*)	*Corymbia henryi*

Species	Species	Species
Corymbia intermedia	*Eucalyptus cinerea*	*Eucalyptus microcorys*
Corymbia maculata	*Eucalyptus crebra*	*Eucalyptus moluccana*
Corymbia tessellaris	*Eucalyptus dalrympleana* subsp. *dalrympleana*	*Eucalyptus nitens*
Corymbia variegata [= *citriodora*] x *C. torelliana*	*Eucalyptus deanei* (Synonym: *Eucalyptus brunnea*)	*Eucalyptus obliqua*
Darwinia glaucophylla (V)	*Eucalyptus delegatensis*	*Eucalyptus olida*
Darwinia procera	*Eucalyptus dunnii*	*Eucalyptus ovata* var. *ovata*
Decaspermum humile [Southern metapopulation]	*Eucalyptus elata*	*Eucalyptus pauciflora* subsp. *pauciflora*
Eucalyptus agglomerata	*Eucalyptus fastigata*	*Eucalyptus perriniana*
Eucalyptus baileyana	*Eucalyptus gillii*	*Eucalyptus pilularis*
Eucalyptus baueriana subsp. *baueriana*	*Eucalyptus globoidea*	*Eucalyptus planchoniana*
Eucalyptus burgessiana	*Eucalyptus globulus* subsp. *bicostata* (Synonym: *Eucalyptus bicostata*)	*Eucalyptus populnea* subsp. uncertain
Eucalyptus camaldulensis subsp. uncertain	*Eucalyptus globulus* subsp. *Globulus* (Synonym: *Eucalyptus globulus* [*sens. strict.*])	*Eucalyptus punctata* (Synonym: *Eucalyptus biturbinata*)
Eucalyptus camfieldii (V)	*Eucalyptus globulus* subsp. uncertain	*Eucalyptus radiata* subsp. *radiata*
Eucalyptus campanulata (Synonym: *E. andrewsii* subsp. *campanulata*)	*Eucalyptus goniocalyx* subsp. uncertain	*Eucalyptus resinifera* [subsp. uncertain]
Eucalyptus camphora subsp. uncertain	*Eucalyptus grandis*	*Eucalyptus resinifera* subsp. *hemilampra*
Eucalyptus carnea	*Eucalyptus haemastoma*	*Eucalyptus robusta*
Eucalyptus cephalocarpa	*Eucalyptus laevopinea*	*Eucalyptus rubida* subsp. *rubida*

Species	Species	Species
Eucalyptus saligna	*Lenwebbia prominens*	*Leptospermum trinervium*
Eucalyptus siderophloia	*Lenwebbia* sp. Main Range (P.R.Sharpe+ 4877) (CE)	*Leptospermum whitei*
Eucalyptus sieberi	*Leptospermum brachyandrum*	*Lophostemon suaveolens*
Eucalyptus smithii	*Leptospermum continentale* 'cv. Horizontalis'	*Melaleuca alternifolia*
Eucalyptus tereticornis subsp. uncertain	*Leptospermum deuense*	*Melaleuca armillaris* [subsp. uncertain]
Eucalyptus tindaliae	*Leptospermum juniperinum*	*Melaleuca biconvexa* (V)
Eucalyptus viminalis [*sens. str.;* = subsp. *viminalis*]	*Leptospermum laevigatum*	*Melaleuca comboynensis*
Gossia acmenoides	*Leptospermum lanigerum* (P)	*Melaleuca decora*
Gossia bidwillii	*Leptospermum liversidgei*	*Melaleuca howeana*
Gossia floribunda	*Leptospermum luehmannii*	*Melaleuca linariifolia*
Gossia fragrantissima (E)	*Leptospermum morrisonii* 'cv. Burgundy'	*Melaleuca nodosa*
Gossia hillii	*Leptospermum myrsinoides*	*Melaleuca quinquenervia*
Gossia punctata	*Leptospermum petersonii*	*Melaleuca sieberi*
Homoranthus flavescens	*Leptospermum polygalifolium* [subsp. uncertain]	*Melaleuca squamea*
Homoranthus melanostictus	*Leptospermum polygalifolium* x *L. scoparium*	*Melaleuca squarrosa*
Homoranthus prolixus (V)	*Leptospermum rotundifolium* (P)	*Melaleuca styphelioides*
Homoranthus virgatus	*Leptospermum scoparium*	*Metrosideros nervulosa*
Homorathus croftianus (E)	*Leptospermum scoparium* x *L. macrocarpum*	*Metrosideros sclerocarpa*
Kunzea baxteri	*Leptospermum semibaccatum*	*Pilidiostigma glabrum*
Kunzea ericoides	*Leptospermum spectabile* (P)	*Rhodamnia argentea*

Species	Species	Species
Rhodamnia maideniana	*Syzygium francisii*	*Syzygium oleosum*
Rhodamnia rubescens (CE)	*Syzygium fullagarii*	*Syzygium smithii* (Synonym: *Acmena smithii*)
Rhodomyrtus psidioides (CE)	*Syzygium hemilamprum* [subsp. uncertain] (Synonym: *Acmena hemilampra*)	*Syzygium wilsonii* x *luehmannii* (Synonym: *S. luehmannii* x *wilsonii*)
Syncarpia glomulifera subsp. uncertain	*Syzygium hodgkinsoniae* (V)	*Tristania neriifolia*
Syzygium anisatum (Synonym: *Backhousia anisata*, *Anetholea anisata*)	*Syzygium ingens* (Synonym: *Acmena ingens*)	*Tristaniopsis collina*
Syzygium australe	*Syzygium luehmannii*	*Tristaniopsis laurina*
Syzygium corynanthum	*Syzygium moorei* (V)	*Uromyrtus lamingtonensis*
Syzygium floribundum (Synonym: *Waterhousea floribunda*)		

Appendix D: Invasive non-native terrestrial plants that are prohibited matter under the *Biosecurity Act 2015*

The *Biosecurity Act 2015* identifies prohibited matter in Schedule 2. Any person who deals with prohibited matter is guilty of an offence under that Act.

The definition of dealing includes moving, releasing, propagating, experimenting with, disposing, acquiring and possessing plants or animals that are listed prohibited matter.

Table 10 Invasive non-native terrestrial plants that are prohibited matter

Scientific name	Common name	Related BC Act KTP
Andropogon gayanus	Gamba grass	Invasion of native plant communities by exotic perennial grasses
Annona glabra	Pond apple	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
Asparagus declinatus	Bridal veil creeper	Invasion and establishment of exotic vines and scramblers
Bassia scoparia (excluding subsp. *trichophylla*)	Kochia	
Centaurea stoebe subsp. *micranthos*	Spotted knapweed	
Centaurea x moncktonii	Black knapweed	
Chromolaena odorata	Siam weed	
Clidemia hirta	Koster's curse	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
Cryptostegia grandiflora	Rubber vine	Invasion and establishment of exotic vines and scramblers
Hieracium (all species except *H. murorum*) and *Pilosella* spp. (all species)	Hawkweed	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
Miconia spp. (all species)	Miconia	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
Mikania micrantha	Mikania vine	Invasion and establishment of exotic vines and scramblers
Mimosa pigra	Mimosa	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
Nassella tenuissima (syn. *Stipa tenuissima*)	Mexican feather grass	Invasion of native plant communities by exotic perennial grasses

Scientific name	Common name	Related BC Act KTP
Orobanche spp. (all species except the native *O. cernua* var. *australiana* and *O. minor*)	Broomrape	
Parthenium hysterophorus	Parthenium weed	
Striga spp. (except the native *S. parviflora*)	Witchweed	
Vachellia karroo (syn. *Acacia karroo*)	Karoo acacia	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
Vachellia nilotica (syn. *Acacia nilotica*)	Prickly acacia	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants

Appendix E: Additional considerations for amphibian chytrid fungus

Captive frog hygiene management

Frogs and tadpoles should only be removed from a site when absolutely necessary. When holding frogs in captivity, it is important to maintain a high level of hygiene because turnover of frogs in a facility can lead to potentially high risk of amphibian chytrid transmission.

The risks of transmitting amphibian chytrid among captive frogs can be reduced by:

- keeping frogs collected from different sites separate from each other
- reducing the amount of water, equipment or filtration systems shared between tanks or aquaria that are housing frogs
- cleaning, disinfecting and drying tanks and aquaria immediately after removing frogs.

When removal of a frog from the wild is essential (e.g. for research purposes), you should keep frogs from different sites separate (as above) while you monitor for signs of illness or disease. If signs of illness or disease are detected, seek advice from a veterinarian to determine the nature of the problem.

If a frog (or frogs) is infected with chytrid, seek advice from a licensed veterinarian. Common treatments including anti-fungal agents such as *Itraconazole*© can be used to treat chytrid infection. Carefully controlled, ramping heat treatment can be an effective chytrid treatment or prevention strategy in some frog species, but this method can be lethal to native species that cannot withstand high temperatures. This approach should only be considered by experienced laboratories and only with authorisation from a relevant animal ethics committee.

If tadpoles have been bred or held in captivity, they should not be released into the wild. If considering a release of captive tadpoles, you should contact the National Parks and Wildlife Service wildlife team at wildlife.licensing@environment.nsw.gov.au (or 02 9585 6406) to determine your licensing requirements. Pathological testing should be undertaken prior to any release, to reduce the likelihood of releasing individuals infected with amphibian chytrid fungus.

Displaced frogs

Frogs may be inadvertently transported long distances in fruit and vegetable shipments and landscape supplies (this commonly occurs to *Litoria gracilenta*, *L. bicolor* and *L. caerulea*). These frogs pose a risk for the spread of disease and it is rarely feasible to return them to their place of origin with any accuracy.

If you encounter a displaced frog, you should contact a local wildlife carer organisation to collect the animal. The frog should be monitored for signs of infection.

Frogs found on or around roads, dwellings, gardens or swimming pools should not be considered displaced.

Sick and dead frogs

Symptoms

Frogs infected with amphibian chytrid fungus may exhibit a range of physical and/or behavioural symptoms, including:

- discoloured skin
- swollen hind limbs
- emaciation

- skin lesions, increased sloughing (shedding of skin)
- showing little or no response to physical stimuli
- being lethargic or having no appetite.

What to do with sick or dead frogs

Unless part of a licensed research project, sick or dead frogs encountered in the wild should not be touched, collected or moved due to risks of spreading disease.

If collection of a sick or dead frog is part of a licensed research project, you should first (i.e. before you encounter a sick or dead frog) establish what you intend to do with it. This may include preserving it at your own research institute for testing or sending it to a research institute for testing.

When handling sick or dead frogs, wear a new pair of disposable gloves for handling each frog, use a clean plastic bag for transporting each frog (for live frogs, ensure the bag is not airtight) and keep the frog cool during transport.

If the frog is dead, you should preserve it as soon as possible. A frog can be preserved in 10 times its own volume of preservative (70% ethanol or 10% buffered formalin). The frog's belly should be cut open prior to preservation to maximise preservation of internal organs. Alternatively, frogs can be frozen, although freezing can make tissues unsuitable for some laboratory tests.

Euthanasia

If the frog is sick and unlikely to survive, it should be euthanased using an acceptable method. The American Veterinary Medical Association's Guidelines for the Euthanasia of Animals (PDF 11.8MB) (AVMA 2020) prescribes a number of acceptable euthanasia methods, including using injectable and topical agents. These methods should only be undertaken by a licensed veterinarian.

Where other methods are not available, the generally-accepted method of euthanasia is blunt force trauma to the head, followed by decapitation or pithing to ensure quick death. This should only be applied by trained and skilled people (AMVA 2020). Gradually cooling the animal in the refrigerator prior to applying blunt force trauma may reduce the risk of causing suffering.

Euthanasia of frogs associated with animal research must only be done in accordance with an animal research authority.

Appendix F: Template for a hygiene management plan

Team/region/area/park/project	Identify the team, region, area or park to which the hygiene management plan applies. If the plan applies to a specific project (e.g. construction works, conservation project, etc.) specify it here.
Background and infestation status	Provide relevant background information. Consider including: • infestation status (known, suspected, unknown) for pathogens of interest, or past occurrences • presence of susceptible species or ecological communities • the type of work generally being undertaken (earthworks, general maintenance, conservation projects, etc.). If the plan is for a specific project and/or species, specify why hygiene management is an important component.
Objective(s)	What are your specific objectives as they relate to your team, region or area? This could include: • restricting the entry of pathogens to certain locations • restricting exit of pathogens from infested locations in the area • prioritising specific sites or locations for protection • determining the extent of pathogen distribution.
Mapping and risk assessment	Do you propose to undertake any mapping exercises to determine the extent of pathogen distribution? Mapping can help to refine the objectives. What are the risks related to movement of the pathogen(s) throughout, into or out of the area? What are the potential consequences?
Hygiene measures	How will you apply the hygiene measures outlined in the hygiene guidelines? This should relate directly to your objectives and risks identified above and refer to both vehicle and personnel hygiene. For example, if the objective is to restrict pathogen entry to a specific site, strict hygiene measures could be applied at the border of the site prior to entry. Are there any circumstances or sites where additional hygiene measures might be required? Consider developing a tailored decision tree or simply identifying the sites or areas that are prioritised for strict hygiene. How (if at all) will you address hygiene risks posed by the general public? For example, through installation of boot-cleaning stations. Consider boot-cleaning station design and location.
Protecting vegetation	Will you consider any proactive treatments to protect susceptible plants from infection? If so, consider undertaking a risk assessment to help you prioritise areas (or species) for treatment.

Prescriptions for external parties undertaking work on-park	Will you place any prescriptions on external parties undertaking work on-park? Work may include (but should not be limited to) contractors undertaking maintenance or earthworks, research or bush regeneration. If the prescriptions are different from the 'Hygiene measures' above, explain why. These should be included in contracts or agreements when engaging third parties to undertake work on your behalf.
Education and communication	How will you inform people about this hygiene management plan (or appropriate hygiene practices generally)? Consider relevant audiences, including internal staff, contractors and the general public. Examples include signage, pamphlets, information on a website, etc.

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