

Prescribed Ecological Actions Report (PEAR)

for

**Sutherland Hospital, Kingsway & Kareena Rd,
Caringbah
Lot 1 DP 119519 and Lot 1 DP 432283**

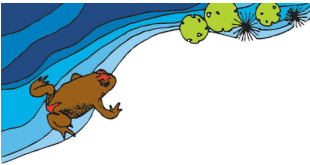
**Proposed Sutherland Hospital (TSH)
Operating Theatre Upgrade project**

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Report No: AE20-REP-2164-ISS 1

Prepared by: Abel Ecology

Date: 27 July 2020



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Document History

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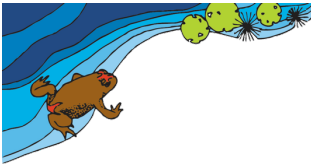
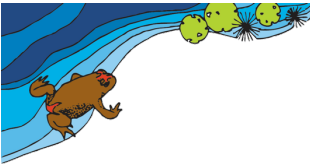


Table of Contents

Executive summary	6
1. Introduction	14
1.1 Legislative context.....	14
1.2 The proposal.....	14
1.3 Sources of information used in this assessment.....	15
2. Biodiversity offsets scheme thresholds 1 and 2	15
2.1 Threshold One: Biodiversity Conservation Regulation 2017 Development area assessment thresholds.....	15
2.2 Threshold Two: Clearing or prescribed activities as listed in the Biodiversity Conservation Regulation 2017 on land included on the Biodiversity Values Map	16
3. Landscape features of the site and the locality	16
3.1 Site description.....	16
3.2 History of the site	16
3.3 Site Soils.....	17
3.4 Landscape features	17
3.4.1 Site landscape features.....	17
4. Field survey methods	18
4.1 BioNet Atlas of NSW Wildlife website search	18
4.2 Field work effort	19
4.3 Flora survey method, vegetation community and habitat classification	19
4.4 Simplified vegetation integrity assessment.....	20
4.5 Fauna survey method	21
4.5.1 Diurnal fauna searches.....	21
4.6 Species likely to occur	21
4.7 Limitations of the survey.....	22
4.8 Staff associated with the field work	22
5. Survey Results: Vegetation and habitat description	22
5.1 Site vegetation and habitat.....	22
5.1.1 Landscape garden/zone 1	22
5.2 Species and Communities of conservation concern	23
5.3 Weeds.....	23
6. Survey Results: Fauna	24
6.1 Species of conservation concern	24
6.2 Fauna results.....	24
6.3 Microbats.....	24
7. Discussion of results	25
8. Impact on biodiversity: Threshold 3	25
8.1 Threshold 3: Five-part test summary	25
9. Environment Protection and Biodiversity Conservation Act 199	27
10. Conclusion and Recommendations	28
11. References	29
Appendix 1. Five-part tests	30
Grey-headed Flying-fox	32



Insectivorous bats	33
Appendix 2. Flora species list	37
Appendix 3. Expected fauna species in the Sydney Basin	38
Appendix 4. Habitat requirements for locally-occurring threatened fauna species	44
Appendix 5. Habitat requirements for locally-occurring threatened plant species.....	48
Appendix 6. Matters of National Environmental Significance	59
Appendix 7. Company Profile	60

Table of Figures

Figure 1. Locality map for Sutherland Hospital.....	7
Figure 2. Area within site to be affected.....	8
Figure 3. Aerial photo of the site and local area with proposal.....	9
Figure 4. Biodiversity values map.	10
Figure 5. Sutherland Hospital site 1943 air photo.....	11
Figure 6. Soil Landscapes of site and surrounding area.....	12
Figure 7. Vegetation map for the site.....	13

Table of Tables

Table 1. Details of lot size and size of proposed native vegetation clearing.	15
Table 2. Areas section 7.2(4) Biodiversity Conservation Regulation 2017.	15
Table 3. Site landscape features.....	17
Table 4: BioNet threatened flora & fauna species records for a 5 km radius of the site since 1 Jan 2010.	18
Table 5: Threatened species assessed in 5 part tests.....	19
Table 6. Survey dates and weather conditions.....	19
Table 7. Staff associated with field work and analysis of field work.	22
Table 8. Significant features and observations for the site.	23
Table 9. Summary of the five-part tests shown in full in Appendix 1.	27



List of Abbreviations

ALS	Actual Lot Size
BAM	Biodiversity Assessment Method
BC Act	<i>Biodiversity Conservation Act 2016</i>
BCR	Biodiversity Conservation Regulation 2017
BDAR	Biodiversity Development Assessment Report
d.b.h.	Diameter at breast height (~1.4 metres)
EEC	Endangered Ecological Community
ESD	Ecologically Sustainable Development
LEP	Local Environmental Plan
LGA	Local Government Area
MLS	Minimum Lot size

Note regarding maps in this report

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Executive summary

The proposal is to demolish existing buildings, remove planted landscapes and construct new facilities.

A biodiversity survey was carried out at Sutherland Hospital to assess the likely impacts of the proposal on species and ecological communities present on the site, and whether the proposal requires a Biodiversity Development Assessment Report (BDAR) because it is a likely trigger to entry into the Biodiversity Offsets Scheme identified in s. 7.4 of the *Biodiversity Conservation Act 2016*.

This report also describes whether there is likely to be any significant effect on any endangered ecological community, endangered population, threatened species or their habitats, as per the listings in the Environment Protection and *Biodiversity Conservation Act 1999* (EPBC Act 1999) (Commonwealth legislation).

The areas to be affected are in a planted landscape garden.

The following three considerations are triggers for entry into the Biodiversity Assessment Method.

1. Threshold 1: The proposal does not exceed the clearing threshold area as described in clause 7.2 of the BC Regulation 2017.
2. Threshold 2: The proposal does not undertake clearing of native vegetation or any prescribed activities (clause 6.1 of the BC Regulation 2017) on land shaded in the Biodiversity Values Land Map
3. Threshold 3: The proposal is not likely to significantly affect any threatened species or Endangered or Critically Endangered Species.

There is no impediment to this proposal in the scope of this report. None of the three thresholds for entry into the Biodiversity Offsets Scheme are triggered by the proposal.

A report prepared using the Biodiversity Assessment Method is not recommended.

The provisions of the EPBC Act 1999 do apply to this proposal and it does not require referral to the Commonwealth.

Recommendation:

A Biodiversity Development Assessment Report (BDAR) is not required.

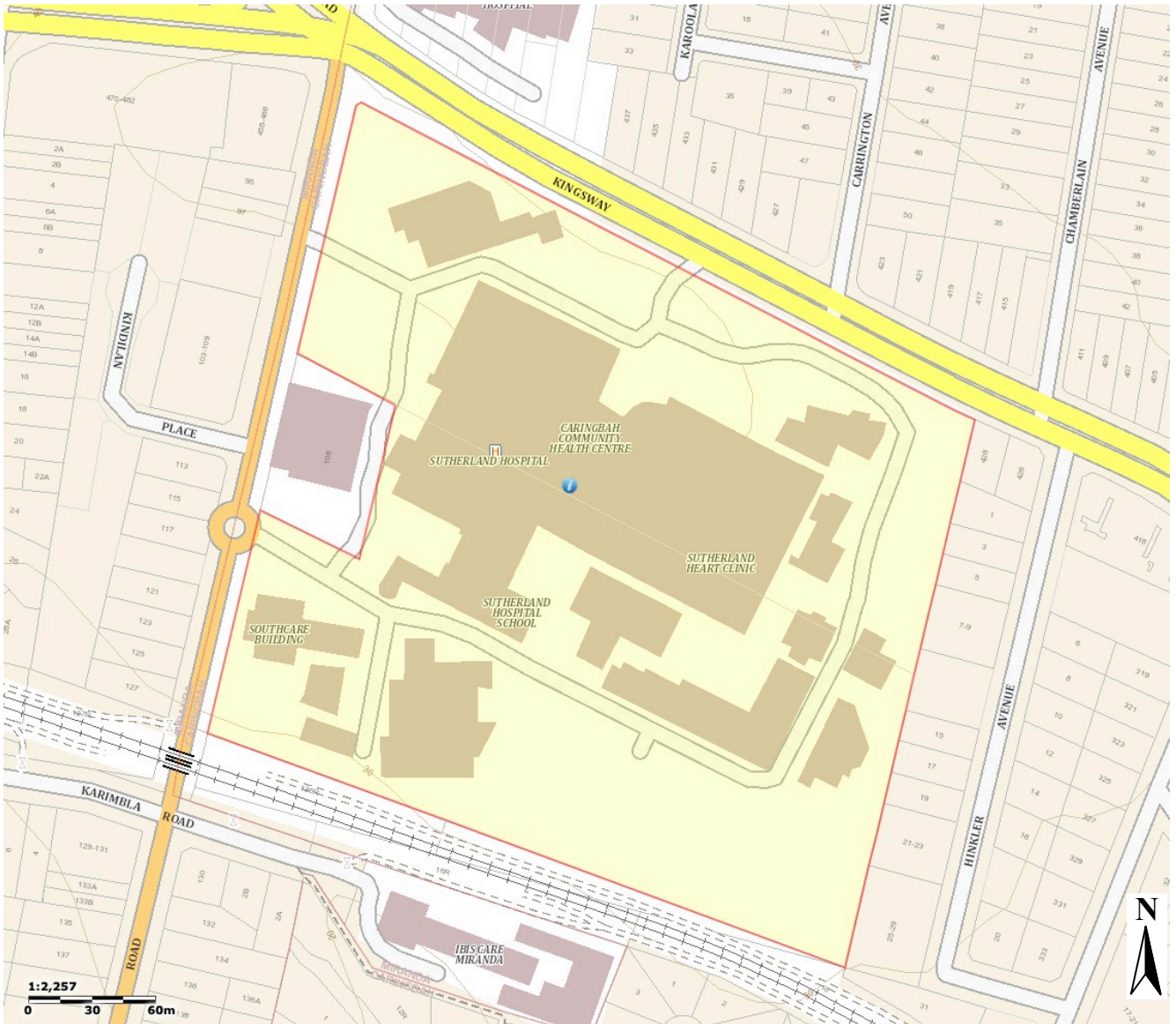
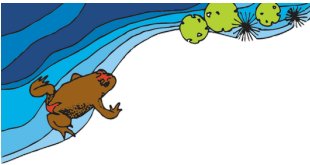



Figure 1. Locality map for Sutherland Hospital.

 Site location

© Land and property Information NSW. Spatial Information eXchange (SIX) website 2020.

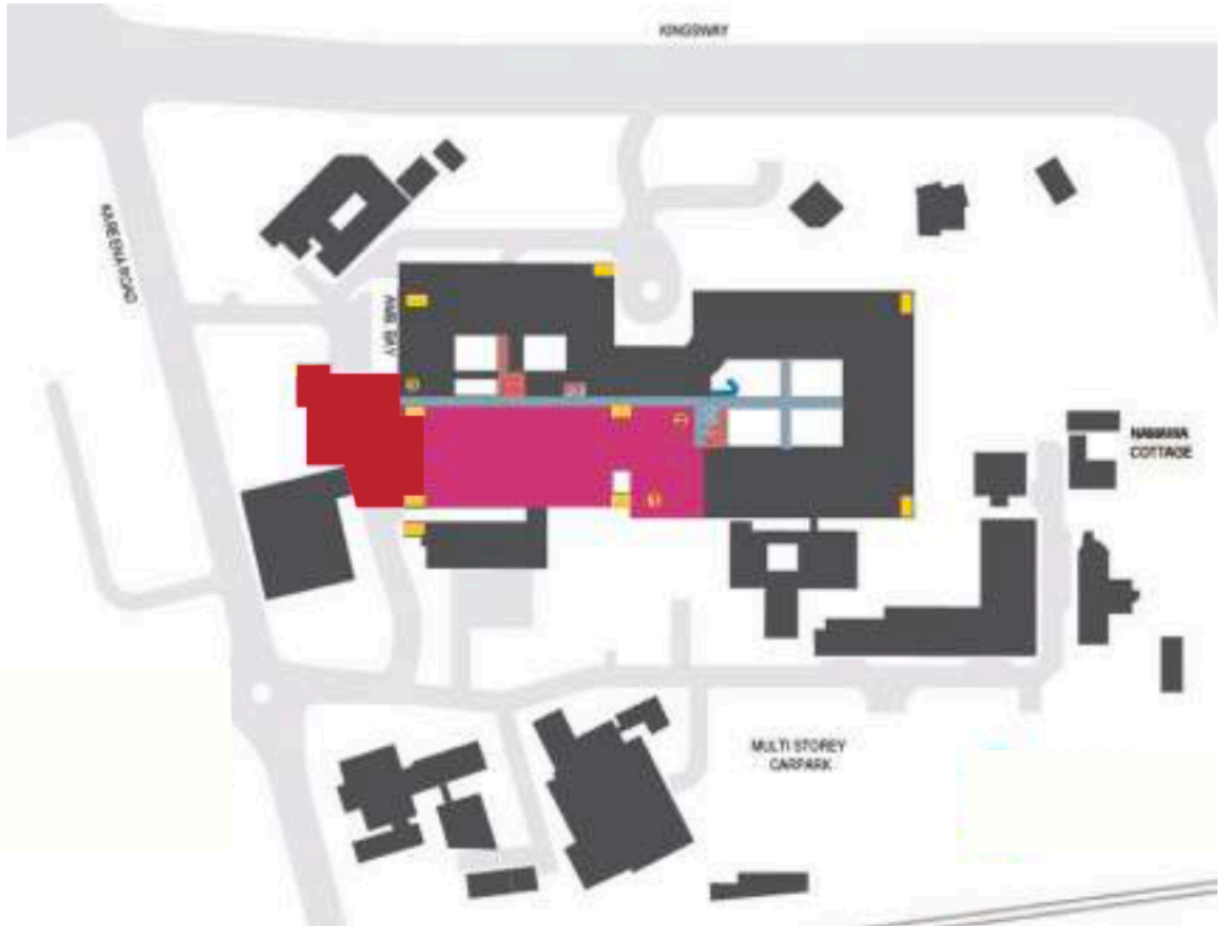
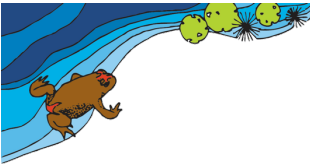


Figure 2. Area within site to be affected.

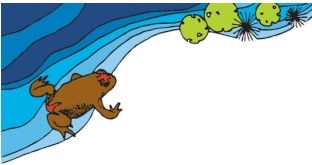



Figure 3. Aerial photo of the site and local area with proposal.

Key

 Site location

N



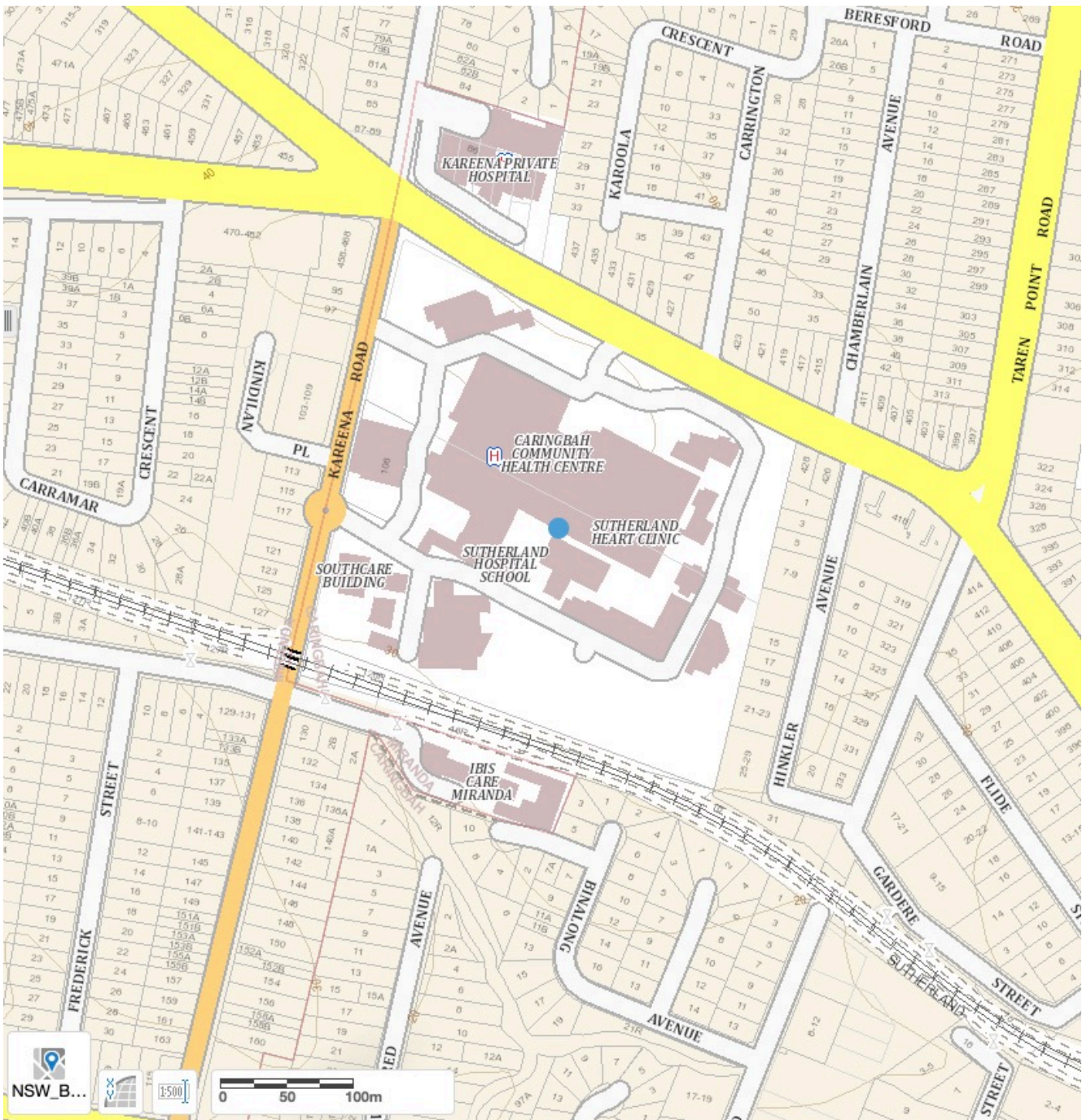
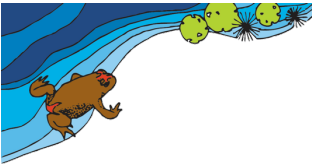


Figure 4. Biodiversity values map.

<https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap>

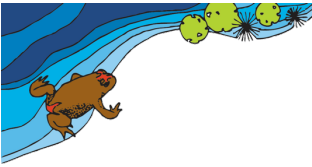


Figure 5. Sutherland Hospital site 1943 air photo.

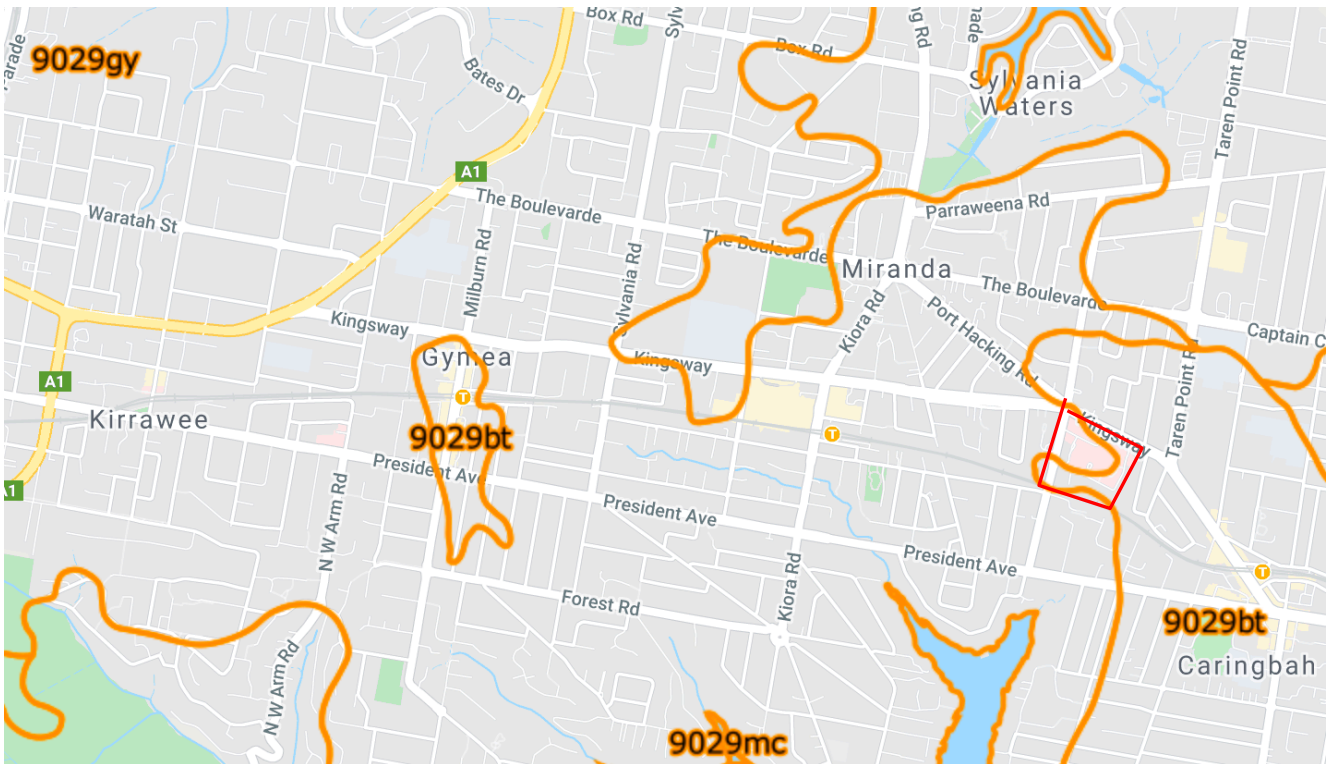
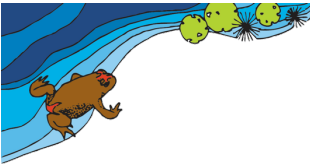


Figure 6. Soil Landscapes of site and surrounding area.

Map extract from the eSpade website 2020

9029 Gymea soil landscape

Landscape – undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20 – 80 m; slopes 10 - 25%. Rock outcrop <25%. Broad convex crests, moderately inclined side-slopes with wide benches, localised rock outcrop on low broken scarps. Extensively cleared open-forest (dry sclerophyll forest) and eucalypt woodland.

Soils – shallow to moderately deep (30 – 100 cm) Yellow Earths (Gn2.24) and Earthy Sands (Uc5.11, Uc5.23) on crests and insides of benches; shallow (<20 cm) Siliceous Sands (Uc1.21) on leading edges of benches; localised Gleyed Podzolic Soils (Dg4.21) and Yellow Podzolic Soils (Dy4.11, Dy5.11, Dy5.41) on shale lenses; shallow to moderately deep (<100 cm) Siliceous Sands (Uc1.2) and leached sands (Uc2.21) along drainage lines.

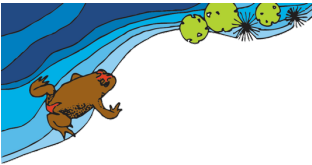


Figure 7. Vegetation map for the site.

Key

Sutherland Hospital	Cleared urban area
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1. Introduction

1.1 Legislative context

This Prescribed Ecology Actions Report meets the requirements of the *Biodiversity Conservation Act 2016* to enable a Council or other consent or determining authority to assess a proposed activity for an approval under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act)

The authority must consider the following three Biodiversity Offset Scheme Development Thresholds.

Threshold Trigger 1: Exceeding the clearing threshold on an area of native vegetation

Threshold Trigger 2: Development or a prescribed activity is carried out on land included in the Biodiversity Values Land Map.

Threshold Trigger 3: A "significant effect" on threatened species or ecological communities

A biodiversity survey of the proposed development site at Sutherland Hospital ('the site' – Figure 1) was undertaken on 7 July 2020. This Prescribed Ecology Actions Report investigates whether the impacts of the proposal to extend the buildings will trigger any of the three thresholds to entry into the Biodiversity Offsets Scheme, thereby requiring a Biodiversity Development Assessment Report.

This assessment addresses both 'endangered' and 'vulnerable', as required by the *Biodiversity Conservation Act 2016* (BCA 2016). Throughout this report 'threatened' refers to those species and communities listed as 'endangered' or 'vulnerable' in Schedules 1 & 2 of the BC Act 2016.

If any of the three thresholds are triggered, then a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor for the Authority to issue a consent or an approval and a calculation of offsetting required.

1.2 The proposal

The proposal (Figure 2) is to redevelop the Sutherland Hospital operating theatre complex.

The Project will be delivered as a combination of new build and refurbishment in a 'live' hospital environment. The key components include:

- The operating theatres will increase from 5 to 8 as well as the endoscopy suites increasing from 1 to 2, resulting in a total of 10 spaces with associated clinic rooms.
- Supporting spaces including recovery, day surgery, storage, staff amenities and other clinical and non-clinical support spaces.
- A new CSSD will be built immediately above the operating theatres.
- A new MRI space will be built immediately below the operating theatres.

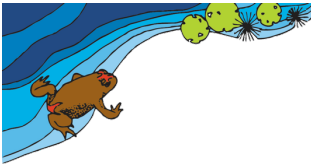


Table 1. Details of lot size and size of proposed native vegetation clearing.

Component of site	Area m ²	Proportion of the site %
Whole site	88,930	100
Extent of proposed native vegetation clearing	340	0.4

1.3 Sources of information used in this assessment

Literature reviewed in order to assess possible issues relating to this site include:

Air photo (SIX maps)

Survey map (NSW Health Infrastructure)

Vegetation map Tozer et al., 2010

Schedules to the BC Act 2016

Schedules to the EPBC Act 1999

OEH Atlas of NSW Wildlife.

Allied Tree Consultancy (2015) Arboricultural Impact Assessment for Sutherland Hospital Caringbah.

2. Biodiversity offsets scheme thresholds 1 and 2

2.1 Threshold One: Biodiversity Conservation Regulation 2017 Development area assessment thresholds

Clearing of native vegetation is declared by clause 7.2(1) to exceed the biodiversity offsets scheme threshold if the area proposed to be cleared is the area set out in Column 2 of the Table to that clause (Table 2 below) opposite the minimum lot size applicable to the land to be cleared in Column 1 of that Table.

Clearing of native vegetation will trigger entry into the offsets scheme if clearing is greater than the assessment threshold. To determine the correct threshold from Table 2 below, the appropriate minimum lot size of land must be selected. The minimum lot size of land can be found on the NSW planning portal <https://www.planningportal.nsw.gov.au/find-a-property/property/>.

Table 2. Areas section 7.2(4) Biodiversity Conservation Regulation 2017.

	Land to be considered	Assessment threshold
	Minimum lot size of land	Area of clearing
A	Less than 1 hectare	0.25 hectare or more
B	Less than 40 hectares but not less than 1 hectare	0.5 hectare or more
C	Less than 1,000 hectares but not less than 40 hectares	1 hectare or more
D	1,000 hectares or more	2 hectares or more



The parcel of land is zoned SP1 and the minimum lot size for this lot is 88,930 m². Row B in Table 2 is appropriate for this proposal, as the proposed clearing of native vegetation is less than 0.5 ha.

Conclusion

The proposed clearing does not exceed the threshold and entry into the BC Act offset scheme is not required as a result of clearing.

2.2 Threshold Two: Clearing or prescribed activities as listed in the Biodiversity Conservation Regulation 2017 on land included on the Biodiversity Values Map

No part of the site is included on the Biodiversity Values Map (Figure 4). Threshold two is not breached.

3. Landscape features of the site and the locality

3.1 Site description

For the purposes of this report, the site (Figure 2) is defined by the property boundaries of lot 1 DP432283 and Lot 1 DP119519. It is approximately 8.89 ha. in size and the elevation is approximately 30 metres above sea level.

<https://www.planningportal.nsw.gov.au/find-a-property/>

The site is on a low ridge crest, sloping gently to the east.

There are no water bodies or creeks.

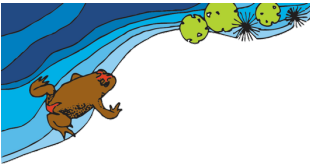
Stormwater management is by engineered structures.

The adjacent properties (Figure 3) are urban residential land use.

The vegetation (Figure 7) is described in detail in Section 5 below and fauna habitat is detailed in Section 5 below.

3.2 History of the site

The site was largely clear as a rural grazing property in 1943 (Figure 5) and since has developed as an urban area.



3.3 Site Soils

9029 Gynea soil landscape

Landscape – undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20 – 80 m; slopes 10 - 25%. Rock outcrop <25%. Broad convex crests, moderately inclined side-slopes with wide benches, localised rock outcrop on low broken scarps. Extensively cleared open-forest (dry sclerophyll forest) and eucalypt woodland.

Soils – shallow to moderately deep (30 – 100 cm) Yellow Earths (Gn2.24) and Earthy Sands (Uc5.11, Uc5.23) on crests and insides of benches; shallow (<20 cm) Siliceous Sands (Uc1.21) on leading edges of benches; localised Gleyed Podzolic Soils (Dg4.21) and Yellow Podzolic Soils (Dy4.11, Dy5.11, Dy5.41) on shale lenses; shallow to moderately deep (<100 cm) Siliceous Sands (Uc1.2) and leached sands (Uc2.21) along drainage lines.

The mapped soil landscapes for the site and locality are displayed in Figure 6.

Source: eSpade

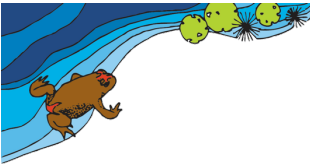
3.4 Landscape features

3.4.1 Site landscape features

The following landscape features are present on the site (Table 3).

Table 3. Site landscape features.

Vegetation	The entire site has been cleared or disturbed. There is a planted landscape with no remnant local native trees.
Non-native vegetation	The landscape has minor potential for foraging habitat for threatened species of bats and birds.
Human structures	Buildings to be demolished have very little potential as bat roosts.
Wetlands/dams/watercourse	None on site
Karst, caves, crevices and other geological features of significance	None on site
Roads	Vehicle traffic and road mortality - No road kill was observed on the site.



4. Field survey methods

4.1 BioNet Atlas of NSW Wildlife website search

Records from the BioNet Atlas of NSW Wildlife website were accessed using the following search criteria:

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (\wedge rounded to 0.1°C; $\wedge\wedge$ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Licensed Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Animals in selected area [North: -33.99 West: 151.07 East: 151.17 South: -34.09] recorded since 01 Jan 2010 until 03 Jul 2020 returned a total of 632 records of 34 species. Copyright the State of NSW through the Office of Environment and Heritage.

These species (Table 4) were considered in designing field survey targets and methods. Unsuitable candidates were eliminated on the basis of habitat requirements (Appendix 4 and Appendix 5).

Table 4: BioNet threatened flora & fauna species records for a 5 km radius of the site since 1 Jan 2010.

Scientific Name	Common Name	NSW status	Comm. status
<i>Hirundapus caudacutus</i>	White-throated Needle-tail	P	V
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	
<i>Lathamus discolor</i>	Swift Parrot	E1,3	CE
<i>Ninox strenua</i>	Powerful Owl	V,3	
<i>Epthianura albifrons</i>	White-fronted Chat	V	
<i>Epthianura albifrons</i>	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	E2,V	
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	
<i>Phascolarctos cinereus</i>	Koala	V	V
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	
<i>Myotis macropus</i>	Southern Myotis	V	
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	

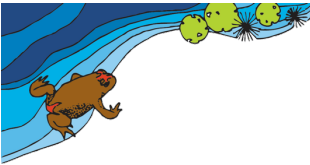


Table 5: Threatened species assessed in 5 part tests.

Scientific Name	Common Name	NSW status	Comm. status
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	

Targeted surveys were made for relevant threatened species (Table 5).

4.2 Field work effort

Over the one day of fieldwork a total of one hour was spent undertaking survey work on the site and surrounding habitat areas.

Table 6. Survey dates and weather conditions.

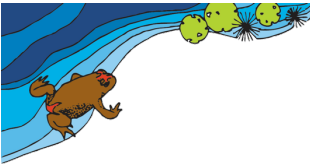
Date	Time	Temperature (°C)	Task	Hours (hrs x no. people)
7 July 2020	11:37 - 12:24	15.9 – 16.1	Vegetation and fauna survey	1 x 1 = 1
22 July 2020	11:25 - 13:00	17	Walk proposal boundaries, document flora and make habitat assessments	1.5 x 1 = 1.5

Survey effort was concentrated within the site boundaries, although adjacent surrounding vegetation was noted (Figure 3).

4.3 Flora survey method, vegetation community and habitat classification

A flora survey was conducted to compile vegetation descriptions and species lists for the site. No targeted surveys were made for threatened species (See Appendix 5) since the site is entirely disturbed and landscaped.

Vegetation quality is assessed as described below (Section 4.4). The plant community/communities on site were classified according to the NSW VIS.



4.4 Simplified vegetation integrity assessment

On-site vegetation may be described according to a simplified vegetation integrity classification for each vegetation zone / habitat type. The simplified vegetation integrity assessment is based upon a modified version of the vegetation integrity assessment described in the NSW Biodiversity Assessment Method (BAM) 2017. This simplified assessment is based upon a qualitative assessment; no quantitative assessment was undertaken and no vegetation integrity score is calculated. The assessment requires the assessor to compare the observed vegetation with the vegetation type presumed to be present prior to 1750 (high quality native vegetation). Vegetation with good or moderate integrity usually provide higher quality habitat for a diverse range of indigenous species.

Four main qualitative classes of vegetation integrity are recognised. There is variation within each class, and in addition the class boundaries are somewhat fluid where one grades into the other.

Good integrity vegetation

Characteristics: Relatively high indigenous species diversity, diversity of flora species growth form (mix of trees, shrubs and groundcovers etc), diversity of tree size, canopy layer regeneration observed, fallen logs present on the ground, dead vegetative litter (leaves, twigs etc) cover present, weed invasion absent or minimal

Moderate integrity vegetation

Characteristics: Remnants and regenerating areas that have experienced disturbance but appear to retain the capability of recovery. Weed invasion may be moderate.

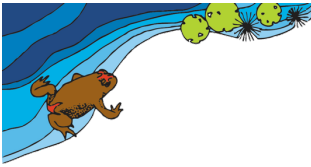
Poor integrity vegetation

Characteristics: The vegetation is highly disturbed. It typically consists of scattered trees/shrubs or clumps of trees and shrubs. Tree size diversity significantly reduced. The groundcover layer is comprised of a mix of indigenous species and exotic species. Fallen logs rare to absent, ground vegetative litter lacking.

Cleared class

Characteristics: Indigenous canopy species are absent and the indigenous understorey (shrubs/climbers/scramblers/groundcovers) are approximately less than 50%.

Note: some vegetation types naturally lack some of the characteristics. For example, trees are rare to absent in saltmarshes, sedge swamps, alpine herbfields and arid shrublands. However, providing the other characteristics are consistent with a natural undisturbed area of the same vegetation type then these vegetation types are classified as having “good integrity”.



4.5 Fauna survey method

The methods of survey undertaken to detect the various faunal groups or their habitat are outlined below. Locations for specific survey methods are shown in Figure 6. Targeted surveys were made for threatened species based on records of sightings from the BioNet Atlas website, and the Ecologist's knowledge.

Dates, weather and temperatures of all fieldwork were recorded and are tabulated in Table 6 above.

4.5.1 Diurnal fauna searches

Searching, opportunistic observations and call recording provides an indication of types of species using a site. These methods are used to identify and record live animals, or record indirect evidence of animal presence on the site. On occasions, specific surveys may be conducted for a targeted group or species, such as searching the margins of a dam for frogs. Generally though, birds, reptiles, frogs and mammals, or evidence of them, may all be present in the same habitat at the time of survey, therefore searching for these faunal groups is generally run concurrently. This involved:

- a) Searching shelter sites, basking sites, opportunistic observation, and assessment of shelter site diversity suitability for reptiles.
- b) Searching shelter sites, calling sites, egg deposition sites, spotlighting and triangulation on calling males for frogs.
- c) Opportunistic observations and identification of calls of species, and search for indirect evidence such as nests, feathers, scratchings and feeding signs for birds.
- d) Searching for indirect evidence, such as diggings, droppings, runways and burrows, and opportunistic observations for mammals.

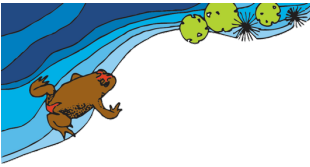
While rigorous surveys are likely to find more species, high species richness for birds can be recorded in a relatively short amount of time. Bird surveys are used as a simple indicator of other parameters, such as biodiversity and the functioning of the ecosystem.

4.6 Species likely to occur

Species to be listed as 'likely to occur' or 'expected' (see Appendix 3), are common species generally found in the region, which are likely to occur on site if suitable habitat is present.

Native flora may include species local to the area (occurring in local remnants). Structure and species composition will depend upon locally occurring communities.

Expected species are common and, by definition, are not threatened species.



4.7 Limitations of the survey

This survey was conducted in the winter season. This was not suitable for summer migrants.

The weather conditions were clear, cool and still. This was not suitable for reptiles, being too cold.

Species that may use the site were not detected during the survey for the following reasons:

- a) The species was present during the survey but was not detected due to dormancy, inactivity or cryptic habits.
- b) The species use the site at other times of the year, but was not present during the survey due to being nomadic or migratory.

4.8 Staff associated with the field work

Table 7. Staff associated with field work and analysis of field work.

	Field work	Analysis of field work
Dr Danny Wotherspoon	Vegetation and fauna survey	Dr Danny Wotherspoon
Dr Alison Hewitt	Vegetation and habitat survey	Dr Danny Wotherspoon
Mark Sherring	Plant identification	Dr Danny Wotherspoon

5. Survey Results: Vegetation and habitat description

5.1 Site vegetation and habitat

The site contains planted landscape vegetation and habitat zones which are described below. The distribution of vegetation/habitat zones on the site and surrounding areas is shown in Figure 7.

No potential habitat trees were observed on the site. Hollow bearing trees are absent across the site.

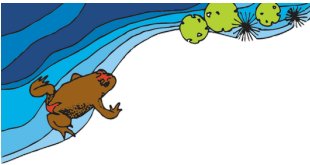
There is generally a lack of fallen logs and dead wood or coarse woody debris.

Other site habitat characteristics are described below.

Appendix 2 shows the list of flora found on the site.

5.1.1 Landscape garden/zone 1

Vegetation for this zone comprises an earth mound of imported fill, planted native trees and shrubs that are generally not local to the area. The herb layer is weeds and lawn grasses such as kikuyu.



An arborist report for the site recommends the trees here within the new theatre footprint for removal due to only medium life expectancy or poor vigour and condition (Allied Tree Consultancy 2015).

Important habitat features that have significance for fauna occupation of the site are discussed below (Table 3). These include site disturbance but there are no natural features.

Table 8. Significant features and observations for the site.

Significant features	Observations
Frequency of large trees (approx. > 80 cm DBH)	Absent
Tree regeneration and Tree stem-size diversity	All canopy species are planted. Some younger planting in the past two or three years are still less than three metres tall.
Logs, woody debris and litter cover	Logs, woody debris and leaf litter are absent.
Food resources	Eucalyptus, Corymbia and Lilly Pilly provide food resources of fruit, blossoms and seeds.

The vegetation community is a planted landscape garden on a cleared and filled landscape.

The vegetation within this zone is classified as poor integrity vegetation.

There are no threatened plant species within this zone.

5.2 Species and Communities of conservation concern

There are no endangered ecological communities or threatened species in this planted landscape.

5.3 Weeds

The NSW Noxious Weeds Act 1993 has been repealed and the *Biosecurity Act 2015* has replaced it. The *Biosecurity Act 2015* requires each landholder and/or occupier to control biosecurity matter (weeds) on their property. The landholder and/or occupier is to develop an effective control strategy and plan to ensure they meet their General Biosecurity Duty.

The General Biosecurity Duty (GBD) is imposed on any person who deals with biosecurity matter (weeds), and who knows (or ought reasonably to know) of the biosecurity risk posed (or likely to be posed), has a biosecurity duty to ensure that the risk associated with those weeds is prevented, eliminated or minimised - so far as is reasonably practicable. A requirement is that all public and private land owners or managers and all other people who deal with weed species (biosecurity matter) must use the most appropriate approach to prevent, eliminate or minimise the negative impact (biosecurity risk) of those weeds.



Council may issue a Biosecurity Direction when any owner/occupier fails in their biosecurity duty to control weeds on their land. The owner/occupier must comply with this biosecurity direction. A penalty notice or prosecution may follow if the owner/occupier fails to comply with the Biosecurity Direction. Broad-leaved privet *Ligustrum lucidum* is a priority weed in Sutherland Shire to be removed from the site.

6. Survey Results: Fauna

6.1 Species of conservation concern

List any threatened species and give brief overview of their occurrence on the site.
No threatened fauna species are likely to use the planted garden proposed to be removed.

6.2 Fauna results

A total of one species was detected, being rainbow lorikeet.

Species listed as 'likely to occur' in the area are presented in Appendix 4. Note that the majority of the 'Expected Species' would not occur on the site due to the lack of habitat, but do occur in the area. All the species listed as 'likely to occur' are common throughout the locality and the region. It is unlikely that protected species will be affected at a local, regional or state-wide scale by the proposal.

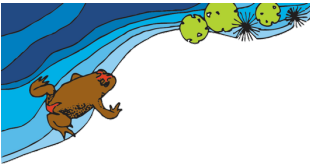
The habitats for threatened species that occur in the area are tabulated in Appendix 5.

The habitats for threatened species that occur in the area are tabulated in Appendix 5.

6.3 Microbats

Foraging Habitat

This site provides potentially suitable foraging habitat for seven of the nine possible threatened species. *Myotis macropus* (syn. *Myotis adversus*) has no suitable foraging habitat in the form of open water bodies. *Kerivoula papuensis* is only likely to forage in areas within a few kilometres of rainforest or rainforest gullies.



Roosting Habitat

This site has no tree hollows that provide suitable roosting habitat for *Falsistrellus tasmaniensis*, *Mormopterus norfolkensis*, *Scoteanax rueppellii*, *Myotis macropus*, *Miniopterus australis* and *Saccolaimus flaviventris*. This site has no caves, culverts, or bridges, but does have buildings and other suitable (often human-made) structures that provide potentially suitable roosting habitat for *Chalinolobus dwyeri*, *Miniopterus schreibersii oceanensis*, *Myotis macropus*. *Kerivoula papuensis* normally roosts in hanging bird nests or trees in rainforest gullies so is very unlikely to roost in the surveyed site.

Buildings were investigated for potential as bat roosts. No evidence of openings, access or occupancy was found.

7. Discussion of results

The site is a long cleared area with old urban development. Some older planted trees occur in the area as street trees. Past records of grey-headed flying-fox are attributable to planted lemon-scented gum *Corymbia citriodora* that are common in the area, which that species uses for feeding. Records of other threatened fauna such as powerful owl and microbats are in patches of residual bushland along estuary foreshores distant from the site.

The area to be cleared has a young landscape garden with species commonly planted in the past 20 to 30 years. Fauna habitat is minimal and value for fauna is minimal due to the urban development surrounding the site.

8. Impact on biodiversity: Threshold 3

8.1 Threshold 3: Five-part test summary

Habitat requirements for locally occurring threatened faunal species, and the presence or absence of such habitat on the site, is tabulated in Appendix 4. Threatened plant species, listed in the BC Act and the EPBC Act, are shown in Appendix 5.

Under Section 7.3 of the Biodiversity Conservation Act several factors (listed in Appendix 1) need to be considered in deciding whether there is likely to be a Significant effect on threatened species, populations or ecological communities, or their habitats. If there is likely to be a significant effect on threatened species, etc., the proposal must be accompanied by a Biodiversity Development Assessment Report.



While the overall proposal incorporates mitigating considerations and offsets, these are not taken into account in determining the outcome of the five-part tests.

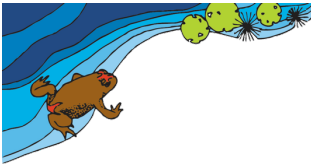


Table 9. Summary of the five-part tests shown in full in Appendix 1.

Species/Communities	Recorded on site	State listing BC Act '16	C-wealth listing EPBC Act '99	Result
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	No	Sch. 2, Vul.	Vulnerable	No significant effect
Insectivorous bats				
Yellow-bellied Sheathtail-bat <i>Saccolaimus flaviventris</i>	No	Sch. 2, Vul.	-	No significant effect
Little Bentwing-bat <i>Miniopterus australis</i>		Sch. 2, Vul.	-	
Eastern Bentwing-bat <i>Miniopterus schreibersii oceanensis</i>		Sch. 2, Vul.	-	
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>		Sch. 2, Vul.	-	

There is no significant effect so a Biodiversity Development Assessment Report is not required.

9. Environment Protection and Biodiversity Conservation Act 1999

The Protected Matters Search Tool was used to find relevant Matters of National Environmental Significance (MNES) on or near the site. The outputs are shown in (Appendix 6) and summarised below.

Vulnerable species:

- Grey-headed Flying-fox *Pteropus poliocephalus*
- Large-eared Pied Bat, Large Pied Bat *Chalinolobus dwyeri*.

There were no Critically Endangered or Endangered species or communities recorded on the site.

There were Vulnerable species recorded near the site in the OEH Bionet database. The provisions of the EPBC Act apply to this proposal. However there is no significant effect and the proposal does not require referral to the Commonwealth.

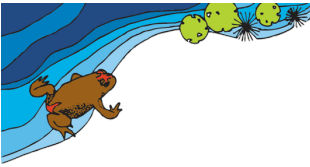


10. Conclusion and Recommendations

None of the three thresholds are triggered as follows:

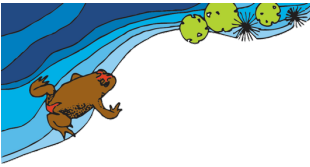
1. Area of clearing
2. Biodiversity Land Map – clearing or prescribed biodiversity impacts
3. Five Part Tests

Therefore a Biodiversity Development Assessment Report (BDAR) is not required.



11. References

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Appendix 1. Five-part tests

While the overall proposal incorporates mitigating considerations and offsets, these are not taken into account in determining the outcome of the **five-part** tests.

The Assessment of Significance (Office of Environment and Heritage (OEH)) states that “Proposed measures that mitigate, improve or compensate for the action, development or activity should not be considered in determining the degree of the effect on threatened species, populations or ecological communities, unless the measure has been used successfully for that species in a similar situation.”

Species addressed are as follows:

Scientific Name	Common Name	NSW status	Comm. status
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V
<i>Miniopterus australis</i>	Little Bentwing-bat	V	
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	

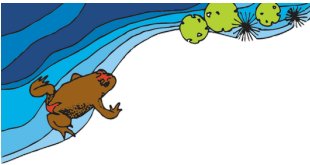
Where applicable threatened populations are considered as threatened species in the following five part tests.

7.2 Development or activity "likely to significantly affect threatened species"

(1) For the purposes of this Part, development or an activity is **"likely to significantly affect threatened species"** if:

- (a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, or
- (b) the development exceeds the biodiversity offsets scheme threshold if the biodiversity offsets scheme applies to the impacts of the development on biodiversity values, or
- (c) it is carried out in a declared area of outstanding biodiversity value.

(2) To avoid doubt, subsection (1) (b) does not apply to development that is an activity subject to environmental impact assessment under Part 5 of the *Environmental Planning and Assessment Act 1979*.



7.3 Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(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

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

(i) 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

(ii) 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,

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

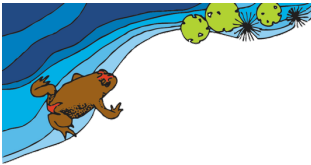
(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, 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,

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.



Grey-headed Flying-fox

Scientific name	Common name	NSW status	Comm. status
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V

Key

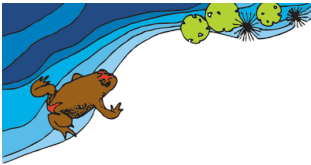
V = Vulnerable

P = Protected

Habitat and ecology

<http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10697>

- 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 and are commonly found in gullies, close to water, in vegetation with a dense canopy.
- Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.
- Annual mating commences in January and conception occurs in April or May; a single young is born in October or November.
- Site fidelity to camps is high; some camps have been used for over a century.
- Can travel up to 50 km from the camp to forage; commuting distances are more often <20 km.
- Feed on the nectar and pollen of native trees, in particular *Eucalyptus*, *Melaleuca* and *Banksia*, and fruits of rainforest trees and vines.
- Also forage in cultivated gardens and fruit crops.



Insectivorous bats

Scientific name	Common name	NSW status	Comm. status
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	-
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V
<i>Miniopterus australis</i>	Little Bentwing-bat	V	-
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	-
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	Near Threatened

Key

V = Vulnerable

P = Protected

Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*

<http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10741>

Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.

Large-eared Pied Bat *Chalinolobus dwyeri*

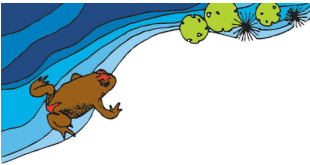
<http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10157>

Large-eared Pied Bat roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring.

Little Bentwing-bat *Miniopterus australis*

<http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10533>

Little Bentwing-bat prefers moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects



beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (*Miniopterus schreibersii*) and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites /maternity colonies are known in Australia.

Eastern Bentwing-bat *Miniopterus schreibersii oceanensis*

<http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10534>

Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.

Greater Broad-nosed Bat *Scoteanax rueppellii*

<http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10748>

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.

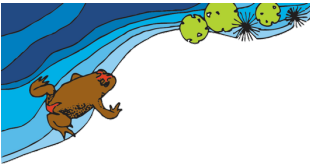
7.3 Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(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

No

Risk of extinction will increase if any factor operates to reduce population size or reproduction success. Removal or modification of habitat or changes to the nature of important periodic disturbances (fire, flood) may affect survival of species.



While the proposal will modify a small area of foraging habitat for these species, the extent of habitat modification is minor considering the disturbed nature of the proposal area. Bats will continue to forage within and around the hospital grounds. The proposal is unlikely to effect the life cycles of these species such that a viable local population will be placed at risk of extinction.

The habitat on site is marginal for these species. Thus while these species may fly over or occasionally forage on the site, the site does not provide significant habitat for any of these species. Similar habitat is found commonly in the locality. The proposal is unlikely to have an adverse effect on any threatened bats such that they are likely to be placed at risk of extinction.

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

(i) 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

Not applicable. This test is for a group of threatened species.

(ii) 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,

Not applicable. This test is for a group of threatened species.

(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 proposed development or activity, and

Up to 300m² of planted landscape vegetation will be removed for the proposal.

The habitat is young and has little potential for habitat or foraging use by these species.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

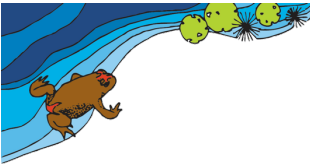
No

There is no contiguous or native vegetation in the proximity of the development site.

The majority of site habitat is already fragmented. An area of degraded continuous habitat exists in the locality.

(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,

Negligible.



Criterion	Comment
Area and quality of habitat within the locality (maps, photos, survey)	The locality is a suburban matrix with areas of often-degraded landscaped vegetation around typically cleared residential properties.
Area and quality of habitat on site in relation to the area and quality of habitat in the locality	Similar habitat is available on nearby and adjacent properties. The feeding resource value is low.
Role of habitat to be affected in sustaining habitat connectivity in the locality	Minimal
Ecological integrity of habitat to be affected on site, in relation to the ecological integrity, tenure and security of the habitat which will remain both on site and in locality.	The entire site is disturbed, however canopy species have been planted as street trees that will remain.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No. No area of outstanding biodiversity value has been specifically declared for these species.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

No. The vegetation to be removed is a young planted landscape.

Conclusion

The proposed activity is unlikely to have a significant effect on Grey-headed flying-fox, Yellow-bellied Sheath-tail-bat, Large-eared Pied Bat, Little Bentwing-bat, Eastern Bentwing-bat, Greater Broad-nosed Bat. Therefore a Biodiversity Development Assessment Report is not recommended.



Appendix 2. Flora species list

MAGNOLIOPSIDA

DICOTYLEDONS

AIZOACEAE

% *Carpobrotus glaucescens*

ASTERACEAE

* *Dimorphotheca pluvialis*

CASUARINACEAE

Allocasuarina littoralis

Casuarina glauca

ELAEOCARPACEAE

Elaeocarpus reticulatus

EUPHORBIACEAE

Homalanthus populifolius

FABACEAE

MIMOSOIDEAE

Acacia implexa

LAMIACEAE

% *Westringia fruticosa*

MELIACEAE

Melia azedarach

MYRTACEAE

% *Acmena (ingens)*

Acmena sp. cultivar

% *Callistemon viminalis*

% *Corymbia citriodora*

Eucalyptus botryoides

Eucalyptus paniculata

% *Kunzea ambigua*

% *Leptospermum petersonii*

Syzygium australe

Syzygium oleosum cultivar

% *Waterhousea floribunda*

OLEACEAE

* *Ligustrum lucidum* HTE

PROTEACEAE

% *Banksia integrifolia*

% *Grevillea robusta*

RUTACEAE

% *Correa alba* cultivar

MONOCOTYLEDONS

LOMANDRACEAE

% *Lomandra (hystrix)*

PHORMIACEAE

Dianella caerulea

POACEAE

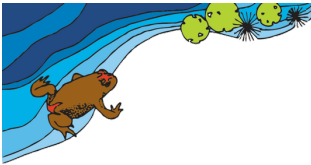
% *Cenchrus purpurascens*

% *Themeda australis*

* Exotic / Weed

HTE High Threat Exotic

% Non-local native (planted)



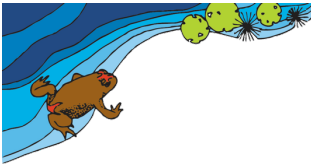
Appendix 3. Expected fauna species in the Sydney Basin

Mammals

Common name	Scientific name
White-striped Freetail-bat	<i>Austronomus australis</i>
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>
Chocolate Wattled Bat	<i>Chalinolobus morio</i>
Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>
Gould's Long-eared Bat	<i>Nyctophilus gouldi</i>
Bush Rat	<i>Rattus fuscipes</i>
Swamp Rat	<i>Rattus lutreolus</i>
Long-nosed Bandicoot	<i>Perameles nasuta</i>
Brown Antechinus	<i>Antechinus stuartii</i>
Dusky Antechinus	<i>Antechinus swainsonii</i>
Yellow-footed Antechinus	<i>Antechinus flavipes</i>
Common Wombat	<i>Vombatus ursinus</i>
Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>
Sugar Glider	<i>Petaurus breviceps</i>
Feathertail Glider	<i>Acrobates pygmaeus</i>
Eastern Grey Kangaroo	<i>Macropus giganteus</i>
Large Forest Bat	<i>Vespadelus darlingtoni</i>
Little Forest Bat	<i>Vespadelus vulturnus</i>
Common Wallaroo	<i>Macropus robustus</i>
Red-necked Wallaby	<i>Macropus rufogriseus</i>
Swamp Wallaby	<i>Wallabia bicolor</i>
Common Brushtail Possum	<i>Trichosurus vulpecula</i>
Greater Glider	<i>Petauroides volans</i>
Short-beaked Echidna	<i>Tachyglossus aculeatus</i>
Fox	<i>Vulpes vulpes</i>
Black Rat	<i>Rattus rattus</i>
Rabbit	<i>Oryctolagus cuniculus</i>

Frogs

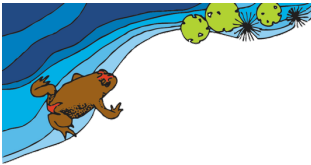
Common Name	Scientific Name
Green Tree Frog	<i>Litoria caerulea</i>
Blue Mountains Tree Frog	<i>Litoria citropa</i>
Bleating Tree Frog	<i>Litoria dentata</i>
Eastern Dwarf Tree Frog	<i>Litoria fallax</i>
Jervis Bay Tree Frog	<i>Litoria jervisiensis</i>
Broad-palmed Frog	<i>Litoria latopalmata</i>
Peron's Tree Frog	<i>Litoria peronii</i>



Common Name	Scientific Name
Leaf-green Tree Frog	<i>Litoria phyllochroa</i>
Tyler's Tree Frog	<i>Litoria tyleri</i>
Verreaux's Frog	<i>Litoria verreauxii</i>
Common Eastern Froglet	<i>Crinia signifera</i>
Eastern Banjo Frog	<i>Limnodynastes dumerilii</i>
Ornate Burrowing Frog	<i>Limnodynastes ornatus</i>
Brown-striped Frog	<i>Limnodynastes peronii</i>
Spotted Grass Frog	<i>Limnodynastes tasmaniensis</i>
Haswell's Froglet	<i>Paracrinia haswelli</i>
Smooth Toadlet	<i>Uperoleia laevigata</i>
Tyler's Toadlet	<i>Uperoleia tyleri</i>

Reptiles

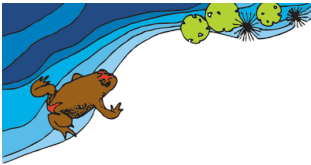
Common Name	Scientific Name
Diamond Python	<i>Morelia spilota spilota</i>
Common Death Adder	<i>Acanthophis antarcticus</i>
Yellow-faced Whip Snake	<i>Demansia psammophis</i>
Common Tree Snake	<i>Dendrelaphis punctulatus</i>
Golden-crowned Snake	<i>Cacophis squamulosus</i>
Eastern Small-eyed Snake	<i>Cryptophis nigrescens</i>
Red-naped Snake	<i>Furina diadema</i>
Black-bellied Swamp Snake	<i>Hemiaspis signata</i>
Tiger Snake	<i>Notechis scutatus</i>
Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>
Eastern Brown Snake	<i>Pseudonaja textilis</i>
Dwyer's Snake	<i>Parasuta dwyeri</i>
Bandy Bandy	<i>Vermicella annulata</i>
Blackish Blind Snake	<i>Ramphotyphlops nigrescens</i>
Wood Gecko	<i>Diplodactylus vittatus</i>
Lesueur's Velvet Gecko	<i>Oedura lesueurii</i>
Broad-tailed Gecko	<i>Phyllurus platurus</i>
Thick-tailed Gecko	<i>Underwoodisaurus milii</i>
Burton's Snake-lizard	<i>Lialis burtonis</i>
Common Scaly-foot	<i>Pygopus lepidopodus</i>
Jacky Lizard	<i>Amphibolurus muricatus</i>
Bearded Dragon	<i>Pogona barbata</i>
Punctate Worm-skink	<i>Anomalopus swansonii</i>
Eastern Blue-tongue	<i>Tiliqua scincoides</i>
Southern Rainbow-skink	<i>Carlia tetradactyla</i>
Cream-striped Shinning-skink	<i>Cryptoblepharus virgatus</i>
Robust Ctenotus	<i>Ctenotus robustus</i>
Copper-tailed Skink	<i>Ctenotus taeniolatus</i>



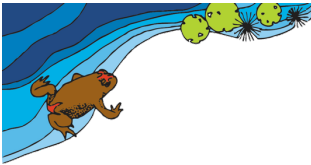
Common Name	Scientific Name
Mainland She-oak Skink	<i>Cyclodomorphus michaeli</i>
Pink-tongued Skink	<i>Cyclodomorphus gerrardii</i>
Cunningham's Skink	<i>Egernia cunninghami</i>
Black Rock Skink	<i>Egernia saxatilis</i>
White's Skink	<i>Liopholis whitii</i>
Eastern Water-skink	<i>Eulamprus quoyii</i>
Barred-sided Skink	<i>Eulamprus tenuis</i>
Dark-flecked Garden Sunskink	<i>Lampropholis delicata</i>
Pale-flecked Garden Sunskink	<i>Lampropholis guichenoti</i>
Weasel Skink	<i>Saproscincus mustelinus</i>
Red-throated Skink	<i>Acritoscincus platynota</i>
Three-toed Skink	<i>Saiphos equalis</i>
Lace Monitor	<i>Varanus varius</i>
Eastern Snake-necked Turtle	<i>Chelodina longicollis</i>

Birds

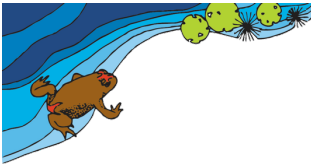
Common Name	Scientific Name
Brown Quail	<i>Coturnix ypsilophora</i>
Black Swan	<i>Cygnus atratus</i>
Australian Wood Duck	<i>Chenonetta jubata</i>
Mallard	<i>Anas platyrhynchos</i>
Pacific Black Duck	<i>Anas superciliosa</i>
Grey Teal	<i>Anas gracilis</i>
Chestnut Teal	<i>Anas castanea</i>
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>
Great Crested Grebe	<i>Podiceps cristatus</i>
Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>
Great Cormorant	<i>Phalacrocorax carbo</i>
Australian Pelican	<i>Pelecanus conspicillatus</i>
White-faced Heron	<i>Egretta novaehollandiae</i>
Little Egret	<i>Egretta garzetta</i>
White-necked Heron	<i>Ardea pacifica</i>
Great Egret	<i>Ardea alba</i>
Cattle Egret	<i>Ardea ibis</i>
Intermediate Egret	<i>Ardea intermedia</i>
Australian White Ibis	<i>Threskiornis molucca</i>
Straw-necked Ibis	<i>Threskiornis spinicollis</i>
Royal Spoonbill	<i>Platalea regia</i>
Black-shouldered Kite	<i>Elanus axillaris</i>
Whistling Kite	<i>Haliastur sphenurus</i>



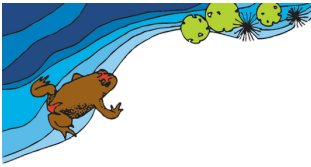
Common Name	Scientific Name
Wedge-tailed Eagle	<i>Aquila audax</i>
White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>
Swamp Harrier	<i>Circus approximans</i>
Brown Goshawk	<i>Accipiter fasciatus</i>
Collared Sparrowhawk	<i>Accipiter cirrocephalus</i>
Brown Falcon	<i>Falco berigora</i>
Australian Hobby	<i>Falco longipennis</i>
Nankeen Kestrel	<i>Falco cenchroides</i>
Buff-banded Rail	<i>Gallirallus philippensis</i>
Purple Swamphen	<i>Porphyrio porphyrio</i>
Dusky Moorhen	<i>Gallinula tenebrosa</i>
Eurasian Coot	<i>Fulica atra</i>
Latham's Snipe	<i>Gallinago hardwickii</i>
Black-winged Stilt	<i>Himantopus himantopus</i>
Black-fronted Dotterel	<i>Elsyornis melanops</i>
Masked Lapwing	<i>Vanellus miles</i>
Silver Gull	<i>Chroicocephalus novaehollandiae</i>
Rock Dove	<i>Columba livia</i>
White-headed Pigeon	<i>Columba leucomela</i>
Spotted Turtle-dove	<i>Streptopelia chinensis</i>
Brown Cuckoo-dove	<i>Macropygia amboinensis</i>
Emerald Dove	<i>Chalcophaps indica</i>
Common Bronzewing	<i>Phaps chalcoptera</i>
Crested Pigeon	<i>Ocyphaps lophotes</i>
Bar-shouldered Dove	<i>Geopelia humeralis</i>
Wonga Pigeon	<i>Leucosarcia picata</i>
Topknot Pigeon	<i>Lopholaimus antarcticus</i>
Yellow-tailed Black-cockatoo	<i>Calyptorhynchus funereus</i>
Galah	<i>Eolophus roseicapilla</i>
Long-billed Corella	<i>Cacatua tenuirostris</i>
Little Corella	<i>Cacatua sanguinea</i>
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>
Scaly-breasted Lorikeet	<i>Trichoglossus chlorolepidotus</i>
Musk Lorikeet	<i>Glossopsitta concinna</i>
Australian King-parrot	<i>Alisterus scapularis</i>
Crimson Rosella	<i>Platycercus elegans</i>
Eastern Rosella	<i>Platycercus eximius</i>
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>
Horsfield's Bronze-cuckoo	<i>Chalcites basalis</i>
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>
Asian Koel	<i>Eudynamys scolopaceus</i>
Southern Boobook	<i>Ninox novaeseelandiae</i>



Common Name	Scientific Name
Barn Owl	<i>Tyto alba</i>
Tawny Frogmouth	<i>Podargus strigoides</i>
White-throated Nightjar	<i>Eurostopodus mystacalis</i>
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>
White-throated Needletail	<i>Hirundapus caudacutus</i>
Laughing Kookaburra	<i>Dacelo novaeguineae</i>
Sacred Kingfisher	<i>Todiramphus sanctus</i>
Rainbow Bee-eater	<i>Merops ornatus</i>
Dollarbird	<i>Eurystomus orientalis</i>
Superb Lyrebird	<i>Menura novaehollandiae</i>
Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>
Superb Fairy-wren	<i>Malurus cyaneus</i>
Variegated Fairy-wren	<i>Malurus lamberti</i>
Spotted Pardalote	<i>Pardalotus punctatus</i>
White-browed Scrubwren	<i>Sericornis frontalis</i>
Large-billed Scrubwren	<i>Sericornis magnirostra</i>
Brown Gerygone	<i>Gerygone mouki</i>
White-throated Gerygone	<i>Gerygone albogularis</i>
White-throated Treecreeper	<i>Cormobates leucophaea</i>
Brown Thornbill	<i>Acanthiza pusilla</i>
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>
Yellow Thornbill	<i>Acanthiza nana</i>
Striated Thornbill	<i>Acanthiza lineata</i>
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>
Red Wattlebird	<i>Anthochaera carunculata</i>
Little Wattlebird	<i>Anthochaera chrysoptera</i>
Noisy Friarbird	<i>Philemon corniculatus</i>
Bell Miner	<i>Manorina melanophrys</i>
Noisy Miner	<i>Manorina melanocephala</i>
Lewin's Honeyeater	<i>Meliphaga lewinii</i>
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>
Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>
White-naped Honeyeater	<i>Melithreptus lunatus</i>
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>
Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>
Jacky Winter	<i>Microeca fascians</i>
Rose Robin	<i>Petroica rosea</i>
Eastern Yellow Robin	<i>Eopsaltria australis</i>
Eastern Whipbird	<i>Psophodes olivaceus</i>
Crested Shrike-tit	<i>Falcunculus frontatus</i>
Golden Whistler	<i>Pachycephala pectoralis</i>



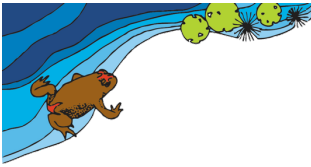
Common Name	Scientific Name
Rufous Whistler	<i>Pachycephala rufiventris</i>
Grey Shrike-thrush	<i>Colluricincla harmonica</i>
Black-faced Monarch	<i>Monarcha melanopsis</i>
Leaden Flycatcher	<i>Myiagra rubecula</i>
Restless Flycatcher	<i>Myiagra inquieta</i>
Magpie-lark	<i>Grallina cyanoleuca</i>
Rufous Fantail	<i>Rhipidura rufifrons</i>
New Zealand Fantail	<i>Rhipidura fuliginosa</i>
Willie Wagtail	<i>Rhipidura leucophrys</i>
Spangled Drongo	<i>Dicrurus bracteatus</i>
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
White-bellied Cuckoo-shrike	<i>Coracina papuensis</i>
Olive-backed Oriole	<i>Oriolus sagittatus</i>
Dusky Woodswallow	<i>Artamus cyanopterus</i>
Grey Butcherbird	<i>Cracticus torquatus</i>
Australian Magpie	<i>Cracticus tibicen</i>
Pied Currawong	<i>Strepera graculina</i>
Australian Raven	<i>Corvus coronoides</i>
White-winged Chough	<i>Corcorax melanorhamphos</i>
Apostlebird	<i>Struthidea cinerea</i>
Eurasian Skylark	<i>Alauda arvensis</i>
Australasian Pipit	<i>Anthus novaeseelandiae rogersi</i>
House Sparrow	<i>Passer domesticus</i>
Red-browed Finch	<i>Neochmia temporalis</i>
Double-barred Finch	<i>Taeniopygia bichenovii</i>
Mistletoebird	<i>Dicaeum hirundinaceum</i>
Welcome Swallow	<i>Hirundo neoxena</i>
Tree Martin	<i>Petrochelidon nigricans</i>
Fairy Martin	<i>Petrochelidon ariel</i>
Cicadabird	<i>Coracina tenuirostris</i>
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>
Australian Reed-warbler	<i>Acrocephalus australis</i>
Little Grassbird	<i>Megalurus gramineus</i>
Golden-headed Cisticola	<i>Cisticola exilis</i>
Silvereye	<i>Zosterops lateralis</i>
Eurasian Blackbird	<i>Turdus merula</i>
Common Starling	<i>Sturnus vulgaris</i>
Common Myna	<i>Sturnus tristis</i>



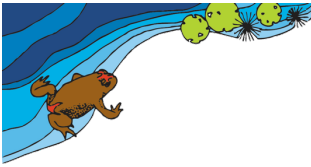
Appendix 4. Habitat requirements for locally-occurring threatened fauna species

Birds

Common name Scientific name Schedule listing	Preferred habitat	Comment
Australasian Bittern <i>Botaurus poiciloptilus</i> BC Act, Sch. 2, Vul.	Inhabits wetlands that generally have permanent fresh water and dense vegetation of sedges, rushes and reeds.	No suitable natural habitat occurs on the site.
Spotted Harrier <i>Circus assimilis</i> BC Act Sch. 2, Vul.	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	No suitable natural habitat occurs on the site.
Little Eagle <i>Hieraetus morphnoides</i> BC Act Sch. 2, Vul.	Occupies open Eucalypt forest, woodland or open woodland. She-oak or acacia woodlands and riparian woodlands are also used. Builds a stick nests in winter in tall living trees within remnant patches.	No suitable natural habitat occurs on the site.
Square-tailed Kite <i>Lophoictinia isura</i> BC Act, Sch. 2, Vul.	Inhabits coastal forest and woodlands. Most commonly associated with ridge and gully forests dominated by Woollybutt, Spotted Gum or Peppermint Gum.	No suitable natural habitat occurs on the site.
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i> BC Act, Sch. 2, Vul.	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands – also in urban areas including parks and gardens. Requires tree hollows for nesting.	No suitable natural habitat occurs on the site.
Glossy Black-cockatoo <i>Calyptorhynchus lathami</i> BC Act, Sch. 2, Vul.	Found in open forests with Allocasuarina species and hollows for nesting.	No suitable natural habitat occurs on the site.
Little Lorikeet <i>Glossopsitta pusilla</i> BC Act, Sch. 2, Vul.	Inhabits the open forests and dead timber alongside watercourses. Also occurs in eucalypt forest in mountainous regions.	Suitable foraging habitat occurs on the site.
Swift Parrot <i>Lathamus discolor</i> BC Act, Sch. 2, Vul. EPBC Act, End.	Occurs in a variety of Eucalypt forests. Migrates from Tasmania to the mainland during the winter/autumn months to feed mostly on winter flowering Eucalypts.	Suitable foraging habitat occurs on the site.

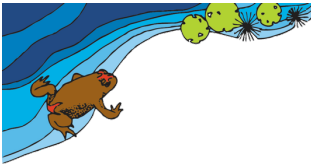


Common name Scientific name Schedule listing	Preferred habitat	Comment
Barking Owl <i>Ninox connivens</i> BC Act, Sch. 2, Vul.	Found in open forests, woodlands, dense scrubs, river red gums and other large trees near watercourses.	No suitable natural habitat occurs on the site.
Powerful Owl <i>Ninox strenua</i> BC Act, Sch. 2, Vul.	Pairs occupy permanent territories in mountain forests, gullies and forest margins, sparser hilly woodlands, coastal forests, woodlands and scrubs.	No suitable natural habitat occurs on the site.
Masked Owl <i>Tyto novaehollandiae</i> BC Act, Sch. 2, Vul.	Forests, open woodlands and farms with large trees, e.g. river red gums adjacent to cleared country.	No suitable natural habitat occurs on the site.
Sooty Owl <i>Tyto tenebricosa</i> BC Act, Sch. 2, Vul.	Tall, wet forests in sheltered mountain gullies, usually with an east and Southeast aspect.	No suitable natural habitat occurs on the site.
Speckled Warbler <i>Pyrholaemus sagittatus</i> BC Act Sch. 2, Vul.	Inhabits Eucalypt 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.	No suitable natural habitat occurs on the site.
Varied Sittella <i>Daphoenositta chrysoptera</i> BC Act Sch. 2, Vul.	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	No suitable natural habitat occurs on the site.
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i> BC Act Sch. 2, Vul.	Often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests.	No suitable natural habitat occurs on the site.
Flame Robin <i>Petroica phoenicea</i> BC Act Sch. 2, Vul.	In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains.	No suitable natural habitat occurs on the site.
Diamond Firetail <i>Stagonopleura guttata</i> BC Act Sch. 2, Vul	Mostly inhabits grassy eucalypt woodlands, also occurring in open forest and riparian areas within these. Feeds exclusively on the ground, occurring in flocks between five to 40+ birds.	No suitable natural habitat occurs on the site.



Mammals

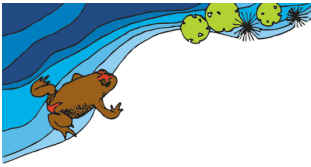
Common name Scientific name Schedule listing	Preferred habitat	Comment
Spotted-tailed Quoll <i>Dasyurus maculatus</i> BC Act, Sch. 2, Vul. EPBC Act, End.	Occurs mostly in sclerophyll forest and woodlands as well as coastal heath lands and rainforests. Requires suitable den sites such as hollows or caves and large areas of intact vegetation.	No suitable natural habitat occurs on the site.
Koala <i>Phascolarctos cinereus</i> BC Act, Sch. 2, Vul.	Eucalypt forests rich in Swamp Mahogany (<i>E. robusta</i>), Forest Red Gum (<i>E. tereticornis</i>), and Grey Gum (<i>E. punctata</i>).	No suitable natural habitat occurs on the site.
Yellow-bellied Glider <i>Petaurus australis</i> BC Act, Sch. 2, Vul.	Restricted to tall, mature sclerophyll forests in regions of high rainfall. Requires nesting hollows and a year-round supply of flowering trees.	No suitable natural habitat occurs on the site.
Squirrel Glider <i>Petaurus norfolkensis</i> BC Act, Sch. 2, Vul.	Inhabits dry sclerophyll forest and woodland. Requires abundant hollow-bearing trees and a mix of Eucalypts, acacias and Banksias. At least one floral species should flower heavily in the winter and one or more species of Eucalypts need to be smooth-barked.	No suitable natural habitat occurs on the site.
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> BC Act, Sch. 2, Vul. EPBC Act, Vul.	Found in rainforest, wet and dry sclerophyll forest and mangroves. Camps are usually in gullies, close to water and in vegetation with a dense canopy. Feeds on a wide variety of flowering and fruiting plants.	Suitable foraging habitat occurs on the site.
Eastern Freetail-bat <i>Mormopterus norfolkensis</i> BC Act, Sch. 2, Vul.	Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in man-made structures.	Suitable foraging habitat occurs on the site.
Large-eared Pied Bat <i>Chalinolobus dwyeri</i> BC Act, Sch. 2, Vul.	Found in well-timbered areas containing gullies.	Suitable foraging habitat occurs on the site.
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i> BC Act, Sch. 2, Vul.	Little known of habitat. Has been found roosting in stem holes of living Eucalypts.	Suitable foraging habitat occurs on the site.



Common name Scientific name Schedule listing	Preferred habitat	Comment
Eastern Bentwing-bat <i>Miniopterus schreibersii oceanensis</i> BC Act, Sch. 2, Vul.	Well-timbered valleys. Roosts in caves and storm-water channels and similar structures. Does not roost in tree hollows.	Suitable foraging habitat occurs on the site.
Southern Myotis <i>Myotis macropus</i> BC Act, Sch. 2, Vul.	Requires open areas of water over which it hunts. Roosts in caves, under bridges and buildings and sometimes in dense foliage in rainforests. May roost in tree hollows.	No suitable natural habitat occurs on the site.
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i> BC Act, Sch. 2, Vul. EPBC Act, Lower risk (near threatened)	Found in woodlands, moist and dry sclerophyll forests and rainforests. Prefers gullies. Roosts in tree hollows only.	Suitable foraging habitat occurs on the site.

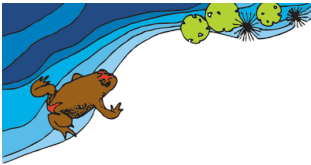
Invertebrates

Common name Scientific name Schedule listing	Preferred habitat	Comment
Cumberland Plain Land Snail <i>Meridolum carneovirens</i> BC Act, Sch. 1, End. EPBC Act, Vul.	Found amongst logs and debris in Cumberland Plain and Castlereagh woodlands.	No suitable natural habitat occurs on the site.
Dural Woodland Snail <i>Pommerhelix duralensis</i> EPBC Act, End.	Forested habitats that have good native cover and woody debris. Under rocks or inside curled-up bark. It does not burrow nor climb.	No suitable natural habitat occurs on the site.

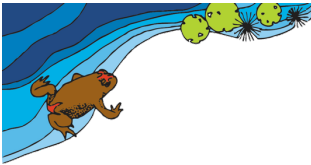


Appendix 5. Habitat requirements for locally-occurring threatened plant species

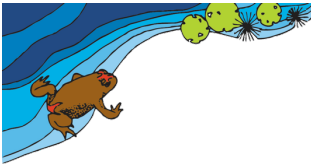
Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Acacia asparagoides</i> ROTAP, 2R	Grows in dry sclerophyll forest or occasionally heath on sandstone.	No
<i>Acacia baueri</i> subsp. <i>aspera</i> ROTAP, 2RC – BC Act, Sch. 2, Vul.	Grows in low heath, often on exposed sandstone ridges.	No
<i>Acacia bynoeana</i> ROTAP, 3VC – BC Act, Sch. 1, End. EPBC Act, Vul.	Grows mainly in heath and dry sclerophyll forest, in sandy soils.	No
<i>Acacia clunies-rossiae</i> ROTAP, 2RC – † BC Act, Sch. 2, Vul.	Grows in dry sclerophyll forest, in valleys, on slopes and ridges, and along creeks.	No
<i>Acacia flocktoniae</i> ROTAP, 2VC – BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in dry sclerophyll forest on sandstone.	No
<i>Acacia gordonii</i> ROTAP, 2K BC Act, Sch. 1, End. EPBC Act, End.	Grows in dry sclerophyll forest and heath on sandstone outcrops.	No
<i>Acacia pubescens</i> ROTAP, 3VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Usually grows in dry sclerophyll forest and woodland in clay soils. Often in roadside and railside bushland remnants.	No
<i>Acacia terminalis</i> subsp. <i>terminalis</i> ROTAP, 2RCi BC Act, Sch. 1, End. EPBC Act, End.	Scattered or locally common in scrub and open eucalypt woodland or forest, usually in sandy soil on creek banks, hillslopes or in shallow soil in rock crevices and sandstone platforms on cliffs.	No
<i>Acrophyllum australe</i> ROTAP, 2VCi BC Act, – Sch. 2, Vul. EPBC Act, Vul.	Grows in damp crevices in sandstone, usually near waterfalls. Restricted to the Blue Mtns, near Springwood, Linden, Woodford and Lawson.	No
<i>Allocasuarina glareicola</i> ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Grows in open forest on lateritic soil; restricted to a few small populations in or near Castlereagh S.F., NE of Penrith.	No
<i>Almaleea incurvata</i> ROTAP, 2RC – †	Grows in swamps dominated by sedges and/or shrubs, on sandstone; restricted to the Blue Mtns.	No
<i>Amperea xiphoclada</i> var. <i>papillata</i> ROTAP, 3KC	Grows with other native sedges and rushes in swamps on sandstone at altitudes of greater than 600 m.	No



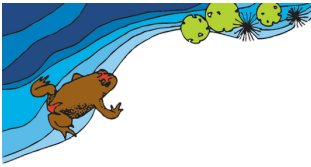
Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Ancistrachne maidenii</i> ROTAP, 2KC - BC Act, Sch. 2, Vul.	Grows on sandstone soils; north of Sydney.	No
<i>Angophora crassifolia</i> ROTAP, 2RCa	Locally frequent but restricted to the Ku-ring-gai Plateau region.	No
<i>Asterolasia elegans</i> ROTAP, 2ECa BC Act, Sch. 1, End. EPBC Act, End.	Grows in wet sclerophyll forest on moist hillsides, known from only one locality, north of Maroota.	No
<i>Atkinsonia ligustrina</i> ROTAP, 2RCa	Occurs in woodland and heath in exposed sites, a single plant often parasitic on the roots of many nearby plants; confined to a small area in the Blue Mtns.	No
<i>Banksia conferta</i> var. <i>penicillata</i> BC Act, Sch. 1, End.	Grows in dry sclerophyll forest or woodland, restricted to small populations in the Blue Mtns on sandstone cliffs or steep slopes and around rocky outcrops.	No
<i>Blandfordia cunninghamii</i> ROTAP, 3RCi	Grows in damp shallow sandy and peaty soils, often on sandstone cliff edges; chiefly in the Blue Mtns and Illawarra areas.	No
<i>Blechnum gregsonii</i> ROTAP, 2RCa	Pendent clumps found in cool rainforest, often in damp places near waterfalls, sometimes epiphytic; chiefly in the Blue Mtns and Illawarra coastal ranges.	No
<i>Boronia fraseri</i> ROTAP, 2RCa (UBBS 97 Recommend)	Grows mainly in wet sclerophyll forest and in rainforest in gullies on sandstone, chiefly in the Sydney region.	No
<i>Boronia serrulata</i> ROTAP, 2RC -	Grows in moist heath in sandy situations, chiefly in a coastal band in the Sydney district; record for the SWS in Jacobs & Pickard (1981) not substantiated.	No
<i>Brasenia schreberi</i> ROTAP, 3RC- +	Widespread but rarely common, found in shallow freshwater lagoons or backwaters.	No
<i>Callistemon linearifolius</i> ROTAP, 2RCi BC Act, Sch. 2, Vul.	Grows in dry sclerophyll forest on the coast and adjacent ranges, chiefly from Georges R. to the Hawkesbury R.	No
<i>Callistemon shiressii</i> ROTAP, 3RC -	Grows on shale ridges, in moist eucalypt forest and rainforest gullies, occasionally along riverbanks; chiefly from Colo R. to Gosford district, also Howes Valley to Bulga district.	No
<i>Carex klaphakei</i> BC Act, Sch. 1, End.	Known only from a few localities on Central Tablelands near Blackheath, Mt Werong and Penrose at 600–1200 m alt.	No
<i>Chamaesyce psammogeton</i> BC Act, Sch. 1, End.	Grows on dunes and sea strandlines.	No
<i>Cryptostylis hunteriana</i> BC Act, Sch. 2, Vul. EPBC Act, Vul.	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland.	No



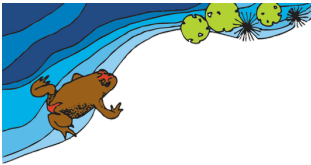
Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Cynanchum elegans</i> ROTAP, 3ECi BC Act, Sch. 1, End. EPBC Act, End.	Rare, recorded from rainforest gullies scrub and scree slopes; from the Gloucester district to the Wollongong area and inland to Mt Dangar.	No
<i>Cyphanthera scabrella</i> ROTAP, 2RC -	Grows in dry or wet sclerophyll forest in sandstone-derived soil; restricted to Bilpin-Mt Wilson area in Blue Mtns.	No
<i>Darwinia biflora</i> ROTAP, 2VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath on sandstone or in the understorey of woodland on shale-capped ridges; Cheltenham to Hawkesbury R., rare.	No
<i>Darwinia diminuta</i> ROTAP, 2RCi	Grows in heath or dry sclerophyll forest in poorly drained sandy soil; Manly to Ingleside and Loftus to Helensburgh, rare.	No
<i>Darwinia fascicularis</i> subsp. <i>oligantha</i> BC Act, Sch. 1, End. Pop. (Baulkham Hills)	Grows in heath or shallow soils; higher parts of the Blue Mtns.	No
<i>Darwinia grandiflora</i> ROTAP, 2RCi	Grows in dry sclerophyll forest and woodland on poorly drained sandy soil; Woronora Plateau and Illawarra region, rare.	No
<i>Darwinia peduncularis</i> ROTAP, 3RCi BC Act, Sch. 2, Vul.	Grows in dry sclerophyll forest on sandstone hillsides and ridges; Hornsby to Hawkesbury R. and west to Glen Davis, rare.	No
<i>Deyeuxia appressa</i> ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Grows on wet ground; in the Hornsby area.	No
<i>Deyeuxia microseta</i> ROTAP, 3KC -	Grows in montane sclerophyll forest, especially wetter areas.	No
<i>Dillwynia tenuifolia</i> ROTAP, 2RCa BC Act, Sch. 2, Vul.	Grows in dry sclerophyll woodland on sandstone, shale or laterite; from Cumberland Plain, Blue Mtns to Howes Valley area.	No
<i>Discaria pubescens</i> ROTAP, 3RCa	In woodland and forest, often in rocky situations; widespread, but considered endangered.	No
<i>Diuris aequalis</i> ROTAP, 3VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows among grass in sclerophyll forest, mainly in the ranges and tablelands; chiefly from Braidwood to Kanangra and Liverpool.	No
<i>Epacris hamiltonii</i> ROTAP, 2ECi BC Act, Sch. 1, End. EPBC Act, End.	Grows in skeletal sandy soils in sheltered damp rock situations on sandstone in the Blackheath area.	No
<i>Epacris muelleri</i> ROTAP, - 3RC -	Grows on skeletal soils on damp rock faces on sandstone in the Blue Mtns and Wollemi N.P.	No



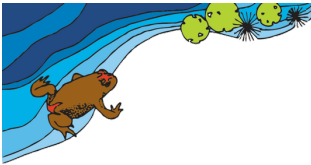
Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Epacris purpurascens</i> var. <i>purpurascens</i> BC Act, Sch. 2, Vul.	Grows in sclerophyll forest, scrubs and swamps on sandstone from Gosford and Sydney districts.	No
<i>Epacris sparsa</i> ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in sandy soil among rocks beside Grose R.	No
<i>Epacris sparsa</i> ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Rare and localized, in mallee shrubland on skeletal sandy soil on sandstone; sporadic occurrences between Linden and Berrima.	No
<i>Eucalyptus baeuerlenii</i> ROTAP, 3RCa	Locally frequent but restricted, in wet forest or woodland in sheltered often sloping sites; from Wentworth Falls to Budawang Ra.	No
<i>Eucalyptus benthamii</i> ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Restricted but locally abundant, in wet forest on sandy alluvial soils along valley floors; confined to the lower Nepean R. area.	No
<i>Eucalyptus burgessiana</i> ROTAP, 2RCa	Locally frequent but restricted, in mallee shrubland on skeletal sand on sandstone; restricted to lower Blue Mtns.	No
<i>Eucalyptus camfieldii</i> ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Rare and localized, in coastal shrub heath on sandy soils on sandstone, often of restricted drainage; from Gosford to Royal N.P.	No
<i>Eucalyptus cannonii</i> ROTAP, 2VCi BC Act, Sch. 2, Vul.	Locally frequent but restricted, in sclerophyll woodland on shallow soil on rises; Rylstone to upper Wolgan Valley.	No
<i>Eucalyptus copulans</i> ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Locally frequent but restricted, in sclerophyll woodland on shallow soil on rises; Rylstone to upper Wolgan Valley.	No
<i>Eucalyptus cunninghamii</i> ROTAP, 2RCa	Restricted but locally frequent, in mallee heath skeletal sandy soil on sandstone; confined to central Blue Mtns.	No
<i>Eucalyptus</i> sp. 'Cattai' BC Act, Sch. 1, End.	Grows as isolated trees or small groups of trees in scrub, heath and low woodland, in sandstone-derived soils.	No
<i>Eucalyptus leuhmanniana</i> ROTAP, 2RCa	Locally abundant but restricted, in mallee heath on shallow infertile sandy soils of poor drainage on sandstone; confined to coastal plateau between the Hawkesbury R. and Bulli.	No
<i>Euphrasia bowdeniae</i> ROTAP, 2VCit BC Act Sch. 2, Vul. EPBC Act, Vul.	Grows on sandstone cliffs in shallow soil on ledges or sometimes trailing over rock, in higher parts of Blue Mtns.	No
<i>Genoplesium baueri</i> BC Act, Sch. 1, End.	Prefers sandy dry Eucalyptus habitats.	No



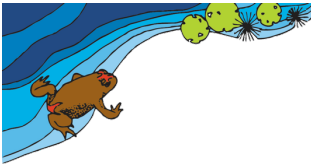
Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Grammitis stenophylla</i> BC Act, Sch. 1, End.	Prefers moist shaded gullies, typically grows on rocks near moss.	No
<i>Grevillea caleyi</i> BC Act, Sch. 1, End. EPBC Act, End.	Grows on sandy soil with lateritic influences, typically on ridges.	No
<i>Microtis angusii</i> BC Act, Sch. 1, End. EPBC Act, End.	Difficult to determine, growing among weeds and on a disturbed soil. Possibly prefers sandy soils with lateritic influences.	No
<i>Gonocarpus longifolius</i> ROTAP, 3RC -	Grows in shrub communities on sandstone; mainly on the ranges from Armidale to the Blue Mtns, east of Rylstone.	No
<i>Goodenia rostrivalvis</i> ROTAP, 2RCa	Grows on damp south-facing sandstone cliffs in Blue Mtns, in the Wentworth Falls area, rare.	No
<i>Grevillea juniperina</i> subsp. <i>juniperina</i> BC Act, Sch. 2, Vul.	Grows in open dry sclerophyll (eucalypt-dominated) forest or woodland, at altitudes of less than about 50 m, in sandy to clay-loam soils and red pseudolateritic gravels.	No
<i>Grevillea longifolia</i> ROTAP, 2RC -	Grows in moist areas of sclerophyll forest, often near creeks, on Hawkesbury sandstone; chiefly the southern half of Sydney Basin, and Woronora Plateau; possibly also in Lawson area.	No
<i>Grevillea obtusiflora</i> BC Act, Sch. 1, End. EPBC Act, End.	Grows in sandy loam soils in open low scrub beneath dry sclerophyll forest in the Kandos area.	No
<i>Grevillea parviflora</i> subsp. <i>parviflora</i> BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heathy associations or shrubby woodland, in sandy or light clay soils usually over shale substrates.	No
<i>Gyrostemon thesioides</i> ROTAP, 2KC - BC Act Sch. 1, End.	Grows on hillsides and riverbanks, only from sites near Georges (30 yrs ago) and Nepean Rivers (90 yrs ago). May already be extinct.	No
<i>Hakea constablei</i> ROTAP, 2RCa	In dry sclerophyll forest on rocky outcrops, scattered in the Blue Mtns between 500–1100 m alt., from Bell to Mt Wilson, rare.	No
<i>Haloragodendron lucasii</i> BC Act, Sch. 1, End. EPBC Act, End.	Grows in dry sclerophyll open forest on sheltered slopes near creeks on sandstone; confined to Sydney area, rare.	No
<i>Hibbertia hermanniifolia</i> ROTAP, 3RCa	Open forest on sandstone; confined to Bents Basin (Nepean R), Yarrowitch district and the coastal ranges south from Wadbilliga N.P.; rare.	No
<i>Hibbertia nitida</i> ROTAP, 2RC -	Widespread on sandstone in the Sydney district.	No
<i>Hibbertia superans</i> BC Act, Sch. 1, End.	Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.	No



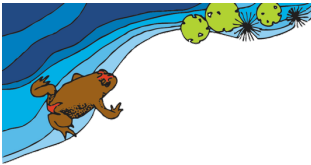
Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Hymenophyllum lyallii</i> (was <i>Sphaerocionium lyallii</i>) ROTAP, 3RC – +	Grows on rocks or trees in moist rainforest in the Blue Mtns and ranges of the south coast.	No
<i>Hymenophyllum pumilum</i> ROTAP, 3RC -	Epiphytic in cooler rainforest of the Blue Mtns and adjacent ranges; uncommon.	No
<i>Isopogon fletcheri</i> ROTAP, 2VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in dry sclerophyll forest and heath on sandstone; confined to sheltered moist positions on the escarpment in the Blackheath district of the Blue Mtns, rare.	No
<i>Isotoma sessiliflora</i> (was <i>Hypsela sessiliflora</i>) ROTAP, 2X BC Act, Sch. 1, End.	Grows in damp places, on the Cumberland Plain, very rare.	No
<i>Keraudrenia corollata</i> var. <i>denticulata</i> ROTAP, 3RC -	Mostly on sandstone. Rare; recorded from near Grafton and west of Sydney.	No
<i>Kunzea cambagei</i> ROTAP, 2VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath; known mainly from near Mt Werong and Berrima.	No
<i>Kunzea rupestris</i> ROTAP, 2VCa BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath on rock platforms; known only from between Lower Portland and Ku-ring-gai Chase N.P.	No
<i>Lasiopetalum joyceae</i> ROTAP, 2RC - BC ACT, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath on sandstone; Hornsby Plateau.	No
<i>Leionema lachnaeoides</i> ROTAP, 2ECi BC Act, Sch. 1, End. EPBC Act, End.	Rare, from higher Blue Mtns, on barren rocky situations.	No
<i>Lepidosperma evansianum</i> BC Act, Sch. 2, Vul.	Grows on wet sandstone cliff faces.	No
<i>Lepidosperma evansianum</i> BC Act, Sch. 2, Vul. <i>Leptospermum rupicola</i> ROTAP, -3RC -	Grows in shrubby communities and heath on sandstone cliffs and escarpments.	No
<i>Leucopogon exolasius</i> ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in woodland on sandstone, restricted to the Woronora and Grose Rivers and Stokes Creek, Royal N.P.	No
<i>Leucopogon fletcheri</i> subsp. <i>fletcheri</i> ROTAP, 2RC - BC Act, Sch. 1, End.	Grows in woodland on lateritic soils; rare, in the Springwood area.	No



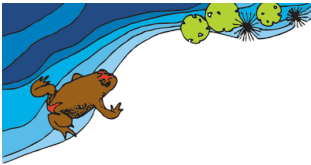
Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Lissanthe sapida</i> ROTAP, 3RCa	Grows in open woodland and dry sclerophyll forest, on rocky sandstone ridges and hillsides on sandy soil; occasional, from Bargo to Coloual Ra. and Blackheath.	No
<i>Lomandra brevis</i> ROTAP, 2RC -	Grows in dry sclerophyll forest on sandstone-derived soils in the Sydney region; not common.	No
<i>Lomandra fluviatilis</i> ROTAP, 3RCa	Grows in creek beds on sandy soils; in the Royal N.P. to Colo R	No
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> BC Act, Sch. 1, End. Pop.	Grows in woodland and scrub; north from the Razorback Ra. (Bankstn, Blacktn, Camden, Campbelltn, Fairfield, Holroyd, Liverpool & Penrith LGAs)	No
<i>Melaleuca deanei</i> ROTAP, 3RC- BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in wet heath on sandstone; uncommon, in coastal districts from Berowra to Nowra.	No
<i>Micromyrtus blakelyi</i> ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath in depressions on sandstone rock platforms; restricted to areas near the Hawkesbury R.	No
<i>Micromyrtus minutiflora</i> ROTAP, 2V BC Act, Sch. 1, End. EPBC Act, Vul.	Grows in dry sclerophyll forest in western part of the Cumberland Plain; rare.	No
<i>Monotoca ledifolia</i> ROTAP, 3RC - <i>Notochloe microdon</i> ROTAP, 2RC -	Grows in exposed sites in dry sclerophyll forest and shrubland on sandstone in the Woronora Plateau and Blue Mtns area.	No
<i>Notochloe microdon</i> ROTAP, 2RC -	Grows in moist shady areas of the Blue Mtns district.	No
<i>Olearia cordata</i> ROTAP, 2VCi BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in dry sclerophyll forest and open shrubland, on sandstone; chiefly from Wisemans Ferry to Wollombi.	No
<i>Olearia quercifolia</i> ROTAP, 3RC -	Grows in swampy or moist terrain; confined to the Blue Mtns.	No
<i>Ozothamnus adnatus</i> ROTAP, 3KC-	Grows in sclerophyll forest and woodland, usually on sandy soil; rare, south from Guyra district.	No
<i>Persoonia acerosa</i> ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath or dry sclerophyll forest on sandstone; central Blue Mtns south to Hill Top.	No
<i>Persoonia bargoensis</i> ROTAP, 2V BC Act, Sch. 1, End. EPBC Act, Vul.	Grows in woodland to dry sclerophyll forest, on sandstone and laterite; restricted to the Bargo area.	No



Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Persoonia hirsuta/revoluta</i> ROTAP, 3KCi BC Act, Sch. 1, End. EPBC Act, End.	Grows in woodland to dry sclerophyll forest on sandstone; both subspecies occurring as isolated individuals or very small populations.	No
<i>Persoonia laxa</i> BC Act, Sch. 1, Ext. EPBC Act, Ext.	Considered extinct. Probably prefers heath or sclerophyll forest with sandy soils.	No
<i>Persoonia mollis subsp. maxima</i> ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Grows in dry to wet sclerophyll forest on Hawkesbury sandstone, Cowan–Hornsby area.	No
<i>Persoonia nutans</i> ROTAP, 2ECi BC Act, Sch. 1, End. EPBC Act, End.	Grows in woodland to dry sclerophyll forest on laterite and alluvial sand; confined to the Cumberland Plain.	No
<i>Pherosphaera fitzgeraldii</i> (was <i>Microstrobos fitzgeraldii</i>) ROTAP, 2ECi BC Act, Sch. 1, End.	Usually grows on wet rocks within the spray of waterfalls or on ledges or in caves near waterfalls; restricted to southerly aspects on sandstone near waterfalls in the Katoomba to Wentworth Falls area of the Blue Mtns.	No
<i>Philotheca obovalis</i> (was <i>Eriostemon obovalis</i>) ROTAP, 3RCa	Grows in heath and dry sclerophyll forest on sandstone; chiefly in the Blue Mountains, also recorded for Kydra Mountain.	No
<i>Pilularia novae-hollandiae</i> BC Act, Sch. 1, End.	Widespread but not common in seasonally dry depressions and margins of marshes; may grow submerged.	No
<i>Pimelea curviflora var. curviflora</i> BC Act, Sch. 2, Vul. EPBC Act, Vul.	Confined to coastal areas around Sydney on sandstone.	No
<i>Pimelea spicata</i> ROTAP, 3ECi BC Act, Sch. 1, End. EPBC Act, End.	Grows on the coast from Lansdowne to Shellharbour and inland to Penrith; rare.	No
<i>Platysace clelandii</i> ROTAP, 2RCa	Grows among sandstone boulders in dry sclerophyll forest, from Glen Davis to Berowra.	No
<i>Pomaderris brunnea</i> ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	In open forest, confined to the Colo R. and upper Nepean R.	No
<i>Prostanthera cryptandroides</i> BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows chiefly in the Lithgow to Sandy Hollow districts.	No
<i>Prostanthera marifolia</i> BC Act, Sch. 4, Ext A. EPBC Act, CE.	Occurs in sandy soils with clay-loam and ironstone on ridge tops.	No



Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Pseudanthus divaricatissimus</i> ROTAP, 3RCa	Mostly from Muswellbrook to Bega, with outlying populations near Urbenville and Dubbo (Goonoo State Forest).	No
<i>Pterostylis gibbosa</i> ROTAP, 2E (X-WSyd) BC Act, Sch. 1, End. EPBC Act, End.	Grows among grass in sclerophyll forest; rare, chiefly in the southern parts of the central coast, with a disjunct population in the Hunter Valley.	No
<i>Pterostylis saxicola</i> ROTAP, (2E) BC Act, Sch. 1, End. EPBC Act, End.	Grows in shallow soil over sandstone sheets, often near streams; rare, from Picnic Point to Picton area.	No
<i>Pultenaea</i> sp. 'Genowlan Point' (NSW 417813) BC Act, Sch. 1, Crit. End. EPBC Act, Crit. End.	It is endemic to New South Wales and is only found at Genowlan Point in the Capertee Valley. At Genowlan Point, <i>Pultenaea</i> sp. 'Genowlan Point' (Allen s.n., 29 Nov. 1997) is restricted to well drained stoney soils.	No
<i>Pultenaea glabra</i> EPBC Act, Vul.	Grows in dry sclerophyll forest on sandstone; higher Blue Mtns and Glen Davis area.	No
<i>Pultenaea parviflora</i> ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, Vul.	Grows in dry sclerophyll forest on Wianamatta Shale, laterite or alluvium, Cumberland Plain.	No
<i>Pultenaea pedunculata</i> BC Act, Sch. 1, End.	Grows in dry sclerophyll forest and disturbed sites on a variety of soils on the South Coast and edge of the Southern Tableland, but with disjunct restricted populations on Wianamatta Shale on the Cumberland Plain in N.S.W.	No
<i>Pultenaea villifera</i> var. <i>villifera</i> ROTAP, 3RC - BC Act, Sch. 1, End. Pop. (Lower Blue Mountains)	Grows in dry sclerophyll forest on sandy soil; lower Blue Mtns to Eden district.	No
<i>Rhizanthella slateri</i> ROTAP, 3KC - BC Act, Sch. 2, Vul. EPBC Act, End.	Grows in sclerophyll forest in shallow to deep loams. Collections tend to be accidental and it is not possible to determine distribution accurately; recorded for the Blue Mtns, also Bulahdelah south to Dharug N.P.	No
<i>Rupicola apiculata</i> ROTAP, 2RCa	Grows in skeletal sandy soils in damp situations on sandstone rock ledges between 700–1100 m alt.; restricted to the Blue Mtns.	No
<i>Rupicola ciliata</i> ROTAP, 2RC – †	Grows in skeletal sandy soils in rock crevices, on rock ledges and beneath cliff overhangs in Kurrajong Heights, Bilpin to lower Yarramun Creek areas in the Blue Mtns.	No
<i>Rupicola sprengelioides</i> ROTAP, 2RC – †	Restricted to skeletal sandy soils on sandstone ledges, cliff faces and rocky ground, in the Burragorang Valley.	No
<i>Sprengelia monticola</i> ROTAP, 2RC – †	Grows on wet rock faces and ledges or cliff bases on sandstone in the Blue Mtns.	No



Botanical name Conservation status	Habitat description	Suitable habitat on site
<i>Syzygium paniculatum</i> BC Act, Sch. 1, End. EPBC Act, Vul.	Rainforest and open forest near riparian zones.	No
<i>Tetraloche glandulosa</i> ROTAP, – 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in sandy or rocky heath or scrub, from Mangrove Mtn to the Blue Mtns and Sydney.	No
<i>Tetraloche neglecta</i> ROTAP, 3RC -	Grows in sandy heath and dry sclerophyll forest; chiefly in the Sydney district, south to Robertson.	No
<i>Thesium australe</i> ROTAP, 3VCI BC Act, -Sch. 2, Vul. EPBC Act, Vul.	Grows in grassland or woodland, often in damp sites; widespread but rare and possibly endangered.	No
<i>Tylophora woollsii</i> ROTAP, 2E BC Act, Sch. 1, End. EPBC Act, End.	Grows in wet sclerophyll forest and rainforest in the Clouds Creek area near Nymboida and in sclerophyll forest near Parramatta; rare.	No
<i>Velleia perfoliata</i> ROTAP, 2VC - BC Act, Sch. 2, Vul. EPBC Act, Vul.	Grows in heath on shallow sandy soil over sandstone; confined to the Hawkesbury district to the upper Hunter Valley.	No
<i>Veronica lithophila</i> (was <i>Parahebe lithophila</i>) ROTAP, 2RC -	Grows on cliffs or rock exposures, in pockets of soil over sandstone or quartzite; Blue Mtns-Colong region at 650–870 m alt., uncommon.	No
<i>Wilsonia backhousei</i> BC Act, Sch. 2, Vul.	Grows in coastal saltmarshes; chiefly in the Sydney district, also common at Jervis Bay.	No
<i>Zieria covenyi</i> BC Act, Sch. 1, End. EPBC Act, End.	Grows in eucalypt woodland on sandy soils; known only from Narrow Neck Peninsular in the Blue Mtns N.P.	No
<i>Zieria involucrata</i> ROTAP, 2VCa BC Act, Sch. 1, End. EPBC Act, Vul.	Grows in wet sclerophyll forest, chiefly in the Lower Blue Mtns; rare.	No
<i>Zieria murphyi</i> ROTAP, 2VC-	Grows in dry sclerophyll forest in sandy soils; on the ranges from Mt Tomah to Penrose district.	No
<i>Zieria prostrata</i> BC Act, Sch. 1, End. EPBC Act, End.	Restricted to low coastal heaths, near Coffs Harbour; rare.	No



Key

BC Act 2016:

Sch1 = Schedule 1: Endangered species
Part 1: endangered species
Part 2: endangered populations
Part 3: endangered ecological communities
Part 4: species presumed extinct
Sch2 = Schedule 2: Vulnerable species

EPBC Act 1999:

CE = Critically Endangered
E = Endangered
V = Vulnerable
EP = Endangered Population

ROTAP Codes

1 Known by one collection only
2 Geographic range in Australia < 100Km
3 Geographic range in Australia > 100Km
E Endangered
V Vulnerable
R Rare
X Extinct
K Poorly known
C Reserved
a > or = 1000 plants reserved
i < 1000 plants reserved
† Total known population reserved
- Reserved population size unknown
+ Overseas occurrence



Appendix 6. Matters of National Environmental Significance

The Protected Matters Search Tool was used to find relevant Matters of National Environmental Significance (MNES) on or near the site.

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: 08/07/20 16:41:17

[Summary](#)

[Details](#)

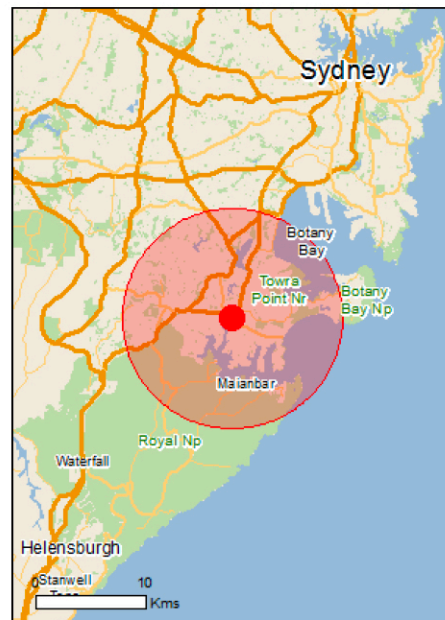
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

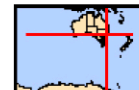
[Acknowledgements](#)

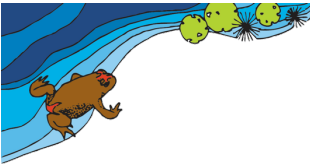


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 10.0Km





Appendix 7. Company Profile

Abel Ecology has been in the biodiversity consulting business since 1991, starting in the Sydney Region, and progressively more state wide in New South Wales since 1998, and now also in Victoria. During this time extensive expertise has been gained with regard to Master Planning, Environmental Impact assessments including flora and fauna, bushfire reports, Vegetation Management Plans, Management of threatened species, Review of Environmental Factors, Species Impact Statements, Biodiversity Development Assessment Reports and as Expert Witness in the Land and Environment Court. We have done consultancy work for industrial and commercial developments, golf courses, civil engineering projects, tourist developments as well as residential and rural projects. This process has also generated many connections with relevant government departments and city councils in NSW. Our team consists of four scientists and two administrative staff, plus casual assistants as required.

Licences

NPWS s132C Scientific licence number is SL100780 expires 31 July 2020

NPWS GIS data licence number is CON95034

DG NSW Dept of Primary Industries Animal Care and Ethics Committee Approval expires 8 November 2021

DG NSW Dept of Primary Industries Animal Research Authority expires 8 November 2020

The Consultancy Team

Dr Danny Wotherspoon

Grad Dip Bushfire Protection (University of Western Sydney 2012)

PhD (researching Cumberland Plain vegetation and fauna habitat, at Centre for Integrated Catchment Management, University of Western Sydney, 2008)

Planning for Bushfire Protection Certificate course (University of Technology, 2006)

Consulting Planners Bushfire Training Course (Planning Institute of Australia, 2003)

MA (Macquarie University, 1991)

Wildlife Photography Certificate (Sydney Technical College, 1987)

Herpetological Techniques Certificate (Sydney Technical College, 1986)

Applied Herpetology Certificate (Sydney Technical College, 1980)

Dip Ed (University of New England, 1978)

BSc (Zoology, Ecology) University of New England 1974)



Dr Daniel McDonald

B. Ag Sc; M. Agr; PhD (The University of Sydney)

Cert IV – GIS (Riverina TAFE)

Daniel is an accredited Biobanking Assessor (0075) and an accredited BAM assessor (BAAS17056) Quantified Tree Risk Assessment (QTRA) and Visual Tree Assessment (VTA), White Card

Daniel is an experienced ecologist with expertise in fauna, plant species identification, vegetation assessment, agriculture, arboriculture, conservation genetics and seed collection and preservation. He is accredited both for BAM assessments, BioBanking assessments and Biodiversity Certification. His present research interest is in Eastern Suburbs Banksia Scrub and fragmented endangered ecological communities.

Dr Alison Hewitt

B. Sc. (Hons), PhD.

MESA, MAPS, MASBS, Snr 1st Aid cert, White card.

Alison has researched and published on the reproductive biology and ecology of Australian Melaleuca species, native plant responses to fire and the vegetation of western Sydney. Alison's interests include plant ecology and flora survey methodology, bush regeneration, plant identification and gardening. Alison teaches Botany and Ecology sessionally with Western Sydney University.

Mark Sherring

BM, MAABR, Cert. Hort., Cert. Bush Regen, Cert. Rural Ops, White Card.

Member of the Australian Association of Bush Regenerators

Mark has extensive knowledge and experience of plant species in New South Wales. He has built up his expert knowledge on NSW native plant species over the many years that he has practised as a Botanist. He is regularly asked to contribute to the extensive (ongoing) flora surveys of the Sydney Basin and Blue Mountains carried out by the Royal Botanic Gardens, Sydney. Mark has extensive field survey experience, having worked for over ten years in various plant-related roles. His role in Abel Ecology is to provide expert advice on flora and on the full range of flora management issues encountered and in the design and management of environmental monitoring projects.