FLORA AND FAUNA ASSESSMENT

SUBDIVISION, WINDRADYNE

July 2020

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NGH Environmental Pty Ltd (ACN: 124 444 622. ABN: 31 124 444 622) and NGH Environmental (Heritage) Pty Ltd (ACN: 603 938 549. ABN: 62 603 938 549) are part of the NGH Environmental Group of Companies.

W. www.nghconsulting.com.au

E. ngh@nghconsulting.com.au

BEGA - ACT & SOUTH EAST NSW
Suite 11, 89-91 Auckland Street
(PO Box 470) Bega NSW 2550
T. (02) 6492 8333

NEWCASTLE - HUNTER & NORTH COAST
Unit 2, 54 Hudson Street
Hamilton NSW 2303
T. (02) 4929 2301

BRISBANE
Suite 4, Level 5, 87 Wickham Terrace
Spring Hill QLD 4000
T. (07) 3129 7633

SYDNEY REGION
Unit 18, Level 3, 21 Mary Street
Surry Hills NSW 2010
T. (02) 8202 8333

CANBERRA - NSW SE & ACT
Unit 8, 27 Yallourn Street
(PO Box 62) Fyshwick ACT 2609
T. (02) 6280 5053

WAGGA WAGGA - RIVERINA & WESTERN NSW
35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650
T. (02) 6971 9696

GOLD COAST
19a Philippine Parade
(PO Box 466 Palm Beach QLD 4221)
Tugun QLD 4224 T. (07) 3129 7633

WODONGA
Unit 2, 83 Hume Street
(PO Box 506) Wodonga VIC 3690
T. (02) 6067 2533

NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au
ABN 31 124 444 622 ACN 124 444 622

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ACRONYMS AND ABBREVIATIONS

ASL	Above sea level
BRC	Bathurst Regional Council
BC Act	NSW Biodiversity Conservation Act
BN	BioNet
BOS	Biodiversity Offset Scheme
Cwth	Commonwealth
DCP	Development Control Plan
DPI	NSW Department of Primary Industry
DPE	NSW Department of Planning and Environment
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
FM Act	*Fisheries Management Act 1994* (NSW)
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
km	Kilometres
Kph	Kilometre per hour
LEP	Local Environment Plan
LGA	Local Government Area
m	Metres
MNES	Matters of National environmental significance under the EPBC Act (*c.f.*)
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PCT	Plant Community Type
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy (NSW)
SIS	Species Impact Statement
sp/spp	Species/multiple species
TEC	Threatened Ecological Community

1 INTRODUCTION AND BACKGROUND

This Flora and Fauna Assessment (FFA) has been prepared by NGH Environmental for AT&L and Associates, on behalf of Bathurst Regional Council (BRC). Its purpose is to consider the potential flora and fauna impacts associated with the proposed subdivision of Lot 1126 DP1215618 at Windradyne, NSW. The BRC is the consent authority for the development, under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposal is therefore to be assessed under the provisions of the *Biodiversity Conservation Act 2016* (BC Act).

This FFA was submitted to BRC as part of a Development Application in 2018. The approval process of the DA is ongoing following design changes. This report has been updated in response to a change in design, including alterations to the structure of a dam which was outside the previously assessed impact area. This report has been updated to include assessment of the additional impact area shown in Figure 1-4.

1.1 THIS REPORT

This report assesses the impacts of the proposed development on native flora and fauna values in the study area. The report identifies and describes biodiversity values in terms of vegetation structure, composition, type and condition, and fauna habitats, sightings and signs.

The potential for, and significance of, impacts to threatened species and communities listed under the NSW BC Act and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) have been evaluated.

The report addresses the flora and fauna assessment requirements of Clauses 1.7 and 4.15 of the EP&A Act and *section 3 Subdivision of Land* and *section 9 Environmental Considerations of the Bathurst Development Control Plan* (DCP). Where relevant, recommendations are provided to avoid and minimise flora and fauna impacts.

1.2 THE PROPOSAL

1.2.1 *Site location and description*

The property is located at Lot 1126, Richardson Street, Windradyne, approximately 3.5 kilometres west of the Bathurst town centre (Figure 1-1). The majority of the property lacks a tree or shrub layer. It currently exists with mostly groundcover and is undeveloped.

There are three drainage lines that transect the property, one along the eastern boundary of the property and one that runs south-north on the western side. Both converge with Sawpit Creek, a tributary of the Macquarie River, that flows south-north along the western boundary outside the subject land. There is a farm dam south of the development footprint and another in the north.

The site is approximately 41 ha with a change in elevation from 703 to 690 m asl on sloping terrain with easterly, northerly and westerly aspects. NSW Geology Plus (2018) maps the whole site as I-type granites, dating from the Carboniferous. The soils in Bathurst (ba, Residual) are non-calcic brown soils on the hills with yellow solodic soils on the lower slopes and in drainage lines. Sands of mottled yellow solodic soils also occur (OEH 2018).

Land surrounding the development site consists of agriculture to the west, urban residential to the north and east, and large lot residential to the south. Remnant vegetation in proximity to the development site

remains scattered along Sawpit Creek and along drainage lines and within the urban residential area to the east (Figure 1-2).

Figure 1-1 Location map of subject land and development site, Richardson Street, Windradyne NSW.

Figure 1-2 Image taken at the development site looking north with residential areas to the east and north

The site is zoned R1 General Residential under the Bathurst Local Environmental Plan 2014 (Figure 1-3). The site is listed as having a land capability class 5, which is non-arable land suitable for grazing but not cultivation (LLS 2018). The site is not mapped as bushfire-prone land (RFS 2018).

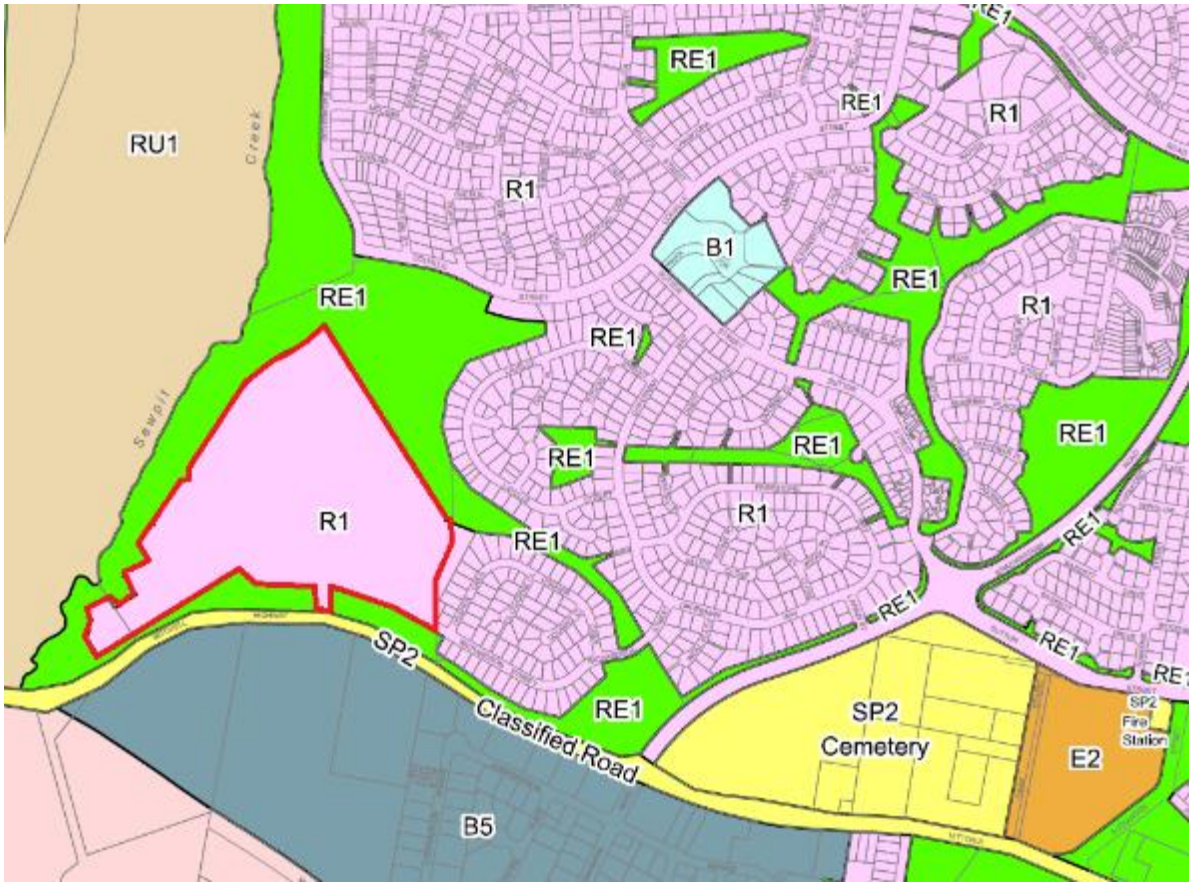

Figure 1-3 General residential land zoning of the development site, indicated by the red boundary (LEP 2014)

1.2.2 *Proposal description*

The proposal involves a residential subdivision. The proposed subdivision covers an area of 24 ha.

The subdivision would include the extension of Richardson Street and Governors Parade, and the addition of six new roads. These new roads would service approximately 92 blocks. It is assumed the entire footprint would be cleared and developed. The proposed site plan is provided in Figure 1-4.

Works are required to improve the structure and integrity of the northern dam. This includes the following:

1. Draining the dam
2. Cutting a slot through the dam wall and stockpiling the excavated material adjacent to the work
3. Placing a low flow pipe and reconstructing the dam wall
4. Shaping a spillway from the dam and laying geotextile and rock armouring.
5. Revegetation for stabilisation

Figure 1-4 Map of the development site and the development footprint of the subdivision

2 STATUTORY CONSIDERATIONS

2.1 BIODIVERSITY CONSERVATION ACT 2016

The NSW government introduced new biodiversity legislation for the consideration and assessment of biodiversity impacts in 2017. The *Biodiversity Conservation Act 2016* (BC Act) and *Local Land Services Act 2013* (LLS Act) commenced on the 25th August 2017 and has replaced the *Threatened Species Conservation Act 1995*. As the transitional arrangements in place have expired, this report has been prepared to meet the requirements of the new legislation.

The Biodiversity Offset Scheme (BOS) applies to local developments assessed under Part 4 of the EP&A Act (1979) where development activities exceed the BOS Thresholds for the clearing of native vegetation. The BOS Threshold is a test used to determine whether the clearing activities require further assessment to evaluate the impacts of the development approval. There are three triggers of the BOS set out in the *Biodiversity Conservation Regulation 2017*. The three elements of the threshold include:

- Whether the amount of native vegetation being cleared exceeds the threshold areas as set out in Table 2-1.
- Whether the impacts occur on an area mapped as being of Outstanding Biodiversity Value, see Table 2-1.
- Whether the proposed activity has the potential to significantly affect threatened biota.

Additional specific impacts are detailed in Clause 6.1 of the BC Regulations.

Table 2-1 BOS thresholds and the application to the development site

<table>
<tr><th>Threshold</th><th>Application to the Proposal</th></tr>
<tr><td><table>
<tr><th>Minimum lot size associated with the property</th><th>Threshold for clearing native vegetation.</th></tr>
<tr><td>Less than 1 ha</td><td>0.25 ha or more</td></tr>
<tr><td>1 ha to less than 40 ha</td><td>0.5 ha or more</td></tr>
<tr><td>40 ha to less than 1000 ha</td><td>1 ha or more</td></tr>
<tr><td>1000 ha or more</td><td>2 ha or more</td></tr>
</table></td><td>The minimum lot size is 0.13 ha. Therefore, the threshold for the proposal is 0.25 ha or more.
Assessed in Section 5</td></tr>
<tr><td>Areas of Outstanding Biodiversity Value:
Gould's Petrel critical habitat declaration
Little penguin population in Sydney's North Harbour
Mitchell's Rainforest Snail in Stotts Island Nature Reserve
Wollemi Pine</td><td>None occur near the development site.</td></tr>
<tr><td>Significant impact on threatened species, populations or ecological communities</td><td>Assessed in Section 5</td></tr>
<tr><td>Impacts to additional biodiversity values (Clause 6.1 of the Regulations):
Specific habitat of threatened species or ecological communities including karst, caves, crevices, cliffs and other geological features of significance, rocks, human made structures, non-native vegetation
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
Movement of threatened species that maintains their lifecycle
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)
Wind turbine strikes on protected animals
Vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.</td><td>Assessed in Section 5</td></tr>
<tr><td>Activity on land identified as being of high biodiversity value on the Biodiversity Values Map</td><td>Assessed in Section 5</td></tr>
</table>

2.2 STATE ENVIRONMENTAL PLANNING POLICY (KOALA HABITAT PROTECTION) 2019

The *State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44)* was repealed and replaced by the *State Environmental Planning Policy (Koala Habitat Protection)* (KHP SEPP) on 1 March 2020. The KHP SEPP is applicable to Part 4 development.

The KHP SEPP encourages the conservation and management of natural vegetation that provides habitat for Koalas. Koalas are listed under the BC Act as a vulnerable species. The Koala Habitat Protection SEPP applies to each local government area listed in Schedule 1 of the SEPP. Bathurst Regional Council is listed in Schedule 1 and falls within the Central and Southern Tablelands Koala Management Regions. No Koala Plan or Management exists for the Bathurst Regional Council.

The proposal site does not contain any pink area identified as a Koala Development Application Map area (Appendix B). The SEPP does therefore not apply.

This Flora and Fauna Assessment has considered the presence of core and potential Koala habitat at the site.

2.3 ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION (EPBC) ACT 1999 (CWTH)

The EPBC Act protects nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance. Matters of national environmental significance relevant to biodiversity are:

- Wetlands of international importance
- Nationally threatened species and ecological communities
- Migratory species
- Commonwealth marine areas

Significance of impacts is determined in accordance with the Significance impact guidelines 1.1 – Matters of National Environmental Significance (DoE 2013).

Where a proposal is likely to have a significant impact on a matter of national environmental significance, the proposal is referred to the Commonwealth Environment Minister via the Department of the Environment (DoE). The Minister then determines whether the proposal is a 'controlled action'. If a proposal is declared a controlled action, an assessment of the action is carried out and the Minister makes a decision to approve, approve with conditions, or not approve the proposed action.

This assessment considers the potential for the proposal to impact on matters of national environmental significance relevant to biodiversity.

2.4 FISHERIES MANAGEMENT ACT 1994

The *Fisheries Management Act 1994* (FM Act) sets out to conserve fish stocks and key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation and biological diversity. Further, it aims to promote viable commercial fishing, aquaculture industries and recreational fishing opportunities. Threatened species, populations and ecological communities and key threatening process are listed in the FM Act's Schedules.

2.5 BATHURST LEP

The particular aims of the Bathurst LEP are as follows:

a) to deliver growth and development in the city of Bathurst and rural localities.
b) to promote development that is consistent with the principles of ecologically sustainable development and the management of climate change and water resources.
c) to enhance and protect the region's unique Aboriginal and European cultural heritage as key social and economic assets.
d) to identify, protect, enhance and manage areas of high biodiversity conservation value as a means to:

i. Preserve and improve the ecosystem services they provide.
ii. Protect the region's significant vegetation and scenic quality.
iii. Respond to and plan for climate change by identifying and protecting habitat corridors and links through the local government area.

e) To facilitate rural housing choice through sustainable rural settlement growth that includes rural village living and strategic rural lifestyle living opportunities.
f) To provide greater housing choice within the city of Bathurst through sustainable urban settlement growth that includes greater opportunities for medium density housing and the minimisation of the city's environmental footprint.
g) To promote the well-being of the people of the region by encouraging living, vibrant and growing rural settlement areas, urban villages and suburbs that generate a sense of community and place.
h) To protect the region's key transport assets and to promote opportunities for sustainable transport, particularly public and active transport.
i) To provide a secure future for the region's recreation assets, in particular, the Mount Panorama and the Macquarie River precincts.
j) To minimise risk to the community in areas subject to environmental hazards, particularly flooding and bush fires and to minimise cumulative impacts on environmentally sensitive areas.
k) To encourage the dynamic and innovative development and growth of the region's primary resources.
l) To protect and enhance the region's landscapes, views, vistas and open spaces.
m) To create a land use framework for controlling development in the region that allows detailed provisions to be made in any development control plan made for that purpose.

The provisions of Chapter 9 of the Bathurst DCP, where they relate to Biodiversity, are not relevant to the proposal as:

1. The land is not zoned RU1
2. The land does not contain any areas of High or Moderate Biodiversity Sensitivity as mapped on Map 31 of the DCP.

3 METHODOLOGY

3.1 BACKGROUND REVIEW

3.1.1 *Database searches and literature review*

Database searches were undertaken on 25 June 2018 and on 2nd July 2020 to identify threatened species, populations and ecological communities known to occur, or with potential to occur, within a 10 km radius of the proposal site. The following online search tools were used:

- NSW Bionet Atlas database for species, populations and communities listed under the NSW BC Act and Commonwealth EPBC Act.
- Commonwealth *Protected Matters Search Tool* for threatened species and communities listed under the EPBC Act.
- Office of Environment and Heritage Interim Biogeographic Regionalisation (IBRA) search by region and habitat for threatened species and communities listed under the BC Act.

Information was compiled on threatened species, populations, and communities which have potential to be present in the study area from current scientific publications and environmental survey and assessment reports. Online databases used include the OEH Threatened Biodiversity Data Collection, particularly the Vegetation Information System (VIS) and threatened species profiles, and the Commonwealth EPBC Act Species Profiles and Threats Database (SPRAT).

3.1.2 *Threatened species evaluation*

The results of the database searches and literature review have been used to evaluate the potential for threatened species, ecological communities and endangered populations to be present in the study area, and to be adversely affected by the works. The threatened species evaluation also considers field survey results in relation to habitat type and quality, and on-site records. The approach is consistent with the NSW Threatened Species Test of Significance Guidelines ()OEH, 2018). The Threatened Species Evaluation is included as 7Appendix CAppendix C.

3.2 FIELD SURVEYS

The proposal site was surveyed by two ecologists on 27 June 2018 to assess the biodiversity values of the site. The survey was undertaken over a period of 4.5 hours (flora, ecological communities and fauna), between 12.30 pm and 5.00 pm. The weather was sunny, cool (14°C) with a light breeze.

3.2.1 *Flora*

Random meander (Cropper 1993) and floristic plots under the Biodiversity Assessment Methodology (BAM - NSW Government 2017) were used to survey vegetation at the proposal site. These methods provide good coverage in terms of area and microhabitats and maximises opportunities for detecting rare or sparsely distributed species.

Species occurrences were recorded progressively and within 20 x 20 m plots. Cover/abundances were identified within each plot. Any priority weeds were recorded opportunistically. The survey method and effort are consistent with the NSW guidelines Field Survey Methods (DEC 2004) and the BAM.

Plant Community Types (PCTs) were identified according to the OEH BioNet Vegetation Classification (OEH, 2017). Where relevant, Threatened Ecological Communities (TEC) were confirmed based on the relevant Scientific Committee – final determinations for each TEC. Botanical nomenclature follows Harden (1990-2002) and the PlantNet website, updated with recent changes recognised in Angiosperm Phylogeny Group (2016) and the Australian Plant Census.

3.2.2 *Field Survey – Fauna and Fauna Habitat*

The terrestrial fauna survey was undertaken to record and assess the value of habitats at the site to fauna, particularly threatened species with potential to occur at the site. Fauna sign and key habitat features were recorded, including:

- hollows and fissures in standing trees and stags.
- large woody debris and litter.
- fauna sign such as nests, scratches, glider sap feed marks, scats and latrine sites.
- food tree species (for gliders and possums, Koala).
- microhabitats such as soaks, rock outcrops and dense understorey.

All trees were individually inspected for trunk or limb hollows and any signs of occupation or use. Any disturbances and active threats to fauna or habitats were also recorded during the survey.

3.3 ASSUMPTIONS AND LIMITATIONS

The flora assessment is based on single-visit random meander survey and five floristic 20 m x 20 m plots. It is unlikely that all plant species were detected that may be present at the site due to the time of year the survey was undertaken. In particular, some inconspicuous or geophytic species which flower outside the survey period may not have been recorded. However, native grasses and forbs were visible along Sawpit Creek, which lies outside the boundary of the subject land. If these species were present within the development site, it is likely they would have also been visible. Both the development site and the vegetation along Sawpit Creek undergo the same grazing pressure from kangaroos and hares (Figure 3-1).

No targeted fauna surveys were undertaken. Opportunistic sightings of fauna are recorded in an inventory in Appendix F. However, in view of the scale and disturbed context of the development area, and the assessed low potential for direct impacts to threatened species, the approach is considered adequate and appropriate for the identification and assessment of biodiversity impacts.

Figure 3-1 Native grasses and forbs along Sawpit Creek, outside the development site boundary

4 RESULTS

4.1 BACKGROUND SEARCHES

The results of the desktop study identified the threatened flora and fauna species that have the potential to occur in region. Of the species identified, the following number have the potential to occur at the study site:

- 5 flora species
- 14 birds
- 4 mammals
- 3 frogs
- 1 ecological community

A full list of the threatened species identified through these searches with further description is available in Appendix C.

4.2 GENERAL

The development site is situated within the rolling foothills of the upper Macquarie River. The terrain is undulating and has been previously cleared for agriculture. The majority of the site is comprised of an exotic grassland. Four mature native trees remain on the site and are located in or adjacent to drainage channels. A map of the key biodiversity values recorded in the development site is included in Figure 4-1. The development site is currently impacted by grazing pressure from Eastern Grey Kangaroos and hares (Figure 4-2).

Exotic vegetation in the development site is predominant and in place, bare soil is exposed. The vegetation type reflects past clearing activities. The development site is dominated by Mediterranean Turnip (**Brassica tournefortii*), Goose Grass (**Eleusine tristachya*), Patterson's Curse (**Echium plantagineum*), Perennial Ryegrass (**Lolium perenne*), Red-flowered Mallow (**Modiola caroliniana*), Sheep Sorrel (**Acetosella vulgaris*) and Blue Heliotrope (**Heliotropium amplexicaule*).

There are two areas (0.04 ha and 0.09 ha) of remnant native vegetation. These patches are comprised of three eucalypt saplings near the three Yellow Box (*Eucalyptus mellidora*) adjacent to the drainage channel along the eastern boundary of the site and an isolated Blakely's Red Gum (*Eucalyptus blakelyi*) along the western creekline. The understorey of the woodland patches is predominantly exotic but some native saltbush (*Einadia nutans*) occurs in the ground layer.

The eastern boundary of the development footprint (Figure 4-1) would impact the native vegetation on the remnant patch of vegetation on the eastern boundary. The development footprint will also impact the remnant paddock tree towards the western boundary in the drainage channel (Figure 4-1).

Northern dam improvement works would temporarily drain water from the dam and disturb the dam bank through construction of a low flow pipe and reshaping of the spillway. The vegetation along the dam bank is dominated by perennial exotic grasses including *Phalaris* and *Paspalum dillatatum.* Native Juncus occur within the inflow area.

Figure 4-1 Biodiversity value map of the development site

Figure 4-2 Proposed development site for the subdivision looking north

Figure 4-3 Two Yellow Box adjacent to the drainage channel along the eastern boundary of the proposed development site

Figure 4-4 Exotic groundcover representative of much of the site. This quadrat photo is from floristic Plot 5.

Figure 4-5 Northern dam dominated by exotic perennial groundcover.

4.3 FLORA

4.3.1 *Flora Species recorded*

Table 4-1 Flora species recorded in study area.

Item	Detail	Photo
48 Flora Species (11 Native, 37 Exotic)	A complete list of all species recorded during the field survey is provided in Appendix E.	 A representative image of the development site.
Threatened Flora Species	None recorded. Threatened flora that has the potential to occur in the vicinity of the site is detained in Appendix C.	
10 Priority Weeds	The priority weeds include: Fleabane, African Boxthorn, Blackberry, Saffron Thistle, Blue Heliotrope, Bathurst Burr, Serrated Tussock, Spear Thistle, Scotch Thistle and Common Thornapple (Appendix E). Biosecurity measures include prevent, eliminate or minimise any biosecurity risk these weeds may pose (DPI 2018).	 Blue heliotrope.

4.3.2 *Threatened flora*

One endangered plant species, Basalt Peppercress (*Lepidium hyssopifolium),* was identified to have the potential to occur within the study area by the OEH IBRA search for the Bathurst IBRA Subregion (BC Act) search. Two recent sightings of this species occur within 10km of the development site (Bionet, 2018).

The Basalt Peppercress has been detected in the Bathurst area and responds to disturbance. Many of the remaining populations of Basalt Peppercress occur in heavily modified, non-natural environments including exotic pastures and grasslands.

Surveys were undertaken throughout the development site using the random meander method. One Lepidium species (**Lepidium africanum*) occurred throughout the site in high abundance. No other Lepidium species were detected. The recovery plan for the Basalt Peppercress states that "the Basalt Peppercress produces large seeds that lack any long-distance dispersal mechanism, so recruitment is likely to be close (within a few metres) to a parent plant. The natural introduction of seeds to new sites is

unlikely" (Tumino, 2010). The Basalt Peppercress also needs bare ground to germinate, mostly occurs under the canopy cover of trees and does not tolerate grazing (Tumino, 2010).

The lack of any parent plant detected during the survey, dominance of perennial groundcovers such as Phalaris and Blue Heliotrope, lack of overstory trees and high grazing pressure from Hares and Kangaroo indicates it is unlikely that this species would be present within the development site.

The dominance of Phalaris and lack of overstory vegetation along the dam bank indicates habitat surrounding the dam is not suitable for this species.

4.3.3 *Plant community types*

One Plant Community Type (PCT) was identified within the development site. The PCT was detected in two areas of the site, along the drainage line near the north-eastern boundary and in the drainage line towards the western boundary. The summary of the PCT is shown in Table 4-2.

Table 4-2 The plant community type identified within the development site

Plant community type (PCT)	Condition class	Threatened ecological community	Area (ha) in development site
Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (277)	Moderate	Yes. Remnant Yellow Box and Blakley's Red Gum form part of White Box Yellow Box Blakley's Red Gum Woodland (Box-Gum Woodland) EEC.	0.04 0.09
Total			**0.13**

An assessment of significance has been undertaken for the White Box Yellow Box Blakely's Red Gum EEC (Appendix D).

4.4 FAUNA

Table 4-3 Fauna species recorded, identified habitats and fauna resources of the study area.

Item	Detail	Description	Photo
9 bird species, 1 mammal and 1 amphibian were recorded during the field survey.	A complete list is provided in Appendix F.		
Threatened fauna species	None were identified.		

Item	Detail	Description	Photo
3 habitats present	Grassland	Provides foraging and grazing resources for fauna. Eastern Grey Kangaroos (*Macropus giganteus*) were seen utilising the open areas.	 Low condition grassland
	Grassy woodland	The woodland vegetation provides an upper storey layer for protection, food and breeding habitat for some birds. The paddock trees identified within the study area provide moderate quality habitat in a cleared landscape. These trees provide roosting, foraging and breeding habitat for several fauna species.	 Moderate condition grassy woodland
	Drainage channels	Superb Fairy Wrens (*Malurus cyaneus*) were seen utilising the vegetation in these areas and a Spotted Marsh Frog (*Limnodynastes tasmaniensis*) was heard in this habitat.	 Ephemeral aquatic habitat behind the Yellow Box
2 fauna Resources	Fallen timber	1 large log in plot 1 and Fallen timber near the north-western boundary. Fallen timber provides habitat for a range of fauna, including skinks, snakes, birds, and ground-dwelling mammals.	
	Hollow-bearing trees	One in development site. One hollow-bearing tree was identified within the development site - a Yellow Box in PCT 277 adjacent to Proposed Road 01. Hollow-bearing trees	The location of this is identified in Figure 4-1.

Item	Detail	Description	Photo
		provide an important roosting, nesting and sheltering habitat for birds and a range of nocturnal species.	
Northern dam	Riparian habitat	The dam contains permanent aquatic habitat with fringing and emergent vegetation including Juncus and exotic grasses. The habitat is suitable for wetland birds and amphibians.	

4.4.1 *Threatened fauna*

Birds

No threatened bird species were observed during the survey. Based on the threatened species evaluation (Appendix C) the following birds have potential to occur in the study area:

- Spotted Harrier (*Circus assimilis)*
- Superb Parrot *(Polytelis swainsonii)*
- Little Lorikeet (*Glossopsitta pusilla*)
- Diamond Firetail (*Stagonopleura guttata*)
- Barking Owl (*Ninox connivens*)
- Scarlet Robin (*Petroica boodang*)
- Powerful Owl (*Ninox strenua*)
- Masked Owl (*Tyto novaehollandiae*)
- Magpie Goose (*Anseranas semipalmata)*
- Red-tailed Tropicbird (*Phaethon rubricauda)*
- Black Falcon (*Falco subniger)*
- Brown Treecreeper (*Climacteris picumnus victoriae*)
- Black-chinned Honeyeater (*Calidris ferruginea*)
- Dusky Woodswallow (*Artamus cyanopterus*)
- Regent Honeyeater (*Anthochaera Phrygia)*
- Speckled Warbler (*Chthonicola sagittata*)
- Gang-Gang Cockatoo (*Callocephalon fimbriatum*)
- Yellow Wagtail (*Motacilla flava)*

The development site is heavily disturbed and provides minimal foraging habitat for the listed birds with three paddock trees and one hollow-bearing tree. The groundcover is predominantly exotic and heavily grazed. Drainage lines that transect the site are ephemeral and predominantly vegetated by Phalaris. Raptors including the Masked Owl, Powerful Owl and Barking Owl would forage on pest and native prey species in the study area. All these species are highly mobile. The development site does not support habitat critical to the survival.

Potential impact has been identified for the Superb Parrot, Diamond Firetail, Black Falcon, Spotted Harrier, Barking Owl, Powerful Owl, Masked Owl, the Little Lorikeet and the Yellow-bellied Sheathtail-bat. Assessments of Significance have been undertaken for these species (Appendix D) under Section 7.3 of the BC Act. The removal of potential habitat as a result of the proposal is considered unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be likely to be placed at risk of extinction.

Bats

The database searches indicated that two threatened bat species have the potential to occur in the study area. The Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*) and the Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*) are unlikely to occur in the development site. There are minimal habitat resources within the development site. The quality of the habitat within the development area for these species is of low quality, all these species are highly mobile, and the development area does not support habitat critical to their survival.

Reptiles

The database searches indicated that one threatened reptile has the potential to occur within the study area. It is unlikely that it would be found in the development site. The Striped Legless Lizard (*Delma impar*) was not detected during the field survey. The quality of the habitat in the development site for this species is poor. The site is heavily disturbed and has been previously cleared and cropped. There are minimal habitat features and no rocky outcrops. It is considered highly unlikely that these species occur in the development site.

Amphibians

The database searches indicated that four threatened amphibians have the potential to occur within the study area. The Green and Golden Bell Frog (*Litoria aurea*), the Booroolong Frog (*Litoria booroolongensis*) and the Yellow-spotted Tree Frog (*Litoria castanea*) have been sighted within a 10 km radius of the development site. The drainage lines are ephemeral and highly disturbed.

The Boorolong Frog (*Litoria booroolongensis)* requires habitat with rocky or cobbled permanent streams which is not present in the development site.

Suitable habitat exists for the Green and Golden Bell Frog (*Litoria aurea*) and Yellow Spotted Tree Frog (*Litoria castanea*) within the northern dam. These species require permanent ponds or dams with abundant emergent vegetation. Test of Significance has been completed for these species and with the implementation of mitigation measures a significant impact is considered unlikely.

Mammals

The database searches indicated two threatened mammals have the potential to occur in the study area. The Koala (*Phascolarctos cinereus*) and the Spotted-tail Quoll (*Dasyurus maculatus maculatus*) have been sighted within a 10 km radius of the development site. The site is not classed as core koala habitat (section 4.4.2) and there were no observations of koalas or scratching's during the field survey. Suitable habitat for the Spotted-tail Quoll does not exist within the development site. It is considered highly unlikely that these species occur in the development site.

4.4.2 *Koala Habitat*

EPBC Act Koala Habitat Assessment Tool

The development site has been assessed using the Koala Habitat Assessment Tool from the Commonwealth EPBC Act Referral Guidelines for the Vulnerable Koala (DOE 2014); refer Table 4-4. Two secondary food tree species (Blakely's Red Gum, *E. blakelyi* and Yellow Box, *E. melliodora*) are listed for the Central and Southern Tablelands Koala Management Area (DECC 2008a). The abundance of Blakely's Red Gum in the development site is low (< 5 % cover). The abundance of Yellow Box within the development site is low (< 5 % cover). The trees are within the development site and are located in the areas proposed for development.

The site does not qualify as 'Koala habitat' under the Guidelines and is not considered habitat critical to the survival of the Koala, having scored zero using the Habitat Assessment Tool (Table 4-4). The referral guidelines indicate that proposals involving less than 2 hectares of habitat clearing and a score of 5 are not recommended for referral to the Commonwealth.

Table 4-4 EPBC Koala Habitat Assessment Tool for Lot 1126 DP 1215618, Windradyne NSW.

Attribute	Score	Description for habitat
Koala occurrence	0 (low)	No evidence of koalas at the site within the last 10 years, based on ALA and BioNet records. One sighting has been recorded within the last 10 years over 7 km from the site.
Vegetation composition	0 (low)	No woodland occurs on-site. There are four paddock trees, which are two known koala secondary food tree species.
Habitat connectivity	0 (low)	Area is not part of a contiguous landscape and does not meet the criteria for < 500 ha to > 300 ha or > 500 ha.
Key existing threats	0 (low)	Areas which score 0 for occurrence and are likely to have some degree of dog or vehicle threat present as a result of the adjacent residential area and highway.
Recovery value	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives outlines in the Table 1 of the Guidelines.
Total score	**0**	

State Environmental Planning (Koala Habitat Protection) 2019

The site does contains two feed trees (Blakely's Red Gum and Yellow Box) feed trees, which are listed on Schedule 2 of SEPP.

There is one current record of a Koala sighting between 10 kilometres of the site. There are 11 recorded sightings within 10 km of the site between the years of 1975 and 2017. The most recent record is a sighting of a Koala in 2017, over 7 km from the development site. No Koala climbing signs (deep scratches on tree trunks) were observed during the survey. While suitable food trees are present, the structure of the potential habitat is not ideal.

On the basis of marginal habitat structure, no detectable signs during the field survey and no nearby records, it is unlikely that the study area supports a resident Koala population and the site is not considered Core Koala Habitat.

4.5 AQUATIC HABITAT

4.5.1 *Existing environment*

Aquatic habitat was identified in the dam in the north of the development site. The dam receives freshwater only after rainfall. The banks of the dam are well vegetated. The inflow area is densely vegetated with native *Juncus sp*. and *Carex sp* providing natural filtration. The large areas of the three drainage lines are well vegetated, predominantly with Phalaris.

Amphibians

The database searches indicated that four threatened amphibians have the potential to occur within the study area. The site survey has identified suitable habitat exists in the development site for two threatened amphibians.

Fish

The database searches indicated that three threatened fish have the potential to occur within the study area. The site survey has identified no suitable habitat for these species.

4.6 EPBC MATTERS OF NATIONAL SIGNIFICANCE

The following matters of national significance relevant to biodiversity are considered to apply to the proposal. These matters are assessed further in this report.

4.6.1 *Endangered Ecological Communities*

Two endangered ecological communities were identified to have the potential to occur within the study area by the Protected Matters (EPBC Act) search.

One of these communities, White Box-Yellow Box-Blakely's Red Gum and Derived Native Grassland (Box-Gum woodland) had the potential to occur within the study area, based on the presence of remnant Yellow Box and Blakely's Red Gum trees. However, the remnant vegetation did not meet the condition threshold for the EPBC listed EEC due to the understory being dominated by exotic species (DEH 2016). Based on plot data, 15% of the groundcover is dominated by perennial exotic species such as African Boxthorn, Phalaris (**Phalaris aquatica*) and Blue Heliotrope (**Heliotropium amplexicaule*) and 0.1% cover occurs as perennial native species (*Einadia nutans*).

The EPBC listed Box-Gum Woodland is not considered to occur within the development site.

4.6.2 *Threatened Species*

The Koala (*Phascolarctos cinereus*) is listed as Vulnerable under the EPBC Act. The EPBC Act assessment tool has determined that no further assessment of this species is required.

One endangered plant species, Basalt Peppercress (*Lepidium hyssopifolium),* was identified to have the potential to occur within the study area by the Protected Matters (EPBC Act) search.

The Basalt Peppercress has been detected in the Bathurst area and responds to disturbance. Many of the remaining populations of Basalt Peppercress occur in heavily modified, non-natural environments including

exotic pastures and grasslands. However, the habitat of the development site did not meet the criteria listed in the recovery plan for the Basalt Peppercress (Tumino 2010).

The lack of a parent plant, dominance of perennial groundcovers and lack of overstory trees detected through the field survey indicates it is unlikely that this species would be present. Therefore, an Assessment of Significance was not undertaken for this species.

No other threatened fauna or flora species under the EPBC Act were identified within the development site or are considered likely to occur.

4.6.3 *Migratory Species*

Eleven species listed as Migratory under the EPBC Act are considered to have potential to occur within the study area. Based on a habitat assessment (Appendix C), habitat was present for the Yellow Wagtail (*Motacilla flava*). However, it is unlikely it would be impacted as the watercourse and riparian vegetation is small and would only be temporarily disturbed. The Yellow Wagtail is highly mobile and is unlikely to be reliant on the aquatic habitat in the development site. Impact to the remaining 10 species is considered unlikely by the proposal.

5 ASSESSMENT OF IMPACTS

5.1 CONSTRUCTION IMPACTS

One hollow-bearing tree and three paddock trees of PCT 277 will be removed as a result of the proposed works for the subdivision. The proposed subdivision will impact a previously cleared and cultivated heavily exotic dominated grassland. Therefore, impacts to threatened flora and fauna would be considered low.

The ephemeral drainage line would be impacted as the development footprint (Figure 4-1) indicates development over the drainage line. This would unlikely impact any threatened flora or fauna and would be considered low.

The total area of moderate condition woodland of PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion to be impacted is approximately 0.13 ha for the proposed works of the Subdivision. This community also forms part of the NSW listed EEC – White Box, Yellow Box, Blakely's Red Gum Woodland. No significant impacts to this EEC are considered likely for the following reasons:

- The removal of the small remnant patches is not likely to have an adverse effect on the extent of the EEC such that its local occurrence is likely to be placed at risk of extinction. The 0.13 ha is heavily disturbed with a predominantly exotic understorey and groundcover. It is unlikely that the proposal would substantially and adversely modify the composition of the EEC such that its local occurrence is likely to be placed at risk of extinction.
- There are three paddock trees and one hollow-bearing tree to be removed as part of the works.
- The condition of the majority of the impact area is low.
- There is better condition vegetation along Sawpit Creek that is situated outside the western boundary that would be retained and continue to support native fauna.

The spread of priority weeds may occur during the construction of the proposal. Ten priority weeds were identified during the field survey (Table 4-1). These species require particular treatments to be successfully managed. Detailed information on managing this species can be sought from the Noxious and Environmental Weed Control Handbook (DPI 2015).

The proposal would involve the division of land for the construction of housing. The drainage line is ephemeral and does not constitute aquatic habitat, therefore no impacts to aquatic habitat are expected as a result of these works. However, there is potential for sediment laden run off to impact water quality in receiving waters, Sawpit Creek and the Macquarie River, during construction. These impacts can be avoided with the implementation of appropriate erosion and sediment controls and standard construction safeguards.

The proposal would involve structural improvement works to the northern dam including minor reconstruction of the dam wall bank through installation of a low flow pipe and spill way reform. Temporary disturbance to aquatic habitat would occur and potentially impact threatened amphibians. With the implementation of mitigation measures, including avoiding disturbance to the inflow area of the dam, these impacts are likely to be temporary in nature and unlikely to significantly impact threatened amphibian species.

No impacts to threatened fish species is expected to occur as a result of the construction phase of the proposal (Appendix C.3).

5.2 OPERATIONAL IMPACTS

The proposal would introduce impermeable surfaces and reduced infiltration into the current greenfield site that currently provides stormwater infiltration for the surrounding drainage catchment. Changes to the hydrology of the site has the potential to impact peak discharge and the water quality of receiving waters, Sawpit Creek and the Macquarie River.

Impacts on water quality from the operation of the proposal are expected to be minimal. These impacts can be avoided with the implementation of appropriate stormwater management controls. No threatened fish populations are expected to be affected (Appendix C.3).

The proposal would introduce two new activities into the study area with the potential to impact on flora and fauna:

1. Vehicular traffic to the new dwellings
2. Human activity associated with the dwellings

Vehicular traffic associated with the proposal would be high to access the 92 proposed homes, which continues the urban sprawl west of the Bathurst town centre. Vehicles would travel at speeds of 50 kph. Therefore, the potential for car strike and the risk of collision could increase.

Human activity associated with occupation of the proposed subdivision includes noise, light spill, and the introduction and movements of pets. As the vegetation of the development site is largely exotic and of low quality, it is unlikely that these activities would further reduce the value of the site for fauna sensitive to such activities. However, pets have the potential to compete with native wildlife and may kill birds, reptiles or small mammals.

The northern dam would be retained and become a natural feature of the residential area, improving aesthetic appeal. Disturbance from human activity is already present due to the surrounding residential areas. Therefore, the proposal is unlikely to further reduce the value of the site for fauna sensitive to such activities.

These impacts are expected to be very limited geographically to the area surrounding each development envelope. Given the existing residential development in the area, impacts from the proposal on fauna are expected to be very minor and limited.

5.3 BOS THRESHOLDS

A summary of the potential impacts from the proposal against the BOS thresholds is provided in Table 5-1.

Table 5-1 Impact assessment against the BOS Thresholds.

<table>
<tr><th colspan="2">Threshold</th><th>Application to the Proposal</th><th>Threshold Exceeded?</th></tr>
<tr><td colspan="2"><table>
<tr><th>Minimum lot size associated with the property</th><th>Threshold for clearing of native vegetation</th></tr>
<tr><td>Less than 1 ha</td><td>0.25 ha or more</td></tr>
<tr><td>1 ha to less than 40 ha</td><td>0.5 ha or more</td></tr>
<tr><td>40 ha to less than 1000 ha</td><td>1 ha or more</td></tr>
<tr><td>1000 ha or more</td><td>2 ha or more</td></tr>
</table></td><td>The proposal is located on land with a minimum lot size of 0.13 ha. 0.13 ha of native vegetation would be removed. This is below the 0.25 ha threshold.

Disturbances to the dam bank and spillway</td><td>No</td></tr>
</table>

	reform occur in exotic vegetation.	
Areas of Outstanding Biodiversity Value	None occur in the development site.	No
Significant impact on threatened species, populations or ecological communities	There is unlikely to be any impact on threatened species (refer to Appendix C).	No
Impacts to additional biodiversity values (Clause 6.1 of the Regulations): • Specific habitat of threatened species or ecological communities including karst, caves, crevices, cliffs and other geological features of significance, rocks, human made structures, non-native vegetation • Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range • Movement of threatened species that maintains their lifecycle • Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development) • Wind turbine strikes on protected animals • Vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.	 No impact would occur on any of these habitats. No impact to connectivity would occur. No impact to the movement of species would occur No impact to aquatic bodies or processes would occur. The proposal does not involve turbines. The proposal poses a low risk to fauna from vehicle strikes.	 No No No No No No
Activity on land identified as being of high biodiversity value on the Biodiversity Values Map	The development site does not impact on any land classed as land of high biodiversity value (Figure 5-1). However, Sawpit Creek, west of the western boundary, is considered as land of high biodiversity value.	No

The proposal does not trigger or exceed the BOS threshold. Therefore, no further assessment is required.

Figure 5-1 The Biodiversity Value Map. The proposal, marked by the red boundary, lies outside of areas mapped of high biodiversity value. Sawpit Creek is identified by the orange (NSW Government 2018)

6 MITIGATION MEASURES

These safeguards are a tool to assist with minimising the impacts on biodiversity during vegetation removal and maintenance works (Table 6-1).

Table 6-1 Safeguards for Protection of Flora and Fauna.

Impact	Environmental safeguards	Responsibility	Timing
Introduction and spread of priority weeds and pathogens	• Declared priority weeds should be managed according to the requirements stipulated by the Biosecurity Act, and recommendations made by the local control authority (MLLS) and the Noxious and Environmental Weed Handbook (DPI, 2015), which contains details as to the management of specific noxious weeds. • Regular targeted control of priority weeds should take place for at least 24 months following rehabilitation of disturbed areas. • All weed material containing seed heads, weeds that contain toxins, and weeds that are able to reproduce vegetatively should be disposed of at an appropriate waste management facility or otherwise properly treated to prevent weed growth. • All herbicides should be used in accordance with the requirements on the label. Any person undertaking pesticide (including herbicide) application should be trained to do so and have the proper certificate of completion/ competency or statement of attainment issued by a registered training organisation. • Hygiene protocols should be implemented in accordance with the NSW Hygiene Guidelines (Appendix G).	Contractor	Construction Operation Construction Construction Construction
Disturbance to fallen timber, dead wood and bush rock	• Any fallen timber, dead wood and bush rock encountered in the impact area should be relocated to other areas within the study site.	Contractor	Construction
Unexpected threatened species finds	• The site induction should include measures to make employees aware of potential threatened flora and fauna during works and understand the procedures if threatened fauna are detected, this will be recorded as a part of the induction procedure and toolbox talks: ○ Stop work, ○ Alert an Ecologist for assessment and possible re-location during works.	Contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
Decreases to water quality of receiving waters and northern dam	A construction and operation Soil and Water Management Plan and construction Erosion and Sediment Control Plan would be prepared, implemented and monitored during the construction and operation of the proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. These plans would include provisions such as: • At the commencement of the works, and progressively during construction, install the required erosion control and sediment capture measures. • Regularly inspect erosion and sediment controls, particularly following rainfall. • Maintain a register of inspection and maintenance of erosion control and sediment capture measures. • Ensure there are appropriate erosion and sediment control measures in place to prevent erosion and sedimentation occurring within the stormwater channel during concentrated flows. • Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks. • Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads. • In all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. • During excavation activities, monitor for increases in salinity, reduce water inputs and remediate the site with salt tolerant vegetation. • Stockpile topsoil appropriately to minimise weed infestation, maintain soil organic matter, and maintain soil structure and microbial activity. • Manage works in consideration of heavy rainfall events.	Contractor	Construction Operation

Impact	Environmental safeguards	Responsibility	Timing
	• Areas of disturbed soil would be rehabilitated promptly and progressively during construction. • Ensure all water stormwater captured o-site is treated before release to receiving waters. • Maintain erosion control structures at discharge points to ensure no decrease in water quality in Sawpit Creek and the Macquarie River. • Disturbances to existing vegetation on the northern dam would be minimised where practicable. Vegetation in the inflow area would be avoided and protected with erosion controls.		

7 REFERENCES

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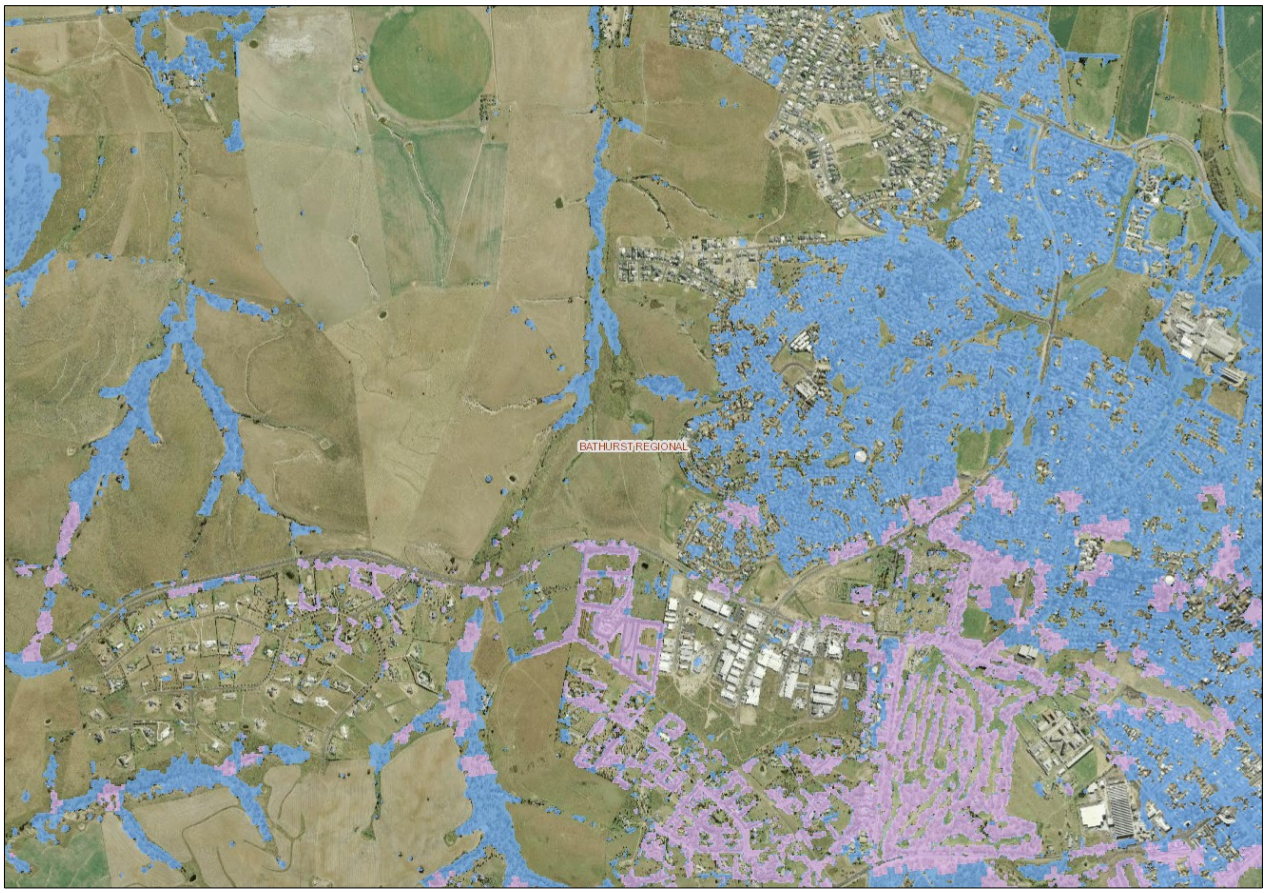
APPENDIX A CONCEPT DESIGN

APPENDIX B DATABASE SEARCH RESULTS



Planning, Industry & Environment

SEPP - Koala Habitat

Legend

Local Government Area

Land Application Map

Koala Development Application Map

Site Investigation Area for Koala Plans of Management Map

Notes:

0 0.20 0.4 0.79 kilometres

SEPP Kola Development Application Map

Map created: 09-Jul-2020

NSW GOVERNMENT

NSW Department of Planning, Industry and Environment

Home > Topics > Animals and plants > Search for threatened species > Find by region

Threatened Species found in Bathurst IBRA sub-region

Search using criteria below or filter existing results

Status

☐ Show nationally listed species only

Search

Matching records: 120

Save to CSV

Click on column headers to sort

Scientific name ▲	Common name	Conservation project	Type of species	NSW status	Occurrence	Vegetation class
Asterolasia buxifolia	*Asterolasia buxifolia*	Asterolasia buxifolia conservation project	Plant > Shrubs	Endangered	Known	Show 3 linked vegetation classes
Chalinolobus dwyeri	Large-eared Pied Bat	Chalinolobus dwyeri conservation project	Animal > Bats	Vulnerable	Known	Show 58 linked vegetation classes
Veronica blakelyi	*Veronica blakelyi*	Veronica blakelyi conservation project	Plant > Shrubs	Vulnerable	Predicted	Show 13 linked vegetation classes
Euphrasia scabra	Rough Eyebright	Euphrasia scabra conservation project	Plant > Herbs and Forbs	Endangered	Known	Show 6 linked vegetation classes
Grevillea divaricata	*Grevillea divaricata*	Grevillea divaricata conservation project	Plant > Shrubs	Endangered	Predicted	Show 9 linked vegetation classes
Limosa limosa	Black-tailed Godwit	Limosa limosa conservation project	Animal > Birds	Vulnerable	Predicted	Show 15 linked vegetation classes
Litoria raniformis	Southern Bell Frog	Litoria raniformis conservation project	Animal > Amphibians	Endangered	Predicted	Show 11 linked vegetation classes
Lophoictinia isura	Square-tailed Kite	Lophoictinia isura conservation project	Animal > Birds	Vulnerable	Predicted	Show 70 linked vegetation classes
Mixophyes balbus	Stuttering Frog	Mixophyes balbus conservation project	Animal > Amphibians	Endangered	Predicted	Show 38 linked vegetation classes

Myotis macropus	**Southern Myotis**	**Myotis macropus conservation project**	Animal > Bats	Vulnerable	Known	**Show 68 linked vegetation classes**
Ninox connivens	**Barking Owl**	**Ninox connivens conservation project**	Animal > Birds	Vulnerable	Known	**Show 67 linked vegetation classes**
Paralucia spinifera	**Purple Copper Butterfly, Bathurst Copper Butterfly**	**Paralucia spinifera conservation project**	Animal > Invertebrates	Endangered	Known	**Show 8 linked vegetation classes**
Phaethon rubricauda	**Red-tailed Tropicbird**	**Phaethon rubricauda conservation project**	Animal > Birds	Vulnerable	Known	**Show 2 linked vegetation classes**
Phascolarctos cinereus	**Koala**	**Phascolarctos cinereus conservation project**	Animal > Marsupials	Vulnerable	Known	**Show 62 linked vegetation classes**
Scoteanax rueppellii	**Greater Broad-nosed Bat**	**Scoteanax rueppellii conservation project**	Animal > Bats	Vulnerable	Known	**Show 57 linked vegetation classes**
Thesium australe	**Austral Toadflax**	**Thesium australe conservation project**	Plant > Herbs and Forbs	Vulnerable	Predicted	**Show 27 linked vegetation classes**
Competition from feral honey bees, Apis mellifera L.	**Competition from feral honeybees**	**Competition from feral honey bees, Apis mellifera L. conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Bushrock removal	**Bushrock Removal**	**Bushrock removal conservation project**	Threat > Habitat Loss/Change	Key Threatening Process	Predicted	
Invasion of the Yellow Crazy Ant, Anoplolepis gracilipes (Fr. Smith) into NSW	**Invasion of the yellow crazy ant (*Anoplolepis gracilipes*) into NSW**	**Invasion of the Yellow Crazy Ant, Anoplolepis gracilipes (Fr. Smith) into NSW conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Predation by Gambusia holbrooki Girard, 1859 (Plague Minnow or Mosquito Fish)	**Predation by the Plague Minnow (*Gambusia holbrooki*)**	**Predation by Gambusia holbrooki Girard, 1859 (Plague Minnow or Mosquito Fish) conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Invasion of native plant communities by exotic perennial grasses	**Invasion of native plant communities by exotic perennial grasses**	**Invasion of native plant communities by exotic perennial grasses conservation project**	Threat > Weed	Key Threatening Process	Predicted	
Clearing of native vegetation	**Clearing of native vegetation**	**Clearing of native vegetation**	Threat >	Key Threate		

		conservation project	Habitat Loss/Change	ning Process	Predicted	
Invasion and establishment of exotic vines and scramblers	**Invasion and establishment of exotic vines and scramblers**	**Invasion and establishment of exotic vines and scramblers conservation project**	Threat > Weed	Key Threatening Process	Predicted	
Predation and hybridisation by Feral Dogs, Canis lupus familiaris	**Predation and hybridisation by Feral Dogs, Canis lupus familiaris**	**Predation and hybridisation by Feral Dogs, Canis lupus familiaris conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Hieraaetus morphnoides	**Little Eagle**	**Hieraaetus morphnoides conservation project**	Animal > Birds	Vulnerable	Known	**Show 100 linked vegetation classes**
Circus assimilis	**Spotted Harrier**	**Circus assimilis conservation project**	Animal > Birds	Vulnerable	Known	**Show 58 linked vegetation classes**
Daphoenositta chrysoptera	**Varied Sittella**	**Daphoenositta chrysoptera conservation project**	Animal > Birds	Vulnerable	Known	**Show 80 linked vegetation classes**
Invasion of native plant communities by African Olive Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif.	**Invasion of native plant communities by African Olive Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif.**	**Invasion of native plant communities by African Olive Olea europaea subsp. cuspidata (Wall. ex G. Don) Cif. conservation project**	Threat > Weed	Key Threatening Process	Predicted	
Haliaeetus leucogaster	**White-bellied Sea-Eagle**	**Haliaeetus leucogaster conservation project**	Animal > Birds	Vulnerable	Known	**Show 68 linked vegetation classes**
Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion	**Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion**	**Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion conservation project**	Community > Threatened Ecological Communities	Critically Endangered Ecological Community	Known	**Show 5 linked vegetation classes**
Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions	**Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions**	**Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions conservation project**	Community > Threatened Ecological Communities	Critically Endangered Ecological Community	Predicted	**Show 5 linked vegetation classes**
Acacia clunies-rossiae	**Kanangra Wattle**	**Acacia clunies-rossiae conservation project**	Plant > Shrubs	Vulnerable	Known	**Show 7 linked vegetation classes**
Cercartetus nanus	**Eastern Pygmy-possum**	**Cercartetus nanus conservation project**	Animal > Marsupials	Vulnerable	Known	**Show 62 linked vegetation classes**

Delma impar	**Striped Legless Lizard**	**Delma impar conservation project**	Animal > Reptiles	Vulnerable	Predicted	**Show 9 linked vegetation classes**
Eucalyptus pulverulenta	**Silver-leafed Gum**	**Eucalyptus pulverulenta conservation project**	Plant > Mallees	Vulnerable	Known	**Show 5 linked vegetation classes**
Grantiella picta	**Painted Honeyeater**	**Grantiella picta conservation project**	Animal > Birds	Vulnerable	Known	**Show 51 linked vegetation classes**
Hoplocephalus bungaroides	**Broad-headed Snake**	**Hoplocephalus bungaroides conservation project**	Animal > Reptiles	Endangered	Predicted	**Show 34 linked vegetation classes**
Litoria booroolongensis	**Booroolong Frog**	**Litoria booroolongensis conservation project**	Animal > Amphibians	Endangered	Known	**Show 35 linked vegetation classes**
Callistemon megalongensis	**Megalong Valley Bottlebrush**	**Callistemon megalongensis conservation project**	Plant > Shrubs	Critically Endangered	Known	**Show 4 linked vegetation classes**
Melanodryas cucullata cucullata	**Hooded Robin (south-eastern form)**	**Melanodryas cucullata cucullata conservation project**	Animal > Birds	Vulnerable	Predicted	**Show 60 linked vegetation classes**
Melithreptus gularis gularis	**Black-chinned Honeyeater (eastern subspecies)**	**Melithreptus gularis gularis conservation project**	Animal > Birds	Vulnerable	Known	**Show 39 linked vegetation classes**
Oxyura australis	**Blue-billed Duck**	**Oxyura australis conservation project**	Animal > Birds	Vulnerable	Predicted	**Show 10 linked vegetation classes**
Chthonicola sagittata	**Speckled Warbler**	**Chthonicola sagittata conservation project**	Animal > Birds	Vulnerable	Known	**Show 50 linked vegetation classes**
Stagonopleura guttata	**Diamond Firetail**	**Stagonopleura guttata conservation project**	Animal > Birds	Vulnerable	Known	**Show 54 linked vegetation classes**
Stictonetta naevosa	**Freckled Duck**	**Stictonetta naevosa conservation project**	Animal > Birds	Vulnerable	Predicted	**Show 14 linked vegetation classes**
Introduction of the Large Earth Bumblebee Bombus terrestris (L.)	**Introduction of the large earth bumblebee (*Bombus terrestris*)**	**Introduction of the Large Earth Bumblebee Bombus terrestris (L.) conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	

High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	**Ecological consequences of high frequency fires**	**High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition conservation project**	Threat > Habitat Loss/Change	Key Threatening Process	Predicted	
Predation by the European Red Fox Vulpes Vulpes (Linnaeus, 1758)	**Predation by the European Red Fox**	**Predation by the European Red Fox Vulpes Vulpes (Linnaeus, 1758) conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Importation of Red Imported Fire Ants Solenopsis invicta Buren 1972	**Importation of red imported fire ants into NSW**	**Importation of Red Imported Fire Ants Solenopsis invicta Buren 1972 conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Competition and grazing by the feral European Rabbit, Oryctolagus cuniculus (L.)	**Competition and grazing by the feral European rabbit**	**Competition and grazing by the feral European Rabbit, Oryctolagus cuniculus (L.) conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Invasion of native plant communities by Chrysanthemoides monilifera	**Invasion of native plant communities by bitou bush & boneseed**	**Invasion of native plant communities by Chrysanthemoides monilifera conservation project**	Threat > Weed	Key Threatening Process	Predicted	
Anseranas semipalmata	**Magpie Goose**	**Anseranas semipalmata conservation project**	Animal > Birds	Vulnerable	Known	**Show 17 linked vegetation classes**
Boronia deanei	**Deane's Boronia**	**Boronia deanei conservation project**	Plant > Shrubs	Vulnerable	Predicted	**Show 5 linked vegetation classes**
Calyptorhynchus lathami	**Glossy Black-Cockatoo**	**Calyptorhynchus lathami conservation project**	Animal > Birds	Vulnerable	Known	**Show 63 linked vegetation classes**
Dasyurus maculatus	**Spotted-tailed Quoll**	**Dasyurus maculatus conservation project**	Animal > Marsupials	Vulnerable	Known	**Show 70 linked vegetation classes**
Eucalyptus robertsonii subsp. hemisphaerica	**Robertson's Peppermint**	**Eucalyptus robertsonii subsp. hemisphaerica conservation project**	Plant > Trees	Vulnerable	Predicted	**Show 2 linked vegetation classes**
Falsistrellus tasmaniensis	**Eastern False Pipistrelle**	**Falsistrellus tasmaniensis conservation project**	Animal > Bats	Vulnerable	Known	**Show 53 linked vegetation classes**

Grus rubicunda	Brolga	Grus rubicunda conservation project	Animal > Birds	Vulnerable	Predicted	Show 18 linked vegetation classes
Litoria aurea	Green and Golden Bell Frog	Litoria aurea conservation project	Animal > Amphibians	Endangered	Known	Show 35 linked vegetation classes
Litoria castanea	Yellow-spotted Tree Frog	Litoria castanea conservation project	Animal > Amphibians	Critically Endangered	Known	Show 5 linked vegetation classes
Petaurus norfolcensis	Squirrel Glider	Petaurus norfolcensis conservation project	Animal > Marsupials	Vulnerable	Known	Show 52 linked vegetation classes
Petrogale penicillata	Brush-tailed Rock-wallaby	Petrogale penicillata conservation project	Animal > Marsupials	Endangered	Known	Show 49 linked vegetation classes
Phascogale tapoatafa	Brush-tailed Phascogale	Phascogale tapoatafa conservation project	Animal > Marsupials	Vulnerable	Predicted	Show 46 linked vegetation classes
Pseudophryne australis	Red-crowned Toadlet	Pseudophryne australis conservation project	Animal > Amphibians	Vulnerable	Predicted	Show 25 linked vegetation classes
Rostratula australis	Australian Painted Snipe	Rostratula australis conservation project	Animal > Birds	Endangered	Known	Show 17 linked vegetation classes
Swainsona sericea	Silky Swainson-pea	Swainsona sericea conservation project	Plant > Herbs and Forbs	Vulnerable	Known	Show 25 linked vegetation classes
Tyto novaehollandiae	Masked Owl	Tyto novaehollandiae conservation project	Animal > Birds	Vulnerable	Known	Show 66 linked vegetation classes
Anthochaera phrygia	Regent Honeyeater	Anthochaera phrygia conservation project	Animal > Birds	Critically Endangered	Known	Show 51 linked vegetation classes
Zieria obcordata	Granite Zieria	Zieria obcordata conservation project	Plant > Shrubs	Endangered	Known	Show 2 linked vegetation classes
Callocephalon fimbriatum	Gang-gang Cockatoo	Callocephalon fimbriatum conservation project	Animal > Birds	Vulnerable	Known	Show 51 linked vegetation classes

Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations	**Infection by Psittacine circoviral (beak and feather) disease affecting endangered psittacine species**	**Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations conservation project**	Threat > Disease	Key Threatening Process	Predicted	
Loss or degradation (or both) of sites used for hill-topping by butterflies	**Loss and/or degradation of sites used for hill-topping by butterflies**	**Loss or degradation (or both) of sites used for hill-topping by butterflies conservation project**	Threat > Habitat Loss/Change	Key Threatening Process	Predicted	
Predation by the Feral Cat Felis catus (Linnaeus, 1758)	**Predation by feral cats**	**Predation by the Feral Cat Felis catus (Linnaeus, 1758) conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	**Infection of frogs by amphibian chytrid causing the disease chytridiomycosis**	**Infection of frogs by amphibian chytrid causing the disease chytridiomycosis conservation project**	Threat > Disease	Key Threatening Process	Predicted	
Herbivory and environmental degradation caused by feral deer	**Herbivory and environmental degradation caused by feral deer**	**Herbivory and environmental degradation caused by feral deer conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Loss of Hollow-bearing Trees	**Loss of Hollow-bearing Trees**	**Loss of Hollow-bearing Trees conservation project**	Threat > Habitat Loss/Change	Key Threatening Process	Predicted	
Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	**Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners**	**Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners conservation project**	Threat > Other Threat	Key Threatening Process	Predicted	
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	**Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae**	**Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae conservation project**	Threat > Disease	Key Threatening Process	Predicted	
Acacia flocktoniae	**Flockton Wattle**	**Acacia flocktoniae conservation project**	Plant > Shrubs	Vulnerable	Known	**Show 8 linked vegetation classes**
Aprasia parapulchella	**Pink-tailed Legless Lizard**	**Aprasia parapulchella conservation project**	Animal > Reptiles	Vulnerable	Predicted	**Show 15 linked vegetation classes**

Botaurus poiciloptilus	**Australasian Bittern**	**Botaurus poiciloptilus conservation project**	Animal > Birds	Endangered	Predicted	**Show 18 linked vegetation classes**
Burhinus grallarius	**Bush Stone-curlew**	**Burhinus grallarius conservation project**	Animal > Birds	Endangered	Predicted	**Show 60 linked vegetation classes**
Climacteris picumnus victoriae	**Brown Treecreeper (eastern subspecies)**	**Climacteris picumnus victoriae conservation project**	Animal > Birds	Vulnerable	Known	**Show 45 linked vegetation classes**
Lathamus discolor	**Swift Parrot**	**Lathamus discolor conservation project**	Animal > Birds	Endangered	Known	**Show 51 linked vegetation classes**
Lepidium hyssopifolium	**Aromatic Peppercress**	**Lepidium hyssopifolium conservation project**	Plant > Herbs and Forbs	Endangered	Known	**Show 7 linked vegetation classes**
Litoria littlejohni	**Littlejohn's Tree Frog**	**Litoria littlejohni conservation project**	Animal > Amphibians	Vulnerable	Predicted	**Show 19 linked vegetation classes**
Miniopterus orianae oceanensis	**Large Bent-winged Bat**	**Miniopterus orianae oceanensis conservation project**	Animal > Bats	Vulnerable	Known	**Show 74 linked vegetation classes**
Micronomus norfolkensis	**Eastern Coastal Free-tailed Bat**	**Micronomus norfolkensis conservation project**	Animal > Bats	Vulnerable	Known	**Show 53 linked vegetation classes**
Ninox strenua	**Powerful Owl**	**Ninox strenua conservation project**	Animal > Birds	Vulnerable	Known	**Show 50 linked vegetation classes**
Persoonia marginata	**Clandulla Geebung**	**Persoonia marginata conservation project**	Plant > Shrubs	Vulnerable	Known	**Show 8 linked vegetation classes**
Petaurus australis	**Yellow-bellied Glider**	**Petaurus australis conservation project**	Animal > Marsupials	Vulnerable	Known	**Show 41 linked vegetation classes**
Polytelis swainsonii	**Superb Parrot**	**Polytelis swainsonii conservation project**	Animal > Birds	Vulnerable	Known	**Show 27 linked vegetation classes**
Pteropus poliocephalus	**Grey-headed Flying-fox**	**Pteropus poliocephalus conservation project**	Animal > Bats	Vulnerable	Known	**Show 66 linked vegetation classes**

Saccolaimus flaviventris	**Yellow-bellied Sheathtail-bat**	**Saccolaimus flaviventris conservation project**	Animal > Bats	Vulnerable	Known	**Show 87 linked vegetation classes**
Varanus rosenbergi	**Rosenberg's Goanna**	**Varanus rosenbergi conservation project**	Animal > Reptiles	Vulnerable	Known	**Show 37 linked vegetation classes**
White Box Yellow Box Blakely's Red Gum Woodland	**White Box Yellow Box Blakely's Red Gum Woodland**	**White Box Yellow Box Blakely's Red Gum Woodland conservation project**	Community > Threatened Ecological Communities	Endangered Ecological Community	Known	**Show 9 linked vegetation classes**
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions	**Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions**	**Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions conservation project**	Community > Threatened Ecological Communities	Endangered Ecological Community	Known	**Show 6 linked vegetation classes**
Alteration of habitat following subsidence due to longwall mining	**Alteration of habitat following subsidence due to longwall mining**	**Alteration of habitat following subsidence due to longwall mining conservation project**	Threat > Habitat Loss/Change	Key Threatening Process	Predicted	
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	**Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands.**	**Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands conservation project**	Threat > Habitat Loss/Change	Key Threatening Process	Predicted	
Removal of dead wood and dead trees	**Removal of dead wood and dead trees**	**Removal of dead wood and dead trees conservation project**	Threat > Habitat Loss/Change	Key Threatening Process	Predicted	
Predation, habitat degradation, competition and disease transmission by Feral Pigs, Sus scrofa Linnaeus 1758	**Predation, habitat degradation, competition and disease transmission by Feral Pigs (*Sus scrofa*)**	**Predation, habitat degradation, competition and disease transmission by Feral Pigs, Sus scrofa Linnaeus 1758 conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Invasion and establishment of the Cane Toad (Bufo marinus)	**Invasion and establishment of the Cane Toad**	**Invasion and establishment of the Cane Toad (Bufo marinus) conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Invasion, establishment and spread of Lantana (Lantana camara L. sens. Lat)	**Invasion, establishment and spread of Lantana (*Lantana camara* L. *sens. lat*)**	**Invasion, establishment and spread of Lantana (Lantana camara L. sens. Lat) conservation project**	Threat > Weed	Key Threatening Process	Predicted	
Competition and habitat degradation	**Competition and habitat**	**Competition and habitat**	Threat >	Key Threate		

by Feral Goats, Capra hircus Linnaeus 1758	**degradation by Feral Goats, *Capra hircus* Linnaeus 1758**	**degradation by Feral Goats, Capra hircus Linnaeus 1758 conservation project**	Pest Animal	ning Process	Predicted	
Anthropogenic Climate Change	**Human-caused Climate Change**	**Anthropogenic Climate Change conservation project**	Threat > Habitat Loss/Change	Key Threatening Process	Predicted	
Infection of native plants by Phytophthora cinnamomi	**Infection of native plants by *Phytophthora cinnamomi***	**Infection of native plants by Phytophthora cinnamomi conservation project**	Threat > Disease	Key Threatening Process	Predicted	
Invasion and establishment of Scotch Broom (Cytisus scoparius)	**Invasion and establishment of Scotch Broom (*Cytisus scoparius*)**	**Invasion and establishment of Scotch Broom (Cytisus scoparius) conservation project**	Threat > Weed	Key Threatening Process	Predicted	
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	**Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions**	**Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions conservation project**	Community > Threatened Ecological Communities	Endangered Ecological Community	Known	**Show 7 linked vegetation classes**
Glossopsitta pusilla	**Little Lorikeet**	**Glossopsitta pusilla conservation project**	Animal > Birds	Vulnerable	Known	**Show 54 linked vegetation classes**
Eucalyptus aggregata	**Black Gum**	**Eucalyptus aggregata conservation project**	Plant > Trees	Vulnerable	Known	**Show 12 linked vegetation classes**
Petroica phoenicea	**Flame Robin**	**Petroica phoenicea conservation project**	Animal > Birds	Vulnerable	Known	**Show 47 linked vegetation classes**
Petroica boodang	**Scarlet Robin**	**Petroica boodang conservation project**	Animal > Birds	Vulnerable	Known	**Show 56 linked vegetation classes**
Epthianura albifrons	**White-fronted Chat**	**Epthianura albifrons conservation project**	Animal > Birds	Vulnerable	Known	**Show 24 linked vegetation classes**
Calidris ferruginea	**Curlew Sandpiper**	**Calidris ferruginea conservation project**	Animal > Birds	Endangered	Known	**Show 11 linked vegetation classes**
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	**Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants**	**Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants conservation project**	Threat > Weed	Key Threatening Process	Predicted	

Falco subniger	**Black Falcon**	**Falco subniger conservation project**	Animal > Birds	Vulnerable	Known	
Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, Manorina melanocephala (Latham, 1802)	**Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners *Manorina melanocephala*.**	**Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, Manorina melanocephala (Latham, 1802) conservation project**	Threat > Pest Animal	Key Threatening Process	Predicted	
Caladenia attenuata	**Duramana Fingers**	**Caladenia attenuata conservation project**	Plant > Orchids	Critically Endangered	Predicted	**Western Slopes Dry Sclerophyll Forests**
Artamus cyanopterus cyanopterus	**Dusky Woodswallow**	**Artamus cyanopterus cyanopterus conservation project**	Animal > Birds	Vulnerable	Known	**Show 104 linked vegetation classes**
Rhodamnia rubescens	**Scrub Turpentine**	**Rhodamnia rubescens conservation project**	Plant > Shrubs	Critically Endangered	Known	**Show 10 linked vegetation classes**

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

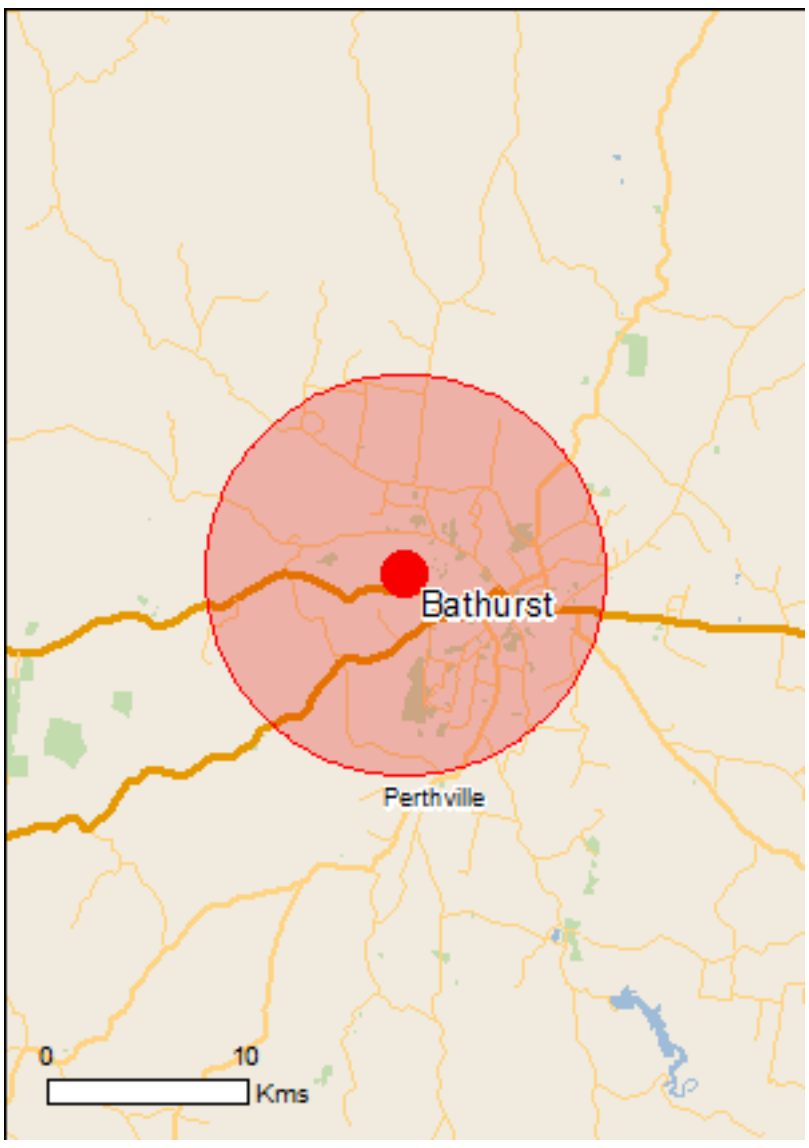
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 02/07/20 12:15:43

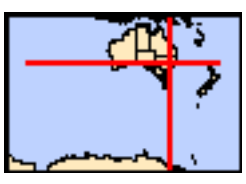
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	32
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	7
Commonwealth Heritage Places:	None
Listed Marine Species:	19
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	30
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	800 - 900km upstream
Riverland	700 - 800km upstream
The coorong, and lakes alexandrina and albert wetland	900 - 1000km upstream
The macquarie marshes	300 - 400km upstream

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Breeding known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Fish		
Maccullochella macquariensis		
Trout Cod [26171]	Endangered	Species or species habitat may occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria aurea		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
Litoria booroolongensis		
Booroolong Frog [1844]	Endangered	Species or species habitat known to occur within area
Litoria castanea		
Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	Critically Endangered	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Caladenia attenuata		
Duramana Fingers [87595]	Critically Endangered	Species or species habitat may occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus pulverulenta		
Silver-leaved Mountain Gum, Silver-leaved Gum [21537]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta		
[4325]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Lepidium hyssopifolium Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat known to occur within area
Leucochrysum albicans var. tricolor Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat likely to occur within area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Telstra Corporation Limited
Defence - KELSO ORDINANCE DEPOT
Defence - RACECOURSE DEPOT (BATHURST TRAINING/STORES DEPOT)

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.40621 149.5376

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

APPENDIX C THREATENED SPECIES EVALUATIONS

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed for Windradyne in the *NSW BioNet* [1], those identified as potentially occurring in the area according to the Commonwealth EPBC *Protected Matters Search Tool*[2] and those identified in the *Bathurst IBRA Sub-region*[3] .

The likelihood of occurrence is based on presence of habitat, proximity of nearest records and mobility of the species (where relevant). The assessment of potential impact is based on the nature of the proposal, the ecology of the species and its likelihood of occurrence. The following classifications are used:

Presence of habitat:

Present: Potential or known habitat is present within the study area

Absent: No potential or known habitat is present within the study area

Likelihood of occurrence

Unlikely: Species known or predicted within the locality but unlikely to occur in the study area

Possible: Species could occur in the study area

Present: Species was recorded during the field investigations

Possible to be impacted

No: The proposal would not impact this species or its habitats. No Assessment of Significance (AoS) is necessary for this species.

Yes: The proposal could impact this species or its habitats. An AOS has been applied to these entities.

[1] The *NSW BioNet* is administered by the NSW Office of Environment and Heritage (OEH) and is an online database of fauna and flora records that contains over four million recorded sightings.

[2] This online tool is designed for the public to search for matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is managed by the Commonwealth Department of the Environment, Water, Heritage and the Arts.

[3] This online tool is administered by the NSW Office of Environment and Heritage (OEH) and is designed for the public to search the data base of threated flora and fauna in NSW by geographic region and habitat.

C.1 EVALUATION OF THE LIKELIHOOD AND EXTENT OF IMPACT ON THREATENED FLORA SPECIES

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Flora				

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Acacia clunies-rossiae Kanangra Wattle BC-V	Kanangra Wattle is a bushy shrub or tree to 8 metres tall. The phyllodes (leaves) are 4 - 6 cm long by 4 - 10 mm wide, with a small point at the tip. Young phyllodes are densely hairy. The golden-yellow flower heads are produced in sprays of globular heads in early spring. Each spray has eight to 25 heads. Kanangra Wattle grows in the Kowmung and Coxs River areas entirely within Kanangra-Boyd and Blue Mountains National Parks. Grows in dry sclerophyll forest on skeletal soils on rocky slopes, or on alluvium along creeks.	**Absent**	**Unlikely – confined to Kanangra-Boyd and Blue Mountains National Parks**	**No**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Eucalyptus pulverulenta Silver-leafed Gum BC-V EPBC-V	A distinctive, straggly mallee or small tree that grows to about 10 m tall. The bark is smooth and grey or bronze, shedding in long strips. Found in two quite separate areas, the Lithgow to Bathurst area and the Monaro (Bredbo and Bombala areas). Occurs on the crests or upper slopes of moderately steep hillsides or mountains, at altitudes of 800–1000 m, usually on well-drained skeletal soils with frequent rock outcrops. The southern populations occur in sandy or gravelly loams over shales and sedimentary rock. Grows as an understorey plant in open forest, typically dominated by Brittle Gum (*Eucalyptus mannifera*), Red Stringybark (*E. macrorhynca*), Broad-leafed Peppermint (*E. dives*), Silvertop Ash (*E. sieberi*) and Apple Box (*E. bridgesiana*). The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory, and Temperate Highland Peat Swamps on Sandstone.	**Absent**	**Possible-** **Species has been recorded in the locality.** **However, it was not detected in field survey.**	**No**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Euphrasia arguta Euphrasia arguta EPBC-CE	An erect, semi-parasitic annual herb growing up to 45 cm high. *Euphrasia arguta* had not been found since 1904 until its rediscovery in 2008. It is listed as presumed extinct under the New South Wales Threatened Species Conservation Act 1995 and its status is under review. Now known from six sites spanning 25 km. Four of the sites are in Nundle State Forest, south east of Tamworth, NSW, while another occurs both within Nundle State Forest and on adjacent forested private land. The sixth site is on private land nearby. Its known area of occupancy in 2009 was approximately 0.03 km^2. All sites are in the Nandewar IBRA Bioregion of northern NSW, in the south-east section of Namoi NRM region. The species' previous habitat consisted of grassy areas near rivers at elevations up to 700 m above sea level, with an annual rainfall of 600 mm. The recently discovered populations are in grassy forests or regrowth vegetation following clearing of a firebreak. Flowers mainly from October to January, although one flowering collection was made in June. As *Euphrasia arguta* is an annual plant, population numbers may fluctuate substantially from year to year and site to site.	**Absent**	**Unlikely – suitable habitat not present. Not identified in field surveys. Heavily disturbed site.**	**No**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Persoonia marginata Clandulla Geebung BC-V (BN)	A spreading shrub that grows to 50 cm high and up to 1 m across. Young branches are hairy. Leaves are elliptic to obovate, 2 – 4 cm long and 6 – 23 mm wide, sparsely hairy when young and hairless when mature. Flowers are yellow with brownish hairs; have a densely hairy ovary; and occur on short stalks 2 – 7 mm long. The Clandulla Geebung occurs between Kandos and Clarence in the western Blue Mountains. Populations are largely disjunct and include Clandulla, Ben Bullen and Sunny Corner State Forests; isolated populations have also been recorded from Turon and Gardens of Stone National Parks. Grows in dry sclerophyll forest and woodland communities on sandstone. Recorded flowering period varies and includes December and Winter. Fruit is probably dispersed by large birds such as Currawongs and large mammals such as kangaroos and possums. Reported fire response of adult plants varies with the species sometimes resprouting after fire and at other times killed by fire. Has a persistent soil stored seed bank. May initially respond favourably to disturbance, with greater densities found along the edges of tracks and in areas disturbed by forestry activities. This species is restricted to the western Blue Mountains, near Clarence, near Mt Horrible, on Nullo Mountain and in the Coricudgy Range. Over this range, occurrences are patchy and generally small in in size. It occurs in eucalypt forest, often in moist and sheltered areas, associated canopy species include Eucalyptus dives, E. dalrympleana, E. rossii and E. pauciflora. Flowers in late Spring through to early Summer.	**Absent**	**Possible-** **Species has been recorded in the locality.**	**No – suitable habitat not present**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Euphrasia scabra Rough Eyebright BC-E (BN)	Rough Eyebright is a semi-parasitic, annual herb, growing to about 0.5 m tall. The stems branch just below the flower-clusters (inflorescence). The leaves are variable on individual plants; those closer to the inflorescences tend to be narrower and have more teeth. The leaves are stalkless with up to five pairs of teeth and a terminal tooth. The green calyx (the 'base' of the flower) is four-lobed and covered in hairs. The yellow flower tube is five-lobed. There are ten old herbarium collections of Rough Eyebright from NSW (including Port Jackson, Bathurst Plains, Lake George, Jindabyne, Yarrangobilly Caves and Tumbarumba). The species is regarded as extinct in South Australia. There is one population in Tasmania and seven in Victoria. There are three extant populations in NSW: Bondi State Forest, South East Forests National Park and near Nunnock Swamp. Total NSW population is between 250 and 500 plants. This number varies with season with few plants appearing in some years. Occurs in or at the margins of swampy grassland or in sphagnum bogs, often in wet, peaty soil. An annual species. Most flowering collections of the species have been made between January and April. Appears to be self-fertilising but seed production is variable, perhaps depending on season. Although parasitic, the species does not appear to be host-specific.	**Absent**	**Possible-** **Species has been recorded in the locality.**	**No – suitable habitat not present**
Lepidium hyssopifolium Basalt Peppercress EPBC – E BC-E (BN)	An erect perennial herb growing 30 to 50 cm tall. In NSW, there is a population consisting of 6 plants near Bathurst, a population near Bungendore and Crookwell both on the Southern Tablelands. The species was also recorded near Armidale in 1945 and 1958 however it is not known whether it remains in this area. A specimen collected in the Cooma area about 100 years ago may also be Aromatic Peppercress. The species occurs in a variety of habitats including woodland with a grassy understorey and grassland. Appears to respond to disturbance, having appeared after soil disturbance at one site. It's cryptic and non-descript nature (appearing like several weed species) makes it hard to detect. Almost all remaining populations of Basalt Peppercress occur in heavily modified, non-natural environments, usually amongst exotic pasture grasses and weed species, sometimes with an overstorey of introduced tree species. Soils are light to heavy, often friable, clay loams. Most sites are on roadsides, on fringes of developed agricultural land or occur in small reserves within an agricultural landscape.	**Present**	**Unlikely** **Species has been recorded in the locality.** **Not detected during site surveys.**	**No – Species unlikely to occur.**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Leucochrysum albicans var. tricolor Hoary Sunray, Grassland Paper-daisy. EPBC - E	A low tufted to mounding perennial straw daisy up to 15 cm tall. It flowers in spring and summer, after flowering it dries out to rootstock. The Hoary Sunray occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils. It can be found in natural or semi-natural vegetation and grazed or ungrazed habitat, however, bare ground is required for germination. In NSW and ACT, Hoary Sunray occurs at relatively high elevations in grasslands, grassy areas in woodlands and dry open forests, and modified habitats, on a variety of soil types including clays, clay loams, stony and gravely soil in an area roughly bounded by Goulburn, Albury and Bega. The species has been recorded in the Yass Valley, Tumut, Upper Lachlan, Snowy River and Galong.	**Absent**	**Unlikely – suitable habitat not present**	**No**
Swainsona recta Small Purple-pea BC- E EPBC - E (BN)	Small Purple-pea occurs predominantly in grassy woodlands, but sometimes extends into grassy open forest, usually with tree cover including Blakely's Red Gum, Yellow Box, and White Box. A slender, erect perennial plant with few stems 20 - 30 cm high. The range of *S. recta* has contracted to two disjunct clusters in NSW, one between Wellington and Mudgee, and the other from Canberra and Queanbeyan south to Williamsdale. Occurs in grassland and open woodland, often on stony hillsides, dominated by one or more of the following: *Callitris endichleri*, *C. glaucophylla*, *Eucalyptus blakelyi, E. bridgesiana, E. dives, E. melliodora, E. microcarpa, E. nortonii and E. polyanthemos*. Requires a forb-rich grassy groundlayer dominated by *Themeda triandra, Poa sieberiana var. sieberiana or Austrostipa spp*. Resprouts in autumn and winter from a woody root.	**Present**	**Unlikely – heavily disturbed site.**	**No - Species unlikely to occur.**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Philotheca ericifolia EPBC-E	Much-branched and wide spreading shrub, 1-2 m high, with sparsely warty branchlets. Known only from the upper Hunter Valley and Pilliga to Peak Hill districts of NSW. The records are scattered over a range of over 400 km between West Wyalong and the Pilliga Scrub. Site localities include Pilliga East State Forest, Goonoo State Forest, Hervey Range, Wingen Maid Nature Reserve, Toongi, Denman, Rylestone district and Kandos Weir. Grows chiefly in dry sclerophyll forest and heath on damp sandy flats and gullies. It has been collected from a variety of habitats including heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops. Associated species include *Melaleuca uncinata, Eucalyptus crebra, E. rossii, E. punctata, Corymbia trachyphloia, Acacia triptera, A. burrowii, Beyeria viscosa, Philotheca australis, Leucopogon muticus and Calytrix tetragona.* Flowering time is in the spring. Fruits are produced from November to December. Noted as being a "moisture-loving plant", with plants common on the sides of a particular spur of the Hervey Ranges where soakage from the high background provides sufficient moisture for the plants. Also recorded growing in a recently burnt site (wildfire) and within a regeneration zone resulting from clearing. Populations comprise from 3-12 adult plants to approx. 200 plants (mostly seedlings in one population). Populations in Pilliga State Forest consist of hundreds or thousands of individuals. A very large population occurs in Lincoln State Forest near Gilgandra.	**Absent**	**Unlikely – not detected in field surveys**	**No - Species unlikely to be impacted by the proposal**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Zieria obcordata Granite Zieria BC-E	A densely rounded shrub 40-50 cm high and 50 cm wide. Known only from near Bathurst on the Central Tablelands of NSW and from near Wellington on the Central Western Slopes of NSW. All known sites are on private property: Bulbudgeree Station near Wellington, comprising of a single population of 77 plants and Crackerjack Rock/Rock Forests area NW of Bathurst, comprising of 5 populations across 3 sites, totaling 259 plants. Grows in eucalypt woodland or shrubland dominated by species of *Acacia* on rocky hillsides. Also occurs in *Eucalyptus* and *Callitris* dominated woodland with an open, low shrub understorey, on moderately steep, west to north-facing slopes in sandy loam amongst granite boulders. The altitude range of sites is 500 to 830 metres. Associated vegetation includes *Eucalyptus blakelyi, Brachychiton populneus* and *Acacia implexa* woodland with pockets of low shrub understorey. Also in *Eucalyptus goniocalyx, Eucalyptus dwyeri, Acacia doratoxylon* and *Callitris glaucophylla* woodland with a shrubby understorey. Understorey species include *Pandorea pandorana, Isotoma axillaris, Westringia eremicola, Leucopogon attenuatus, Dillwynia sericea, Olearia ramulosa, Stypandra glauca, Stellaria pungens, Acacia vestita, Melichrus urceolatus, Cryptandra amara, Lepidosperma, Styphelia, Kunzea, Haloragis* and *Cheilanthes* species. In wild populations, plants tend to grow in crevices between granite boulders. *Zieria obcordata* is extremely sensitive to grazing and browsing disturbances by domestic stock and native herbivores. Heavily browsed plants and vigorous regrowth (following severe browsing by wallabies) have been recorded at sites. Flowering time is in spring (September-October) with fruiting specimens observed in summer.	**Absent**	**Unlikely – not detected in field surveys**	**No - Species unlikely to be impacted by the proposal**
Caladenia attenuata Duramana Fingers BC-CE EPBC-CE	*Caladenia attenuata* is an unusually tall terrestrial orchid, to 24cm high with white flowers, usually <10mm across. The dorsal sepal (back flower part) is lax, hooding the column; and the midlobe of the labellum (distinctive median petal) has entire wrinkled margins. The orchid flowers in spring, usually between October and November. It has a highly restricted distribution, having been recorded from 2 localities within the Bathurst Ilford region with an area of occupancy estimated to be 8 square kilometres. Recent surveys have only found an unconfirmed specimen from the Ilford site.	**Absent**	**Unlikely – Site heavily disturbed**	**No - Species unlikely to be impacted by the proposal**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Eucalyptus aggregata Black Gum BC-V EPBC-V	Black Gum is a small to medium-sized woodland tree growing to 18 m tall. Black Gum is found in the NSW Central and Southern Tablelands, with small isolated populations in Victoria and the ACT. In NSW it occurs in the South Eastern Highlands Bioregion and on the western fringe of the Sydney Basin Bioregion. Black Gum has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands, for example in the Blayney, Crookwell, Goulburn, Braidwood and Bungendore districts. Grows in the lowest parts of the landscape. Grows on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Often grows with other cold-adapted eucalypts, such as Snow Gum or White Sallee (*Eucalyptus pauciflora*), Manna or Ribbon Gum (*E. viminalis*), Candlebark (*E. rubida*), Black Sallee (*E. stellulata*) and Swamp Gum (*E. ovata*). Black Gum usually occurs in an open woodland formation with a grassy groundlayer dominated either by River Tussock (*Poa labillardierei*) or Kangaroo Grass (*Themeda australis*), but with few shrubs. Also occurs as isolated paddock trees in modified native or exotic pastures. There are very few stands in conservation reserves. Many populations occur on travelling stock reserves, though stands and isolated individuals also occur on private land.	**Absent**	**Possible-** **Species has been recorded in the locality.** **However, it was not detected in field surveys.**	**No**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Dichanthium setosum Bluegrass EPBC - V	Bluegrass is an upright grass less than 1 m tall. Occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, as well as in Queensland and Western Australia. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas. Flowering time is mostly in summer. Associated with heavy basaltic black soils. Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. (Often collected from disturbed open grassy woodlands on the northern tablelands, where the habitat has been variously grazed, nutrient-enriched and water-enriched). It is open to question whether the species tolerates or is promoted by a certain amount of disturbance, or whether this is indicative of the threatening processes behind its depleted habitat. Associated species include *Eucalyptus albens, Eucalyptus melanophloia, Eucalyptus melliodora, Eucalyptus viminalis, Myoporum debile, Aristida ramosa, Themeda triandra, Poa sieberiana, Bothriochloa ambigua, Medicago minima, Leptorhynchos squamatus, Lomandra aff. longifolia, Ajuga australis, Calotis hispidula and Austrodanthonia, Dichopogon, Brachyscome, Vittadinia, Wahlenbergia* and *Psoralea* species. Locally common or found as scattered clumps in populations.	**Absent**	**Unlikely – suitable habitat not present**	**No - Species unlikely to be impacted by the proposal**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland BC – EEC EPBC - CE	Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. Commonly co-occurring eucalypts include Apple Box (*E. bridgesiana*), Red Box (*E. polyanthemos*), Candlebark (*E. rubida*), Snow Gum (*E. pauciflora*), Argyle Apple (*E. cinerea*), Brittle Gum (*E. mannifera*), Red Stringybark (*E. macrorhyncha*), Grey Box (*E. microcarpa*), Cabbage Gum (*E. amplifolia*) and others. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (*Themeda australis*), Poa Tussock (*Poa sieberiana*), wallaby grasses (*Austrodanthonia spp*.), spear-grasses (*Austrostipa spp*.), Common Everlasting (*Chrysocephalum apiculatum*), Scrambled Eggs (*Goodenia pinnatifida*), Small St John's Wort (*Hypericum gramineum*), Narrow-leafed New Holland Daisy (*Vittadinia muelleri*) and blue-bells (*Wahlenbergia spp*.). Shrubs are generally sparse or absent, though they may be locally common. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant. Some of the component species (e.g. wattles, she-oaks, native legumes) fix nitrogen that is made available to other species in the community, while fallen timber and leaves recycle their nutrients. Disturbed remnants are considered to form part of the community, including where the vegetation would respond to assisted natural regeneration.	**Present**	**Present – Yellow Box and Blakley's Red Gum occur within the study area**	**Yes – Assessment of Significance applied.**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Natural Temperate Grasslands of the South Eastern Highlands EPBC- CE	A naturally treeless or sparsely-treed community, in which the most obvious components are various species of native grasses. Characterised by the dominance of native grasses, including Kangaroo Grass *Themeda australis*, Snow-grass *Poa sieberiana*, River Tussock *P. labillardieri*, Red-grass *Bothriochloa macra*, speargrasses *Austrostipa spp*. and wallaby grasses *Austrodanthonia spp*. Intact sites have a diversity of wildflowers (forbs) including lilies, orchids, peas, daisies and many more. Sites may contain a low density of trees or shrubs and may also contain wet areas that are habitat for wetland flora species. The community also includes a range of mammal, bird, reptile, frog and invertebrate fauna species. Intact remnants that contain a high diversity of flora species are now rare. Occurs in the South Eastern Highlands of NSW between Orange and Bathurst to Goulburn and Braidwood and the coastal ranges and escarpments to the south; the Monaro region (Cooma, Jindabyne and Bombala distircts), and in the west, areas extending from Khancoban through Tumbarrumba and Tumut, with a north-western boundary extending from Burrinjuck Dam to Boorowa, then east to the Lachlan River and northwards). Contained within the South Eastern Highlands bioregion and within an altitude range of between 560 and 1200 metres. Occurs in a variety of landforms, but generally on the fertile lower parts of the landscape (flats, drainage lines, frost hollow valleys, foothills) where resources such as water and nutrients are abundant, but tree growth is restricted by periodic drying or waterlogging, frosting, or exposure to westerly winds; remnants also occur on midslopes to hilltops and plateaux, particularly in basalt but also on other substrates, where exposure and soil conditions limit growth of trees. Remnants may occur within a mosaic of grassy woodlands, including Box-Gum Woodland and Snow Gum Woodland, or may be bounded by dry or wet sclerophyll forest, wetland or heathland.	**Absent**	**Unlikely – not detected in field surveys**	**No**
Swainsona sericea Silky Swainson-pea BC-V	Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Its stronghold is on the Monaro. Also found in South Australia, Victoria and Queensland. Found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* Woodland on the Monaro. Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes.	**Present**	**Unlikely-** **Species has been recorded in the locality.** **The site is heavily degraded with minimal native understory and previously cropped.**	**No – species unlikely to occur.**

Species	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Thesium austral Austral Toadflax BC – V EPBC - V	An erect perennial herb to 40 cm high. Found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland, often found in damp sites in association with Kangaroo Grass (*Themeda australis*).	**Absent**	**Unlikely-** **Known associated species not present.**	**No**

CE BC = listed as Critically Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

CE EPBC = listed as Critically Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

E BC = listed as Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

V BC = listed as Vulnerable under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

V EPBC = listed as Vulnerable under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

M EPBC = listed as Migratory under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

CAMBA = Chinese-Australia Migratory Bird Agreement

JAMBA = Japan-Australia Migratory Bird Agreement

C.2 EVALUATION OF THE LIKELIHOOD AND EXTENT OF IMPACT ON THREATENED FAUNA SPECIES

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Fauna				
Aves				
Anthochaera phrygia Regent Honeyeater BC - CE EPBC – CE	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests (NPWS, 1999 177 /id) (Pizzey, 1997). A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests (NPWS, 1999 177 /id) (Pizzey, 1997).	**Absent**	**Possible-** **Species has been recorded in the locality**	**No - No suitable habitat present**
Artamus cyanopterus cyanopterus Dusky Woodswallow BC – V	The Dusky Woodswallow is widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. The species primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. Most breeding activity occurs on the western slopes of the Great Dividing Range.	**Absent**	**Possible-** **Species has been recorded in the locality**	**No - No suitable habitat present**
Burhinus grallarius Bush Stone-curlew BC-E (BN)	Bush Stone-curlews inhabit open forests and woodlands with a sparse, grassy ground layer and fallen timber.	**Absent**	**Unlikely**	**No - Species unlikely to occur**
Callocephalon fimbriatum Gang-Gang Cockatoo BC-V (BN)	In New South Wales, Gang-gang Cockatoos occur from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. In spring and summer, they are generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, they often move to lower altitudes in drier, more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages.	**Absent**	**Possible-** **Species has been recorded in the locality**	**No - No suitable habitat present**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Calidris ferruginea Curlew Sandpiper EPBC - CE	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh.	**Absent**	**Unlikely- Suitable habitat not present.**	**No-** **Species unlikely to occur.**
Merops ornatus Rainbow Bee-eater EPBC	The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels.	**Absent**	**Unlikely- Suitable habitat not present.**	**No-** **Species unlikely to occur**
Chthonicola sagittata Speckled Warbler BC – V	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	**Absent**	**Possible-** **Species has been recorded in the locality**	**No - No suitable habitat present**
Climacteris picumnus victoriae Brown Tree Creeper (Eastern Species) BC – V	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The western boundary of the range of *Climacteris picumnus victoriae* runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell and along this line the subspecies intergrades with the arid zone subspecies of Brown Treecreeper *Climacteris picumnus picumnus* which then occupies the remaining parts of the state. The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plains, Hunter Valley and parts of the Richmond and Clarence Valleys. Mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis)* Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses.	**Absent**	**Possible-** **Species has been recorded in the locality**	**No - No suitable habitat present**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Daphoenositta chrysoptera Varied Sittella BC – V	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west. It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy.	**Absent**	**Unlikely – preferred habitat is not present**	**No - Species habitat unlikely to be impacted by the proposal.**
Hieraaetus morphnoides Little Eagle BC – V	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	**Absent**	**Unlikely- Suitable habitat not present**	**No- Species unlikely to be impacted by the proposal.**
Lophoictinia isura Square-tailed Kite BC - V	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.	**Absent**	**Unlikely - No major watercourses present**	**No- Species unlikely to be impacted by the proposal**
Melanodryas cucullata cucullata Hooded Robin (south-eastern form) BC - V	The Hooded Robin is considered a sedentary species, but local seasonal movements are possible. The south-eastern form is found from Brisbane to Adelaide throughout much of inland NSW, with the exception of the north-west. The species is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey.	**Absent**	**Unlikely- Suitable habitat not present**	**No- Species unlikely to be impacted by the proposal.**
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies) BC-V	Black-chinned Honeyeaters occupy mostly the upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark, White Box, Grey Box, Yellow Box, Blakely's Red Gum, and Forest Red Gum. They also inhabit open forests of smooth-barked gums, stringybarks, ironbarks, tea trees, and river she-oaks.	**Absent**	**Possible- Species has been recorded in the locality**	**No - No suitable habitat present**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
(BN)				
Ninox strenua Powerful Owl BC - V	In NSW the Powerful Owl lives in forests and woodlands occurring in the coastal, escarpment, tablelands and western slopes environments. Specific habitat requirements include eucalypt forests and woodlands on productive sites on gentle terrain; a mosaic of moist and dry types, with mesic gullies and permanent streams; presence of leafy sub-canopy trees or tall shrubs for roosting; presence of large old trees to provide nest hollows. Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials. Roosts in groves of dense mid-canopy trees or tall shrubs in sheltered gullies, typically on wide creek flats and at the heads of minor drainage lines, but also adjacent to cliff faces and below dry waterfalls. Species commonly used for roosting include the She-oaks *Allocasuarina* spp., rainforest species such as Coachwood *Ceratopetalum apetalum*, Lilly Pilly *Acmena smithii* and Sassafras *Doryphora sassafras*, Black Wattle *Acacia melanoxylon*, Turpentine *Syncarpia glomulifera* and eucalypts. Nests in old hollow eucalypts in unlogged, unburnt gullies and lower slopes within 100 m of streams or minor drainage lines. Hollow entrances are greater than 6 m above ground, commonly more than 20 m where the forest permits, in trees of at least 80 cm diameter at breast height.	**Present – foraging habitat only**	**Possible**	**Yes – Assessment of Significance applied**
Petroica boodang Scarlet Robin BC – V	The Scarlet Robin is found from SE Queensland to SE South Australia and also in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	**Present**	**Unlikely- abundant logs and fallen timber not present.**	**No-** **No suitable habitat present**
Petroica phoenicea Flame Robin BC – V	The Flame Robin is endemic to SE Australia, and ranges from near the Queensland border to SE South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The ground layer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse	**Absent**	**Unlikely-** **No suitable habitat present**	**No-** **Species unlikely to be impacted by the proposal**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
	or dense. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains).			
Polytelis swainsonii Superb Parrot EPBC - V BC - V	The Superb Parrot is found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. Inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	**Present – foraging habitat only**	**Possible-** **Species has been recorded in the locality.** **However, it was not detected in field survey.**	**Yes - Assessment of Significance applied.**
Rostratula australis Australian Painted Snipe EPBC - E	They feed in shallow water or at the waters' edge and on mudflats, taking seeds and invertebrates such as insects, worms, molluscs and crustaceans. Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands and although they have occurred at many sites. Primarily occurs along the east coast from north Queensland (excluding Cape York) to the Eyre Peninsula in South Australia, including the majority of Victoria and NSW. In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Inhabits inland and coastal shallow freshwater wetlands. The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire. Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland. Nests on the ground amongst tall vegetation, such as grass tussocks or reeds.	**Absent**	**Unlikely-** **No suitable habitat present.** **Recorded in the locality however Prefers wetlands with open muddy banks.** **Northern dam is unsuitable.**	**No-** **Species unlikely to be impacted by the proposal**
Stagonopleura guttata Diamond Firetail BC – V	The Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW. Also found in the Australian Capital Territory, Queensland, Victoria and South Australia. Groups separate into small colonies to breed, between August and January. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).	**Present**	**Possible-** **Species has been recorded in the locality**	**Yes - Assessment of Significance applied.**
Calyptorhynchus lathami	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the	**Absent**	**Unlikely**	**No**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Glossy Black-Cockatoo BC – V	southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Dependent on large hollow-bearing eucalypts for nest sites. Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur. In the Riverina area, inhabits open woodlands dominated by Belah (*Casuarina cristata*). Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill.			
Circus assimilis Spotted Harrier BC – V	The Spotted Harrier occurs throughout the Australian mainland, except in densly forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	**Present**	**Possible** **Recorded in the locality**	**Yes - Assessment of Significance applied.**
Grantiella picta Painted Honeyeater BC – V EPBC – V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*. Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches**.**	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal**
Lathamus discolour Swift Parrot EPBC - CE	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Grey Box *E. macrocarpa* and Blackbutt *E. pilularis*. Return to home foraging sites on a cyclic basis depending on food availability.	**Absent**	**Unlikely-** **No suitable habitat present**	**No-** **Species unlikely to be impacted by the proposal**
Numenius madagascariensis	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. The Eastern Curlew mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near	**Absent**	**Unlikely-** **No suitable habitat present**	**No-**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Eastern Curlew, Far Eastern Curlew EPBC - CE	mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The Eastern Curlew roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands.			**Species unlikely to be impacted by the proposal.**
Ardea alba Great Egret EPBC	With its long, white breeding plumes, orange-yellow bill, and green facial skin, the Great Egret at the height of the breeding season is stunning to behold. Even at other times of the year, when it loses its plumes and its face and bill return to their typical dull yellow, this large, white wader is difficult to overlook. Male and female Great Egrets are similar (38 inches) at all times of the year. The Great Egret is widely distributed across warmer parts of the globe. In North America, the Great Egret breeds primarily in the southeastern United States, with smaller pockets of breeding territory in the Great Plains, the northeast, and in the west. Most of the Great Egrets in the southeast are permanent residents, but those in cooler climates migrate south for the winter, where they may be found along the coast of California, in the southwest, and in Texas. This species also breeds in Eurasia from southern Europe east to east Asia, wintering in North Africa, India, and Southeast Asia. Populations also exist in South America, Australia and New Zealand. Great Egrets live in and around small bodies of water. In summer, Great Egrets nest in colonies, called 'rookeries,' in trees surrounding lakes and ponds. This species utilizes similar habitats during the winter. Great Egrets mainly eat fish but may also take crustaceans and small vertebrates (such as frogs, lizards, and mice) when the opportunity arises. Great Egrets may be best observed wading in shallow water, where they may be seen plunging their bills into the water to catch fish. It is also possible to see Great Egrets at their rookeries, especially when they return to roost at sunset, or while flying with their feet extended and their necks pulled in. Great Egrets are primarily active during the day.	**Absent**	**Unlikely-** **No suitable habitat present**	**No-** **Species unlikely to be impacted by the proposal**
Ardea ibis Cattle Egret EPBC	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It has been recorded on earthen dam walls and ploughed fields. It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer. The Cattle Egret is known to follow earth-moving machinery and has been located at rubbish tips. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation.	**Absent**	**Unlikely-** **No suitable habitat present** **Not recorded in the locality.**	**No-** **Species unlikely to be impacted by the proposal**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Ninox connivens Barking Owl BC – V	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as *Acacia* and *Casuarina* species, or the dense clumps of canopy leaves in large *Eucalypts*. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Territories range from 30 to 200 hectares and birds are present all year. Nests in hollows of large, old eucalypts including River Red Gum (*Eucalyptus camaldulensis*), White Box (*Eucalyptus albens*), (Red Box) *Eucalyptus polyanthemos* and Blakely's Red Gum (*Eucalyptus blakelyi*).	**Present – foraging habitat only**	**Possible**	**Yes – Assessment of Significance applied**
Leipoa ocellata Malleefowl EPBC-V	Occurs in NSW in the south west centred on Mallee Cliffs NP and extending east to near Balranald and scattered records as far north as Mungo NP. West of the Darling River a population also occurs in the Scotia mallee including Tarawi NR and Scotia Sanctuary and is part of a larger population north of the Murray River in South Australia. Further east, a population continues to persist in the Goonoo forest near Dubbo. Outside these areas, occasional records have been made in the Pilliga forests (most recently 1999), around Cobar (1991) and Goulburn River NP (1989) though the extent and status of populations in these areas are unknown. Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species. Prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy and dense and diverse shrub and herb layers. Mainly forage in open areas on seeds of acacias and other native shrubs (Cassia, Beyeria, Bossiaea), buds, flowers and fruits of herbs and various shrubs, insects (cockroaches, ants, soil invertebrates), and cereals if available. Incubate eggs in large mounds that contain considerable volumes of sandy soil.	**Absent**	**Unlikely-** **No suitable habitat present**	**No-** **Species unlikely to be impacted by the proposal**
Haliaeetus leucogaster White-bellied Sea-Eagle EPBC BC-V	The White-bellied Sea-Eagle is a large raptor that has long, broad wings and a short, wedge-shaped tail. It measures 75–85 cm in length, and has a wingspan of 180–220 cm. The plumage of adult birds is predominantly white and grey. The head, breast and belly, and the feathering on the legs, are white. The back and upper surfaces of the wings are grey, although the wings have black tips. The undersides of the wings are greyish-black around the distal edges, with a smaller area of white along the leading edge. The tail is grey at the base and has a white tip. The bill is bluish-grey with a blackish tip, the iris is dark brown, and the legs and feet are	**Absent**	**Unlikely-** **No suitable habitat present**	**No-** **Species unlikely to be impacted by the proposal**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
	a cream colour. The White-bellied Sea-Eagle is distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. It also extends inland along some of the larger waterways, especially in eastern Australia. The inland limits of the species are most restricted in south-central and south-western Australia, where it is confined to a narrow band along the coast. Breeding has been recorded at some sites further inland, e.g. around the Murray, Murrumbidgee and Lachlan Rivers in northern Victoria and south-west NSW, and at other large drainage systems and water storages.			
Phaethon rubricauda Red-tailed Tropicbird BC-V EPBC - Migratory (BN)	A large white seabird, often with long red tail streamers and red bill. Juveniles mottled above, tail streamers missing, bill black. Ranges throughout tropical and subtropical zones of the Indian and West Pacific Oceans, breeding on oceanic islands. Lord Howe Island is said to have the greatest breeding concentration in the world. Marine, breeds in coastal cliffs and under bushes in tropical Australia. Nests on cliffs of the northern hills and southern mountains on the main island at Lord Howe Island. Nest consists of a mere scrape on the ground on an inaccessible cliff ledge. Vagrant birds occur in coastal NSW waters, and occasionally even inland, particularly after storm events.	**Absent**	**Possible-** **Species has been recorded in the locality**	**No –** **No suitable habitat present**
Falco subniger Black Falcon BC-V (BN)	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. It is usually found near watercourses or utilizing patches of isolated trees. It hunts over open wooded grasslands, saltbush plains, bluebush plains and other low vegetation.	**Present**	**Possible-** **Species has been recorded in the locality**	**Yes - Assessment of Significance applied.**
Tyto novaehollandiae Masked Owl BC – V	Extends from the coast where it is most abundant to the western plains. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Habitat for this species is also widespread throughout the dry eucalypt forests of the tablelands, western slopes and the undulating wet-dry forests of the coast. Optimal habitat includes an open understorey and a mosaic of sparse (grassy) and dense (shrubby) ground cover on gentle terrain. Roosts in hollows in live or occasionally dead eucalypts; dense foliage in gullies; and caves. Nest in old hollow eucalypts, live or dead, in a variety of topographic positions, with hollows greater than 40 cm wide and greater than 100 cm deep. Hollow entrances are at least 3 m above ground, in trees of at least 90 cm diameter at breast height. Home range has been estimated as 400-1000 ha according to habitat productivity.	**Present – foraging habitat only**	**Possible**	**Yes – Assessment of Significance applied**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Glossopsitta pusilla Little Lorikeet BC-V (BN)	Little Lorikeets forage primarily in the canopy of open *Eucalyptus* forest and woodland, and finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used due to higher soil fertility and resulting greater productivity. Isolated flowering trees in open country, including paddocks, roadside remnants, and urban trees are also used. They typically select nesting hollows in the limbs and trunks of smooth-barked eucalypts, often in riparian areas, which are known to be used repeatedly for decades.	**Present**	**Possible – the proposal is surrounded by riparian areas**	**Yes - Assessment of Significance applied.**
Anseranas semipalmata Magpie Goose BC-V (BN)	The Magpie Goose is still relatively common in the Australian northern tropics but had disappeared from south-east Australia by 1920 due to drainage and overgrazing of reed swamps used for breeding. Since the 1980s there have been an increasing number of records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands and floodplains; roosts in tall vegetation.	**Absent** **Dam is very small and roosting habitat not present.**	**Possible-** **Species has been recorded in the locality**	**No –** **No suitable habitat present**
Mammals				
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat EPBC - V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Hirundo ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies.	**Absent**	**Unlikely-** **No suitable present habitat.**	**No-** **Species unlikely to be impacted by the proposal.**
Miniopterus schreibersii oceanensis Eastern Bentwing Bat BC – V	Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia.	**Absent**	**Possible-** **Species has been recorded in the locality**	**No-** **No suitable habitat present**
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	Yellow-bellied Sheathtail-bats have a broad distribution, foraging in most forested and clear habitats, and roost in tree hollows and buildings, or in mammal burrows in cleared areas.	**Present**	**Possible**	**Yes - Assessment of Significance applied**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
BC-V (BN)	Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.			
Scoteanax rueppellii Greater Broad-nosed Bat BC-V	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. Little is known of its reproductive cycle, however a single young is born in January; prior to birth, females congregate at maternity sites located in suitable trees, where they appear to exclude males during the birth and raising of the single young.	**Absent**	**Unlikely-** **No suitable present habitat. Altitude above 500 m**	**No-** **Species unlikely to be impacted by the proposal**
Petrogale penicillata Brush-tailed Rock-wallaby BC-V EPBC-V	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. The species' range is now fragmented, particularly in the south where they are now mostly found as small isolated populations dotted across their former range. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Throughout their range, Brush-tailed Rock-wallabies feed on a wide variety of grasses and shrubs and have flexible dietary requirements. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha. Live in family groups of 2 – 5 adults and usually one or two juvenile and sub-adult individuals. Dominant males associate and breed with up to four females. Breeding is likely to be continuous, at least in the southern populations, with no apparent seasonal trends in births.	**Absent**	**Unlikely-** **No suitable present habitat.**	**No-** **Species unlikely to be impacted by the proposal.**
Cercartetus nanus Eastern Pygmy Possum BC – V	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets	**Absent**	**Unlikely-** **preferred habitat not present.**	**No-** **Species unlikely to be impacted by the proposal.**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
	of vegetation, (eg. grass-tree skirts); tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks.			
Dasyurus maculatus maculatus (SE mainland population) Spotted-tailed Quoll BC - V EPBC - E	Tiger Quolls are found in a range of forest habitats, from rainforest to open woodland. They require forest with suitable den sites such as rock crevices, caves, hollow logs, burrows and tree hollows. The Tiger Quoll has a large home range and can cover considerable distances (more than 6km) overnight.	**Absent**	**Possible-** **Species has been recorded in the locality** **No suitable habitat occurs in the proposal**	**No-** **Species unlikely to be impacted by the proposal**
Falsistrellus tasmaniensis Eastern False Pipistrelle BC – V	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter.	**Absent**	**Unlikely**	**No-** **Habitat for this species would not be removed.** **Species unlikely to be impacted by the proposal.**
Myotis Macropus Southern Myotis BC – V	The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	**Absent**	**Unlikely-** **No major rivers**	**No-** **Species unlikely to be impacted by the proposal**
Petaurus australis Yellow-Bellied Glider BC - V	Distribution is mostly continuous from about 50 kilometres east of Melbourne in Victoria, to Sarina near Mackay in central Queensland. In NSW, distribution of the Yellow-bellied Glider is essentially coastal, extending inland to adjacent ranges. It typically occurs in tall, mature eucalypt forest in regions of high rainfall, but is also known to occur in drier areas. It inhabits a wide range of forest types but prefers resource rich forests where mature trees provide nesting hollows and tree species composition provides year-round continuity of food resources. Preferred Yellow-bellied Glider habitat is often characterised by a mosaic of tree species associations likely to provide a continuous, year-round food supply. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. In NSW, the tree species utilised as sap trees are mostly eucalypts (Eucalyptus and Corymbia species).	**Absent**	**Unlikely**	**No-** **Species unlikely to be impacted by the proposal**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Petaurus norfolcensis Squirrel Glider BC - V	The Squirrel Glider is sparsely distributed along the east coast and immediate inland districts from western Victoria to north Queensland. The species is found inland as far as the Grampians in Victoria and the Pilliga and the Coonabarabran areas of NSW. Inhabits dry sclerophyll forest and woodland and is generally absent from rainforest and closed forest. In NSW, potential habitat includes Box-Ironbark forests and woodlands in the west, the River Red Gum forests of the Murray Valley and the eucalypt forests of the northeast. Requires abundant hollow-bearing trees and a mix of eucalypts, acacias and banksias. Smooth-barked eucalypts are preferred as these eucalypts form hollows more readily than rough-barked and support a greater diversity of invertebrates. Squirrel Glider's forage in the upper and lower forest canopies and in the shrub understorey.	**Absent**	**Unlikely- Abundant resources not present.**	**No- Species unlikely to be impacted by the proposal**
Pteropus poliocephalus Grey-headed Flying-fox EPBC - V	Grey-headed Flying-foxes are found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source, often in stands of riparian rainforest, Paperbark or Casuarina forest, and are commonly found in gullies, close to water, or in vegetation with a dense canopy. Forage on the nectar and pollen of native trees, in particular *Eucalyptus*, *Melaleuca* and *Banksia,* and fruits of rainforest trees and vines. Travel up to 50 km to forage.	**Absent**	**Possible- Species has been recorded in the locality. However, camp not observed during the field survey**	**No- Species unlikely to be impacted by the proposal**
Phascolarctos cinereus *Koala* BC - V EPBC - V	Occurs in eastern Australia, from north-eastern Queensland to south-eastern South Australia and to the west of the Great Dividing Range. In NSW it mainly occurs on the central and north coasts with some populations in the western region. The koala inhabits a range of eucalypt forest and woodland communities, including coastal forests, the woodlands of the tablelands and western slopes, and the riparian communities of the western plains.	**Absent**	**Possible- Species has been recorded in the locality. However, not observed during the field survey. Primary food trees not present**	**No- Species unlikely to be impacted by the proposal**
Phascogale tapoatafa *Brush-tailed Phascogale* BC - V	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. Occurs primarily where the annual rainfall exceeds 500mm. Agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater. Feeds mostly on arthropods but will also eat other invertebrates, nectar and sometimes small vertebrates. Nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span. Also shelter in globular nests or possum drays.	**Absent**	**Unlikely- Site highly degraded**	**No- Species unlikely to be impacted by the proposal**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
Petauroides volans Greater Glider EPBC - V	The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level. The species occurs in eucalypt forests and woodlands and is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	**Absent**	**Unlikely-** **Suitable habitat not present**	**No-** **Species unlikely to be impacted by the proposal**
Amphibians				
Litoria booroolongensis Booroolong Frog EPBC - E BC - E	The Booroolong Frog is restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. May shelter on stream banks or vegetation and fallen timber within 100m of stream.	**Absent** **No rocks or cobbles in dam.**	**Possible-** **Species has been recorded in the locality**	**No-** **Species unlikely to be impacted by the proposal**
Mixophyes balbus Stuttering Frog BC – E EPBC - V	The Stuttering Frog is relatively large and muscular, growing to about 8 cm in length. It has large, black eyes and vertical pupils, webbed feet, barred hind legs and a black line from the snout, through the eye and above the 'ear'. The body colour is brown to olive-green and may be broken into irregular blotches. The underside is creamy-white. The adult has a pale-blue crescent across the upper half of the eye; this, and the call - a stuttering 'ugh' or 'op', distinguishes the species from other barred frogs. The tadpole is dark brown to black and grows to 6.5 cm in length. Stuttering Frogs occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Considered to have disappeared from Victoria and to have undergone considerable range contraction in NSW, particularly in south-east NSW. It is the only *Mixophyes* species that occurs in south-east NSW and in recent surveys it has only been recorded at three locations south of Sydney. The Dorrigo region, in north-east NSW, appears to be a stronghold for this species. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor. Breed in streams during summer after heavy rain. Eggs are laid on rock shelves or shallow riffles in small, flowing streams. As the tadpoles grow they move to deep permanent pools and take approximately 12 months to metamorphose.	**Absent** **No suitable riparian habitat**	**Unlikely – suitable habitat not present**	**No-** **Species unlikely to be impacted by the proposal**
Litoria aurea Green and Golden Bell Frog BC-E	Its former distribution was predominantly coastal but extended inland to the central and southern tablelands, including Bathurst in the west. It was known from the northern coastal part of NSW from around Brunswick Heads south along the entire NSW coast extending into the north-eastern portion of Victoria. There are presently 43 identified remaining key	**Present**	**Possible-**	**Yes - Assessment of Significance applied.**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
	populations, most of which have a small fragmented distribution of mainly near coastal locations. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast. There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs. Preyed upon by various wading birds and snakes.	**Northern dam has fringing vegetation and grassy area**	**Species has been recorded in the locality**	
Litoria castanea Yellow-spotted tree frog EPBC-E BC-E	There is only a single known population of the Yellow-Spotted Bell Frog, which occurs on the Southern Tablelands. Historically, this species occurred in two separate highland ranges, on the New England Tableland and on the southern and central highlands from Bathurst/Orange to Bombala. Require large permanent ponds or slow flowing streams with plenty of emergent vegetation such as bulrushes. Adults are active during spring and summer and bask on sunny days. Move and forage at night on grassy banks or float on the water's surface. Males call at night from the open water and breeding generally occurs during or following rain. Eggs are laid amongst aquatic vegetation. Shelter during autumn and winter under fallen timber, rocks, other debris or thick vegetation. Breed and forage in swamps, lagoons, ponds, dams, wetlands or slow-moving streams, or wet areas with emergent vegetation. Best detected from mid spring to autumn.	**Absent** **Northern dam has fringing vegetation and grassy area**	**Possible-** **Species has been recorded in the locality**	**Yes - Assessment of Significance applied.**
Reptiles				
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard EPBC - V	Only known from the Central and Southern Tablelands, and the South Western Slopes. There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. This species is also found in the Australian Capital Territory. Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks.	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal**
Delma impar Striped Legless Lizard EPBC - V	The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma and Tumut areas. Also occurs in the ACT, Victoria and south-eastern South Australia. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland	**Present**	**Unlikely-** **Heavily disturbed grassland and Kangaroo and**	**No-** **Species unlikely to be impacted by the proposal**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
BC - V	and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo and Wallaby. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter.		**Wallaby grass not detected during field survey**	
Varanus rosenbergi Rosenberg's Goanna BC - V	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia. Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	**Absent**	**Unlikely-** **Suitable habitat not present**	**No-** **Species unlikely to be impacted by the proposal**
Fish				
Maccullochella peelii Murray Cod EPBC - V	Found extensively throughout the Murray Darling Basin in the south-eastern region of Australia. Murray cod are able to live in a wide range of habitats from clear, rocky streams in the upper western slopes regions of New South Wales to the slow flowing, turbid rivers and billabongs of the western plains. Generally, they are found in waters up to 5m deep and in sheltered areas with cover from rocks, timber or overhanging banks. They typically spawn eggs onto firm substrates such as hollow logs, rocks, pipes and clay banks, from spring to early summer.	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal.**
Trout Cod *Maccullochella macquariensis* E FM	Areas with large in-stream woody debris.	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal.**
Macquarie Perch *Macquaria australasica* E EPBC E FM	Rivers, in clear, deep, rocky holes with plenty of cover including aquatic vegetation, large boulders, large woody debris, and overhanging banks.	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal.**
Insects				
Paralucia spinifera Purple Copper Butterfly, Bathurst Copper Butterfly BC-E	Occurs on the Central Tablelands of NSW in an area approximately bounded by Oberon, Hartley and Bathurst. The butterfly is found at 35 locations, all within the Greater Lithgow, Bathurst Regional and Oberon local government areas. It is possible that additional locations will be identified, and these may lie outside the currently known distribution. Occurs above	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal.**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
	850 m elevation, at sites with a south-west to north-west aspect, usually where direct sunlight reaches the habitat, and with extremes of cold such as regular winter snowfalls or heavy frosts. Geology, soils and dominant vegetation canopy species vary between habitat locations. However, vegetation structure is consistent, commonly open woodland or open forest with a sparse understorey that is dominated by the shrub, Blackthorn *Bursaria spinosa subsp. lasiophylla*. Its lifecycle relies on a mutualistic relationship with the ant, *Anonychomyra itinerans*, and on the presence of *B. spinosa subsp. lasiophylla* which is used as the larval food plant. The butterflies emerge between August (later at higher altitude sites) and November, with a two-week peak of activity in September. After mating, the females lay eggs on or in the immediate vicinity of *B. spinosa subsp. lasiophylla*. After hatching, the larva is attended by the ant *A. itinerans*, which is thought to provide predator protection to the larva and benefit by receiving nutritional secretions from the larva. Initially remaining on the *B. spinosa subsp. lasiophylla* night and day, the larva becomes nocturnal in the latter part of its six - eight week larval period. Pupation occurs between December and August in the underground nest of *A. itinerans* at the base of the host plant. The relationship with *A. itinerans* and *B. spinosa subsp. lasiophylla* is not well understood, but it is thought to be highly significant. Even though the ant is sometimes difficult to detect, *A. itinerans* has been recorded at almost all locations. Similarly *B. spinosa subsp. lasiophylla* is present at all locations. Other flora species that predominate on all sites are Wattle Mat-Rush (*Lomandra filiformis subsp. filiformis*), Snowgrass (*Poa sieberiana var. sieberiana*), and Silvertop Wallaby Grass (*Joycea pallida*). High proportions of weed species are also found at the sites from which this species is known. The most common are Smooth Hawksbeard (*Crepis capillaris*), Smooth Catsear (*Hypochaeris glabra*), Dandelion (*Taraaxacum officinale*) and the Blackberry species aggregate (*Rubus fruticosus*). Adult males fly rapidly at about one metre from the ground and rest with wings parted in places exposed to full sun. Females fly less rapidly and tend to remain nearer to the host plant. The butterflies generally remain in the vicinity of *B. spinosa subsp. lasiophylla*, and are rarely observed more than 10 m distant from the plant.			
Migratory Species				
Apus pacificus Fork-tailed Swift EPBC - M	This species breeds in the north-east and mid-east Asia and winters in Australia and southern New Guinea. It is a visitor to most parts of Western Australia. It is common in the Kimberley, uncommon to moderately common near north-west, west and southeast coasts and rare to scarce elsewhere. They never settle voluntarily on the ground and spend most of their lives in the air, living on the insects they catch in their beaks.	**Absent**	**Unlikely**	**No-** **Species unlikely to be impacted by the proposal**
Myiagra cyanoleuca Satin Flycatcher	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
EPBC - M	gullies, but not rainforests. The Satin Flycatcher is a migratory species, moving northwards in winter to northern Queensland and Papua New Guinea, returning south to breed in spring.			**Species unlikely to be impacted by the proposal.**
Rhipidura rufifrons Rufous Fantail EPBC - M	The Rufous Fantail is found in northern and eastern coastal Australia, being more common in the north. It is also found in New Guinea, the Solomon Islands, Sulawesi and Guam. The Rufous Fantail is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas. Strongly migratory in the south of its range, it moves northwards in winter, and virtually disappears from Victoria and New South Wales at this time.	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal.**
Actitis hypoleucos Common Sandpiper EPBC - CE	A group of shorebirds (also called waders) which occupy a particular area of Botany Bay and includes the characteristic assemblage of the following 20 species: Bar-tailed Godwit (*Limosa lapponica*), Red Knot (*Calidris canutus*), Great Knot (*Calidris tenuirostris*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Red-necked Stint (*Calidris ruficollis*), Common Sandpiper (*Actitis hypoleucos*), Terek Sandpiper (*Xenus cinereus*), Latham's Snipe (*Gallinago hardwickii*), Grey-tailed Tattler (*Heteroscelus brevipes*), Grey Plover (*Pluvialis squatarola*), Pacific Golden Plover (*Pluvialis fulva*), Common Greenshank (*Tringa nebularia*), Masked Lapwing (*Vanellus miles*), Marsh Sandpiper (*Tringa stagnatilis*), Ruddy Turnstone (*Arenaria interpres*), Pied Oystercatcher (*Haematopus longirostris*), Sooty Oystercatcher (*Haematopus fulinginosus*), Whimbrel (*Numenius phaeopus*), and Eastern Curlew (*Numenius madagascariensis*). Occurs on the relict muddy sand marginal shoal of the Georges River between Taren Point and Shell Point in Botany Bay. Some species identified within this community can also be found foraging and roosting at other locations within Botany Bay. In Botany Bay the shorebird community utilises roosting and foraging habitat (intertidal mud flats and sand flats),the proximity of mangroves (*Avicennia marina*) is important as roosting habitat.	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal.**
Calidris acuminata Sharp-tailed Sandpiper EPBC - M	A group of shorebirds (also called waders) which occupy a particular area of Botany Bay and includes the characteristic assemblage of the following 20 species: Bar-tailed Godwit (*Limosa lapponica*), Red Knot (*Calidris canutus*), Great Knot (*Calidris tenuirostris*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Red-necked Stint (*Calidris ruficollis*), Common Sandpiper (*Actitis hypoleucos*), Terek Sandpiper (*Xenus cinereus*), Latham's Snipe (*Gallinago hardwickii*), Grey-tailed Tattler (*Heteroscelus brevipes*), Grey Plover (*Pluvialis squatarola*), Pacific Golden Plover (*Pluvialis fulva*), Common Greenshank (*Tringa nebularia*), Masked Lapwing (*Vanellus miles*), Marsh Sandpiper (*Tringa stagnatilis*), Ruddy Turnstone (*Arenaria interpres*), Pied Oystercatcher (*Haematopus*	**Absent**	**Unlikely-** **Suitable habitat not present.**	**No-** **Species unlikely to be impacted by the proposal**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
	longirostris), Sooty Oystercatcher (*Haematopus fulinginosus*), Whimbrel (*Numenius phaeopus*), and Eastern Curlew (*Numenius madagascariensis*). Occurs on the relict muddy sand marginal shoal of the Georges River between Taren Point and Shell Point in Botany Bay. Some species identified within this community can also be found foraging and roosting at other locations within Botany Bay. In Botany Bay the shorebird community utilises roosting and foraging habitat (intertidal mud flats and sand flats). For some species (Terek Sandpiper, Grey-tailed Tattler), the proximity of mangroves (*Avicennia marina*) is important as roosting habitat.			
Calidris ferruginea Curlew Sandpiper EPBC – M CE	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Curlew Sandpipers generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh.	**Absent**	**Unlikely- Suitable habitat not present.**	**No- Species unlikely to be impacted by the proposal**
Calidris melanotos Pectoral Sandpiper EPBC - M	This species breeds in high-arctic tundra from the Yamal Peninsula eastwards to the Bearing Strait in Siberia and in arctic Alaska and Canada. It is known to migrate mostly through the USA and Mexico and spends most of its non-breeding months in South America. A small number of these birds are known to reach Australia and are believed to be concentrated in south-eastern Australia. This species prefers freshwater mudflats.	**Absent**	**Unlikely- Suitable habitat not present.**	**No- Species unlikely to be impacted by the proposal**
Gallinago hardwickii Latham's Snipe, Japanese Snipe EPBC - M	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Absent**	**Unlikely- Suitable habitat not present.**	**No- Species unlikely to be impacted by the proposal.**
Hirundapus caudacutus White-throated Needletail EPBC - M	White-throated Needletails often occur in large numbers over eastern and northern Australia. They arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. The White-throated Needletail feeds on flying insects, such as termites, ants, beetles and flies. White-throated Needletails are non-breeding migrants in Australia.	**Absent**	**Unlikely- Suitable habitat not present.**	**No- Species unlikely to be impacted by the proposal.**
Monarcha melanopsis Black-faced Monarch EPBC - M	The Black-faced Monarch breeds in rainforest habitat, and generally nests near the top of trees with large leaves, in the tops of small saplings, or in lower shrubs. The nests are usually well concealed by foliage and usually secured in a three-pronged fork. The species nests less often on horizontal forks or on horizontal branches with thin lateral twigs or	**Absent**	**Unlikely- Suitable habitat not present**	**No-**

Species and Status	Habitat requirements	Presence of habitat	Likelihood of occurrence	Potential impact
	shoots. Tree and shrub species used as nest sites include: daisybushes (*Olearia* spp.), Lilly Pilly (*Acmena smithii*), Yellow Sassafras (*Doryphora sassafras*), wattles (*Acacia* spp.), Coachwood (*Ceratopetalum apetalum*), Grey Myrtle (*Backhousia myrtifolia*) and Turpentine (*Syncarpia* glomulifera). Specific locations where breeding has been recorded includes: the Atherton Region in Queensland (wet tropics) - Julatten south to the Paluma Range and inland to the Atherton Tableland and from 26° S in south-eastern Queensland to near Lakes Entrance, Victoria.			**Species unlikely to be impacted by the proposal**
Motacilla flava Yellow Wagtail EPBC - M	Yellow Wagtails occur in variable habitat, but typically flat, open, grassy area near water, which may include grasslands, air strips, pastures, sports fields, and edges of wetlands, rivers, and dams. Non-breeding habitat only: mostly well-watered open grasslands and the fringes of wetlands. Roosts in mangroves and other dense vegetation.	**Absent**	**Unlikely – suitable habitat is not present within the proposal**	**No** **Species unlikely to be impacted by the proposal**

CE BC = listed as Critically Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

CE EPBC = listed as Critically Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

E BC = listed as Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

V BC = listed as Vulnerable under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*

V EPBC = listed as Vulnerable under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

M EPBC = listed as Migratory under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

CE FM = listed as Critically Endangered under Schedule 4A of the NSW *Fisheries Management Act 1994.*

E FM = listed as Endangered under Schedule 4 of the NSW *Fisheries Management Act 1994.*

V FM = listed as Vulnerable under Schedule 5 of the NSW *Fisheries Management Act 1994.*

CAMBA = Chinese-Australia Migratory Bird Agreement

JAMBA = Japan-Australia Migratory Bird Agreement

C.3 EVALUATION OF THE LIKELIHOOD AND EXTENT OF IMPACT ON THREATENED FISH SPECIES

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Fish				
Flathead Galaxias *Galaxius rostratus* CE EPBC CE FM	Below 150 m in altitude. Billabongs, lakes, swamps, and rivers, with preference for still or slow-flowing waters.	**Absent** No suitable permanent water above 150 m in altitude.	**Possible** Within species distribution.	**No** No suitable habitat in study area.
Murray Hardyhead *Craterocephalus fluviatilis* CE FM	Mostly recorded in saline lakes that are moderately acidic to highly alkaline and have relatively low turbidity. Margins of lakes, wetlands, backwaters, and billabongs. Open water, shallow, slow-flowing or still habitats, with sand or silt substrates. Also, deeper habitats with dense aquatic vegetation.	**Absent** No lakes, backwaters, billabongs with deep water.	**Unlikely** Outside distribution.	**No** No suitable habitat in study area.
Stocky Galaxias *Galaxias tantangara* CE FM	Small, cold, clear and fast-flowing alpine creek, flowing through open forest of eucalypts, low shrubs and tussock grass.	**Absent** No alpine creeks.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Australian Grayling *Prototrocetes marena* E FM	Migrates between rivers, estuaries and coastal seas. Mostly in freshwater rivers and streams, usually in cool, clear waters with gravel substrate and alternating pool and riffle zones.	**Absent** No coastal habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Eastern Freshwater Cod *Maccullochella ikei* E FM	Clear flowing rivers with rocky substrate and large amounts of in-stream cover.	**Absent** No clear flowing rivers.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.

[4] Information sourced from species profiles on NSW DPI species list or the Australian Government's *Species Profiles and Threats* database (SPRAT) unless otherwise stated.

OEH threatened species database: https://www.dpi.nsw.gov.au/fishing/species-protection/conservation/what-current

SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Oxleyan Pygmy Perch *Nannoperca oxleyana* E FM	Coastal lowlands, mostly coastal floodplains in swamps, creeks and lakes of coastal Banksia heath.	**Absent** No coastal habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Southern Pygmy Perch *Nannoperca australis* E FM	Slow-flowing waters and still, vegetated habitats in small streams, lakes, billabongs and wetlands.	**Absent** No suitable permanent water.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Southern Purple Spotted Gudgeon *Mogurnda adspersa* E FM	Rivers, creeks, and billabongs with slow-flowing or still waters or in streams with low turbidity. Cover in the form of aquatic or overhanging vegetation, leaf litter, rocks or snags.	**Absent** No suitable slow-flowing or still permanent water.	**Unlikely** Outside current known species distribution.	**No** No suitable habitat in study area.
Trout Cod *Maccullochella macquariensis* E FM	Areas with large in-stream woody debris.	**Present** Large woody debris.	**Unlikely** Outside current known species distribution.	**No** Population not in study area.
Murray Cod *Maccullochella peelii* V EPBC	Slow flowing, turbid water in streams and rivers, favouring deeper water around boulders, undercut banks, overhanging vegetation and logs.	**Absent** No deep, slow-flowing streams or rivers.	**Unlikely** Outside current known species distribution.	**No** No suitable habitat in study area.
Macquarie Perch *Macquaria australasica* E EPBC E FM	Rivers, in clear, deep, rocky holes with plenty of cover including aquatic vegetation, large boulders, large woody debris, and overhanging banks.	**Absent** No deep water with plenty of cover.	**Unlikely** Outside current known species distribution.	**No** No suitable habitat in study area.
Silver Perch *Bidyanus bidyanus* V FM	Faster-flowing water, including rapids and races, and more open sections of river, throughout the Murray-Darling Basin.	**Present** Fast-flowing water.	**Unlikely** Outside current known species distribution.	**No** Population not in study area.

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Darling River Hardyhead population in the Hunter River catchment *Craterocephalus amniculus* EP FM	North-east part of the Murray-Darling Basin, especially MacIntyre, Namoi and other border rivers. The Hunter River population is the only known occurrence in an eastward flowing river.	**Absent** Outside Hunter River catchment.	**No** Outside population distribution.	**No** Population not in study area.
Murray-Darling Basin population of Eel-tailed Catfish *Tandanus tandanus* EP FM	Diverse range of freshwater environments including rivers, creeks, lakes, billabongs and lagoons. Clear, sluggish or still waters, but also found in flowing streams with turbid waters. Substrates range from mud to gravel and rock.	**Present** Flowing river with gravel and rock substrate.	**Possible** Populations exist in upland areas of Macquarie River.	**Yes** Potential for the proposal to impact this species.
Snowy River population of River Blackfish *Gadopsis marmoratus* EP FM	Clear flowing streams with good instream cover such as woody debris, aquatic vegetation and undercut banks.	**Absent** Outside Snowy River catchment.	**No** Outside population distribution.	**No** Population not in study area.
Western population of Olive Perchlet *Ambassis agassizii* EP FM	Western (Murray-Darling) population is limited to a few localities in Darling drainage upstream from Bourke.	**Absent** Outside Darling drainage system upstream from Bourke.	**No** Outside population distribution.	**No** Population not in study area.
Grey Nurse Shark *Carcharias taurus* CE FM	Inshore coastal waters along coast of NSW and southern Queensland.	**Absent** No coastal habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Scalloped Hammerhead Shark *Sphyrna lewini* E FM	Tropical and warm temperate seas between 45°N and 34°S, inshore and over continental shelf and in adjacent deep water from surface to at least 275 m depth.	**Absent** No marine habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Great Hammerhead Shark *Sphyrna mokarran* V FM	Occurs along coastlines, continental shelves and adjacent drop-offs to about 80 m depth.	**Absent** No marine habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
White Shark *Carcharodon carcharias* V FM	Inshore habitats to outer continental shelf and slope areas.	**Absent** No marine habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Southern Bluefin Tuna *Thunnus maccoyii* E FM	Oceanic waters on seaward side of continental shelf.	**Absent** No marine habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Black Rockcod *Epinephelus daemelii* V FM	Caves, gutters and beneath bommies on rocky reefs, from near shore environments to depths of at least 50 m.	**Absent** No marine habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Invertebrates				
Darling River Snail *Notopala sublineata* CE FM	Darling River and its tributaries. Artificially introduced hard surfaces including irrigation pipelines.	**Absent** No artificial surfaces in waterways.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Hanley's River Snail *Notopala hanleyi* CE FM	Artificially introduced hard surfaces including irrigation pipelines.	**Absent** No artificial surfaces in waterways.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Fitzroy Falls Spiny Crayfish *Euastachus dharawalus* CE FM	Creates burrows in soft stream bed below waterline.	**Absent** No suitable permanent streams.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Murray Crayfish *Euastachus armatus* V FM	Lotic waters of southern Murray-Darling Basin. Habitats ranging from pasture to sclerophyll forest, large and small streams. Deep flowing water proximal to clay banks, wood or rock cover.	**Present** Lotic waters.	**Unlikely** Outside species distribution.	**No** Population not in study area.
Marine Slug *Smeagol hilaris* CE FM	Small isolated location at Merry Beach, south of Ulladulla, NSW.	**Absent** No marine habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Adams Emerald Dragonfly *Archaeophya adamsi* E FM	Narrow, shaded riffle zones with moss and abundant riparian vegetation in small to moderate sized creeks with gravel or sandy bottoms.	**Absent** No suitable narrow, shaded riffle zones.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Sydney Hawk Dragonfly *Austrocordulia leonardi* E FM	Deep river pools with cooler water and permanent flow.	**Present** Deep pools and permanent flow.	**Unlikely** Outside species distribution.	**No** Population not in study area.
Alpine Redspot Dragonfly *Austropetalia tonyana* V FM	Amongst rocks, logs and moss within the splash zone of waterfalls or in the nearby stream edge.	**Absent** No waterfalls or rocky streams.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Bousfield Marsh Hopper *Microrchestia bousfieldi* V FM	Mangrove swamps and salt marshes in eastern Australia.	**Absent** No coastal habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Buchanans Fairy Shrimp *Branchinella buchananensis* V FM	Lake Buchanan in southwest Queensland, and Gidgee and Burkanoko Lakes in northwest NSW.	**Absent** No lake habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Plants				

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Marine Brown Alga *Nereia lophocladia* CE FM	Port Phillip Heads in Victoria and Muttonbird Island, Coffs Harbour in NSW.	**Absent** No coastal habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Posidonia australis seagrass, Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie populations EP FM	Coarse sandy to fine silty sediments between the low tide and approximately 10 m in depth.	**Absent** No marine habitat.	**Unlikely** Outside species distribution.	**No** No suitable habitat in study area.
Endangered Ecological Community				
Lowland Darling River aquatic ecological community EEC FM	Natural creeks, rivers, streams and associated lagoons, billabongs, lakes, flow diversions to anabranches, the anabranches, and the floodplains of the Darling River within NSW, including Menindee Lakes and Barwon River.	**Absent** Not in Darling River catchment.	**Unlikely** Outside community distribution.	**No** No suitable habitat in study area.
Lowland Lachlan River aquatic ecological community EEC FM	Natural rivers, creeks, streams and associated lagoons, billabongs, lakes, wetlands, paleochannels, floodrunners, effluent streams (those that flow away from the river) and the floodplains of the Lachlan River within NSW, including Lake Brewster, Lake Cargelligo and Lake Cowal.	**Absent** Not in Lachlan River catchment.	**Unlikely** Outside community distribution.	**No** No suitable habitat in study area.
Lowland Murray River aquatic ecological community EEC FM	Natural creeks, rivers, and associated lagoons, billabongs and lakes of the regulated portions of the Murray River (also known as the River Murray) downstream of Hume Weir, the Murrumbidgee River downstream of Burrinjuck Dam, the Tumut River downstream of Blowering Dam and all their tributaries anabranches and effluents including Billabong Creek, Yanco Creek, Colombo Creek, and their tributaries, the Edward River and the Wakool River and their tributaries, anabranches and effluents, Frenchmans Creek, the Rufus River and Lake Victoria.	**Absent** Not in Murray or Murrumbidgee Catchment.	**Unlikely** Outside community distribution.	**No** No construction activity in creekline.

Species and Status	Description of habitat[4]	Presence of habitat	Likelihood of occurrence	Potential for impact?
Snowy River aquatic ecological community EEC FM	Rivers, creeks and streams of the Snowy River catchment. This includes Snowy, Eucumbene, Thredbo (or Crackenback), Gungarlin Mowamba, Bombala, McLaughlin, Delegate, Pinch and Jacobs Rivers and their tributaries.	**Absent** Not in Snowy River catchment.	**No** Outside community distribution.	**No** No suitable habitat in study area.

CE FM = listed as Critically Endangered under Schedule 4A of the NSW *Fisheries Management Act 1994.*

E FM = listed as Endangered under Schedule 4 of the NSW *Fisheries Management Act 1994.*

V FM = listed as Vulnerable under Schedule 5 of the NSW *Fisheries Management Act 1994.*

EP = listed as an Endangered Population under Schedule 4 of the NSW *Fisheries Management Act 1994.*

EEC = listed as an Endangered Ecological Community under Schedule 4 of the NSW *Fisheries Management Act 1994.*

APPENDIX D ASSESSMENTS OF SIGNIFICANCE

D.1 BIODIVERSITY CONSERVATION ACT 5 PART TEST

Section 7.3 of the *Biodiversity Conservation Act 2016* specifies five factors to be taken into account in deciding whether a development is likely to significantly affect threatened species, populations or ecological communities, or their habitats, listed at the state level under the Act.

This *Five-part Test* characterises the significance of likely impacts associated with the proposal on the following species:

- Ground/Understorey Birds:
  - Diamond Firetail (*Stagonopleura guttata)* - V
- Canopy/Aerial Birds:
  - Parrots: Little Lorikeet (*Glossopsitta pusilla)* – V, Superb Parrot (*Polytelis swainsonii)* – V
  - Raptors: Black Falcon (*Falco subniger) – V,* Masked Owl *(Tyto novaehollandiae) – V,* Powerful Owl *(Ninox strenua) – V,* Barking Owl *(Ninox connivens) – V,* Spotted Harrier *(Circus assimilis) – V*
- Mammals:
  - Bats: Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris) – V*
- Fish:
  - Freshwater Eel-tailed Catfish (*Tandanus tandanus*) - V
- Flora:
  - EEC: White Box – Yellow Box – Blakely's Red Gum Woodland
- Amphibians:
  - Green and Golden Bell Frog (Litoria aurea)- V
  - Yellow Spotted Tree Frog (Litoria castanea)- E

a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Ground/understorey birds

Potential foraging and roosting habitat for the Diamond Firetail occurs within the development site and would be removed by the proposal. Surveys did not detect these species or signs such as nests that would indicate that the site has recently been used by these species, and so the development site is not considered known habitat.

The proposal would involve the removal of one hollow-bearing tree and two paddock trees along the north-eastern boundary and one paddock tree in the drainage line towards the western boundary of the site to accommodate the new roads and house blocks for the proposed subdivision. These are the only trees that remain onsite. It is an area of around 0.13 ha of Yellow Box and Blakely's Red Gum. Native understorey is minimal with exotic annuals dominant. Vegetation is already fragmented through the study area. There is remnant vegetation that remains along Sawpit Creek, to the west of the development site. This area provides potential habitat and some connectivity with the planted tree lanes south of the site and riparian vegetation north of the site. The removal of potential habitat as a result of the proposal is considered unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be likely to be placed at risk of extinction.

Parrots

Potential foraging habitat for Little Lorikeet and Superb Parrot occur in the development site and would be removed by the proposal. One hollow was present in a Yellow Box. However, it does not meet the criteria for Superb Parrots. It was a large hole in the trunk, about 1.6 m from the ground, so the proposal would not have any impact on breeding habitat. Surveys did not detect these species or any signs that they have recently used the study area, and so the study area is not considered known habitat.

The proposal would involve the removal of one hollow-bearing tree. However, due to location of the hollow and its size, it would not impact on any potential breeding habitat. It is an area of around 0.09 ha of mature Yellow Box. Native understorey is minimal with exotic annuals dominant. Vegetation is already fragmented through the study area. There is remnant vegetation that remains along Sawpit Creek, to the west of the development site. This area provides potential habitat and some connectivity with the planted tree lanes south of the site and riparian vegetation north of the site. The removal of potential habitat as a result of the proposal is considered unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be likely to be placed at risk of extinction.

Raptors

Potential foraging habitat for these species occurs in the development site and would be removed by the proposal. Surveys did not detect these species or signs such as nests that would indicate that the site has recently been used by these species, and so the study area is not considered known habitat.

It is an area of around 0.3 ha of planted species of River Red Gums and Mugga Ironbark around 20 years old. Native understorey is minimal with exotic annuals dominant. Vegetation is already fragmented through the study area. There is a remnant patch of 0.6 ha remaining to the north of the site. This area provides potential habitat and some connectivity with the roadside vegetation along Urana Road and Glenfield Road. The removal of potential habitat as a result of the proposal is considered unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be likely to be placed at risk of extinction.

Bats

Potential foraging and breeding habitat for these species occurs in the development site and would be removed by the proposal. Surveys were not completed for these species, so it is assumed that they could occur in the study area.

The proposal would involve the removal of one hollow-bearing tree, which is a large open hollow in the trunk of the tree where the opening is skyward. Impact on any potential breeding habitat is low. It is an area of around 0.13 ha of three mature native trees and one hollow-bearing tree. Minimal understory exists and is predominantly African Boxthorn and the groundcover is predominantly exotic. Vegetation is already

fragmented through the study area. There is remnant vegetation in the riparian corridor of Sawpit Creek that borders the western boundary of the development site. This area provides potential habitat and some connectivity with the riparian vegetation along the Macquarie River. The removal of potential habitat as a result of the proposal is considered unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be likely to be placed at risk of extinction.

Fish

Potential habitat for these species occurs in proximity to the development site. Impacts to water quality, discharge and change to the hydrological regime could occur as a result of the proposal. Surveys were not completed for these species, so it is assumed that they could occur in the study area.

The proposal could involve an increase in stormwater discharge and changes to water quality, affecting Sawpit Creek and the Macquarie River. The changes to potential habitat as a result of the proposal is considered unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be likely to be placed at risk of extinction.

Amphibians

Habitat for the Yellow Spotted Tree Frog and Green and Golden Bell Frog occur in the northern dam. Surveys were not completed for these species, so it is assumed they could occur on site.

The proposal would involve drainage of dam water and minor reconstruction of the dam wall bank through installation of a low flow pipe and spill way reform. The disturbances to the dam would be temporary during construction with the low flow pipe being installed at existing top water level. With the implementation of mitigation measures the changes to potential habitat as a result of the proposal is considered unlikely to have an adverse effect on the life cycle of these species such that a viable local population would be likely to be placed at risk of extinction.

EEC

Not applicable.

b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

a. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

b. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Ground/understorey birds

Not applicable.

Parrots

Not applicable.

Raptors

Not applicable.

Fish

Not applicable.

EEC

a) The proposal involves the removal of around 0.13 ha of the EEC, which is negligible. Three paddock trees and one hollow-bearing tree would be removed, and it is considered not likely to have an adverse effect on the extent of the EEC such that its local occurrence is likely to be placed at risk of extinction.

b) The proposal involves the removal of around 0.13 ha of the EEC which is in a heavily disturbed area, which has been previously cleared and cropped. There are invasive weeds that are established

across the site. With the recommended mitigation measures of managing the spread of priority weeds, and monitoring disturbed areas for weed growth, it is unlikely that the proposal would substantially and adversely modify the composition of the EEC such that its local occurrence is likely to be placed at risk of extinction.

c) In relation to the habitat of a threatened species or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.

Ground/understorey birds

I. The proposal would result in the removal of around 0.13 ha of potential woodland habitat for these species.

II. The proposal would result in the clearing of small two remnant patches of habitat, which is around 0.3% of the habitat in the development site. Vegetation within the development site is already fragmented. The proposal would not result in further fragmentation of this habitat. However, there remains remnant native vegetation to the west along Sawpit Creek, connecting sparse vegetation to the south of the site, to the Macquarie River.

III. The habitat within the study area is a known habitat. The amount of habitat is small in the context of habitat remaining in the study area. The habitat to be removed is not considered to be important to the long-term survival of these species in the locality.

Parrots

I. The proposal would result in the removal of around 0.13 ha of potential woodland habitat for these species. One HBT would be removed, which does not meet the criteria of the Superb Parrot.

II. The proposal would result in the clearing of two small remnant patches of habitat, which is around 0.3 % of the habitat in the development site. Vegetation within the development site is already fragmented. The proposal would not result in further fragmentation of this habitat. However, there remains remnant native vegetation to the west along Sawpit Creek, connecting sparse vegetation to the south of the site, to the Macquarie River.

III. The habitat within the study area is a known habitat. The amount of habitat is small in the context of habitat remaining in the study area. The habitat to be removed is not considered to be important to the long-term survival of these species in the locality.

Raptors

I. The proposal would result in the removal of around 0.13 ha of potential habitat for these species.

II. The proposal would result in the clearing of two small remnant patches of habitat, which is around 0.3% of the habitat in the development site. Vegetation within the development site is already fragmented. The proposal would not result in further fragmentation of this habitat. However, there remains remnant native vegetation to the west along Sawpit Creek, connecting sparse vegetation to the south of the site, to the Macquarie River.

III. The habitat within the study area is a known habitat. The amount of habitat is small in the context of habitat remaining in the study area. The habitat to be removed is not considered to be important to the long-term survival of these species in the locality.

Bats

I. The proposal would result in the removal of around 0.13 ha of potential woodland habitat for this species.

II. The proposal would result in the clearing of one hollow-bearing tree and three mature native paddock, which is around 0.3 % of the habitat in the development site. Vegetation within the development site is already fragmented. The proposal would result in further fragmentation of this

habitat. However, there remains remnant native vegetation in the riparian zone along Sawpit Creek, connecting the channel corridor with the riparian zone of the Macquarie River.

III. The habitat within the study area is not known habitat. The amount of habitat is small in the context of habitat remaining in the study area. The habitat to be removed is not considered to be important to the long-term survival of these species in the locality.

Fish

I. The proposal would result in an increase to stormwater discharges and changes to water quality.

II. The proposal would not result in fragmentation of habitat.

III. The habitat within the study area is not known habitat. The amount of habitat is small in the context of habitat remaining in the study area. The potential impact to the habitat is not considered to be detrimental to the long-term survival of these species in the locality.

Amphibians

I. The proposal would result in an increase to stormwater discharges and changes to water quality and temporary disturbance to aquatic habitat.

II. The proposal not result in fragmentation of habitat for amphibians

III. The habitat within the study area is a known habitat. The amount of habitat is small in the context of habitat remaining in the study area. The habitat to be removed is not considered to be important to the long-term survival of these species in the locality.

EEC

I. The extent of habitat to be removed or modified is minimal. The proposal involves the removal of around 0.13 ha of the EEC, and includes the removal of two mature Yellow Box, one mature Blakely's Red Gum and one hollow-bearing Yellow Box.

II. The development site is not part of a contiguous landscape. The 0.13 ha of the EEC exists in a 40 ha agricultural development site that consists of a predominantly exotic groundcover. There is remnant riparian vegetation to the west of the site along Sawpit Creek. It is considered is highly unlikely for the EEC to become permanently fragmented and impact the long-term survival.

III. The importance of habitat to be removed, modified or fragmented is very low. Two mature Yellow Box, one mature Blakely's Red Gum and one hollow-bearing Yellow Box would be removed. The habitat potential for roosting and for foraging is low. The extent of the EEC to be removed spans across a 40 ha site and it is considered unlikely impact the long-tern survival of the EEC within the locality.

d) Whether the action proposed is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

No areas of outstanding biodiversity value occur within the development site. There would be no adverse direct or indirect effects on any declared areas of outstanding biodiversity value.

e) Whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Key Threatening Processes (KTPs) relevant to the proposal include the following:

I. Clearing of native vegetation

The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the Scientific Committee's determination, it was found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity.' Clearing can lead to direct habitat loss, habitat fragmentation and associated genetic impacts, habitat degradation and off-site impacts such as downstream sedimentation. Around 0.13 ha of woodland would be cleared as a result of the proposal. The proposal has the potential to increase the impact of this KTP. However, the contribution of this proposal would be relatively minor given the relatively small amount of fragmented habitat to be removed and the area of habitat that would remain in the study area.

II. Invasion and establishment of exotic vines and scramblers

The proposal has the potential to contribute to the spread of exotic species in the development site through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would be likely to make only a minor contribution to this KTP.

III. Invasion of native plant communities by exotic perennial grasses

The proposal has the potential to contribute to the introduction or spread of exotic perennial grasses to the study area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would be likely to make only a minor contribution to this KTP.

IV. Loss of habitat and spawning sites through siltation

The proposal has the potential to contribute to decreases in water quality through the construction and operation of a residential area. Additional increases in erosion could occur with increases to stormwater discharges as a result of the loss of an extensive area of permeability. Mitigation measures have been recommended to prevent increases in erosion and sedimentation and decreases in water quality.

Conclusion

The impacts of the proposal on the assessed threatened species listed under the BC Act are considered to be manageable. A significant threat is considered unlikely based on the following conclusions:

1. The amount of habitat to be removed or disturbed by the proposal is relatively small in an already fragmented area. Corridors of connectivity to the Macquarie River remain intact.
2. No further fragmentation of the habitat would occur.
3. No substantial contribution to any key threatening process would be expected.
4. Mitigation measures listed in Section 6 would be implemented to prevent disruptions to the life cycle or harm to individual animals of these species.

D.2 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT PRINCIPAL SIGNIFICANT IMPACT ASSESSMENT

The *Environment Protection and Biodiversity Conservation Act 1999* specifies factors to be taken into account in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. These assessments characterises the significance of likely impacts associated with the proposal on the following species:

- Canopy/aerial birds:
    - Superb Parrot *Polytelis swainsonii* – V
- Amphibians:
    - Yellow Spotted Tree Frog (*Litoria castanea*)- E

a) Will the action lead to a long-term decrease in the size of an important population of a species?
Superb Parrot
Potential foraging habitat for this species occurs within the development site and would be removed by the proposal. Surveys did not detect these species and so the study area is not considered known habitat. The habitat to be removed (approximately 0.13 ha of PCT 277, one HBT and three mature native trees) is a low proportion of the habitat that would remain (riparian corridors of watercourses). The development site is sparsely vegetated, and fragmentation is high. It is heavily disturbed and has been previously cropped. Sparse understorey is predominantly African Boxthorn and the groundcover is predominantly exotic. The proposal would involve the removal of one hollow-bearing tree, which does not meet the breeding criteria for the Superb Parrot. Therefore, it is unlikely to impact on any potential breeding habitat. There is a remnant native vegetation within the riparian corridor of Sawpit Creek, adjacent to the western boundary of the site. This area provides potential habitat and some connectivity with the riparian corridors long other drainage channels and the Macquarie River. In this context, the removal of potential habitat as a result of the proposal would be unlikely to have an adverse effect on the species such that it would lead to a long-term decrease in the size of a population.
b) Will the action reduce the area of occupancy of an important population of a species?
Superb Parrot
The proposal would result in the removal of around 0.13 ha of potential foraging habitat for this species, which exists in a 0.04 ha patch and a 0.09 ha patch and includes four mature native trees. The development site is not located in a known important population of these species. In this context, the removal of a relatively small area of foraging habitat as a result of the proposal is considered unlikely to reduce the area of occupancy of an important population of this species.
c) Will the action fragment an existing important population into two or more populations?
Superb Parrot
The proposal would result in the removal of around 0.13 ha of potential habitat for this species, which exists in 0.04 ha patch and a 0.09 ha patch and includes four mature native trees. The development site is sparsely vegetated, and fragmentation is high. It is heavily disturbed and has been previously cropped. Sparse understorey is predominantly African Boxthorn and the groundcover is predominantly exotic. The proposal would involve the removal of one hollow-bearing tree, which does not meet the breeding criteria for the Superb Parrot. Therefore, it is unlikely to impact on any potential breeding habitat. There is a remnant native vegetation within the riparian corridor of Sawpit Creek, adjacent to the western boundary of the site. This area provides potential habitat and some connectivity with the riparian corridors long other drainage channels and the Macquarie River. The development site is not located in a known important population of

these species. The proposal would not fragment an existing important population into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

Superb Parrot

No areas of critical habitat have been declared for these species.

e) Will the action disrupt the breeding cycle of an important population?

Superb Parrot

One hollow-bearing tree would be removed as part of the proposal. However, the hollow height from the ground and size does not meet the criteria for breeding habitat of the Superb Parrot. Surveys did not detect these species or any signs that they have recently used the study area, and so the study area is not considered known habitat.

The area of woodland habitat to be removed (0.13 ha) is relatively small in the context of the habitat that would remain (riparian vegetation along water courses). The development site is not located in a known important population of these species. In this context, the removal of a relatively small area of potential habitat as a result of the proposal would be unlikely to disrupt the breeding cycle of an important population of these species. Mitigation measures have been recommended to mitigate the potential for injury or mortality to breeding birds.

f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Superb Parrot

The proposal would remove up to 0.13 ha of potential foraging habitat. There would also be some disturbance associated with construction and operation of the proposal which could decrease the quality of some habitat. The development site is not located in a known important population of these species. In this context, the removal and disturbance of a relatively small area of foraging habitat as a result of the proposal would be unlikely to modify, destroy, isolate or decrease the availability or quality of habitat to the extent that an important population is likely to decline.

g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

The proposal has the potential to contribute to the spread of invasive species in the development site through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would therefore be unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.

h) Will the action introduce disease that may cause the species to decline?

There is a risk that pathogens could be established or spread in the development site via machinery during construction. However, with the recommended mitigation measures, the action would be unlikely to introduce any disease which may cause the species to decline.

i) Will the action interfere substantially with the recovery of the species?

Superb Parrot

The National Recovery Plan for Superb Parrot lists the following specific objectives:

1. Determine population trends in the Superb Parrot.
2. Increase the level of knowledge of the Superb Parrot's ecological requirements.
3. Develop and implement threat abatement strategies.
4. Increase community involvement in and awareness of the Superb Parrot recovery program.

The proposal would not interfere with any of these objectives.

a. Will the action lead to a long-term decrease in the size of a population

Yellow Spotted Tree frog

Potential breeding habitat occurs in the dam north of the proposal area for this species. The proposal would involve drainage of dam water and minor reconstruction of the dam wall bank through installation of a low flow pipe and spill way reform. The disturbances to the dam would be temporary during construction with the low flow pipe being installed at existing top water level. Vegetation along the inflow area would be avoided during construction.

In this context, the temporary disturbance of potential habitat as a result of the proposal would be unlikely to have an adverse effect on the species such that it would lead to a long-term decrease in the size of a population.

b) Will the action reduce the area of occupancy of a species

Yellow Spotted Tree frog

The proposal would result in the temporary disturbance to a small area of the dam wall bank and exotic vegetation along the spill way. The development site is not located in a known important population of these species. In this context, the removal of a relatively small area of potential breeding habitat as a result of the proposal is considered unlikely to reduce the area of occupancy of this species.

c) Will the action fragment an existing population into two or more populations?

Yellow Spotted Tree frog

Aquatic habitat in the northern dam is relatively small and isolated. The proposal would result in the temporary disturbance to a small area of the dam wall bank and exotic vegetation along the spill way. The small areas of disturbance would be rehabilitated. The proposal would not fragment an existing important population into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

Yellow Spotted Tree frog

No areas of critical habitat have been declared for this species.

e) Will the action disrupt the breeding cycle of an important population?

Yellow Spotted Tree frog

The yellow spotted tree frog breeds in summer during November and December. The water in the dam is likely to be low in summer due to the small size of the dam. The proposal would result in the temporary disturbance to a small area of the dam wall bank and exotic vegetation along the spill way. This could temporarily decrease the quality of some habitat, however vegetation within the inflow area would be maintained and the water would return to similar levels. Based on this context, the proposal is unlikely to disrupt the breeding cycle of the population.

f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Yellow Spotted Tree frog

The proposal would result in the temporary disturbance to a small area of the dam wall bank and exotic vegetation along the spill way. This could temporarily decrease the quality of some habitat, however vegetation within the inflow area would be maintained and the water would return to similar levels. In this context, the removal and disturbance of a relatively small area of habitat as a result of the proposal would be unlikely to modify, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

The proposal has the potential to contribute to the spread of invasive species in the development site through the transfer and introduction of plant material and soil on machinery. Mitigation measures have

been recommended to prevent the spread of weeds on site. The proposal would therefore be unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.

j) Will the action introduce disease that may cause the species to decline?

There is a risk that pathogens could be established or spread in the development site via machinery or movement of people during construction. Chytrid fungus is transferred by direct contact between frogs and tadpoles, or through exposure to infected water. However, with the recommended standard mitigation measures for vehicle and machinery hygiene, the action would be unlikely to introduce any disease which may cause the species to decline.

k) Will the action interfere substantially with the recovery of the species?

Yellow Spotted Tree frog

The National Recovery Plan for Yellow spotted bell Frog lists the following specific objectives:

1. to assess the current status of the species through community involvement and scientific research;
2. to encourage the location and identification of any remaining extant populations in the wild;
3. to resolve the identity of possible Peppered Tree Frog populations recently recorded;
4. to increase protection of potential habitat through community awareness and involvement;
5. to effectively protect and manage any extant populations which may be located in the future;•
6. to determine agents which contributed to the species' decline; and
7. to resolve the taxonomic status of the New England and Southern Tablelands forms of The Yellow-spotted Bell Frog and the taxonomic status of the Peppered Tree Frog.

The proposal would not interfere with any of these objectives.

Conclusion

The impacts of the proposal on the assessed threatened and migratory species listed under the EPBC Act are considered to be manageable. A significant impact is considered unlikely based on the following conclusions:

1. The amount of habitat to be removed or disturbed by the proposal is relatively small in the context of the greater area of habitat that would remain.
2. No further fragmentation of habitat would occur.
3. No substantial contribution to any key threatening process would be expected.
4. Mitigation measures listed in Section 6 would be implemented to prevent disruptions to the life cycle or harm to individual animals of these species.

APPENDIX E FLORA SPECIES AND VEGETATION COMMUNITIES

Floristic survey results are presented for the exotic vegetation and one plant community type identified in the development site (PCT)

PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.

The foliage cover of species is based on visual estimates of foliage cover within a standard 20 metre x 20 metre plot. Incidentals are recorded using the random meander method (Cropper 1993). 'C' is common, 'O' is occasional and 'U' is uncommon.

Where uncertainty exists due to the unavailability of reproductive material, the taxon is preceded by a question mark, or plants are identified to genus level only. Species of conservation significance are bolded. Introduced species are denoted by an asterisk. Priority or significant environmental weeds are indicated with a 'Δ' symbol. Scientific nomenclature follows Harden (1990-2002) and the Sydney Royal Botanic Gardens PlantNet website, updated with recent changes accepted by the except where recent changes accepted by the Angiosperm Phylogeny Group (2016) and the Australian Plant Census (2017).

Family	Exotic	Scientific name	Common name	Foliage Cover					Incidentals
				PCT 277 Plot 1	Exotic Plot 2	Exotic Plot 3	Exotic Plot 4	Exotic Plot 5	
TREES									
Myrtaceae		*Eucalyptus blakelyi*	Blakely's Red Gum	18					
Myrtaceae		*Eucalyptus melliodora*	Yellow Box						
SHRUBS, SUB-SHRUBS									
Solanaceae	*	*Lycium ferocissimum* Δ	African Boxthorn	5					
	*	*Prunus sp.*							
VINES/CLIMBERS									
Rosaceae	*	*Rubus fruticosus sp. agg.* Δ	Blackberry complex						U
FORBS									
Polygonaceae	*	*Acetosella vulgaris*	Sheep Sorrel		5	0.5	10	8	C
Amaranthaceae		*Alternanthera nodiflora*	Common Joyweed						U
Brassicaceae	*	*Brassica tournefortii*	Mediterranean Turnip	5	10	30	15	22	C
Brassicaceae	*	*Capsella bursa-pastoris*	Shepherd's Purse						U
Asteraceae	*	*Carthamus lanatus* Δ	Saffron Thistle	0.1	0.1				C
Asteraceae	*	*Cirsium vulgare* Δ	Spear Thistle						C
Chenopodiaceae	*	*Chenopodium spp.*	Goosefoot, Crumbweed			0.1			O
Asteraceae	*	*Chondrilla juncea*	Skeleton Weed		0.2		0.1	0.1	U
Asteraceae	*	*Conyza spp.* Δ	A Fleabane	0.1		0.1		0.1	C
Solanaceae	*	*Datura stramonium* Δ	Common Thornapple						U
Boraginaceae	*	*Echium plantagineum*	Patterson's Curse	8			10	5	C
Chenopodiaceae		*Einadia nutans*	Climbing Saltbush	0.1					
Boraginaceae	*	*Heliotropium amplexicaule* Δ	Blue Heliotrope	0.2			0.1	4	C
Asteraceae	*	*Helminthotheca echioides*	Ox-tongue				0.1		O
Asteraceae	*	*Hypochaeris radicata*	Catsear		0.1	0.1			C
Asteraceae	*	*Lactuca serriola*	Prickly Lettuce				0.1		C

Family	Exotic	Scientific name	Common name	Foliage Cover					Incidentals
				PCT 277 Plot 1	Exotic Plot 2	Exotic Plot 3	Exotic Plot 4	Exotic Plot 5	
Brassicaceae	*	*Lepidium africanum*	Common Peppercress	0.2	0.1	0.1	0.1	0.1	C
Malvaceae	*	*Malva parviflora*	Small-flowered Mallow	5			0.1		C
Lamiaceae	*	*Marrubium vulgare* Δ	White Horehound						U
Malvaceae	*	*Modiola caroliniana*	Red-flowered Mallow	0.1	15	10	4	2	C
Asteraceae	*	*Onopordum acanthium subsp. acanthium* Δ	Scotch Thistle						U
Caryophyllaceae	*	*Paronychia brasiliana*	Brazilian Whitlow		0.1		0.1		O
Plantaginaceae	*	*Plantago lanceolata*	Lamb's Tongues	4	0.1		0.1	0.1	C
Asteraceae		*Pseudognaphalium luteoalbum*	Jersey Cudweed					0.1	U
Polygonaceae	*	*Rumex crispus*	Curled Dock						O
Asteraceae		*Senecio quadridentatus*	Cotton Fireweed						U
Asteraceae	*	*Taraxacum officinale*	Dandelion		0.1			0.1	O
Fabaceae (Faboideae)	*	*Trifolium repens*	White Clover	0.1	0.5	1			C
Fabaceae (Faboideae)	*	*Trifolium subterraneum*	Subterranean Clover						C
Scrophulariaceae	*	*Verbascum thapsus subsp. thapsus*	Great Mullein						O
Verbenaceae	*	*Verbena bonariensis*	Purpletop	0.1					O
Asteraceae	*	*Xanthium spinosum* Δ	Bathurst Burr						U
GRASSES									
Poaceae		*Cynodon dactylon*	Common Couch				0.2		U
Poaceae	*	*Eleusine tristachya*	Goose Grass		20	15	10	40	C
Poaceae	*	*Eragrostis mexicana*	Mexican Lovegrass		4	1	1		C
Poaceae	*	*Eragrostis minor*	Small stink-grass	0.1	0.1	0.1	0.1	0.1	O
Poaceae	*	*Lolium perenne*	Perennial Ryegrass	15	5	5	10		C
Poaceae	*	*Nassella trichotoma* Δ	Serrated Tussock					0.1	U
Poaceae		*Paspalidium spp.*							U

Family	Exotic	Scientific name	Common name	Foliage Cover					Incidentals
				PCT 277 Plot 1	Exotic Plot 2	Exotic Plot 3	Exotic Plot 4	Exotic Plot 5	
Poaceae	*	*Phalaris aquatica*	Phalaris	10					C
Poaceae	*	*Setaria spp.*	Pigeon Grass						O
GRAMINOIDS									
Cyperaceae	*	*Cyperus eragrostis*	Umbrella Sedge						U
Juncaceae		*Juncus spp.*	A Rush						U

APPENDIX F FAUNA SPECIES LIST AND HABITAT OBSERVATIONS

The following fauna were observed opportunistically.

Common name	Scientific name	Observation type
Birds		
Australian Raven	*Corvus coronoides*	Heard
Common Starling*	*Sturnus vulgaris*	Seen
Pied Cormorant	*Phalacrocorax varius*	Seen
Magpie	*Cracticus tibicen*	Heard
Willie Wagtail	*Rhipidura leucophrys*	Seen
Superb Fairy-wren	*Malurus cyaneus*	Seen
Masked Lapwing	*Vanellus miles*	Heard
Pied Currawong	*Strepera graculina*	Heard
Magpie-lark	*Grallina cyanoleuca*	Seen
Mammals		
Eastern Grey Kangaroo	*Macropus giganteus*	Seen
Reptiles and amphibians		
Spotted Marsh Frog	*Limnodynastes tasmaniensis*	Heard

*

indicates non native

APPENDIX G NSW HYGIENE GUIDELINES

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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Department of Planning, Industry and Environment
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Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment, Energy and Science enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
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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.

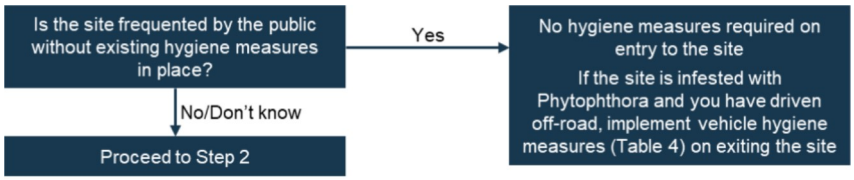
The far south-west of Western Australia contains approximately 40% of Australia's myrtaceous species (Makinson 2018b). Consequently, if introduced, myrtle rust has the potential to cause significant damage to the region. The continued exclusion of the pathogen from south-west Western Australia is a national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

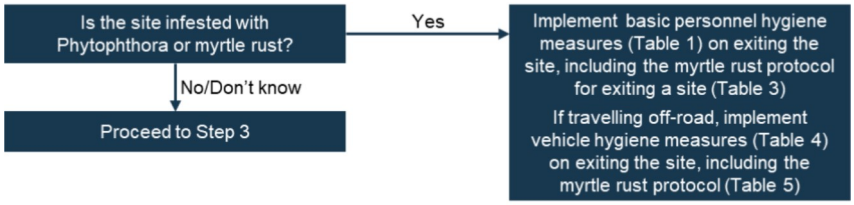
Decision tree 1: Phytophthora and myrtle rust

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

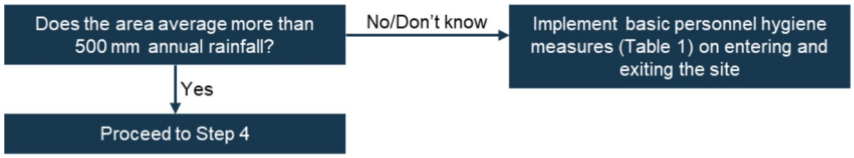
Step 1: Determine nature of public access



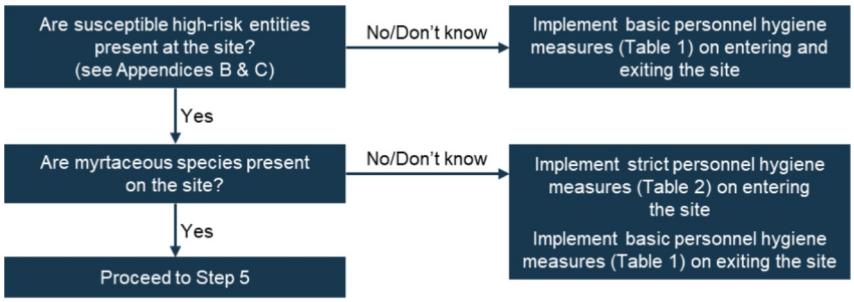
Step 2: Determine presence of Phytophthora or myrtle rust



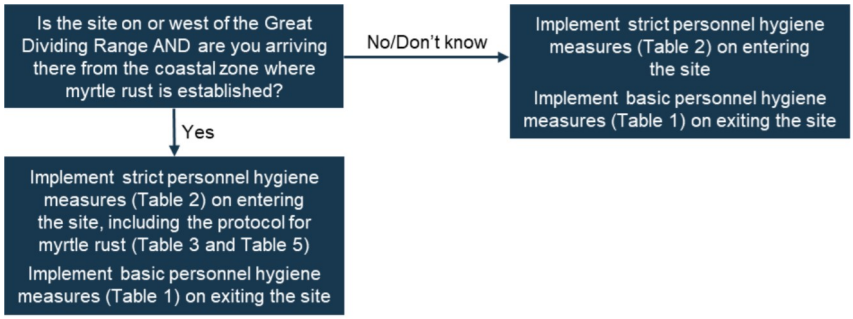
Step 3: Determine average annual rainfall



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.

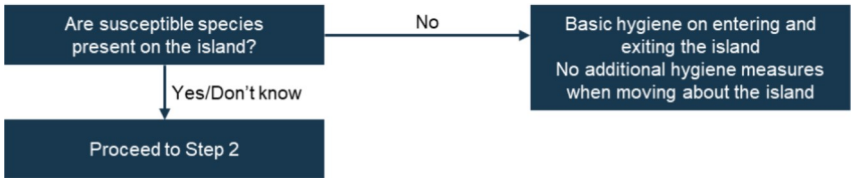
Visiting or working on islands

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.

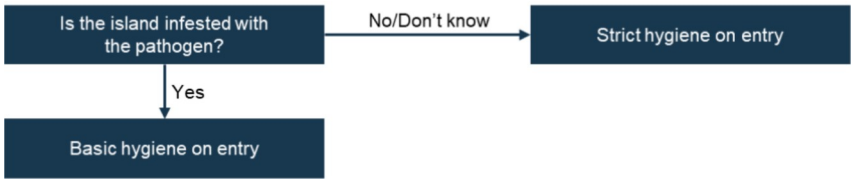
Where hygiene measures are recommended for moving about an island (see Step 3 below), it will be important to establish hygiene points at the boundary of the infested area(s).

Decision tree 2: visiting or working on islands

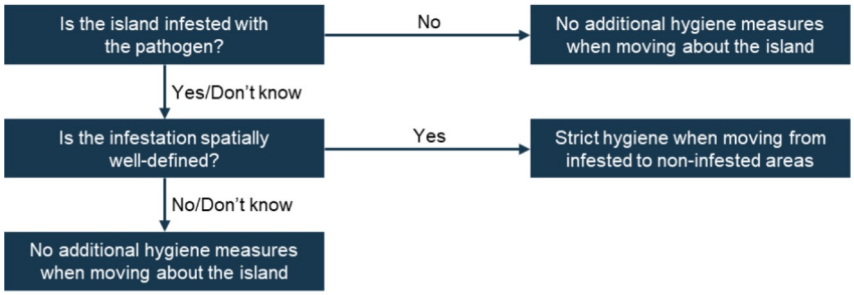
Step 1: Determine presence of susceptible species



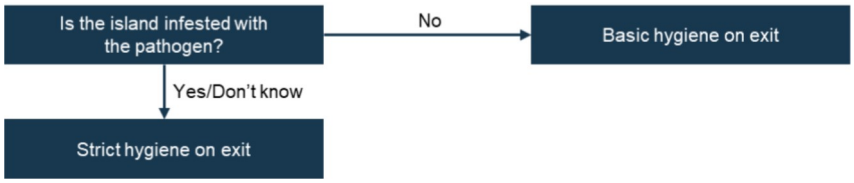
Step 2: Determine hygiene measures before entry to the island



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.

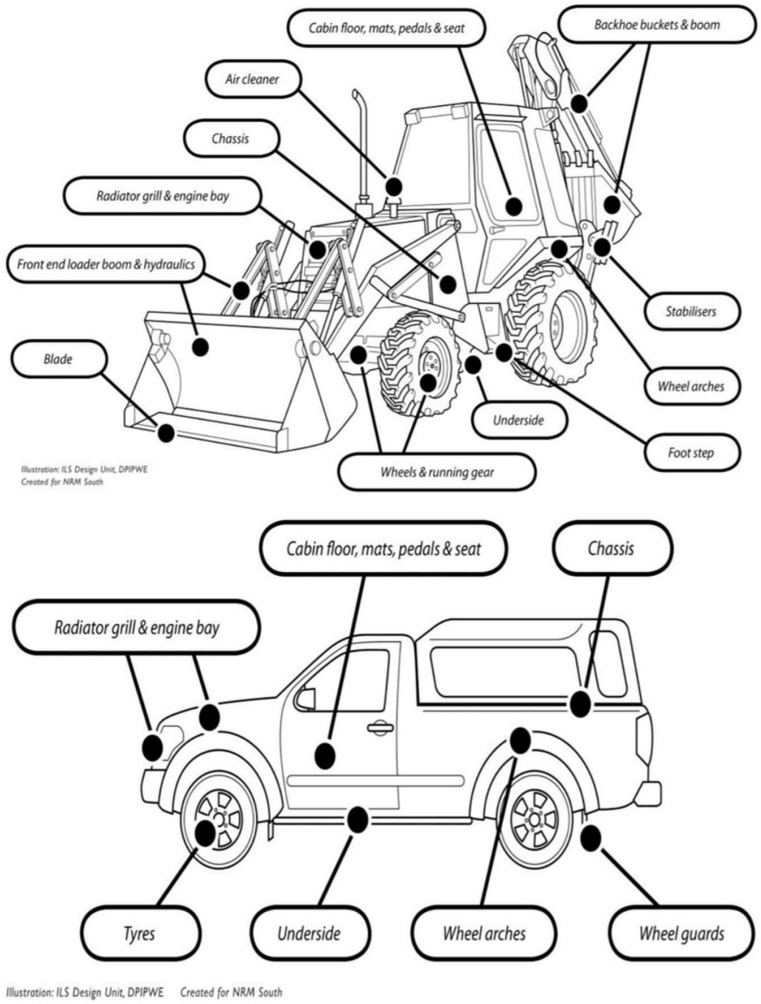


Figure 2 Example illustrated machinery and vehicle cleaning checklists

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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