Abel Ecology

(REVIEW OF ENVIRONMENTAL FACTORS)

Soil conservation works and construction of a new ancillary construction road, MORUYA

1. Introduction

This report supports a Review of Environmental Factors (REF) prepared for Health Infrastructure NSW pursuant to part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the undertaking of soil conservation works and the construction of a new ancillary construction road at Lot 2, DP 1281576, Princes Highway, Moruya.

2. Site Description

The site of the soil conservation works and ancillary construction road works is located on the Princes Highway in the NSW south coast town of Moruya. The site is legally described as Lot 2, DP 1281576 and is a large vacant greenfield site. The soil conservation works will facilitate the ongoing management of the greenfield lot. To the west of the site is Moruya TAFE, and to the north is a small residential subdivision called Mynora Estate.

An aerial figure of the site is shown in **Figure A** below.

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Figure A: Proposed site location

3. Overview of Proposed Works

The soil conservation works proposed under this REF include the following:

1. Construction of five (5) erosion and sediment basins (previously three basins), ranging between 120m^2 and 875m^2 in area.

2. Construction of an ancillary construction road into the site to facilitate construction access into the site.

3. Contrstuction of gravel access driveway to allow for vehicles from the highway over the drainage pipe (which will be replaced prior to driveway construction)

A further detailed description of the proposed works is contained in the Review of Environmental Factors report prepared by Ethos Urban.

Prescribed Ecological Actions Report (PEAR)

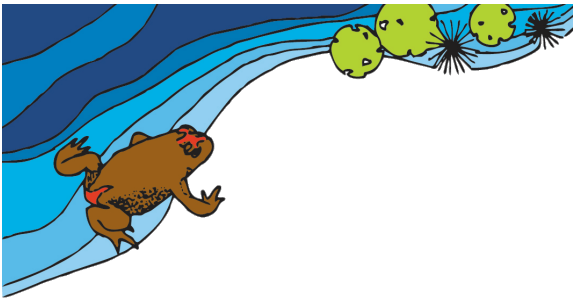
For

Lot 2, DP1281576

Moruya, NSW 2537

Proposed soil conservation works and the construction of a new ancillary construction road.

Prepared for:	Health Infrastructure
Report No:	AE22-REP-2544-ISS-3
Prepared by:	Abel Ecology
Date:	29 September 2023



Disclaimer

This report has been prepared in accordance with the scope of services described in agreement between Abel Ecology and the Client.

In preparing this report, Abel Ecology has relied upon data, surveys and site inspection results taken at or under the particular time and or conditions specified herein. Abel Ecology has also relied on certain verbal information and documentation provided by the Client and/or third parties, but did not attempt to independently verify the accuracy or completeness of that information. To the extent that the conclusions and recommendations in this report are based in whole or in part on such information, they are contingent on its validity. Abel Ecology assumes no responsibility for any consequences arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to Abel Ecology.

The findings contained in this report are the result of discrete/specific methods used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site in question. Under no circumstances, however, can it be considered that these findings represent the actual state of the site/sites at all points.

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I confirm that I have read the NSW Land and Environment Court Practice Note commencing on 14 May 2007, Division 2, Part 31 of the Uniform Civil Procedure Rules 2005 and the Expert Witness Code of Conduct in Schedule 7 to the Uniform Civil Procedure Rules 2005. I have prepared this advice in accordance with the requirements of the Practice Note and Code of Conduct and believe this report is consistent with the requirements of the Practice Note and the Code of Conduct. I agree to be bound by the Practice Note and Code of Conduct.

Document History

Report	Version	Prepared by	Technical Review by	Proofread by	Submission	
					Method	Date
Report	Issue 1	Dr Danny Wotherspoon	Dr Danny Wotherspoon	Janelle Merry	Dropbox	9 December 2022
Report	Issue 2	Mark Mackinnon	Dr Danny Wotherspoon	Janelle Merry	Dropbox	13 December 2022
Report	Issue 3	Jesse Cass		Corinna Campbell	Dropbox	29 September 2023

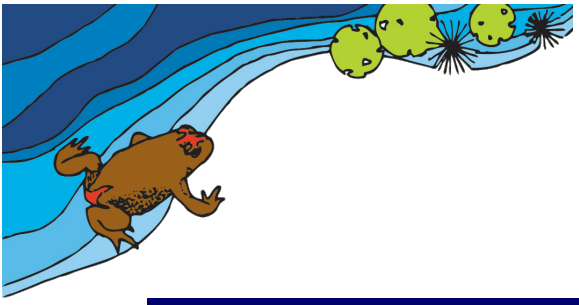
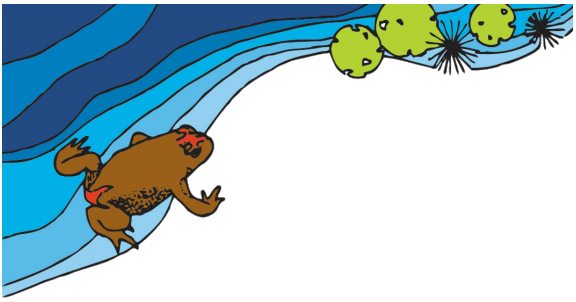
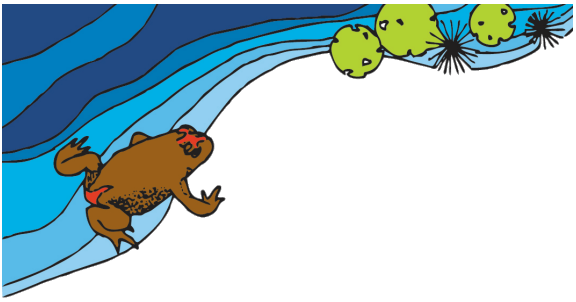


Table of Contents





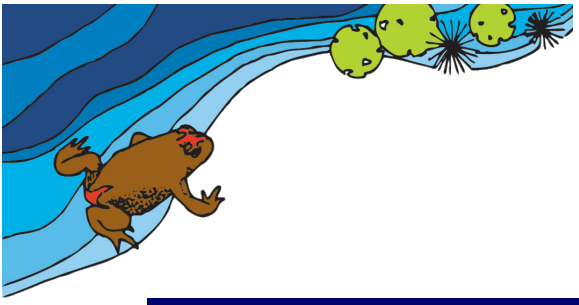


Table of Figures

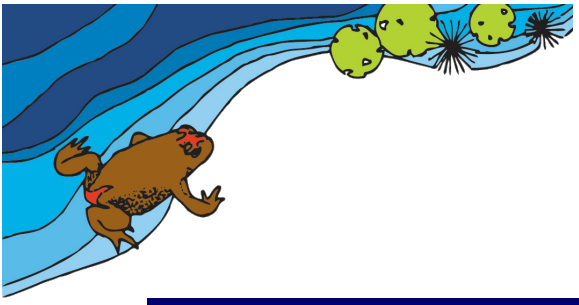
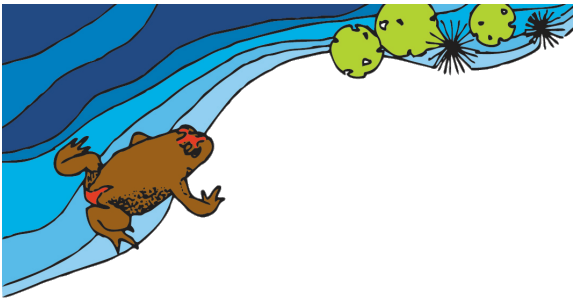
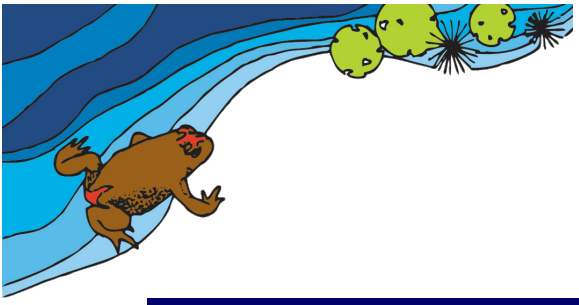


Table of Tables





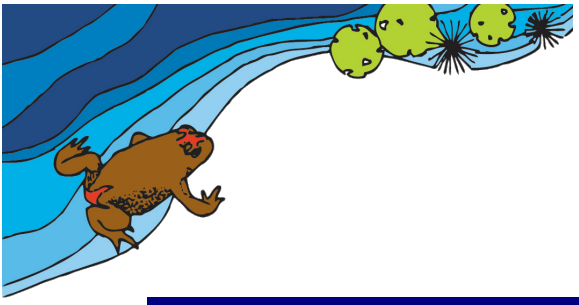
List of Abbreviations

ALS	Actual Lot Size
BAM	Biodiversity Assessment Method
BC Act	Biodiversity Conservation Act 2016
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:

The diagrams/site maps used in this report have been supplied by and are used with the permission of the client.

With regard to maps provided by the Land Information Centre, Topographic maps used with the permission of © Land and Property Information, NSW.



Executive summary

This report supports a Review of Environmental Factors (REF) prepared for Health Infrastructure NSW pursuant to part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction of soil conservation works.

A biodiversity survey was carried out in Lot 2, DP 1281576, Moruya NSW to assess the likely impacts of the proposal on species and ecological communities present on the site. The aim of the assessment is to determine whether the proposal requires a Biodiversity Development Assessment Report (BDAR) or a Species Impact Statement (SIS).

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*Biodiversity Conservation Act 2016* or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) (Commonwealth legislation).

The areas to be affected include native vegetation within Lot 2, DP 1281576, Moruya NSW.

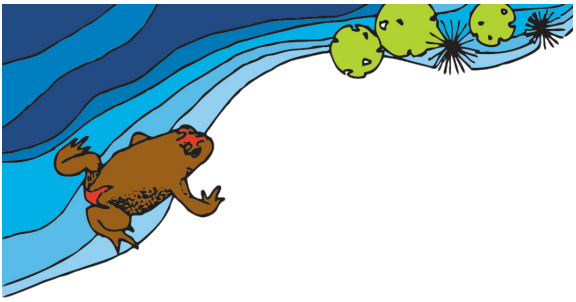
The proposal is a part 5 activity under the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act). A part 5 activity will require further assessment if a test of significance produces a "significant effect" result.

The results from all of "tests of significance" examining the proposal indicate:

The proposal is not likely to significantly affect any threatened species or Endangered or Critically Endangered Species, any scheduled ecological community or their habitats.

There is no impediment to this proposal in the scope of this report. A BDAR prepared using the Biodiversity Assessment Method is not recommended. Similarly, a SIS is not required for the activity.

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



Recommendations:

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

A Species Impact Assessment (SIS) is not required.

An approval may be issued with the following conditions as mitigation measures:

- Revegetation of exposed soils with native pasture grasses;
- Planting of replacement trees for those removed at a rate of 3:1;
- A preclearance survey is to be conducted for hollow-bearing trees to relocate resident fauna, and the hollows salvaged and relocated under the provisions of a Hollow Management Guideline document;
- Supervision daily by a Project Ecologist;
- Mitigation measures to be detailed in a Vegetation and Fauna Management Plan.

Key

Site location

5 km radius around site location

5 km radius measured around site location on six maps.

Land and property Information NSW. Spatial Information eXchange (SIX) website 2022.

Figure 1. Site locality map.

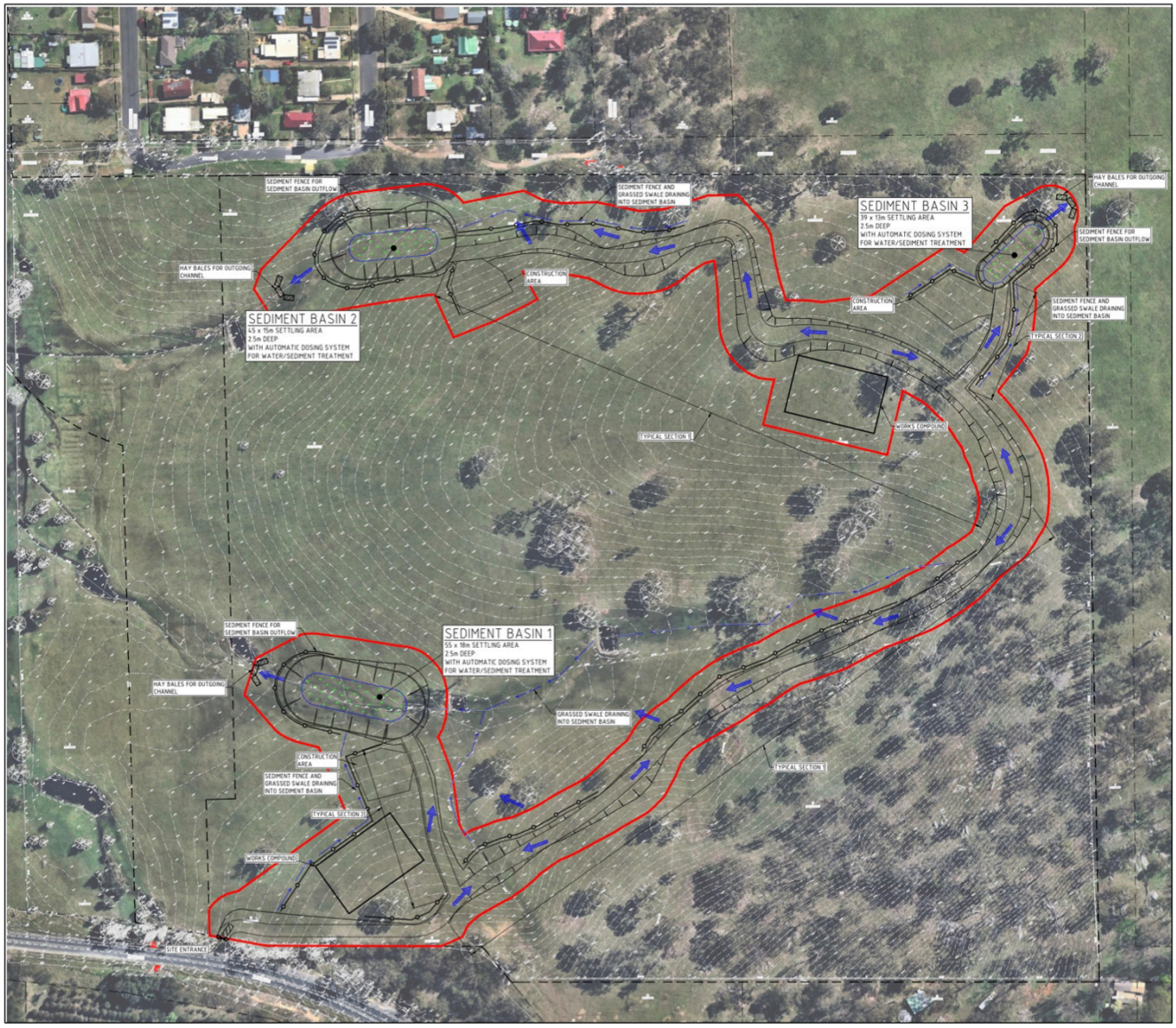


Figure 2. Previous proposal diagram

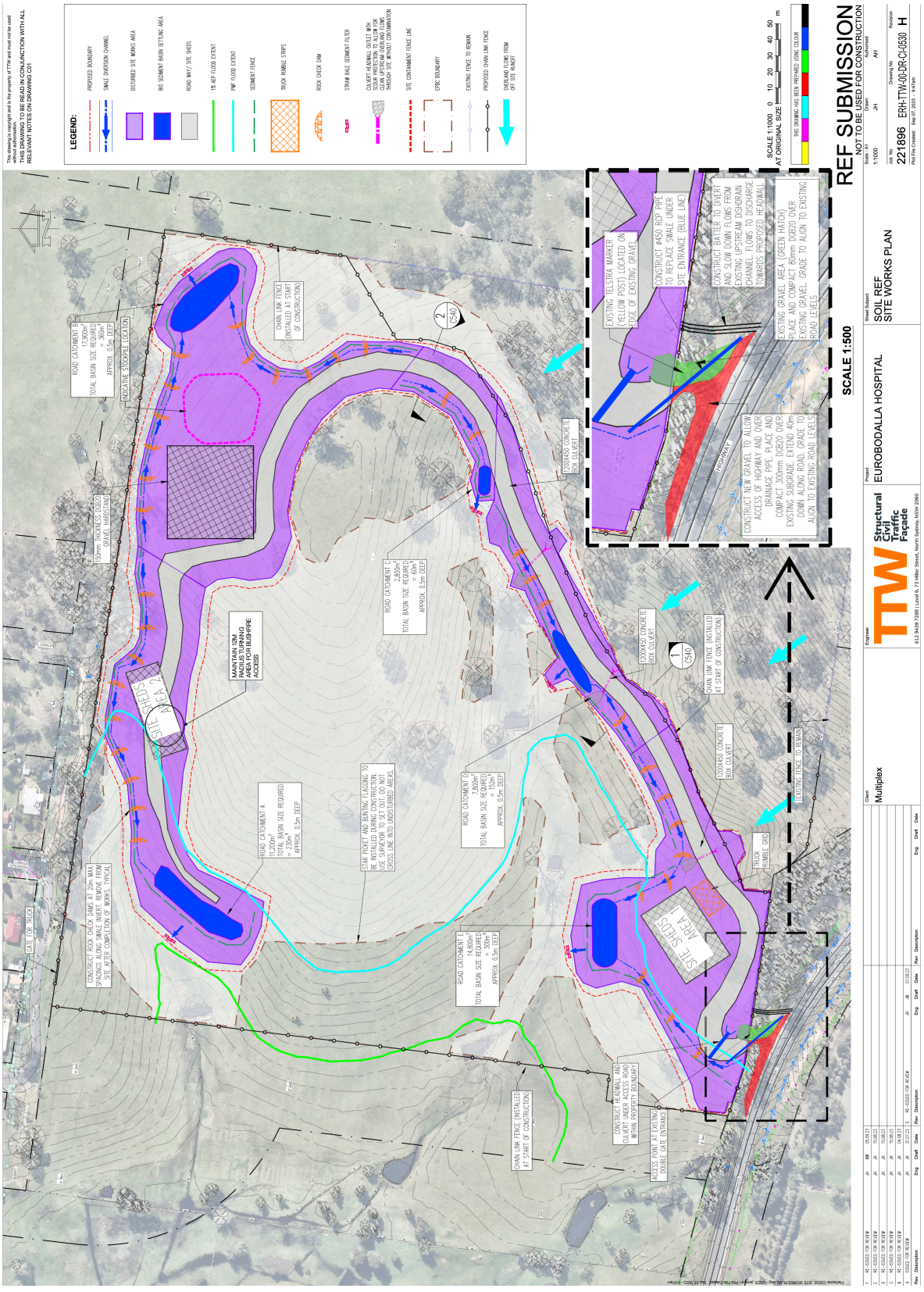


Figure 3. Current Proposal diagram.

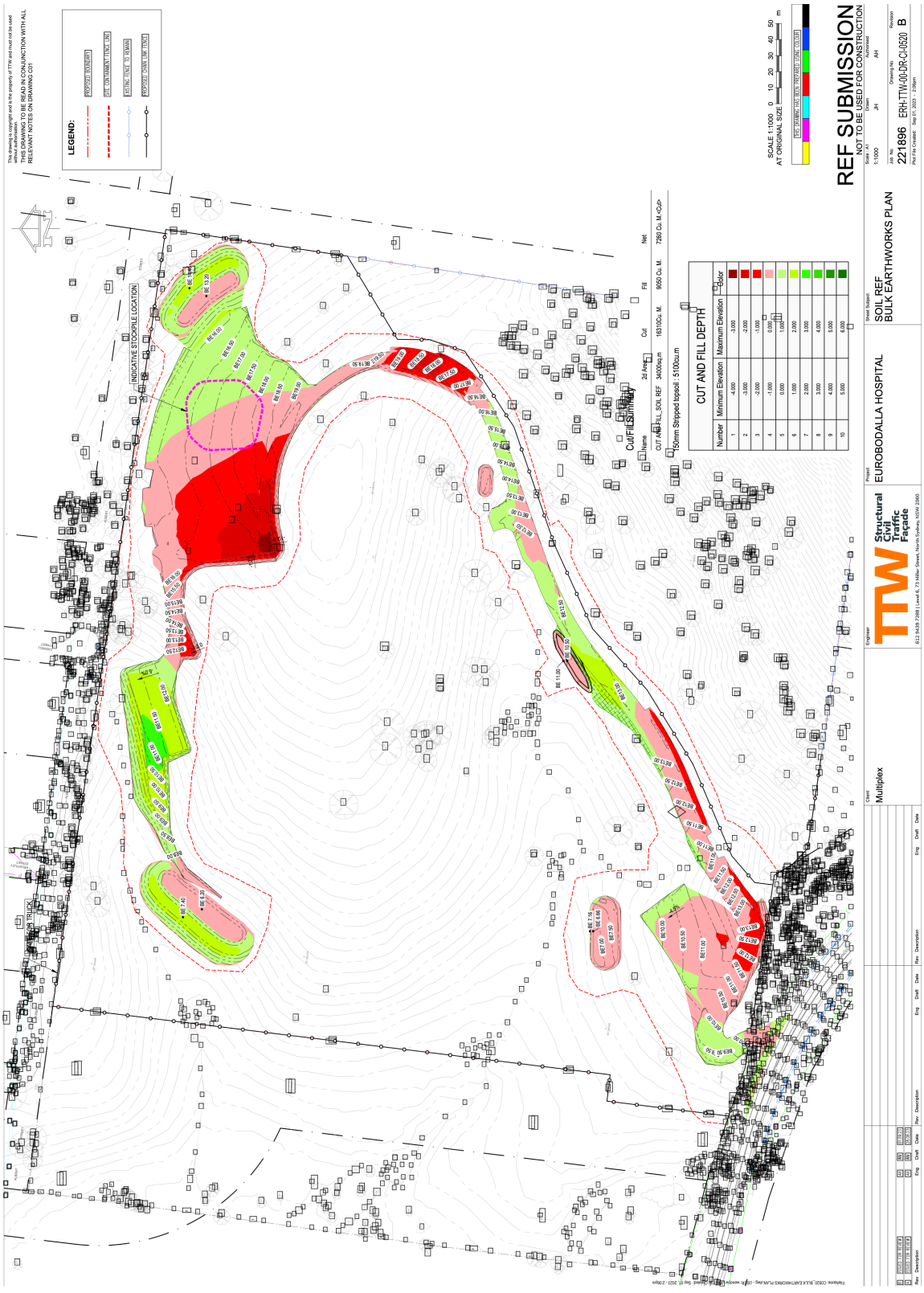


Figure 4. Proposal topographic diagram showing cut and fill earthworks.

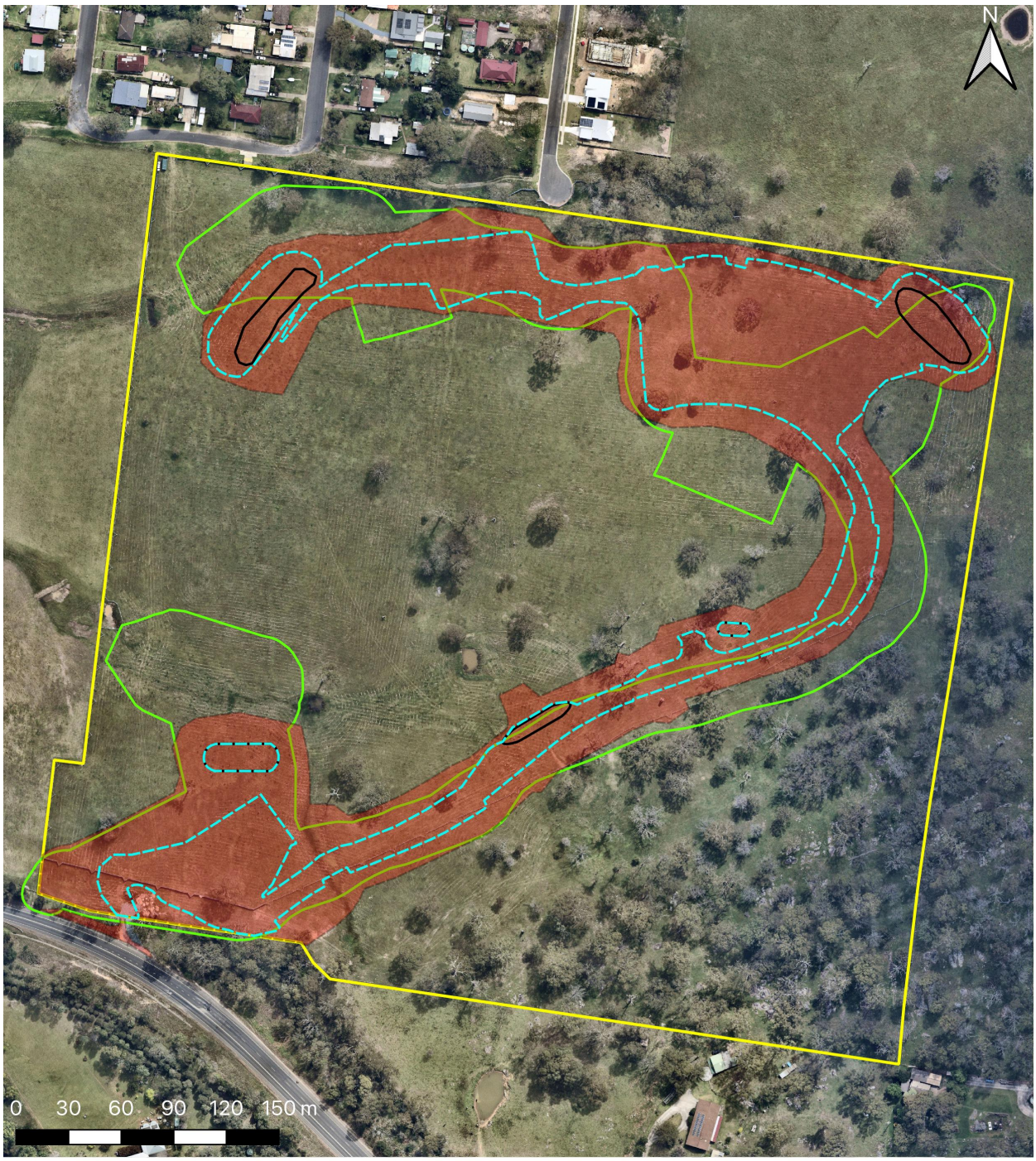


Figure 5. Overlay of old proposal and new proposal

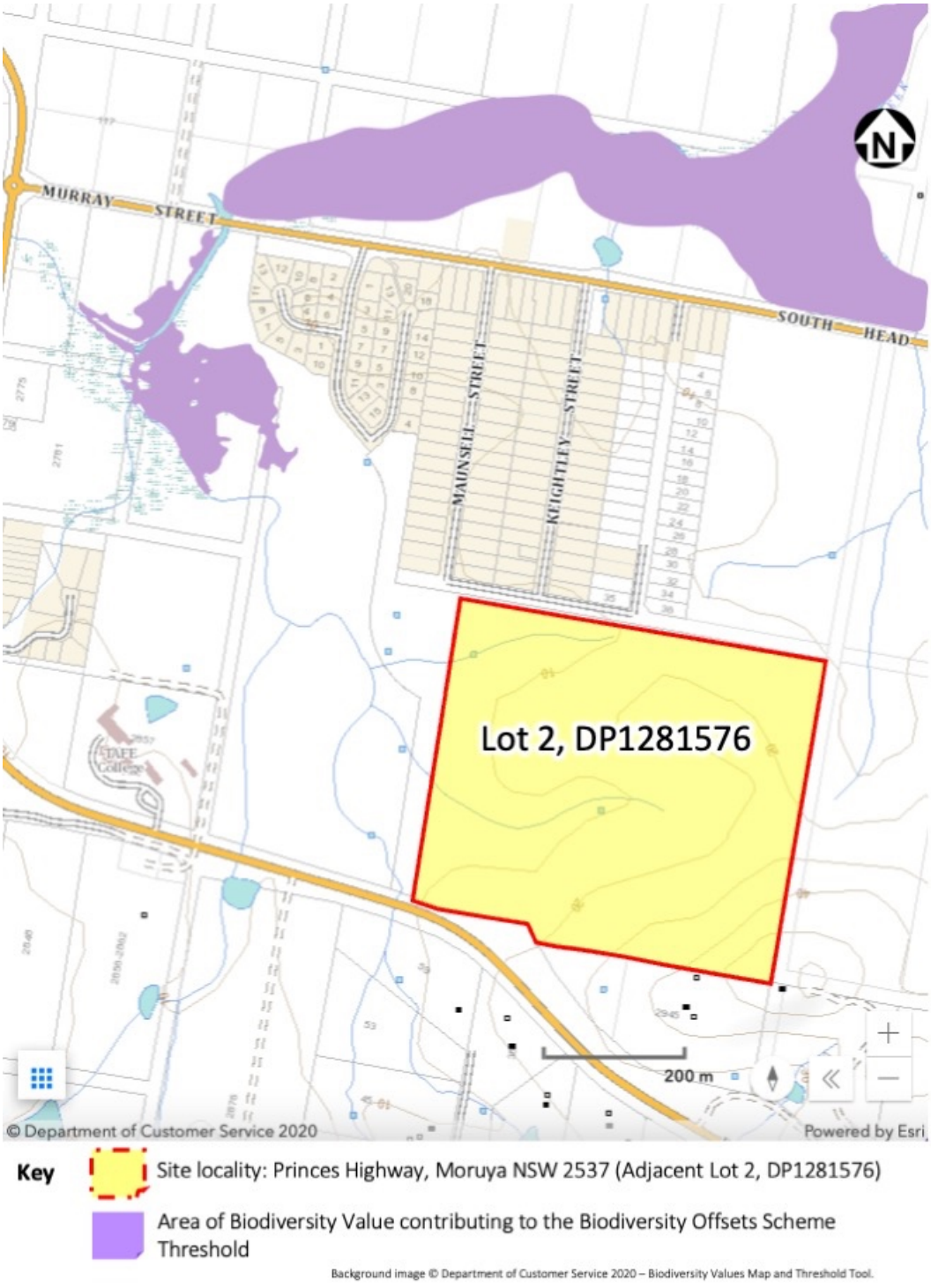


Figure 6. Biodiversity values map.

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

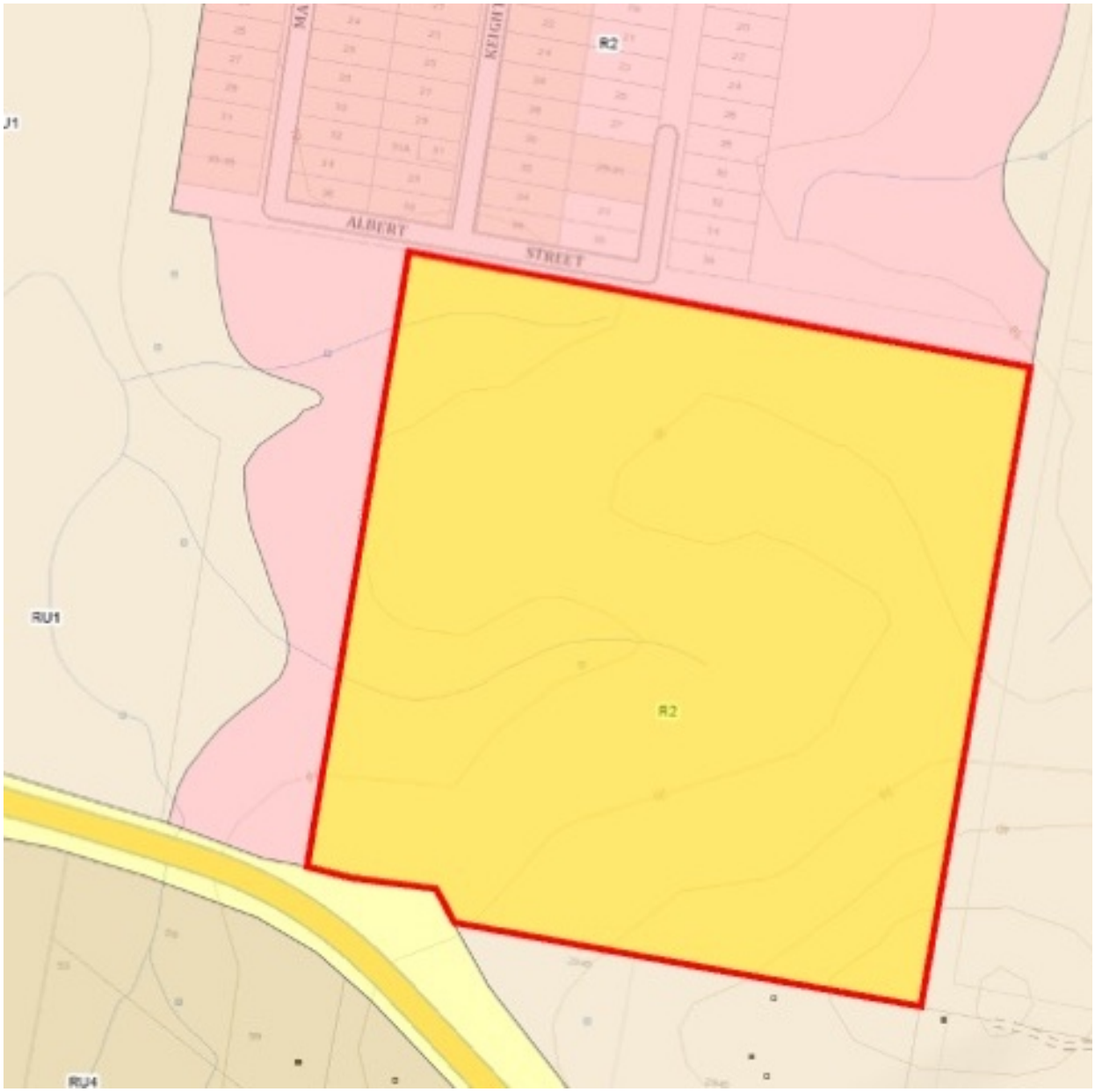


Figure 7. Site LEP zone map.

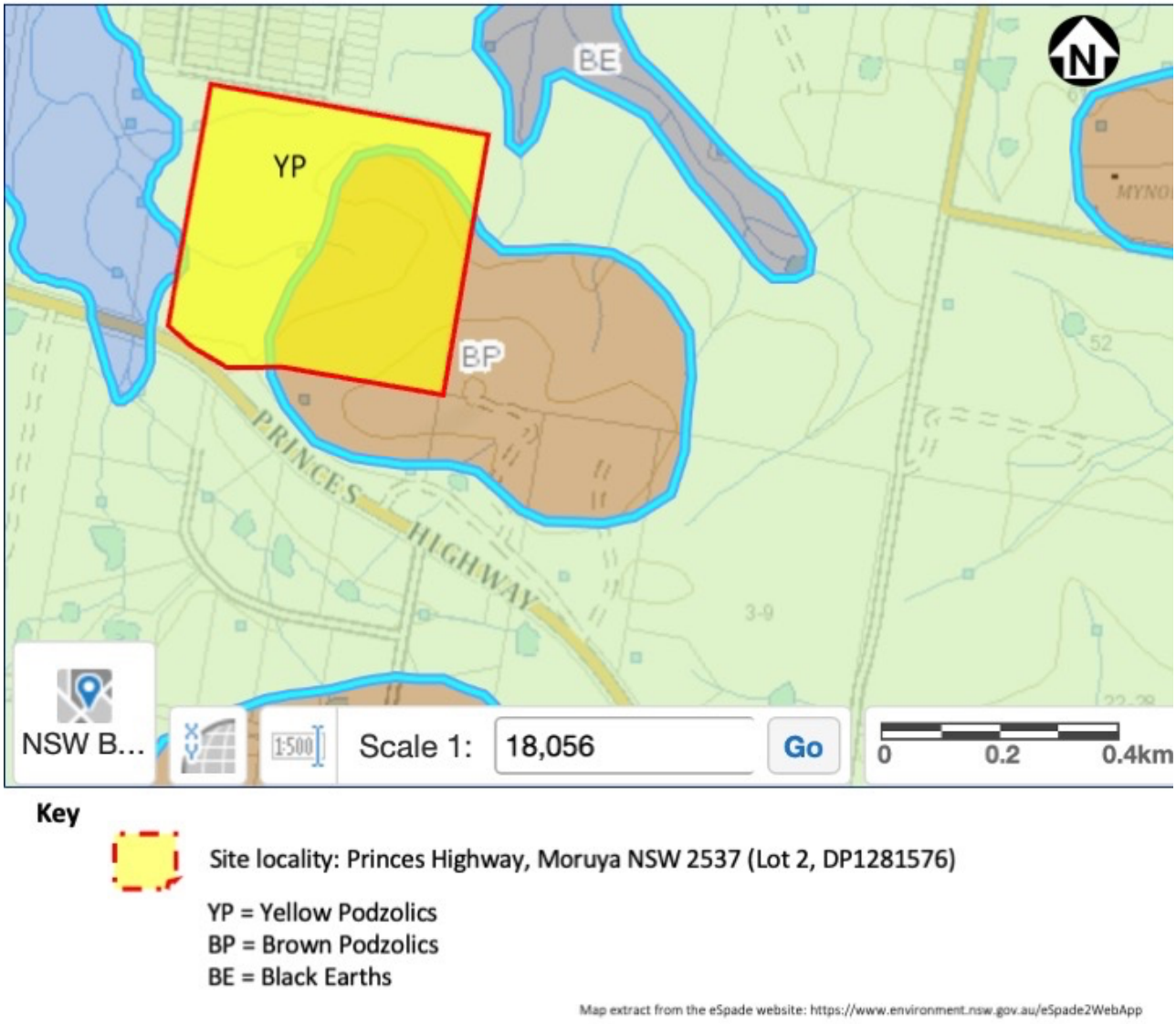
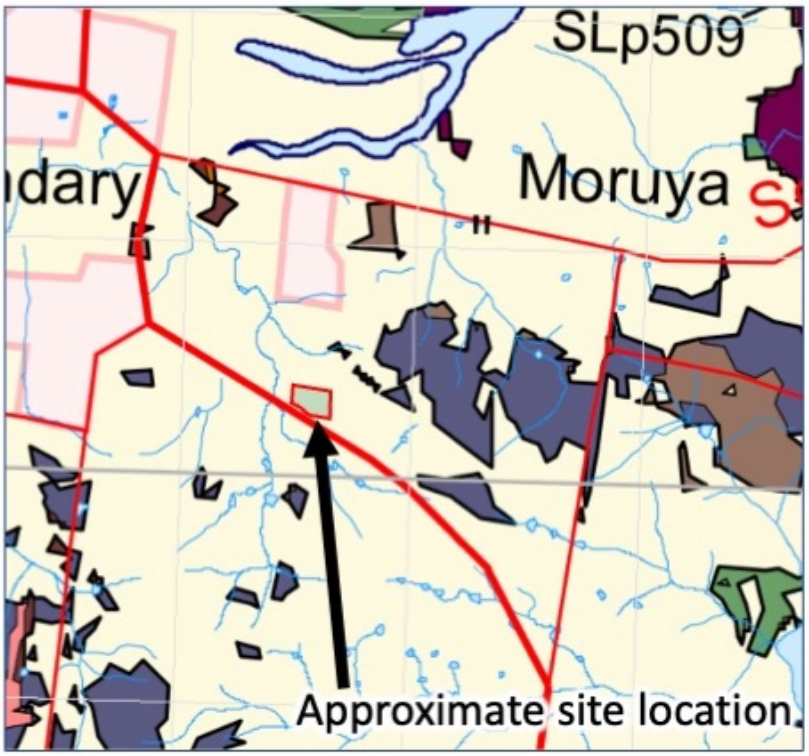


Figure 8. Soil Landscapes of site and surrounding area.

Key

- Subject site
- Old proposal impact area
- Proposed sediment basins
- New proposal impact area and works fenceline
- Cut and fill area

Figure 9. Historic air photo (1961) of the site and surrounding area.

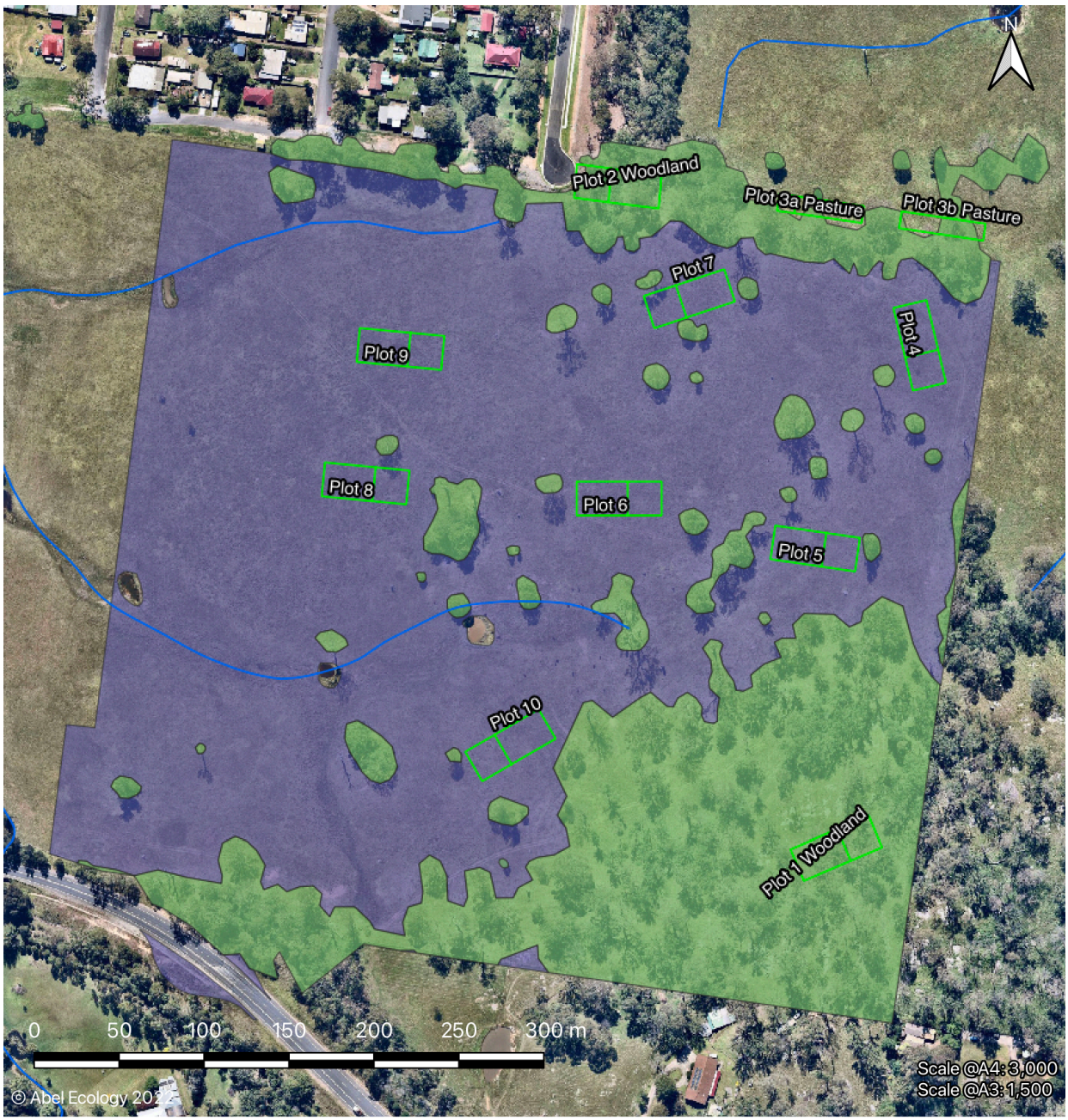


Key (for Tozer 2010 maps)

Approximate site location	Southeast Lowland Grassy Woodland
Modified or disturbed land	South Coast Lowland Swamp Woodland
South Coast River Flat Forest	Coastal Sandstone Ridgetop Woodland
Cumberland River Flat Forest	Coastal Freshwater Lagoon
Temperate Dry Rainforest	

M.G. Tozer et. al (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands

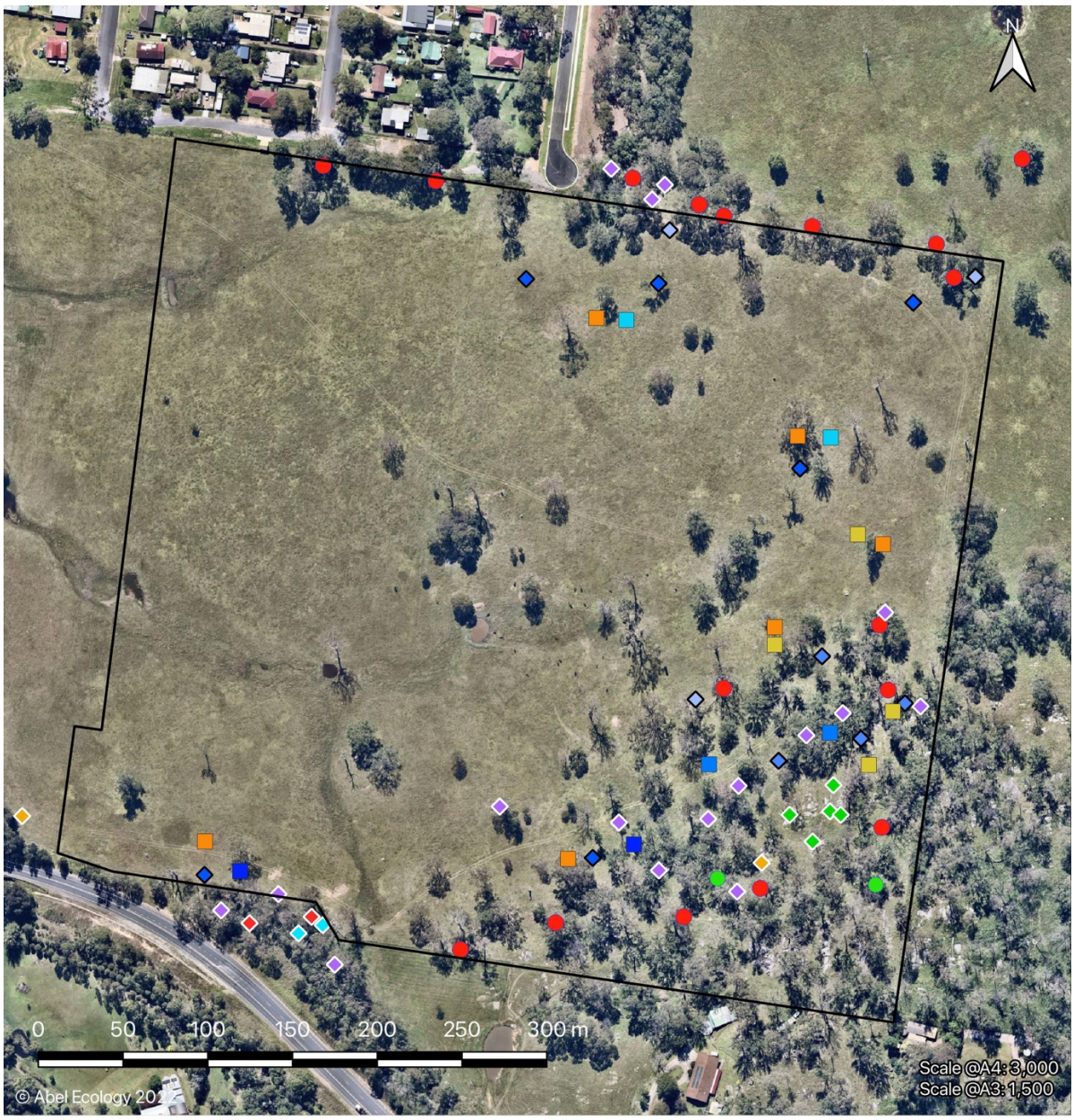
Figure 10. Vegetation map for the site and surrounding area.



Key

- BAM Plots
- Watercourses
- PCT 834 Pasture: Forest Red Gum - Rough Barked Apple - White Stringybark Grassy Woodlands in Dry Valleys, Southern South East Corner Bioregion
- PCT 834 Woodland: Forest Red Gum - Rough Barked Apple - White Stringybark Grassy Woodlands in Dry Valleys, Southern South East Corner Bioregion

Figure 11. Vegetation PCT, vegetation zone and BAM plots locations.



Key

Site Boundary

APR 2021 Fauna Survey
- Anabat
- Camera
- Stag Watch Night 1
- Stag Watch Night 2
- Stag Watch Night 3

OCT 2021 Fauna Survey
- Anabat
- Camera Trap
- Trap Site (Elliot + Hair Tube)
- Habitat Board
- Pipe Trap
- Stag Watch Night 1
- Stag Watch Night 2
- Stag Watch Night 3

JUL 2022 Fauna Survey
- Camera Trap
- Trap Site (Elliot + Hair Tube + Pipe)

Figure 12. Habitat and fauna survey methods map

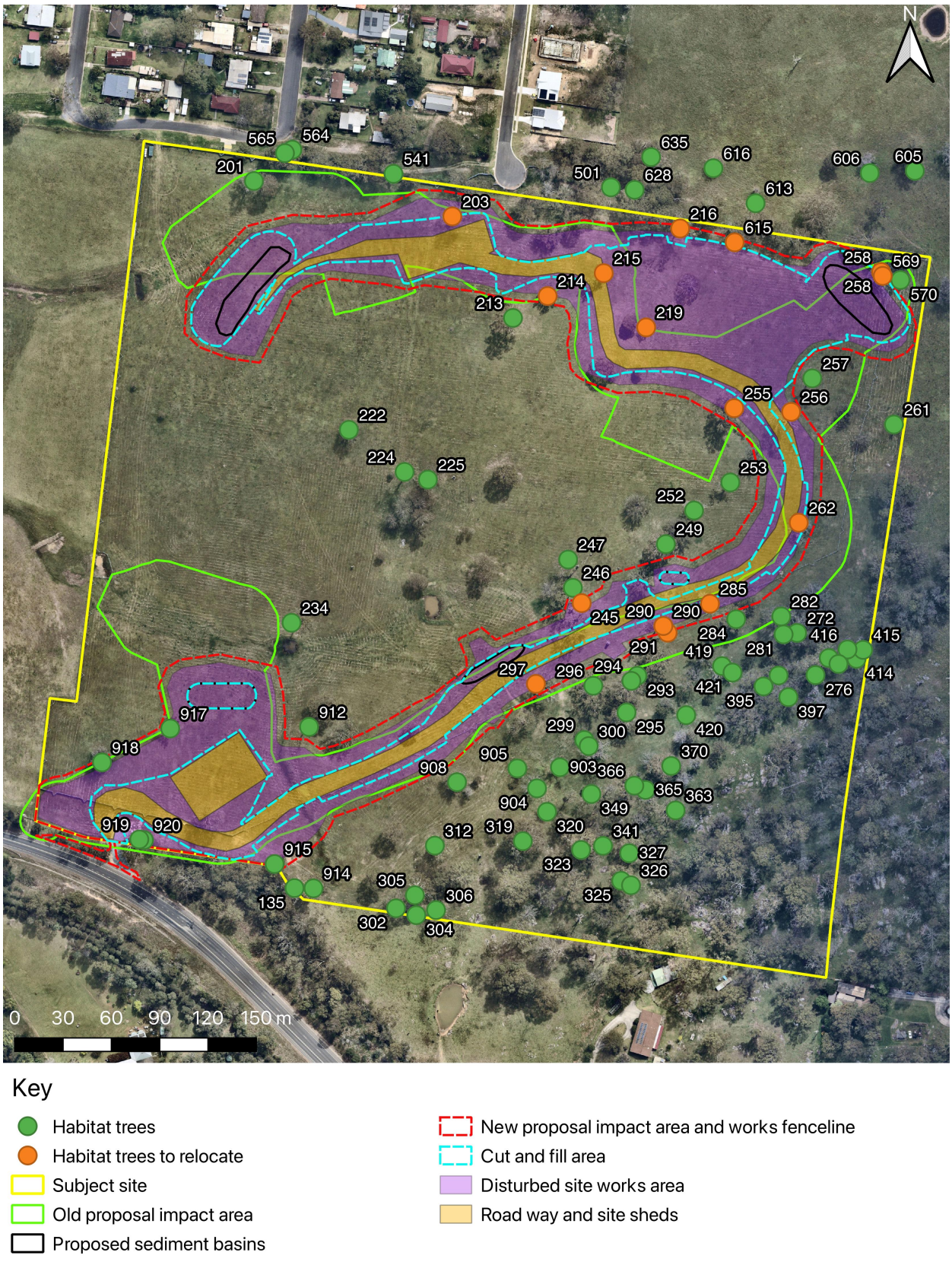


Figure 13. Site habitat trees.

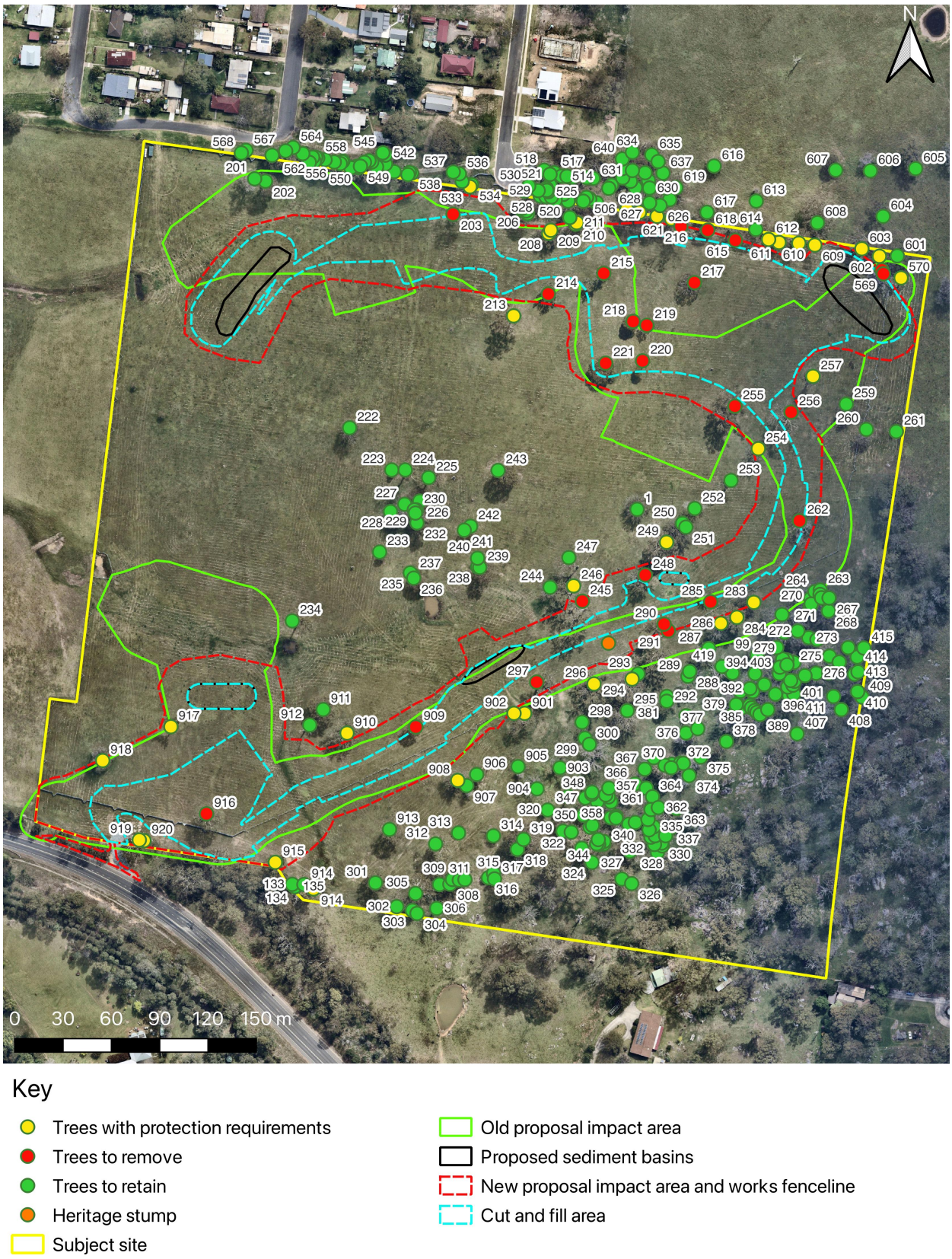


Figure 14. Location of site trees to retain and remove

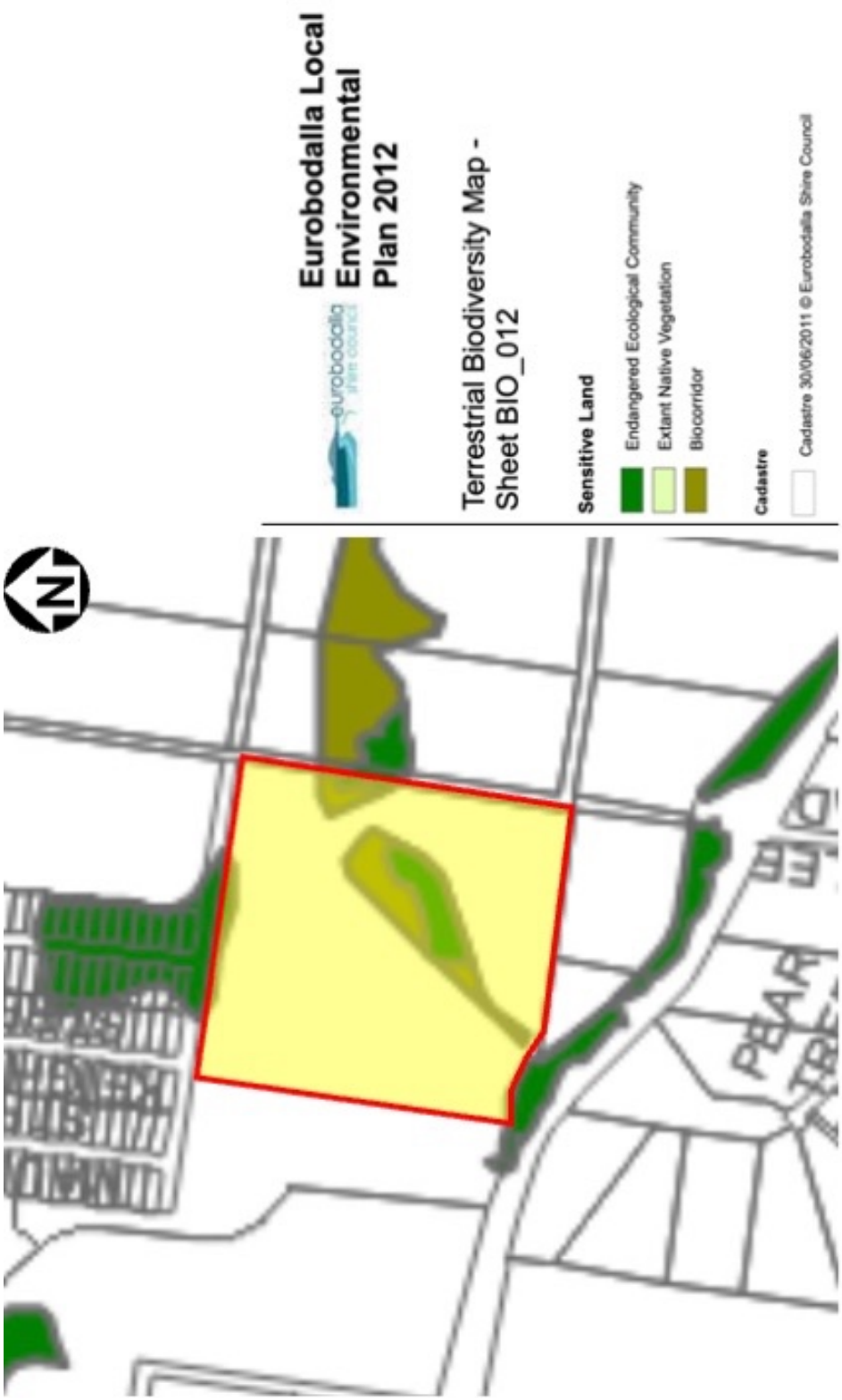


Figure 15. LEP 2012 Terrestrial Biodiversity Map.

1. Introduction

1.1 Legislative context

This Prescribed Ecological Actions Report supports a Review of Environmental Factors (REF) prepared for Health Infrastructure NSW pursuant to part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the construction of soil conservation works comprising:

- Construction of five (5) erosion and sediment basins (previously three basins), ranging between 120m^2 and 875m^2 in area.
- Construction of an ancillary road into the site to facilitate construction access into the site.
- Construction of gravel access driveway to allow for vehicles from the highway over the drainage pipe (which will be replaced prior to driveway construction).

This Prescribed Ecological Actions Report meets the requirements of the *Biodiversity Conservation Act 2016* to enable a determining authority to assess a proposed activity and grant an approval under Part 5 of the EP&A Act.

When assessing a Part 5 activity under the EP&A Act, the authority must only consider 'Threshold Trigger 3' to determine is further assessment through a BDAR or SIS is required: Threshold Trigger 3: A "significant effect" on threatened species or ecological communities.

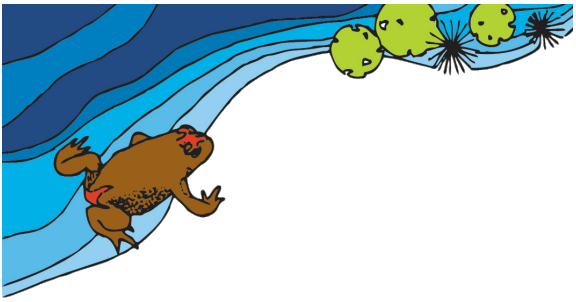
A biodiversity survey of the proposed development site (Figure 1), Lot 2, DP 1281576, Moruya NSW ('the site') was undertaken on three separate occasions, the 12th, 13th and 14th of April 2021 and the 25th, 26th, 27th 28th and 29th of October 2021, followed by a survey 11th to 15th of July 2022.

This Prescribed Ecological Actions Report investigates whether the impacts of a proposal (Figure 3, Figure 4) for new soil conservation works will require further assessment. The *Eurobodalla Local Environmental Plan 2012* lists and maps the site vegetation as an endangered ecological community on the local Terrestrial Biodiversity Planning Map that will need consideration.

This assessment addresses both 'endangered' and 'vulnerable', as required by the *Biodiversity Conservation Act 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 Threshold Trigger 3 is triggered, then a Biodiversity Development Assessment Report (BDAR) or a Species Impact Assessment (SIS) must be prepared by an accredited assessor for the Authority to issue an approval and a calculation of offsetting required.

Other triggers for Part 4 assessments and entry into the BOS scheme are as follows:



The following two triggers provide potential entry into the BOS when assessing a Part 4 assessment. They are included here to provide background only.

Threshold Trigger 1: Exceeding the clearing threshold on an area of native vegetation – Not Applicable to Part 5 activity under the EP&A Act.

Threshold Trigger 2: Development or a prescribed activity is carried out on land included in the Biodiversity Values Land Map (Figure 6). Not Applicable to Part 5 activity under the EP&A Act.

1.2 Previous proposal

This proposal is a modification of the original proposal (REF Approval No: 05/2023, and report 'AE22-REP-2544-ISS-2'). Details of the original proposal are described below:

The previous works proposed under a REF (can be seen in Figure 2 and Figure 5) for new soil conservation works within Lot 2, DP 1281576 comprised the following:

- Construction of three (3) erosion and sediment basins, which ranged between 507m^2 and 990m^2 in area.
- Construction of an ancillary construction road into the site to facilitate construction access into the site.

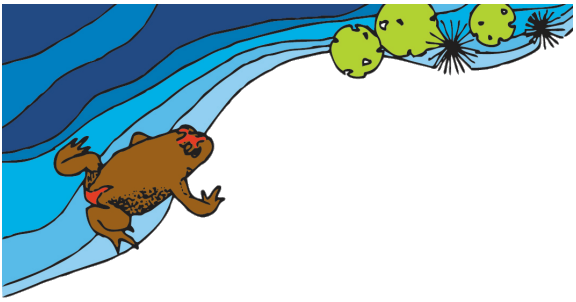
A total of fifty-five (55) trees would have beeen impacted for the purpose of the previous proposal, including the protection of thirty-seven (37) trees from root and structural damage, relocation of thirteen (13) hollow-bearing fauna habitat trees and removal of five (5) other trees.

The previous proposal had an approximate impact area of 6.5ha (65,000m^2), including 0.144ha (1,440m^2) of canopy area to be removed.

1.3 Current proposal

The current works proposed under a REF (Figure 3, Figure 4 and Figure 5) for new soil conservation works within Lot 2, DP 1281576 comprise the following:

- Construction of five (5) erosion and sediment basins, ranging between 120m^2 and 875m^2 in area.
- Construction of an ancillary construction road into the site to facilitate construction access into the site.
- Construction of gravel access driveway to allow for vehicles from the highway over the drainage pipe (which will be replaced prior to driveway construction)



A total of sixty (60) trees will be impacted for the purpose of this proposal, including the protection of thirty-five (35) trees from root and structural damage, relocation of sixteen (16) hollow-bearing fauna habitat trees and removal of nine (9) other trees (Figure 13, Figure 14).

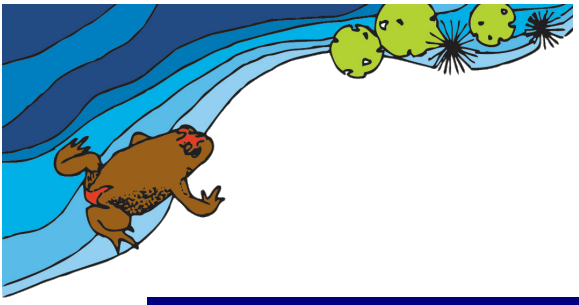
Table 1. Details of proposed native vegetation clearing.

Component of site	Area m^2
Extent of proposed native vegetation clearing (PCT834 Forest Red Gum – Rough-barked Apple – White Stringybark grassy woodland in dry valleys, southern South East Corner Bioregion). This is considered equivalent to the Endangered Ecological Community *Lowland Grassy Woodland in the South East Corner Bioregion*. (For the purpose of this report including native and exotic pasture grassland).	64,187
Disturbed grassland (included above for the purpose of this report, equivalent to PCT834).	(64,187)
Canopy area of twenty-five (25) trees to be removed @ 80m^2 per tree (approximate average) included above.	(2,000)

1.4 Sources of information used in this assessment

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

- Air photo (SIX maps, NearMap)
- Survey map (PTC Consultants)
- Vegetation map (Tozer et al., 2010)
- Schedules to the BC Act 2016
- Schedules to the EPBC Act 1999
- State Environmental Planning Policy (Biodiversity and Conservation) (SEPP 2021) - Koala habitat protection 2020/2021
- Approved Recovery Plan: The Koala (DECC 2008)
- OEH Atlas of NSW Wildlife



2. Landscape features of the site and the locality

2.1 Site description

For the purposes of this report, the site (Figure 3) is defined by the property boundaries of Lot 2, DP 1281576, Moruya NSW. The site of the new work is located near the NSW south coast town of Moruya (Figure 1). The site is located within Lot 2, DP 1281576, a large vacant greenfield site.

To the west of the site is Moruya TAFE, and to the north is a small residential subdivision called Mynora Estate.

The full boundaries of the proposal area are displayed in Figure 4. It is approximately 21.87 ha. in size and the elevation is approximately 5 - 24 metres above sea level. The site is zoned R2 residential (Figure 7).

The site is defined as the proposal footprint of the proposed works.

The adjacent properties (Figure 1, Figure 3, Figure 7) are a mix of residential and grazing agricultural land uses.

The vegetation (Figure 10, Figure 11) is described in detail in Section 5 below and fauna habitat is detailed in Section 6 below.

2.2 History of the site

The site is part of an agricultural landscape comprising cropping and grazing. These activities have likely been carried out for more than 100 years.

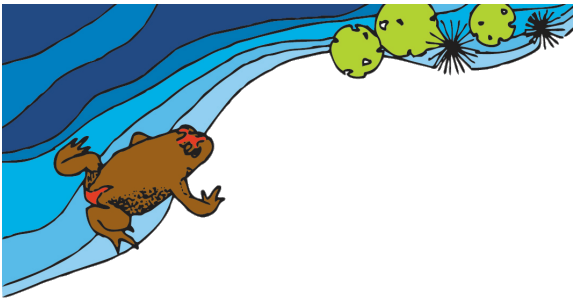
2.3 Drainage lines

2.3.1 Definition of a "river"

The definition of a watercourse has been discussed by Mark Taylor and Robert Stokes in a paper "Up the creek: What is wrong with the definition of a river in New South Wales?" ((2005) 22 EPLJ 193)
Taylor and Stokes pointed out that "as Lloyd J observed in Maule v Liporoni (2002) 122 LGERA 140 at 171, the fact that a "river" is shown on a topographical map does not prove the existence of a river at law" (Stokes p200).

Three Forms of stream are identifiable (Taylor & Stokes 2005):

- Perennial stream: A stream which flows all year. A dynamic drainage network also includes intermittent streams and ephemeral streams but there should always be flow in a perennial stream channel. For much of the time this flow may be in the form of base flow or delayed flow except when quick flow occurs after rainstorms.



- Intermittent stream: A stream is classified as intermittent if flow occurs only seasonally when the watertable is at maximum level. The drainage network is composed of ephemeral, intermittent and perennial streams and the network expands during rainstorms and extends to limits affected by antecedent conditions especially antecedent moisture. Flow may occur along intermittent streams for several months each year but will seldom occur when the water table is lowered during the dry season.
- Ephemeral stream: A stream which is often one of the outer links of the drainage network and which contains flowing water only during and immediately after a rainstorm which may be fairly intense. As the water flows along the ephemeral channel it may infiltrate into the channel bed as a transmission loss by influent seepage and therefore the peak discharge may decrease downstream along the ephemeral channel by as much as 5% per km of channel. In arid and semi-arid areas of the world ephemeral streams are very extensive and represent the major channel type.

Structural features of a watercourse

Features (Table 1) that one would expect to find in a "normal" river system include such structural forms as fluvial sediments, well-defined beds and banks or habitat for aquatic flora and fauna (Taylor & Stokes p 206). Strahler (1952, 1964) indicates that only channel networks with intermittent and perennial stream flow should be used in stream ordering,

Table 1: Informal characteristics of a watercourse (based on Taylor & Stokes 2005)

Character of the drainage swales	Present on site
Are there definable channel banks and a channel bed?	No
Are there fluvial bedforms eg pools, riffles, sediment point bars etc and if so what are they?	No
Is there any evidence for substantial erosion from water flow within the drainage feature?	No
Are there any spring lines that may indicate seasonally intermittent or perennial flow?	No
Is the catchment large enough to sustain perennial or intermittent groundwater flow?	No
Are there any indicators of prolonged wetness within the drainage feature?	No
If surface flow is present, is it continuous and how extensive across the base of the drainage feature is it?	No
Are there any visible habitats that might sustain aquatic fauna?	No
Are there any aquatic flora present that would require periods of uninterrupted moisture?	No

Catchment area of less than 20 hectares is another informal measure to indicate a potential threshold for a watercourse (Taylor & Stokes, p 208). On this site the catchment above the southern drainage line is 12.6ha and the northern catchment 7.5 ha (Figure 14, Figure 15).

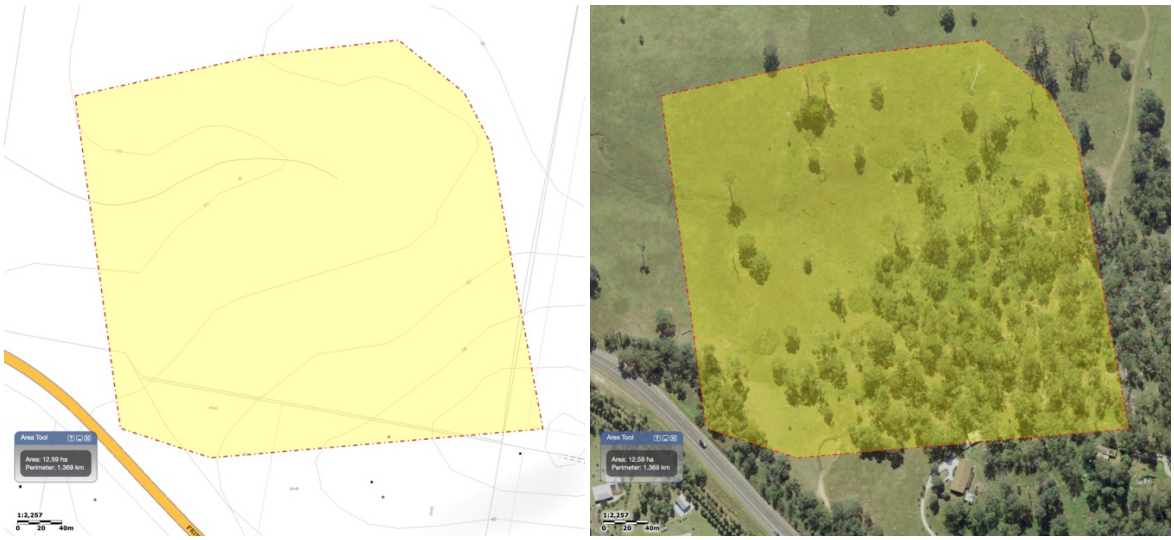


Figure 16: Southern catchment 12.6 ha

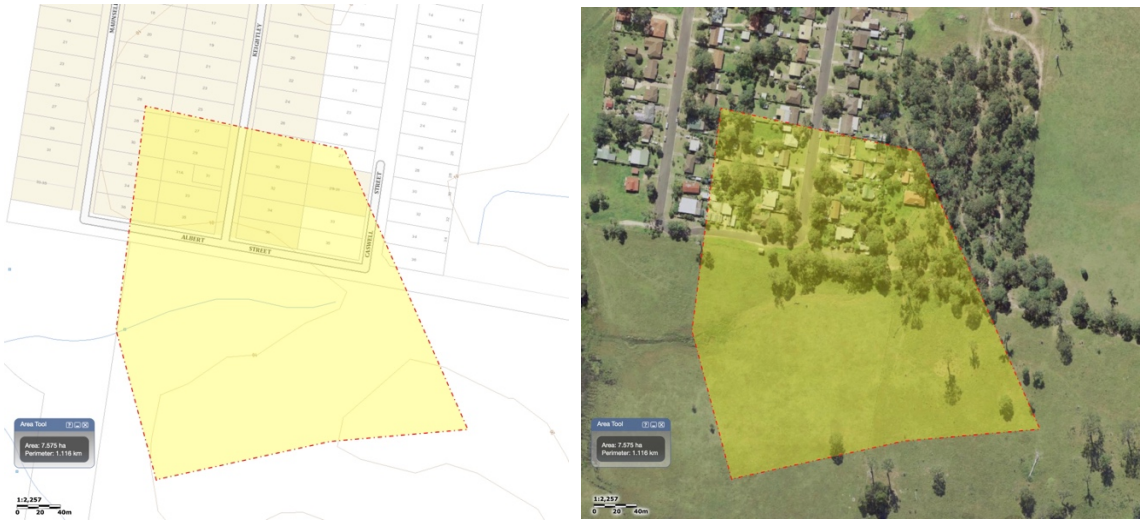


Figure 17: Northern catchment 7.5 ha

Two first order Strahler watercourses are mapped on the western part of the site. These 'mapped watercourses' are tributaries of Racecourse Creek. Racecourse Creek flows into the Moruya River. The drainage lines on the site do not display in general the typical features of a structured watercourse. There is no obvious "bed and

banks", and there is no aquatic vegetation in the drainage lines that is a defined riparian community (Taylor & Stokes 2005). The vegetation along the majority of the drainage lines is similar to nearby pasture. The two ephemeral drainage lines, which structurally form two broad swales, carry overland flow to the western boundary and feed a band of wetland vegetation connecting the swales. On the basis of those criteria there is no "river" on the site.

Four small farm dams ("constructed wetlands") are present on the site. The largest farm dam has a surface area of about 250 m2. Within the dams and the upslope margin from the dams vegetation typical of wetter areas was recorded.

The native Water Couch Paspalum distichum is distributed as scattered patches in the small farm dams on the drainage lines and in the lower wetland on the western boundary. Pasture species of grasses, sedges and forbs extend through the drainage swales. The pasture extends to the flood plain. It may have originally been Swamp Oak Floodplain Forest at the western boundary but has now only some small Casuarina glauca She-oaks present.

The provisions of the Water Management Act 2000 do not apply to drainage swales and therefore a Controlled Activity Permit is not required under that Act.

However, the north drainageline has been mapped under the Eurododalla Local Environmental Plan 2012 planning layer Riparian Lands and Watercourse Map (Figure 16). As a gazetted feature, being a Category 3 stream (Figure 17), the LEP provisions are to be addressed.

Figure 18: Eurobodalla LEP 2012 ePlanning Spatial viewer Map

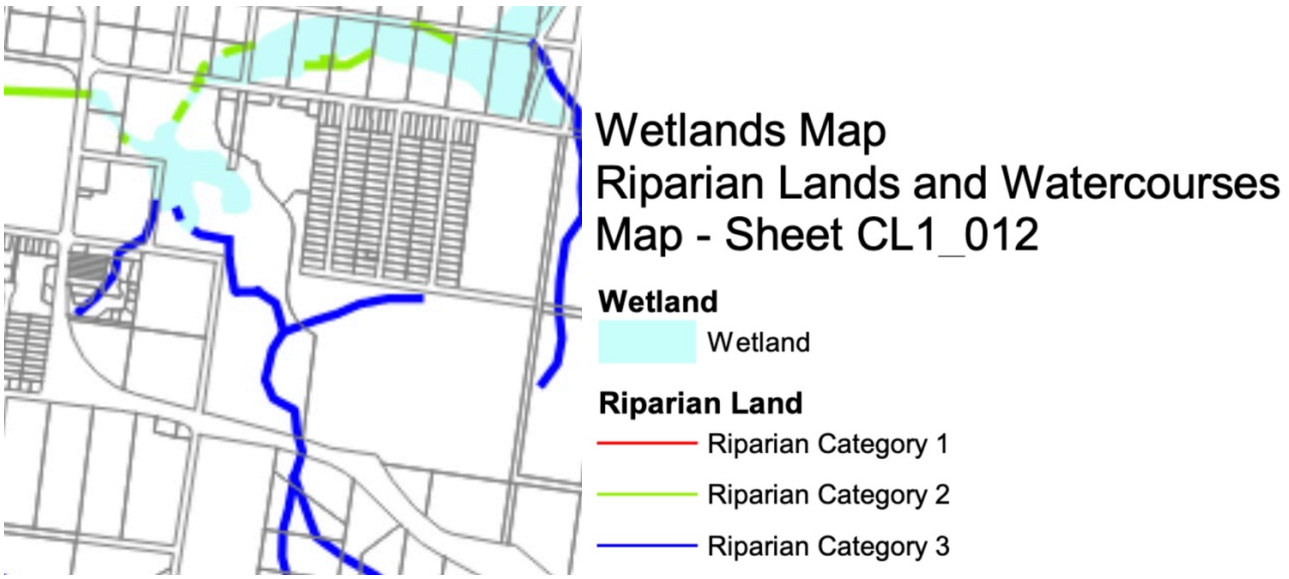
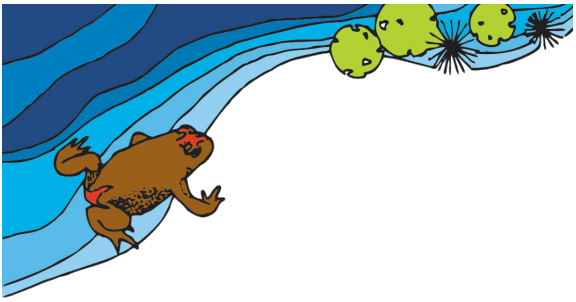


Figure 19: Eurobodalla LEP 2012 Riparian Lands and Watercourse Map

Source: https://eplanningdlprod.blob.core.windows.net/pdfmaps/2750_COM_CL1_012_080_20190307.pdf



2.3.2 Eurobodalla Local Environment Plan 2012

6.7 Riparian lands and watercourses

(1) The objective of this clause is to protect and maintain the following—

(a) water quality within watercourses,

(b) the stability of the bed and banks of watercourses,

(c) aquatic and riparian habitats,

(d) ecological processes within, and continuity and connectivity between, waterways and riparian areas.

(2) This clause applies to land identified as follows on the Riparian Lands and Watercourses Map and situated within the distances specified below in relation to the top of the bank of the watercourse concerned—

(a) Riparian Category 1 watercourse—40 metres,

(b) Riparian Category 2 watercourse—20 metres,

(c) Riparian Category 3 watercourse—10 metres.

(3) Before determining a development application to carry out development on land to which this clause applies, the consent authority must consider whether or not the development—

(a) will cause any adverse impact on the following—

(i) water quality and flows within a watercourse,

(ii) aquatic and riparian species, habitats and ecosystems,

(iii) the stability of the bed, shore and banks of a watercourse,

(iv) the free passage of fish and other aquatic organisms within or along a watercourse,

(v) any future rehabilitation of the watercourse and riparian areas, and

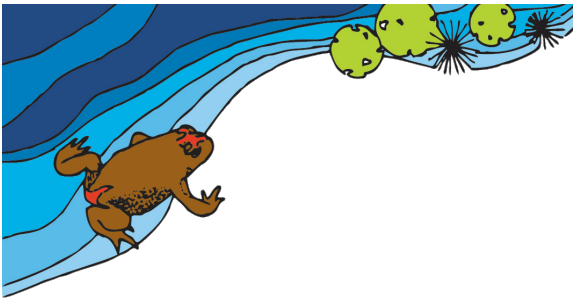
(b) will increase water extraction from a watercourse.

(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that—

(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or

(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.



LEP considerations:

The drainage line on the site is mapped as a Category 3 stream, requiring a 10 metre riparian protection zone. Consideration of the provisions of the LEP 2012 are as follows:

- (3) (a) (i) Since the watercourse is a grassy swale it has a natural mitigation function. Water quality and water flows are not relevant considerations for this drainage line. The proposed works as proposed will capture flows and mitigate peak volume and flow rate, thus enhancing the function of the swale.
- (3) (a) (ii) Since there are no "aquatic and riparian species, habitats and ecosystems" within the swale drainage line there can be no adverse impacts on such features.
- (3) (a) (iii) Since there are no structural features of bed, shore or banks present within the drainage swale, the stability of the bed, shore and banks of a watercourse is not a relevant consideration.
- (3) (a) (iv) Since there is no watercourse, the free passage of fish and other aquatic organisms within or along a watercourse is not a relevant consideration.
- (3) (a) (v) Since there are no structural features of a watercourse consideration of any future rehabilitation of the watercourse and riparian areas is not a relevant consideration.
- (3) (b) Since the works are detention basins with no permanent storage there will be no extraction from the watercourse.
- (4) (a) The works are placed to avoid significant ecological values and avoid the woodland.
- (4) (b) Since the works achieve avoidance of significant impact there is no need to consider the "minimise" criterion.
- (4) (c) Since the works achieve avoidance of significant impact there is no need to consider the "mitigate" criterion.

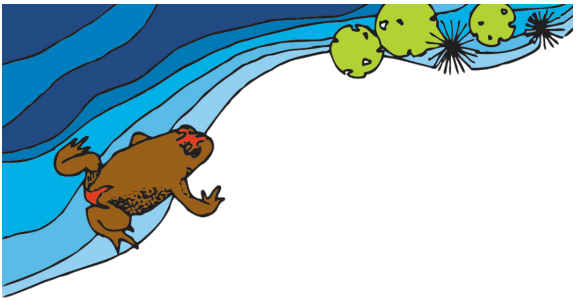
2.3.3 Controlled Activities

Permissible use on a first order stream

If the regulator determines that the blue line does in fact represent a true watercourse, as opposed to the site conditions, structures as proposed as permissible.

The guideline "Controlled activities on waterfront land - Guidelines for riparian corridors on waterfront land" allows works on a first order stream including online detention basins, stormwater outlet structures and essential services, stream realignment and road crossings.

https://www.nrar.nsw.gov.au/__data/assets/pdf_file/0003/367392/NRAR-Guidelines-for-controlled-activities-on-waterfront-land-Riparian-corridors.pdf



The criteria (page 4) comprise:

"**Detention basins**: Detention basins can be built in the outer 50 per cent of the VRZ [Vegetated Riparian Zone] or online where indicated. Refer to the Office of Water's Controlled activities. Guidelines for outlet structures and Controlled activities. Guidelines for instream works. Online basins must:

- be dry and vegetated
- be for temporary flood detention only with no permanent water holding
- have an equivalent VRZ for the corresponding watercourse order
- not be used for water quality treatment purposes."

Harvestable rights

The size expressed as volume of farm dams is regulated.

https://legislation.nsw.gov.au/view/pdf/asmade/sl-2022-211

A calculation is to be made in order to build a farm dam if the structures are designed to permanently hold water.

The Farm Dams Assessment Guide was released in August 1999 in order to implement the Farm Dams Policy. It provides that:

Harvestable Right dams can be placed on 1st and 2nd order watercourses (except where these watercourses have permanent flow) as shown on topographic maps and where no watercourse is shown. However the structures are detention basins rather than farm dams so harvestable rights are not a relevant consideration.

In summary, the works do not trigger any further consideration of impacts on any watercourse.

2.4 Geology

Devonian I-type granites.

Lithology; I-type granite. These granites are interpreted to form by melting of igneous source rocks. Common minerals are quartz, feldspar, and biotite. The presence of amphibole is characteristic.

https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU&runWorkflow=AppendLayerCatalog&CatalogLayer=Industry_Map_Catalog.42.Unit%20Boundaries%20and%20Faults,Industry_Map_Catalog.42.Rock%20Unit%20Pattern%20Fills,Industry_Map_Catalog.42.Rock%20Unit%20Polygon%20Colours)

2.5 Site Soils

There are three Great Soil Groups on site, consisting of yellow podzolic soils, brown podzolic soils, and black earths (Figure 8).

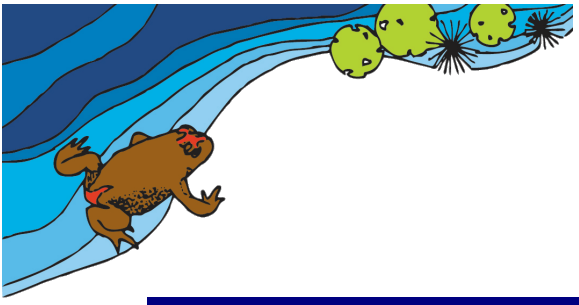
2.6 Landscape features

The following landscape features are present on the site (Table 2).

Table 2. Significant features and observations

Significant features	Observations
Shelter/nesting/roosting sites and diversity	There are hollow-bearing trees in the site (proposal footprint). These habitat trees have been found to provide nesting and roosting sites for several species. Several brush-tailed possums were seen emerging from hollows.
Food resources	Eucalyptus, Acacia, and Angophora provide food resources of blossoms and seeds. Sparse cover of fallen and rotting material is present near the base of remnant trees.
Vegetation layers and density of cover	Leaf litter presence is sparse/rare in the grassland habitat. Leaf litter presence was moderate in the woodland habitat. The canopy provides approximately 50-75% cover in the remnant woodland. The tree cover in the grassland is <1%.
Clearing	The age classes of the trees within the retained forest within the proposal footprint suggest that disturbance has occurred historically. This is also consistent with the historic air photo.
Fire damage and regrowth status	Nil
Vehicle traffic and road mortality	No road kill was observed on the site, but road mortality is expected to have been historically high.

The site has been in its present state since at least 1961 (Figure 9).



3. Assessment methods

3.1 Subject land context methods

3.1.1 Landscape feature method

Landscape features were investigated using a combination of desktop work and fieldwork.

The GIS was used to determine the Mitchell Landscape. The GIS dataset "*Native vegetation of SE NSW"* was for the desktop assessment of mapped native vegetation on the subject land and in the locality.

The field assessment focused on the works footprint and nearby land. Nearby landscape features were checked as required.

3.1.2 Native vegetation local extent

Native vegetation was derived from the GIS dataset "Native vegetation of SE NSW". A comprehensive ground-based assessment of the accuracy of the GIS mapping 'offsite' within 1500 m of the development site was not undertaken during the preparation of this report.

3.2 Native vegetation, threatened communities and vegetation integrity method

3.2.1 Existing background information

Following the vegetation survey of the subject land, plant species records were compared to BioNet VIS and the publication of Tozer *et al.* (2010) (Figure 10). The NSW SEED website was reviewed for local vegetation mapping.

3.2.2 Mapping native vegetation extent method

Vegetation zones within or near the development footprint were mapped using a combination of aerial imagery and groundwork. As discussed previously, the definition of native vegetation is broad. Consequently, all vegetation within or near the development footprint is mapped as a form of native vegetation.

The GIS dataset "Native vegetation of SE NSW" was appropriate for the locality.

For this BDAR, the woodland has been identified as the Endangered Ecological Community Lowland Grassy Woodland in the South East Corner Bioregion (EEC). [Unique Identifier is '20070']

Onsite vegetation mapping is shown in Figure 10, Figure 11 and Figure 15.

3.2.3 Previous vegetation mapping and community relationships

The NSW SEED website was referenced for vegetation mapping within and near the development footprint, per 'Southeast NSW Native Vegetation - VIS 2230'. The SVTM_NSW_Extant_PCT (July 2022) was also referenced for comparison.

Documents referenced to establish the genealogy and nomenclature of the equivalent EPBC community included:

- Conservation Advice for *Lowland Grassy Woodland in the South East Corner Bioregion* (2013),
- Draft listing advice and conservation advice for the Illawarra and south coast lowland grassy woodland ecological community (2016),
- Approved conservation advice (incorporating listing advice) for the Illawarra and south coast lowland forest and woodland ecological community (August 2016).

Collectively, extant vegetation mappings and descriptions, including recent PCT definitions, have become confusing (e.g. 'southeast' vs 'south coast' designators in our context) and require clarification of the 'legal' and the floristic relationships between them. Therefore, relevant definitions and mappings are adduced as follows to establish their relationship(s) to the site native vegetation.

3.2.4 Genealogy of vegetation nomenclature

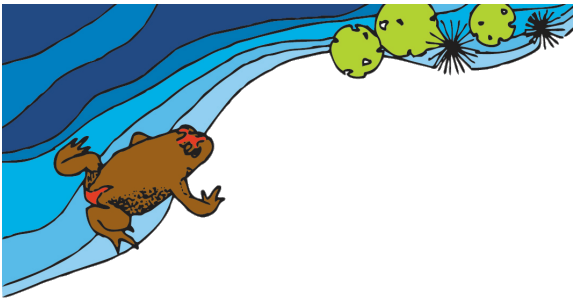
All site woodland qualifies as Endangered under the state BC Act 2016, and as Critically Endangered under the Commonwealth EPBC Act Critically Endangered (16-Feb-2013), as established by the following lineage.

'Southeast NSW Native Vegetation – VIS 2230' mapping [SEED portal] maps two vegetation communities within or near the development footprint:

1. South Coast Lowland Swamp Woodland (Class p3) – as small scattered areas near the centre of the works footprint and on part of the northern boundary (near Keightley Street);
2. Southeast Lowland Grassy Woodland (Class e20 p229) – as woodland canopy across the south-east corner of the subject land (includes the adjacent property 'Spring Hill').

[https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU]

The first is listed under the BC Act 2016 as part of the EEC Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion [Tozer, 2010; Appendix 3, p.212]. It is also included in the EPBC community. [Draft listing advice. 2016. p.4].



The second (e20 p.229) is listed under the BC Act 2016 as part of the EEC Lowland Grassy Woodland of the South East Corner Bioregion. [Tozer, 2010; Appendix 3, p.55]. It is also included in the EPBC community. [Conservation Advice, 2013. p.33].

The development site form of Southeast Lowland Grassy Woodland (p229) is equivalent to:

PCT 834: Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion.

Hence, under current mapping, all onsite woodland qualifies as Endangered under both the state BC Act 2016 and the Commonwealth EPBC Act 1999.

NSW State Vegetation Type Map (SVTM), updated June 2022, is referenced here for comparison purposes. The SVTM classifies the existing onsite woodland as:

PCT 4052: South Coast Low Hills Red Gum Grassy Forest.

This community remains part of the state-listed EEC Lowland Grassy Woodland in the South East Corner Bioregion - South East Corner.

[https://www.environment.nsw.gov.au/threatenedspeciesapp/profileData.aspx?id=20070&cmaName=South+East+Corner]

(That web page shows this community as (incorrectly) not listed under the EPBC Act.)

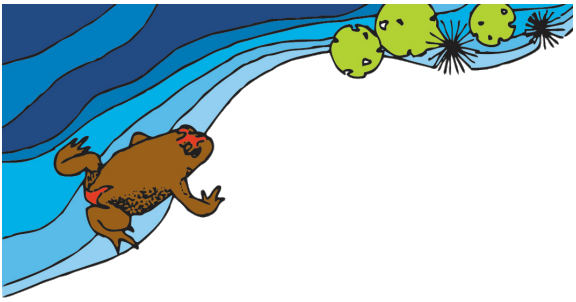
https://www.environment.nsw.gov.au/Topics/Animals-and-plants/Threatened-species/NSW-Threatened-Species-Scientific-Committee/Determinations/Final-determinations/2011-2012/Lowland-Grassy-Woodland-in-the-South-East-Corner-Bioregion-minor-amendment-Determination]

EPBC community

The EPBC community Lowland Grassy Woodland in the South East Corner Bioregion is listed as Critically Endangered (effective 16 February 2013).

The Conservation advice for Lowland Grassy Woodland in the South East Corner Bioregion (2013) indicates that this ecological community corresponds, entirely or in part, to the following vegetation classifications (p.13):

- 20 - Bega Dry Grass Forest - Keith and Bedward (1999).
- 21 - Candelo Dry Grass Forest - Keith (2002).
- 72 - Coastal Rainshadow Grassy Woodlands - Keith (2004).
- Coastal Valley Grassy Woodlands - Gellie (2005) and Thomas et al. (2000).



- 52 - Bega Valley Shrub/Grass Forest.
- 54 - Far South Coast Forest Red Gum Grass/Herb Dry Forest/Woodland.
- Far South Coast Grassy Woodland - Tozer et al. (2006).
- Southeast Lowland Grassy Woodland - Tozer et al. (2010) - GWe20p.229.

Of these, Southeast Lowland Grassy Woodland (Tozer et al. 2010 - GWe20p.229) is relevant for the site.

Allied EPBC community

The closely-allied community Illawarra and south coast lowland forest and woodland ecological community is listed as Critically Endangered under the EPBC Act 1999. It grades southward from its occurrence in the Illawarra region into Lowland Grassy Woodland in the South East Corner Bioregion (as for example around Moruya).

By way of distinction, the Conservation advice for Lowland Grassy Woodland (2013) indicates that:

"Angophora floribunda does occur in this community but is not a characteristic species (as it often is in the Lowland Grassy Woodland ecological community). The understorey is not typically grassy (unlike the grassy understorey of most patches of the Lowland Grassy Woodland ecological community). It also includes drier communities on ridges and slopes and moist communities on the lower escarpment (NSW Scientific Committee, 1999)." [p.34]

The Draft listing advice and conservation advice for the Illawarra and south coast lowland grassy woodland ecological community (2016) indicates that:

"The ecological community encompasses the NSW listed endangered ecological community 'Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion' (NSW Scientific Committee, 1999)." [p.4].

Further, that:

"Two units described by Tozer et al (2010): GW p3 'South coast lowland swamp woodland' and 'GW p34' South coast grassy woodland' are considered to be approximately equivalent to the [EPBC] ecological community. These are estimated to have occupied between 17,667 ha and 42,667 ha before 1750. Of this approximately 4 200 ha remains. This represents a decline of approximately 76-90% in area of occupancy." [p.17];.....

"In the northern part of its range, the ecological community corresponds largely with the NSW listed 'Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion'." [Section 1.8.1, p.17];.....

"At the southern edge of the ecological range, near Moruya, the ecological community grades into the EPBC listed 'Lowland Grassy Woodland in the South East Corner Bioregion', and the similarly named NSW listed ecological

community. Similar to Illawarra and south coast lowland grassy woodland, that ecological community frequently has a canopy dominated by *Eucalyptus tereticornis* (forest red gum), as well as a grassy and sometimes shrubby understorey (although a continuous grassy cover is more typical)." [Section 1.8.1, p.18];.....

"The ecological community wholly or partially corresponds with.....

Tozer et al. (2006) map units GW p3 'South Coast Lowland Swamp Woodland' and GW p34 'South Coast Grassy Woodland'. South Coast Illawarra Vegetation Integration (SCIVI).

Tozer et al. (2010) map units GW p3 'South Coast Lowland Swamp Woodland' and GW p34 'South Coast Grassy Woodland'." [Section 1.7, p.17].

Tozer et al. (2010) identifies 4200 ha. If remnants <0.1ha are excluded due to likelihood of errors in spatial interpretation the remaining area is 4032 ha.

The community GW p34 'South Coast Grassy Woodland' (Tozer, 2010) is equivalent to:

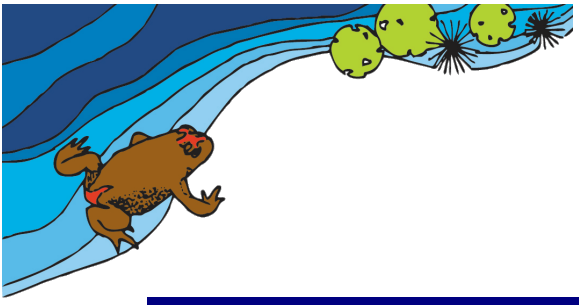
> PCT 838: Forest Red Gum - Thin-leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion.

[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjs2Yy5-Or5AhVsSWwGHTzPAuUQFnoECAsQAQ&url=https%3A%2F%2Fwww.environment.gov.au%2Fsystem%2Ffiles%2Fpages%2F7759f859-bd17-4edb-84bb-51e06ff1462f%2Ffiles%2Fdraft-listing-advice-illawarra-south-coast-lowland-grassy-woodland.docx&usg=AOvVaw1ocQ1lo2j9wmuAoSf55rNv]

The subsequent Approved conservation advice (incorporating listing advice) for the Illawarra and south coast lowland forest and woodland ecological community (approved 26 Aug 2016, effective 16 Sept 2016), indicates that:

"In the South East Corner Bioregion the ecological community grades into the EPBC listed 'Lowland Grassy Woodland in the South East Corner Bioregion', and the similarly named NSW listed ecological community. This may occur as far north as Milton." [Section 2.9, p.18]

[https://www.environment.gov.au/biodiversity/threatened/communities/pubs/144-conservation-advice.pdf]



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:

Licensed Report of all Valid Records of Threatened (listed on *BC Act 2016*) or Commonwealth listed Entities for a 5 km radius of the site (selected area [North: -35.87, West: 150.04, East: 150.15, South: -35.97]). Records since 01 Jan 2000 returned a total of 87 records of 26 threatened flora and fauna species.

Data from the BioNet 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 (^ rounded to 0.1°; ^^ rounded to 0.01°). Copyright the State of NSW through the Office of Environment and Heritage.

These species (Table 3) were considered in designing field survey targets and methods. Unsuitable candidates were eliminated on the basis of habitat requirements (Appendix 5).

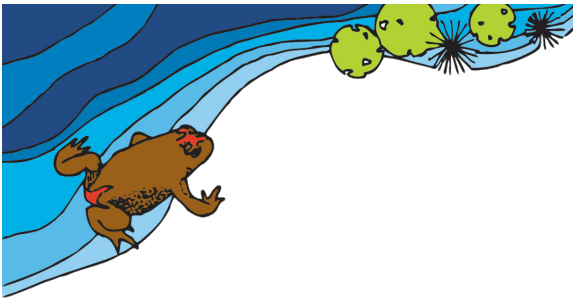
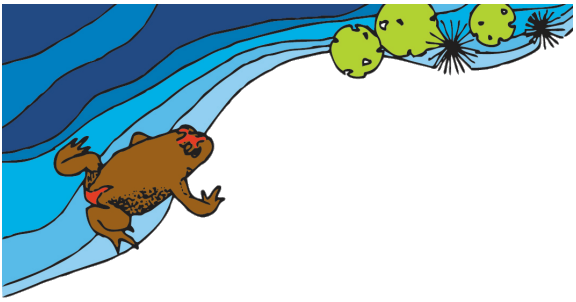


Table 3: BioNet threatened flora & fauna species records for a 5 km radius of the site since 1 Jan 2000.

Scientific Name	Common Name	NSW status	Comm. status
Haliaeetus leucogaster	White-bellied Sea-Eagle	V,P	
Lophoictinia isura	Square-tailed Kite	V,P,3	
Haematopus longirostris	Pied Oystercatcher	E1,P	
Thinornis cucullatus cucullatus	Eastern Hooded Dotterel	E4A	V
Numenius madagascariensis	Eastern Curlew	P	CE,C,J,K
Callocephalon fimbriatum	Gang-gang Cockatoo	V,P,3	
Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P,2	
Glossopsitta pusilla	Little Lorikeet	V,P	
Lathamus discolor	Swift Parrot	E1,P,3	CE
Ninox strenua	Powerful Owl	V,P,3	
Tyto novaehollandiae	Masked Owl	V,P,3	
Calamanthus fuliginosus	Striated Fieldwren	E1,P	
Anthochaera phrygia	Regent Honeyeater	E4A,P	CE
Stagonopleura guttata	Diamond Firetail	V,P	
Dasyurus maculatus	Spotted-tailed Quoll	V,P	E
Phascolarctos cinereus	Koala	V,P	V
Petaurus australis	Yellow-bellied Glider	V,P	
Petaurus norfolcensis	Squirrel Glider	V,P	
Petauroides volans	Greater Glider	P	V
Petauroides volans	Greater Glider population in the Eurobodalla local government area	E2,P	V
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P	
Myotis macropus	Southern Myotis	V,P	
Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P	
Persicaria elatior	Tall Knotweed	V	V



survey and 5 part tests.

Scientific Name	Common Name	NSW status	Comm. status
Hieraaetus morphnoides	Little Eagle	V,P	
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	
Lophoictinia isura	Square-tailed Kite	V	
Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P,2	
Glossopsitta pusilla	Little Lorikeet	V,P	
Lathamus discolor	Swift Parrot	E1,P,3	CE
Ninox strenua	Powerful Owl	V,P,3	
Tyto novaehollandia	Masked Owl	V,P,3	
Daphoenositta chrysoptera	Varied Sittella	V	
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	
Phascolarctos cinereus	Koala	V,P	E
Petaurus australis	Yellow-bellied Glider	V,P	
Petaurus norfolcensis	Squirrel Glider	V,P	
Petauroides volans	Greater Glider	P	V
Petauroides volans	Greater Glider population in the Eurobodalla local government area	E2,P	V
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P	
Myotis macropus	Southern Myotis	V,P	
Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P	
Thesium australae	Austral toadflax	V	V
	Lowland Grassy Woodland in the South East Corner Bioregion	EEC	

Species for which suitable habitat occurs on the site within the range of the species but which did not appear in the Atlas record were added to Appendix 5. Targeted surveys were made for relevant threatened species (

Table 4, Appendix 6).

4.2 General comment about field work

The field work results discussed in this report combines formal fieldwork on adjacent lands to the north and south as well as within Lot 2, in summer, autumn, winter and spring seasons. Casual observations were made during field surveys at other times for arborist and bushfire assessments by the Abel Ecology team.

4.3 Field work effort

The development site overlaps three lots: Lot 2 DP1281576 (the main site) Princes Highway, Moruya, NSW, Lot 69 DP752151 (site to the north) and Albert Street road reserve (to the east of Caswell Street and to the west of Lot 1 DP125563). Multiple fauna surveys of the proposed development site were undertaken on four separate occasions, the 22th February 2021, 12th, 13th and 14th of April 2021, 25th, 26th, 27th 28th and 29th of October 2021 and 11th, 12th, 13th, 14th, and 15th July 2022.

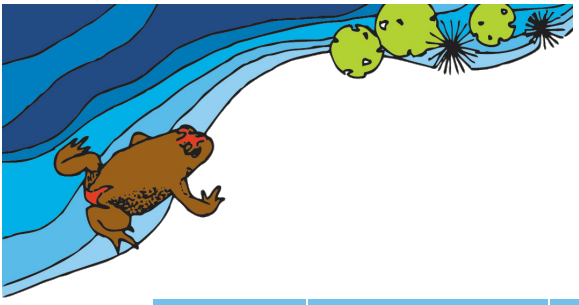
From the 12th to the 14th of April 2021, a total of 51 hours were spent undertaking survey work on the site and surrounding habitat areas. From the 25th to the 29th of October 2021, a total of 258.8 hours were spent undertaking formal fauna and flora survey work on the site and surrounding habitat areas.

Over the 14 days of fieldwork conducted over four visits over the last 18 months, a total of 459.22 hours has been spent undertaking survey work on the site and surrounding habitat areas (Table 5).

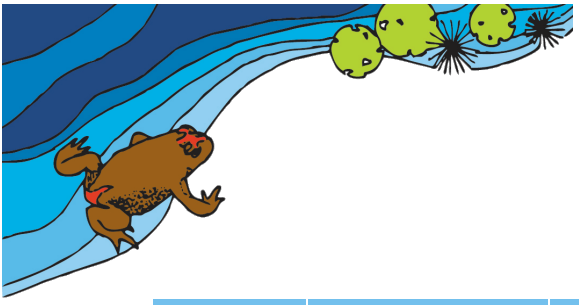
Survey effort was concentrated within the site boundaries (Figure 12), although adjacent surrounding vegetation was noted.

Table 5. Survey dates and weather conditions 2021 and 2022.

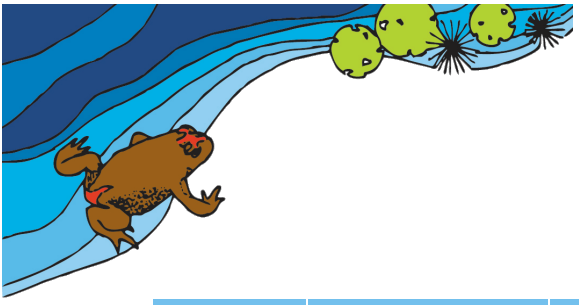
Date	Times	Staff	Weather (°C)	Task	Hours (hrs x no. people)
22Feb21	8:00 – 14:00	Mark Sherring, Danny Wotherspoon		Flora and fauna surveys. 20 m x 20 m plots, random meander, incidental observations, Site inspection.	6.0 x 2 = 12 hours
12Apr21	13:00 – 18:30	Jesse Cass, Danny Wotherspoon,	19°C to 15°C	Random meander method of site survey was used to collect list of flora species found on site. Stag watch.	5.5x2=11



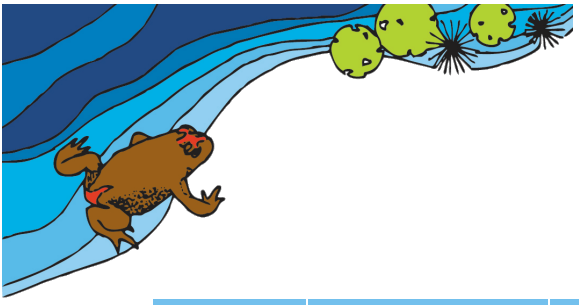
Date	Times	Staff	Weather (°C)	Task	Hours (hrs x no. people)
13Apr21	8:00 – 18:40	Jesse Cass, Danny Wotherspoon	7°C to 16°C	Systematic collection of flora data for arborist report, and continuous fauna search. Stag watch.	10 x 2 = 20
14Apr21	7:15 – 18:45	Jesse Cass, Danny Wotherspoon	15°C to 18°C	Systematic collection of flora data for arborist report, and continuous fauna search. Stag watch.	10x2=20
25Oct21	16:00 to 17:30, 19:00 to 21:00	Jesse Cass, Warwick Fear, Mark Mackinnon, Daniel McDonald, Nathan Sharman, Mark Sherring, Danny Wotherspoon	10°C to 19°C	Spotlighting, arborist records, vegetation surveys, stag watch. Deploy reptile habitat boards and funnel traps.	1.5x7=10.5 2x7=14
26Oct21	08:10 to 17:30, 18:30 to 21:30	Jesse Cass, Warwick Fear, Mark Mackinnon, Daniel McDonald, Nathan Sharman, Mark Sherring, Danny Wotherspoon	6°C to 19°C	Spotlighting, arborist records, setting Elliot traps, setting camera traps, setting ANABAT, vegetation surveys	9.6x7=67.2 3x4=12
27Oct21	08:30 to 17:20 19:00 to 21:15	Jesse Cass, Warwick Fear, Mark Mackinnon, Daniel McDonald, Nathan Sharman, Mark Sherring, Danny Wotherspoon	13°C to 22°C	Spotlighting, arborist records, checking Elliot traps, checking camera traps, checking ANABAT, vegetation surveys	8.8x7=61.6 2.25x3=6.75
28Oct21	8:00 to 18:10	Jesse Cass, Warwick Fear, Mark Mackinnon, Daniel McDonald, Nathan Sharman, Mark Sherring, Danny Wotherspoon	13°C to 27°C	arborist records, checking Elliot traps, checking camera traps, checking ANABAT, vegetation surveys	10.1x7=70.7
29Oct21	8:40 – 11:00	Jesse Cass, Warwick Fear, Mark Mackinnon, Daniel McDonald, Nathan Sharman, Mark Sherring, Danny Wotherspoon	14°C to 29°C	Packing up camera traps, Elliot traps and pipe traps	2.3 x 7 = 16.1



Date	Times	Staff	Weather (°C)	Task	Hours (hrs x no. people)
Monday 11Jul22	12:30 – 16:30, 17:30 – 19:20 (JC) 12:08 – 17:10, 17:50 – 19:08 (MM) 13:30 – 17:10, 17:50 – 19:10 (DM & MS)	Jesse Cass, Mark Mackinnon, Daniel McDonald, Mark Sherring	7.1 to 16.1°C Max wind gust: 19km/h West Rain: 10.2mm in past three days	Setting up fauna survey equipment, stag watch and spotlighting, incidental observations	JC: 5.8 MM: 5.4 DM & MS: 5 5 x 2 = 10 Total = 21.2
Tuesday 12Jul22	9:40-12:50 13:20-16:50 18:00-20:45 (JC) 7:32-9:09, 10:35-13:22, 14:16-16:30, 16:30-18:08 18:45-20:49 (MM) 7:32-9:09 10:35-13:22 14:16-18:08 18:45-20:49 (DM & MS)	Jesse Cass, Mark Mackinnon, Daniel McDonald, Mark Sherring	2.2 to 15.2°C Max wind gust: 17km/hr West Rain: 13mm in past three days	Hollow inspections with drone, Glossy Black Cockatoo habitat assessment, BAM plot survey, stag watch, inspection of traps for fauna	JC: 9.4 MM: 10.33 DM: 12:40 MS:12.40 Total = 44.53



Date	Times	Staff	Weather (°C)	Task	Hours (hrs x no. people)
Wednesday 13Jul22	7:40-10:45 11:05-12:55 13:30-16:55 18:30- 19:32(JC) 7:47-8:40 8:40-10:46 11:13-12:49 13:41-16:54 16:54-17:28 17:55-19:32 (MM) 10:00-13:00 13:50-17:30 17:55-18:55 (DM & MS)	Jesse Cass, Mark Mackinnon, Daniel McDonald, Mark Sherring	6.5 to 14.2°C Max wind gust: 30km/hr SSW Rain: 13.2mm in the past three days	Field work, BAM plot survey, fauna trap inspection, tree hollow count, chewed cone search, SAT koala search, setting up Elliot traps, stag watch, koala drone survey.	JC: 9.37 MM: 9.98 DM: 7.67 MS: 7.67 Total= 34.69
Thursday 14Jul22	7:45-11:20 11:40-13:50 14:20-16:50 18-19:05 (JC) 7:47-8:42 8:42-11:22 11:54-13:48 14:23-16:41 16:41-19:41 (MM) 10:00-13:00 13:50-17:30 17:45-18:00 (DM & MS)	Jesse Cass, Mark Mackinnon, Daniel McDonald, Mark Sherring	5 to 15.5°C Max wind gust: 35km/hr South Rain: 3.2mm in the past three days	Field work, BAM plot survey, fauna trap inspection, Koala SAT survey, Stag watch, set up Elliot traps, spotlighting,	JC: 9.33 MM: 10.78 DM: 6.92 MS: 6.92 Total= 33.95



Date	Times	Staff	Weather (°C)	Task	Hours (hrs x no. people)
Friday 15Jul22	7:41-8:45 (MM, DM, MS)	Mark Mackinnon, Daniel McDonald, Mark Sherring	3 to 15.3°C Max wind gust: 19km/hr ENE Rain: 0.2mm in the past three days	Fauna trap inspection, packing away traps,	MM: 1 DM:1 MS: 1 Total= 3
Total					**459.22 hrs**

More details of the 2022 survey are shown in Appendix 6.

4.4 Flora survey method, vegetation community and habitat classification

A flora survey was conducted in April 2021 to compile vegetation descriptions and species lists for the site. An arborist report was conducted and used to compile a list of SEPP (Biodiversity and Conservation) 2021 (Koala habitat protection 2020/2021) (SEPP 2021) koala habitat trees. More vegetation BAM plots were surveyed in July 2022.

Trees were surveyed for habitat value.

Vegetation quality is assessed as described below (Section 4.5). The plant communities on site were classified according to the NSW VIS and Vegetation Integrity (VI) Scores calculated using the BAM-C calculator.

4.5 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

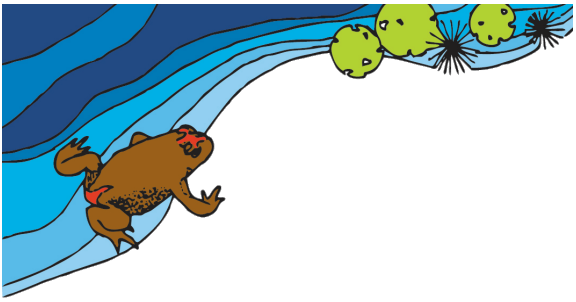
Characteristics: Relatively high indigenous species diversity, diversity of flora species growth form (mix of trees, shrubs and groundcovers etc), diversity of tree size, canopy layer regeneration observed, fallen logs present on the ground, dead vegetative litter (leaves, twigs etc) cover present, weed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

4.5.1 Plot-based vegetation survey method

Both the aerial photo investigation and the on-ground survey indicated that two vegetation zones are present within or near the site (Figure 11).

A preliminary walk-over assessment was undertaken to assess the variability of the vegetation in each zone. The woodland vegetation was relatively homogenous. In contrast, species composition and dominance individual species within the grassland vegetation appeared to vary across the development site.

A more thorough walk-over was conducted to determine if any broad patterns of species dominance were apparent. It was noted that aspect appeared to determine some of the patterns of species dominance within the pasture. Plots were placed in different parts of the pasture with the aim of surveying the influence of aspect on grassland characteristics.

The increased sampling of the grassland would also assist in determining if there were different vegetation zones within the grassland.

During the walkover assessment vegetation in areas where water tended to accumulate when flowing down slope and around dams was assessed. The aim of the assessment of these wetter areas was to determine if there was sufficient difference between the species composition of the pasture and the species composition of the wetter areas. No significant differences were observed.

4.5.2 Vegetation integrity survey method

Within each 400 m^2 plot (Figure 11), all vascular species that could be identified to genus or species within the BAM 2020 Vegetation Integrity plots were recorded. Bryophytes (mosses) that could be identified to genus were also recorded.

Percentage foliage cover of species was estimated.

The diameter at breast height over bark (dbh in centimetres) was measured from each tree with a diameter tape. For multi-stemmed trees, only the largest living stem was included in the dbh measurement. The presence of hollows and lengths of any fallen logs were recorded. This information was recorded for the full 20m x 50m plot.

Litter (and other matter) cover was recorded from five 1m x 1m plots placed alternately approximately at right angles, approximately five (5) metres from the long axis centre line of each 20m x 50m plot.

4.5.3 Location, size and shape of Vegetation integrity survey plots

The site is relatively large, and plots were generally easily located in each zone. All plots except one conformed to the standard plot shape and size of 20m x 20m nested within a larger 20m x 50m plot (Figure 11).

One plot (Plot 9) was placed in the neighbouring grazing property to the north. Access to this property was limited to the existing road reserve along the main northern boundary of the site owned by Eurobodalla Shire Council. Other road reserves are present adjacent to the grazing property. It is the understanding of Abel Ecology that the other road reserves near the east boundary of the site are owned by landholders and are now no longer in public ownership. These other road reserves were not surveyed.

The road reserve in the northern grazing property is twenty (20)m wide. It includes paddock trees and pasture. The plot was placed so that it sampled the pasture rather than the paddock trees. This was achieved by modifying the shape of the BAM 2020 VI plot. Two plots each 10m x 50m long were located within the grassland (pasture) section of the road reserve. A plot equal to 400m^2 was located within one of the 10m x 50m.

4.6 Threatened flora survey methods

4.6.1 Review of existing information

The following information provides guidance to the surveyors undertaking the flora survey.

The publication "Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method" provides relevant information.

Plantnet, the website of the NSW Royal Botanic Gardens, provides information about the habitat requirements of various threatened plant species.

Two publications by Archer (1984; 1987) provide background information about *Thesium australe* a member of the *Santalaceae*.

Mallory Barnes (NSW DPE) and other staff at DPE also provided additional information about *Thesium australe* in an email (15 February 2022).

The NSW government's online Threatened Biodiversity Data Collection also provided information regarding threatened species.

4.6.2 Habitat constraints assessment

There are broadly two habitats on the site:

1. Woodland that includes shaded areas beneath the trees and shrubs;
2. Pasture that includes wetter areas along the shallow drainage lines and in and around the dams.

Each of the habitat areas was surveyed.

4.6.3 Field surveys

A flora survey was conducted to collect the data required for the NSW Biodiversity Assessment Method. This included vegetation integrity plots recording:

1. species present;
2. foliage cover;
3. the number of large trees;
4. tree stem size diversity;
5. tree regeneration;
6. presence of hollows;
7. length of fallen logs and litter cover.

4.7 Fauna survey method 2021 and 2022

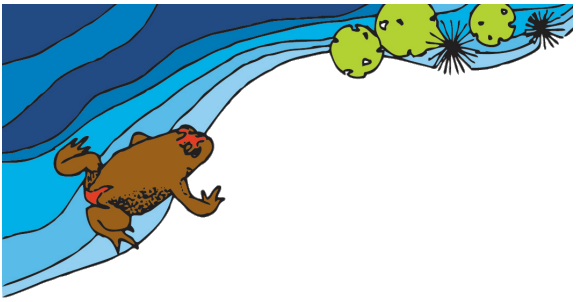
The methods of survey undertaken to detect the various faunal groups or their habitat are outlined below. Locations for specific survey methods are shown in Figure 11. Targeted surveys were made for threatened species based on records of sightings from the BioNet Atlas website, and the Ecologist's knowledge.

Dates, weather and temperatures of all fieldwork were recorded and are tabulated in Section 4.2 above.

4.7.1 Call playback

Call playback was undertaken on the site for the following species:

- Powerful Owl *Ninox strenua*
- Sooty Owl *Tyto tenebricosa* (Generally restricted to tall Wet Sclerphyll Forest)



- Masked Owl *Tyto novaehollandiae*
- Barking Owl *Ninox connivens*
- Yellow-bellied Glider *Petaurus australis*
- Koala *Phascolarctos cinereus*

4.7.2 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.

4.7.3 Trapping

Elliott and hair-tube trapping target small and medium-sized mammals. Trap sites were placed as a transect within the proposal area woodland Figure 12. Medium Elliot Live Traps (32 x 9 x 10cm) were placed on the ground and in trees. Large Elliot Live Traps (46 x 15 x 15cm) were placed on the ground. Three hair tubes were placed at each trap station, one with oat bait at ground level, one with oat bait, tree mounted, and one with fish bait alternating at ground level and tree mounted. Oat bait was a mixture of peanut butter, rolled oats, honey and sesame oil. Each trap site also included a tree mounted pipe trap (Harrison *et al.* 2018) baited with oat bait.

Large and small Elliot traps and pipe traps were used in 2022 at various locations across the site (Figure 12). Most traps (Appendix 6) were deployed elevated onto trees to prevent capture of any non-targeted terrestrial species which may occur in the area. Timber frames were installed onto each trees to support the Elliot traps in a horizontal position and to prevent the trap from falling. Pipe traps were held in place in trees using wire and positioned to be more accessible for fauna. Over three separate weeks (Table 5, Appendix 6), traps were deployed for four nights, bait was replaced where necessary, and all traps were inspected within one hour of sunrise each day. Elliot traps were closed after each inspection to prevent any non-targeted species entering the trap during the day. Traps were re-opened at the end of each day prior to sunset and conducting stag watches.

Hair tube traps were deployed alongside fauna traps onto trees to prevent the inspection of any non-targeted terrestrial species which may occur in the area. These traps were created from 60mm and 100mm diameter PVC piping, internally lined with double sided tape. Bait was placed in a chamber at the end of the PVC piping to entice fauna to enter the pipe where the animal would brush up against the tape. All hair-tubes were deployed during three separate weeks with targeted bait, for four nights, and were collected on the fifth day. All hair samples were sent off to a laboratory for testing and species identification.

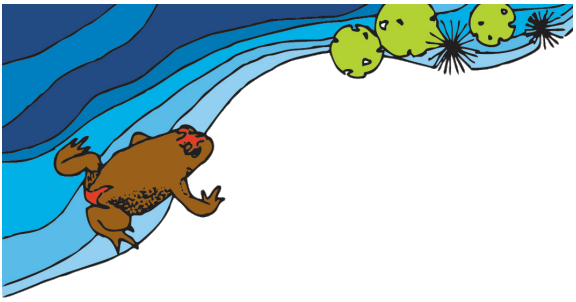
In an attempt to detect small reptiles an array of ten (10) habitat boards (500mm x 500mm) were placed in the south east woodland around rock outcrops among fallen tree trunks for four days 26th to 29th October 2021. Similarly, five (5) reptile funnel traps were deployed among fallen tree trunks for the same period. No reptiles were captured or observed with those methods.

4.7.4 Reconyx Wildlife camera

Two (2) Reconyx cameras were deployed on the 12th and 13th April 2021 at approximately 5pm and remained in their position until we returned to the site the following morning. The camera locations can be seen in Figure 12. The cameras faced towards suspected habitat trees. We sprayed honey water on the base of the tree, in view of the camera, as to attract any local fauna.

Two (2) Reconyx cameras were also deployed on the 26th of October 2021 at approximately 4pm and remained in their position until the 29th of October. Two (2) cameras were deployed again on 11th – 15th July 2022 (Appendix 6).

The cameras were installed on trees approximately one metre above ground level facing downwards. Honey water and bait were distributed in view of the camera to attract fauna.



4.7.5 Stag watching

During the survey period from 12th to 14th April 2021, a stag watch of hollow habitat trees was conducted for fauna. This consisted of quiet watching of a hollow tree for 30 minutes before dusk and 30 minutes after dusk to see what fauna emerged. Surveys for diurnal fauna species were conducted concurrently with flora surveys. Roads were briefly inspected when travelling to and from the site for road-kill fauna. Hollow bearing trees were surveyed by day for birds and night for nocturnal fauna.

During the survey period from the 25th to 29th October 2021, stag watches were also undertaken. This consisted of quiet watching of a hollow tree for 30 minutes before and 30 minutes after dusk to see what fauna emerged. Surveys for diurnal fauna species were conducted concurrently with flora surveys.

Stag watch survey was repeated for 11th – 15th July 2022 (Appendix 6).

Roads were briefly inspected when travelling to and from the site for road-kill fauna. Hollow bearing trees were surveyed by day for birds and night for nocturnal fauna. Searches were made on the basis of known local species records or habitat availability (Appendix 3).

A Jetbeam BC40 Pro LED spotlight was used to maximise detection by eyeshine and movement of fauna (Wotherspoon, D, (2019) Handheld spotlights for Night Field Survey. *Consulting Ecology* (43): 10-11.; Wotherspoon and Mackinnon (2020) Jetbeam BC40 Pro Handheld Spotlights for Night Field Survey. *Consulting Ecology* (45): 9-11).

4.7.6 Nocturnal fauna searches

Spotlighting was undertaken by two people for a total of one man-hour on (12th, 13th and 14th April 2021), each person using a Jetbeam BC40 Pro LED and 10 x 50 binoculars.

On the 25th, 26th, 27th and 28th of October 2021 spotlighting was undertaken by three people for a total of 32.7 man-hours, each person using a Jetbeam BC40 Pro LED and 10 x 50 binoculars.

The 11th – 14th July 2022 spotlight surveys were conducted over four (4) nights (Appendix 6), targeting Brush-tailed Phascogale *Phascogale tapoatafa* and Squirrel Glider *Petaurus norfolcensis*. The spotlight survey was conducted for approximately 1.5 hours each night by at least two staff members at any one time. The forest area in the southeast corner was favoured for most survey effort as it was the most likely area for observing Brush-tailed Phascogales, Squirrel Gliders and other nocturnal animals. Given the size of the site and previous survey events, the July 2022 spotlight survey was conducted in no specific structure or pattern. Each AE staff member conducted their spotlight survey in a different location each night.

Nocturnal searches may encompass all the surveying methods used during the day, but generally consist of either locating a live animal or recording its call. Nocturnal species, such as arboreal mammals, large forest owls, flying-

foxes and calling male frogs, are specifically targeted. Survey methods for microbats are outlined in Figure 12 and Table 6.

A Jetbeam BC40 Pro LED spotlight was used to maximise detection by eyeshine and movement of fauna.

4.7.7 Microbat ultrasonic call recording

The method for identifying free-flying bats by their species-specific echolocation calls is one that has become standard in the last two decades (*Richards 2001*). Insectivorous bats were surveyed on this site by Anabat recordings directly to cf storage zcaim, overnight (*Duffy et al. 2000*). Any other bat survey methods, such as brief survey time, is certain to miss bat species scheduled by the BC Act 2016. Scheduled species are recorded on average within 1.5 hours (94 ±64 minutes) of recording but up to four hours is required to record all threatened species present (Richards 2001). Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* has the largest home range and takes up to four hours to reliably appear at any point in its range. For a small site, any bats that appear in the first half hour are likely to be roosting nearby, with probability of recording 57% in the first half hour and 68% in the first whole hour (*Richards 2001*). Storage to zcaim provides high quality call recordings with very little noise, enabling high reliability in call identification. Flying-foxes and insectivorous bats were sought by nocturnal spotlight transects and searching for roost sites, and Anabat recordings were analysed. Opportunistic observations during fieldwork were noted.

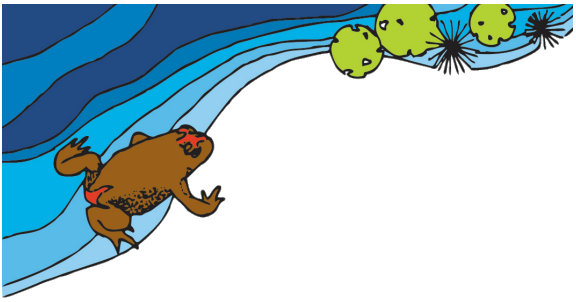


Table 6. Anabat recording dates and weather conditions.

Date	Times	Temperatures (^{O}C)	Weather
12th April 2021	5:30 pm to 6:30 pm	17 ^{O}C to 15 ^{O}C	Fine
13th April 2021	5:40pm to 6:40pm	17ºC to 16ºC	Fine
14th April 2021	5:30pm to 6:30pm	23ºC to 18	Fine
25th October 2021	7pm to 8am	10ºC to 19ºC	Fine
26th October 2021	7pm to 8am	6ºC to 19ºC	Fine
27th October 2021	7pm to 8am	13ºC to 22ºC	Fine
28th October 2021	7pm to 8am	13ºC to 27ºC	Fine

4.8 Koala survey July 2022

4.8.1 Koala habitat

A fauna survey on 11th to 14th July 2022 specifically targeted Koalas, with other species being covered incidentally (Appendix 6).

Table 7: Koala habitat on site

PCT ID	PCT Name	SEPP (Biodiversity and Conservation) 2021 Koala Tree Species Present	SEPP (Biodiversity and Conservation) 2021 Koala Tree Type
4052	South Coast Low Hills Red Gum Grassy Forest	*Allocasuarine littoralis*	Irregular/Low Use
		Angophora floribunda	Irregular/Low Use
		Eucalyptus bosistoana	High Use
		Eucalyptus eugenioides	High Use
		Eucalyptus tereticornis	High-Preferred Use

Suitable habitat (Table 7) occurs in the southeast corner of the site, in an area of intact woodland canopy. The entire site has been deemed as continuous suitable habitat, as all vegetation on site and the neighbouring properties are within 500m. No barriers to Koala movement exist onsite. Fences surrounding the site are potential barriers to movement, but the space between fence wires are sufficient enough for Koala to pass through.

The KMR Region for this survey has been identified as the South Coast Koala Modelling Region.

4.8.2 Survey summary

Spotlighting, SAT survey, and thermal drone surveys were used during the 2022 survey period (Table 8). These survey methods identified as the most appropriate for this site, given the size of the land and the vegetation structure being surveyed.

Table 8: Koala Survey Methods

Date	Start Time	Finish Time	Survey Method	Rainfall 72hours prior	Rainfall on survey day	Min/max temperature (°C)	Relative humidity %	Mean wind speed (kph)
11th July 2022	17:30	19:20	Spotlight	13.2mm	0mm	8.0/16.0	63	8.3
12th July 2022	13:00	17:00	SAT	13.2mm	0mm	6.4/16.3	53	5.8
	18:30	20:00	Drone Survey; spotlight	13.2mm	0mm	6.4/16.3	53	
13th July 2022	08:30	14:30	SAT	13.2mm	0mm	7.0/18.9	64	11.9
	18:00	19:30	Drone Survey; spotlight	13.2mm	0mm	7.0/18.9	64	
14th July 2022	18:00	19:05	Spotlight	4.0mm	0mm	7.4/15.5	48	13.7

4.8.3 SAT Survey

The SAT method was conducted by two surveying field ecologists, Jesse Cass and Mark Mackinnon, beginning on the 12th of July from approximately 1pm to 5pm, and then continuing the next day from approximately 8:30am to 4:30pm. This survey method was conducted to identify if Koalas have been using the site in the in the past, as well as serving as an additional method for increase Koala detection. The method detailed in section 4.1.3 of the Koala BAM Survey Guide was followed with no alterations to methodological approach. Given the size of the lot (<50ha) the 150m spacing grid method was most appropriate for this site. Where possible, all SAT sites followed the minimum sampling effort of 30 trees. Some locations, particularly the western and central portions of the site could not meet the minimum sampling effort without crossing over into other sampling zones/sites. In this instance we surveyed the maximum number of trees that could be surveyed before crossing into another sampling zone/site, as described in section 4.1.3 of the Koala BAM Survey Guide. The collected data varied slightly from the suggested format. Where it was recommended that we obtain a GPS waypoint for each surveyed tree, we collected a waypoint only for the SAT centre tree and used GPS tracking to show our position moving across the site from tree to tree (Figure 20).

4.8.4 Drone Survey

The drone survey was conducted as described in section 4.5.3 of the Koala BAM Survey Guide. Each night for approximately 1.5 hours a drone survey was conducted using thermal imaging. The drone was piloted solely by Jesse Cass. Real-time validation was achieved with 3 other team members (Daniel McDonald, Mark Sherring and Mark Mackinnon) responding to radio communication about potential Koala presence, and by using the spotlight attachment on the drone itself. The flight pattern (Figure 22) was conducted in the recommended 'lawnmower' pattern (as seen in Figure 9 of Koala BAM Survey Guide), with any hotspot that was detected communicated via radio to the closest team member. Said team member immediately moved to the drone's position to identify the source of the thermal hotspot and recorded the koala presence or absence. This method was recommended as to increase Koala survey accuracy and potential identification. As the site sloped, the height of the drone had to be constantly readjusted but maintained 30m above the canopy, as described in section 4.5.3. The survey of this site was conducted over two nights, night one focusing on the forest area in the southeast corner, and night two surveying the remainder of the site.

Meteorological conditions were identified using the BOM weather information for Moruya Airport, and appropriate flight details, logs and actions were recorded and executed as per CASA regulations.

Koala Surveyor: Dr Daniel McDonald

Supporting Personnel: Mark Mackinnon, Mark Sherring

Drone Pilot: Jesse Cass – Chief Remote Pilot, Botanist/Ecologist; Master of Environment Science and Management (enrolled)

4.8.5 Spotlight

Spotlighting was also carried on site, following similar methods to that listed in section 4.3.3 of the Koala BAM Survey Guide. While the guide says to utilise only 'spotlight or drone', we included spotlighting as to increase the chance of Koala detection while also searching for other threatened species that may have occurred on the site. Similar to that of the methodology listed in section 4.3.3, we surveyed the areas of suitable habitat on site. However, given the thin canopy layer present on site and the need to survey for other threatened species, we did not conduct the survey using the suggested transect methods. We instead conducted the spotlight surveys throughout the entire patch of woodland in the southeast corner of the site, the strip along the road reserve in the north, and the trees scattered throughout the middle of the site (Figure 20, Figure 21, Figure 22).

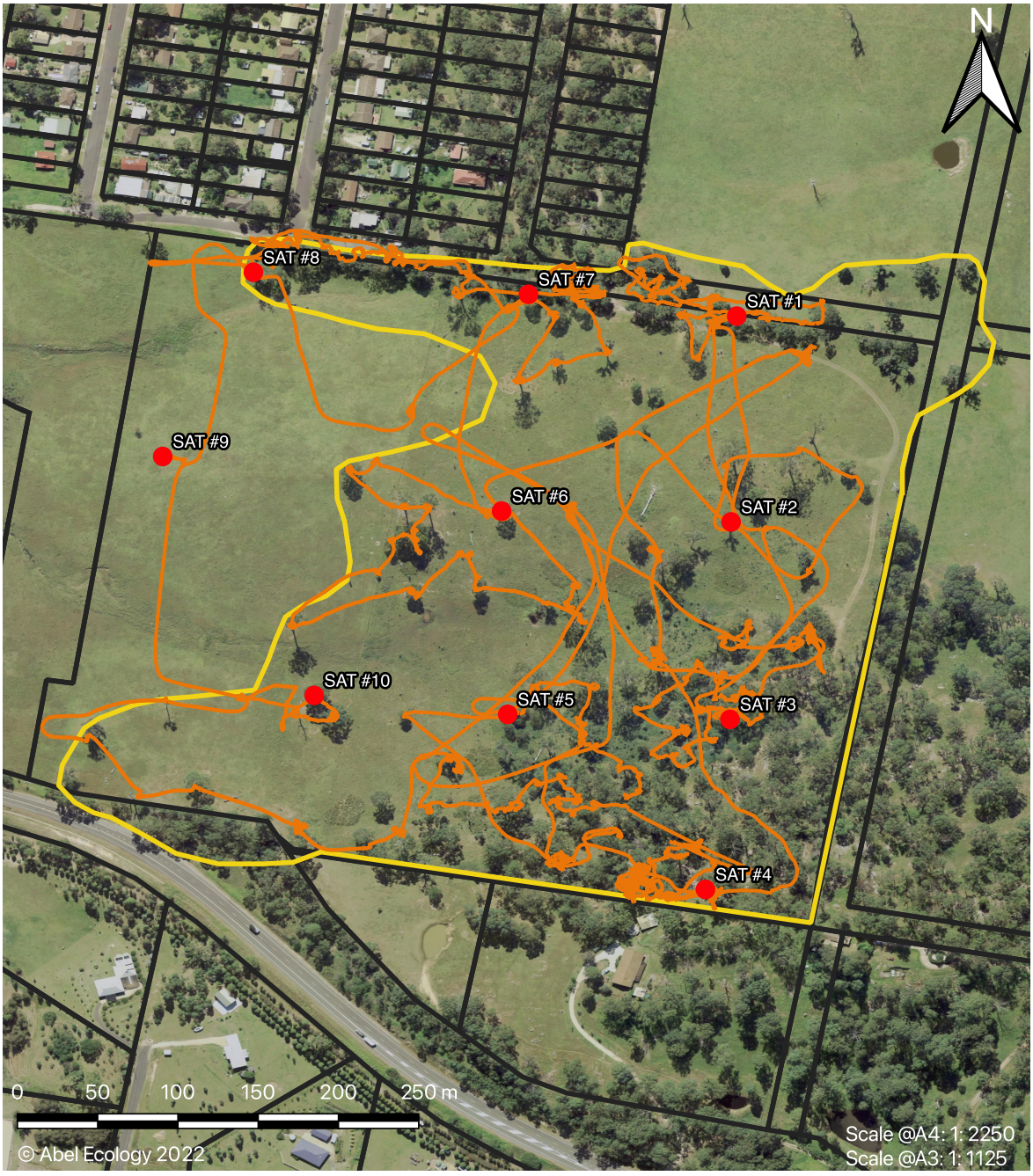
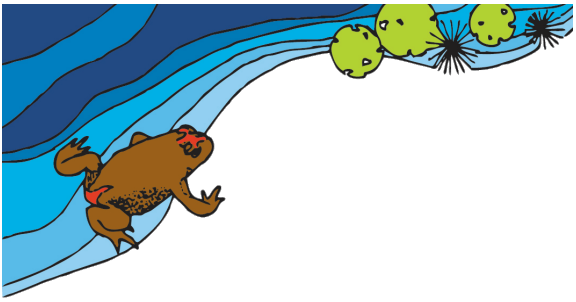


Figure 20: Koala SAT survey

Table 9: SAT survey record

SAT Site	GPS location (GDA2020 – MGA56)	Number of trees sampled	Tree species sampled	Scat present / absent
SAT #1	237973.581, 6020965.433	30	*Angophora floribunda* *Eucalyptus eugenioides* *Eucalyptus tereticornis*	Absent
SAT #2	237974.876, 6020807.743	30	*Angophora floribunda* *Eucalyptus eugenioides* *Eucalyptus tereticornis*	Absent
SAT #3	237978.658, 6020656.412	30	*Angophora floribunda* *Eucalyptus eugenioides* *Eucalyptus tereticornis*	Absent
SAT #4	237967.29, 6020525.679	30	*Angophora floribunda* *Eucalyptus eugenioides* *Eucalyptus tereticornis*	Absent
SAT #5	237840.118, 6020656.188	30	*Angophora floribunda* *Eucalyptus eugenioides* *Eucalyptus tereticornis*	Absent
SAT #6	237831.664, 6020811.83	18	*Angophora floribunda* *Eucalyptus tereticornis*	Absent
SAT #7	237843.415, 6020978.477	30	*Angophora floribunda* *Eucalyptus eugenioides* *Eucalyptus tereticornis*	Absent
SAT #8	237671.528, 6020990.198	28	*Angophora floribunda* *Eucalyptus tereticornis*	Absent
SAT #9	237619.211, 6020847.392	1	Unidentified conifer	Absent
SAT #10	237719.089, 6020667.096	20	*Angophora floribunda* *Eucalyptus eugenioides* *Eucalyptus tereticornis*	Absent



Information:

The 150m spacing grid method (Table 9) was used for this survey as the site was less than 50ha.

Where possible, all SAT sites followed the minimum sampling effort of 30 trees. Some locations, particularly the western and central portions of the site could not meet the minimum sampling effort without crossing over into other sampling zones/sites. In this instance we surveyed the maximum number of trees that could be surveyed before crossing into another sampling zone/site.

Result

No Koalas were detected.

Detection Dogs

Detection dogs were not used for this assessment.

Spotlighting

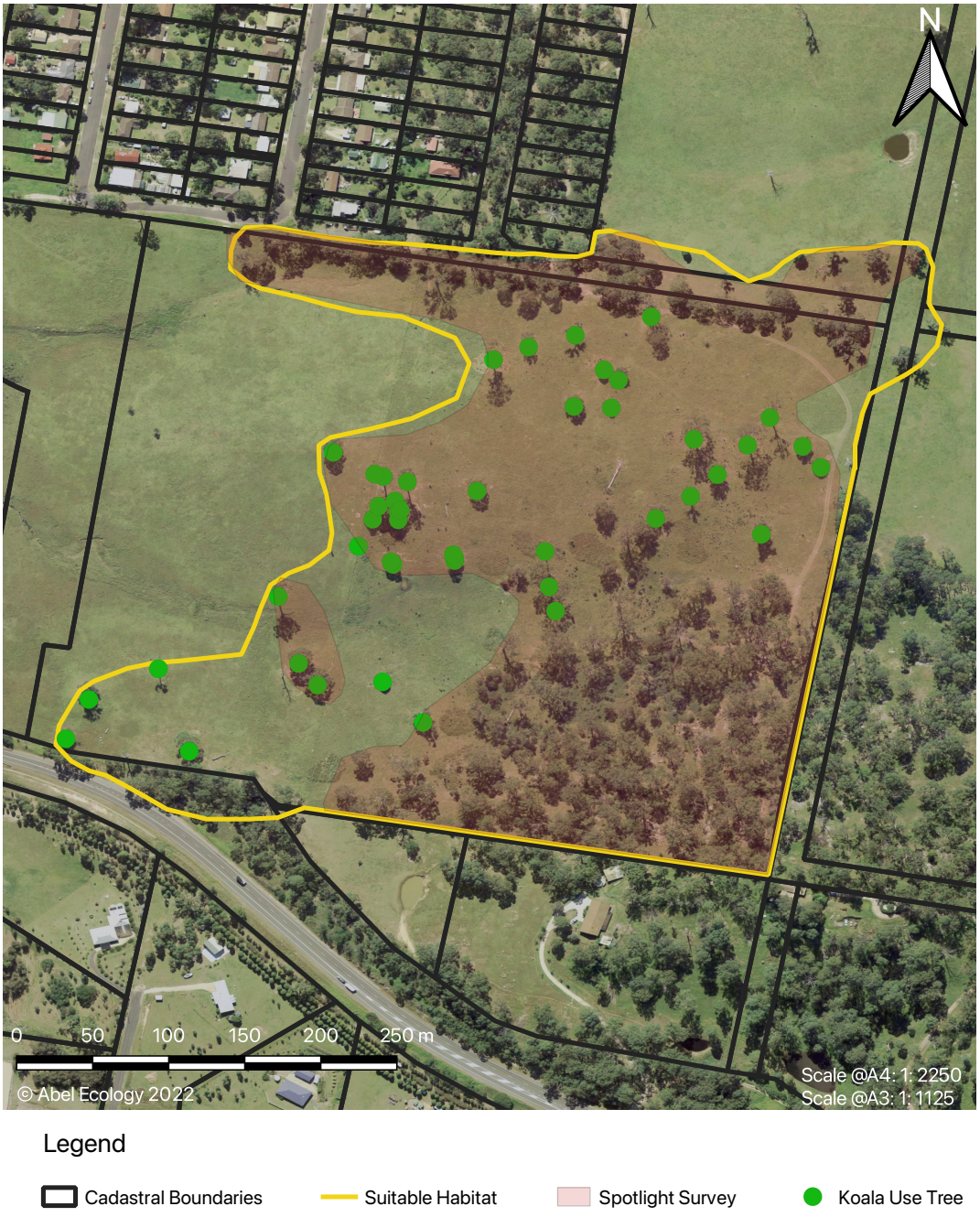
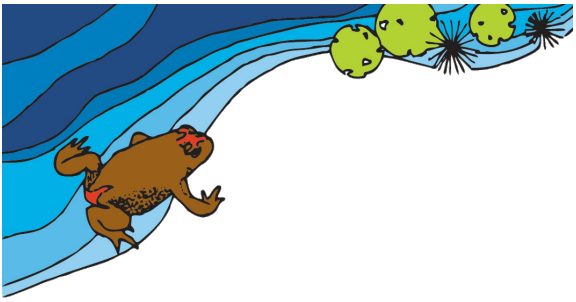


Figure 21: Survey of Koala use trees on site



Spotlight Details

Make: JETBeam

Model: BC40 Pro

Intensity: 2930 LM

Information

The typical transects were not used for this survey. This is due to the size of the survey area, as well as the openness of the canopy vegetation, making it more efficient to survey an entire area than if only transect surveys were conducted. The areas survey can be seen in the figure, shown by the red surveyed areas.

Results

No Koalas were detected.

Passive Acoustic

Passive acoustic surveying (listening for calling Koalas) was not used for this assessment because none were calling.

Drone Survey

Figure 22: Drone survey method July 2022

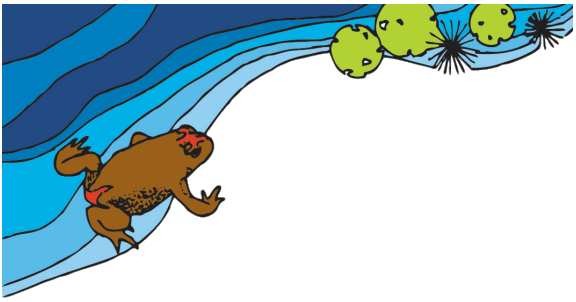


Table 10: Koala survey results

Date	Time	Image Number	GPS coordinates	Validation method	Time of validation	Outcome
12th July 2022	19:31:29	DJI_0078_T	-35.92309, 150.09577	Ground team spotlight	19:33:43	False Positive – Brush-tailed Possum
13th July 2022	18:30:50	DJI_0122_T	-35.92380, 150.09522	Ground team spotlight	18:31:40	False Positive – Brush-tailed Possum
13th July 2022	18:32:58	DJI_0128_T	-35.92407, 150.09417	Drone Spotlight	18:33:25	False Positive – Brush-tailed Possum
13th July 2022	18:35:38	DJI_0144_T	-35.92421, 150.09275	Drone Spotlight	18:36:53	False Positive – Brush-tailed Possum
13th July 2022	18:48:50	DJI_0162_T	-35.92019, 150.09429	Drone Spotlight	18:48:50	False Positive – Brush-tailed Possum
13th July 2022	19:00:45	DJI_0178_T	-35.92140, 150.09603	Drone Spotlight	19:00:51	False Positive – Brush-tailed Possum

Pilot Information

Pilot: Jesse Cass

ARN: 1167946

No prior Koala survey experience

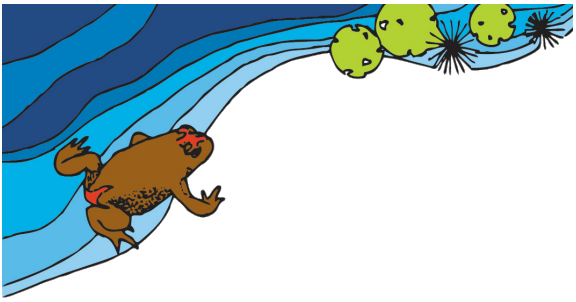
Drone Details

Make: DJI

Model: Mavis 2 Enterprise Advanced

Year Manufacture: 2021

Visual Camera Resolution: 12MP



Drone thermal camera

Focal Length: 9mm

Sensitivity: <50mK

Spectral Range: 8-14µm

Resolution: 640 x 512

Frame Capture Rate: 30Hz

Result

No Koalas were detected.

4.9 Species likely to occur

Species to be listed as 'likely to occur' or 'expected' (see Appendix 4), 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.

4.10 Limitations of the surveys

Flora and fauna surveys were conducted in 2021 on two occasions, in April 2021 and October 2021.

The first survey was conducted in April 2021, in the autumn season. This was not suitable for species sensitive to colder weather, and spring/early summer blooming flowers. The temperature during the survey dropped to 16ºC and dropped below 14ºC during the night, which may have limited the activity of some species preparing for the coming cold temperatures. The day temperatures ranged from cool temperatures on the 12th and 13th, unsuitable for reptiles, to a warm sunny day on 14th April 2021. The days were sunny and clear.

A second survey was conducted in October 2021, in the spring season. This survey was more suitable for species sensitive to colder weather such as bats. Some spring/early summer flowers were blooming. The temperature

during the survey dropped below 14ºC during the night, which may have limited the activity of some species such as bats. The day temperatures ranged from cool temperatures on October the 25th and 26th, to warm sunny days on the 28th and 29th.

The survey in July 2022 was in winter, suitable for mammals except microbats and not suitable for reptiles.

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.

5. Survey Results: Vegetation and habitat description

5.1 Site habitat descriptions

The site habitat within the principle development area is described below. The distribution of vegetation/habitat types on the site and surrounding areas is shown in Figure 10. The location of vegetation survey plots are identified in Figure 11. Habitat zones are illustrated in Figure 11.

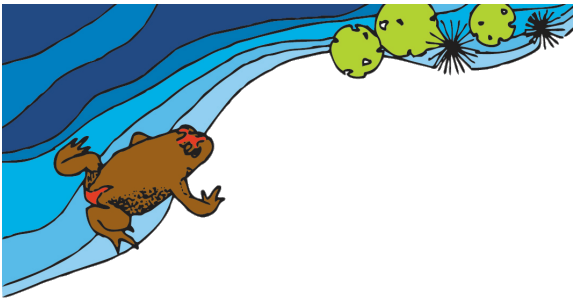
5.2 Habitat 1: Woodland

The woodland has several hollow-bearing trees but historically it has been disturbed, with shrubs being rare and sparsely distributed. PCT834 Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion was found to have a Vegetation Integrity (VI) Score of 73.4, above the significant threshold of 17.

5.3 Habitat 2: Grassland

African Love Grass dominates the grassland habitat, but there is a presence of native grasses. There are several hollow-bearing trees in this habitat, including confirmed roosting/nesting trees for birds and native mammal species. The pasture was found to have a Vegetation Integrity (VI) Score of 11.3, below the significant threshold of 17.

Specific habitat features, rather than types, are listed below in Section 5.4 and Table 11.



5.4 Specific habitat features

Important habitat features that have significance for fauna occupation of the site are discussed below (Table 11). These include both site disturbance and natural features. Potential habitat trees were observed within the proposal area. There is generally a sparse supply of fallen logs and dead wood/coarse woody debris within the woodland habitat.

Table 11. Significant features and observations for the site.

Significant features	Observations
Frequency of large trees (approx. > 80 cm DBH)	Rare
Tree regeneration and Tree stem-size diversity	All canopy species regenerating
Logs, woody debris and litter cover	Logs, woody debris and leaf litter – sparse
Food resources	Eucalyptus trees and grasses provide food resources of blossoms and seeds. Sparse cover of fallen and rotting material is present near the base of remnant trees.

5.5 Pasture

Exotic grasses present within or near the proposal area include: Paspalum *Paspalum dilatatum* and Carpet Grass *Axonopus fissifolius*.

The following native species were also observed within or near the works area: Redleg Grass *Bothriochloa macra*, Lovegrass *Eragrostis leptostachya*, Weeping Grass *Microlaena stipoides* and Rat-tail Grass *Sporobolus creber*.

5.6 Woodland

Dominant trees include Forest Red gum *Eucalyptus tereticornis*, Stringybark *Eucalyptus eugenioides* and Broad-leaved Apple *Angophora subvelutina* and Rough-barked Apple *Angophora floribunda* (Table 12). Rare small trees include *Acacia implexa* and *Exocarpus cupressiformis.* The forest has sparse fallen trees, logs and coarse woody debris. The vegetation is consistent with a form of the Endangered Ecological Community known as *Lowland Grassy Woodland in the South East Corner Bioregion*. The woodland extends into the road reserve of the highway on the southern boundary of the site.

Table 12: Dominant tree species within or near the proposal area.

Species	Common name
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus bosistoana	Coast Grey Box
Eucalyptus eugenioides	Thin-leaved Stringybark
Angophora floribunda	Rough-barked Apple

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

5.7 Off-site habitat

Off-site habitat consists of similar habitat types, large open grassland habitats with woodlands. A small estuarine waterway that flows into Moruya River occurs nearby.

5.8 Species and Communities of conservation concern

The site trees are all remnants of, or are a form of, the lowland grassy woodland ecological community. This community is listed as endangered ecological community in NSW and not listed by the EPBC Act 1999.

https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20070

5.9 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 (Table 13). 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). Such a person 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 (Table 13). 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.

List of Weeds of National Significance

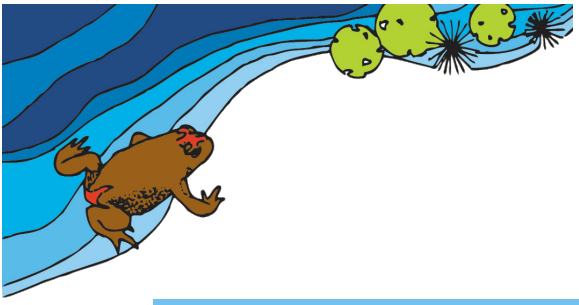
http://weeds.dpi.nsw.gov.au/WeedListPublics/CategoryResults?showImages=True&categoryId=1&pageTitle=Weeds%20of%20National%20Significance/

List of National Environmental Alert List Weeds

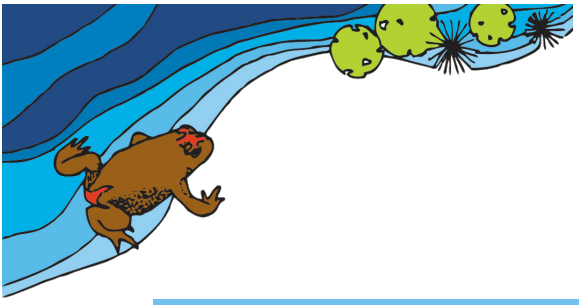
<http://weeds.dpi.nsw.gov.au/WeedListPublics/CategoryResults?showImages=True&categoryId=5&pageTitle=National%20Environmental%20Alert%20List%20weeds>

Table 13: Weeds Of National Significance (WONS), Priority Weeds (PW) and High Threat Exotics (HTE) present within the proposal area and on the rest of the site

Scientific Name	Common Name	Weed Status
* *Agrostis capillaris*	Browntop Bent	*HTE*
* *Aloe maculata*	Common Soap Aloe	
* *Ammi majus*	Bishop's-weed	
* *Anagallis arvensis*	Scarlet pimpernel	
* *Anthoxanthum odoratum*	Sweet Vernal Grass	
* *Asparagus aethiopicus*	Ground Asparagus	*HTE*
* *Aster subulatus*	Wild Aster	
* *Axonopus fissifolius*	Carpet Grass	*HTE*
* *Bidens pilosa*	Cobblers Pegs	*HTE*
* *Briza maxima*	Quaking Grass	
* *Briza minor*	Shivery Grass	
* *Briza subaristata*	Chilean quaking grass	*HTE*
* *Bromus catharticus*	Prairie Grass	
* *Cenchrus clandestinus*	Kikuyu	*HTE*
* *Chlorophytum comosum*	Spider Plant	
* *Cirsium vulgare*	Spear Thistle	
* *Conyza bonariensis*	Flaxleaf Fleabane	
* *Conyza sp.*		



Scientific Name	Common Name	Weed Status
* *Cyperus eragrostis*	Umbrella Sedge	*HTE*
* *Cyperus sesquiflorus*		
* *Dimorphotheca ecklonis*	Cape Daisy	
* *Echinochloa crus-galli*	Barnyard Grass	
* *Ehrharta erecta*	Panic Veldtgrass	*HTE*
* *Eragrostis curvula*	African Lovegrass	
* *Euchiton sphaericus*	Star cudweed	
* *Facelis retusa*	Annual trampweed	
* *Gamochaeta americana*	Cudweed	
* *Grona (Desmodium) varians*	Slender Tick-trefoil	
* *Holcus lanatus*	Yorkshire Fog	
* *Hypochaeris radicata*	Flatweed	
* *Juncus cognatus*	Forked rush	
* *Lamiaceae*		
* *Leontodon saxatilis*	Lesser Hawkbit	
* *Ligustrum sinense*	Small-leaved Privet	*HTE*
* *Lolium perenne*	Perennial Ryegrass	
* *Modiola caroliniana*	Red-flowered Mallow	
* *Ochna serrulata*	Mickey Mouse Plant	*HTE*
* *Olea europaea subsp. cuspidata*	African Olive	
* *Paspalum*		
* *Paspalum dilatatum*	Paspalum	*HTE*
* *Paspalum sp.*		
* *Paspalum sp.*		
* *Paspalum urvillei*	Vasey Grass	
* *Petrorhagia (nanteuilii)*	Childing pink	
* *Phalaris canariensis*	Canary Grass	
* *Phalaris sp.*		
* *Phytolacca octandra*	Inkweed	
* *Plantago lanceolata*	Lambs Tongue	
* *Plantago major*	*Large Plantain*	
* *Poa annua*	Winter Grass	



Scientific Name	Common Name	Weed Status
* *Poa pratensis*	Kentucky Bluegrass	
* *Polycarpon tetraphyllum*	Four-leaved Allseed	
* *Pyracantha angustifolia*	Orange Firethorn	
* *Romulea rosea*	Onion Grass	*HTE*
* *Rosa rubiginosa*	Sweet Briar	*HTE*
* *Rubus anglocandican*	*Blackberry*	
* *Rumex conglomeratus*	Clustered Dock	
* *Rumex crispus*	Dock	
* *Senecio madagascariensis*	Fireweed	*HTE*
* *Setaria parviflora*	Pigeon Grass	
* *Setaria sp.*		
* *Setaria sp.*		
* *Sherardia arvensis*	Field Madder	
* *Sida rhombifolia*	Paddy's Lucerne	
* *Silene gallica*	French Catchfly	
* *Sisyrinchium micranthum*	Blue Pigroot	
* *Sisyrinchium sp. A*	Scourweed	
* *Solanum nigrum*	*Black-berry Nightshade*	
* *Sonchus oleraceus*	Common Sowthistle	
* *Sporobolus africanus*	Parramatta Grass	
* *Taraxacum officinalis*	Common Dandelion	
* *Trifolium dubium*	Yellow Suckling Clover	
* *Verbena bonariensis*	Purpletop	
* *Verbena officinalis*	Common Verbena	
* *Vulpia sp.*		

6. Survey Results: Fauna

6.1 Species of conservation concern

Micronomus norfolkensis (Vulnerable) was found on the site on two separate nights during the April 2021 survey, determined by the Anabat recordings.

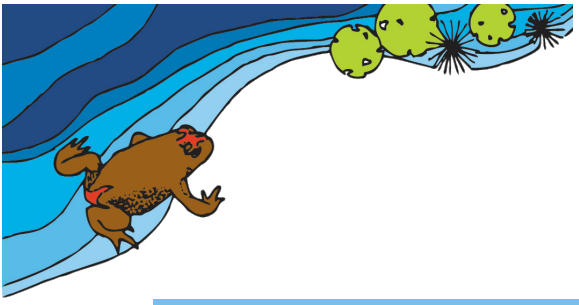
6.2 Fauna results

A total of 114 species were detected, including mammals, birds, frogs and reptiles within the proposal area and on the rest of the site, Lot 2. Species listed as 'likely to occur' in the area are presented in Appendix 3. All the species listed as 'likely to occur' are common throughout the locality and the region. It is unlikely that protected species will be significantly affected at a local, regional or state-wide scale by the proposal.

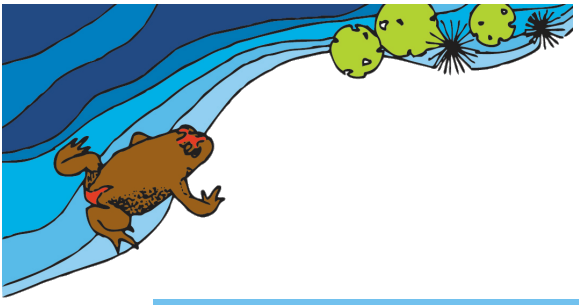
The habitats for threatened species that occur in the area are tabulated in Appendix 4.

Table 14. List of fauna detected on the site for 12th to 14th April 2021

Scientific Name	Common Name	Conservation Status	Recorded AE
Frogs			
1. Crinia signifera	Common Eastern Froglet		W
N=	1		



Scientific Name	Common Name	Conservation Status	Recorded AE
	Birds		
1. Chenonetta jubata	Australian Wood Duck		O
1. Falco cenchroides	Nankeen Kestrel		O
1. Porphyrio porphyrio	Purple Swamphen		O
1. Calyptorhynchus funereus	Yellow-tailed Black-cockatoo		O
1. Eolophus roseicapilla	Galah		O
1. Cacatua tenuirostris	Long-billed Corella		O
1. Cacatua galerita	Sulphur-crested Cockatoo		O
1. Trichoglossus haematodus	Rainbow Lorikeet		O
1. Dacelo novaeguineae	Laughing Kookaburra		W, O
1. Anthochaera carunculata	Red Wattlebird		W,O
1. Manorina melanocephala	Noisy Miner		O
1. Grallina cyanoleuca	Magpie-lark		O
1. Rhipidura leucophrys	Willie Wagtail		O
1. Coracina novaehollandiae	Black-faced Cuckoo-shrike		O
1. Cracticus tibicen	Australian Magpie		O
1. Corvus coronoides	Australian Raven		O
1. Haliaeetus leucogaster	White-Bellied Sea Eagle		O
N=	17		



Scientific Name	Common Name	Conservation Status	Recorded AE
	Mammals		
1. Trichosurus vulpecula	Common Brushtail Possum		O
1. Pteropus poliocephalus	Grey-headed Flying-fox		O
1. Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat		A-Po
1. Austronomus australis	White-striped Freetail-bat		A-C
1. Mormopterus norfolkensis (Micronomus norfolkensis)	Eastern Freetail-bat		A-C
1. Chalinolobus morio	Chocolate Wattled Bat		A-C
1. Scoteanax rueppellii	Greater Broad-nosed Bat		A_Po
1. Ozimops ridei	Ride's freetail bat		A-C
1. Vulpes vulpes	Fox*		O
1. Oryctolagus cuniculus	Rabbit*		O
N=	9		

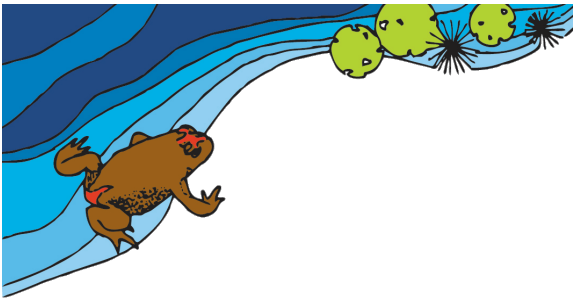
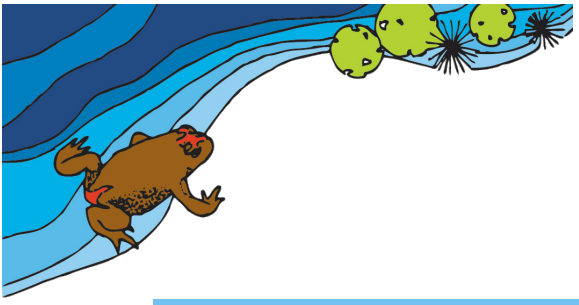


Table 15: List of fauna detected on the site for October 25th to 29th 2021

Scientific Name	Common Name	Conservation Status	Recorded AE
	Frogs		
Limnodynastes tasmaniensis	Spotted grass frog		W
Limnodynastes dumerilii	Pobblebonk		W
Crinia signifera	Common Eastern Froglet		W
N=	3		

Scientific Name	Common Name	Conservation Status	Recorded AE
	Birds		
Chenonetta jubata	Australian Wood Duck	Observed	O
Anas superciliosa	Pacific Black Duck	Observed	O
Egretta novaehollandiae	White-faced Heron	Observed	O
Accipiter fasciatus	Brown Goshawk	Observed	O
Falco cenchroides	Nankeen Kestrel	Observed	O
Porphyrio porphyrio	Purple Swamphen	Observed	O
Calyptorhynchus funereus	Yellow-tailed Black-cockatoo	Animal remains / Feathers	Z
Eolophus roseicapilla	Galah	Observed	O
Platycercus elegans	Crimson Rosella	Observed	O
Platycercus eximius	Eastern Rosella	Observed	O
Scythrops novaehollandiae	Channel-billed Cuckoo	Calls	W
Ninox novaeseelandiae	Southern Boobook	Calls	W
Dacelo novaeguineae	Laughing Kookaburra	Observed	O
Todiramphus sanctus	Sacred Kingfisher	Observed	O
Malurus cyaneus	Superb Fairy-wren	Observed	O
Acanthiza nana	Yellow Thornbill	Observed	O
Acanthiza reguloides	Buff-rumped Thornbill	Calls	W
Lichenostomus chrysops	Yellow-faced Honeyeater	Observed	O
Eopsaltria australis	Eastern Yellow Robin	Calls	W



Scientific Name	Common Name	Conservation Status	Recorded AE
	Birds		
Colluricincla harmonica	Grey Shrike-thrush	Observed	O
Rhipidura leucophrys	Willie Wagtail	Observed	O
Cracticus torquatus	Grey Butcherbird	Observed	O
Cracticus tibicen	Australian Magpie	Observed	O
Strepera graculina	Pied Currawong	Calls	W
Corvus coronoides	Australian Raven	Observed	O
Sturnus vulgaris	Common Starling*	Observed	O
Falco berigora	Brown Falcon	Observed	O
Taeniopygia bichenovii	Double-barred Finch	Observed	O
Alauda arvensis	Skylark	Observed	O
Cacatua sanguinea	Little Corella	Observed	O
Petroica rosea	Rose Robin	Observed	O
Psephotus haematonotus	Red-rumped Parrot	Observed	O
Smicrornis brevirostris	Weebill	Calls	W
Artamus cyanopterus	Dusky Woodswallow	Observed	O
Artamus personatus	Masked Woodswallow	Observed	O
Pardalotus striatus	Striated Pardelote	Observed	O
Melanodryas cucullata	Hooded Robin	Observed	O
Acanthiza chrysorrhoa	Yellow-rumped thornbill	Observed	O
Daphoenositta chrysoptera	Varied sitella	Observed	O
Pachycephala rufiventris	Rufous Whistler	Calls	W
Stagonopleura guttata	Diamond Firetail	Observed	O
Phaps chalcoptera	Common Bronzewing	Observed	O
Aquila audax	Wedge-tailed Eagle	Observed	O
Melithreptus brevirostris	Brown-headed Honeyeater	Observed	O
Petrochelidon nigricans	Tree Martin	Observed	O
Cacomantis pallidus	Pallid Cuckoo	Calls	W
Chrysococcyx lucidus	Shining Bronze cuckoo	Calls	W
Microcarbo melanoleucos	Little pied Cormorant	Observed	O
Bubulcus ibis	Cattle Egret	Observed	O

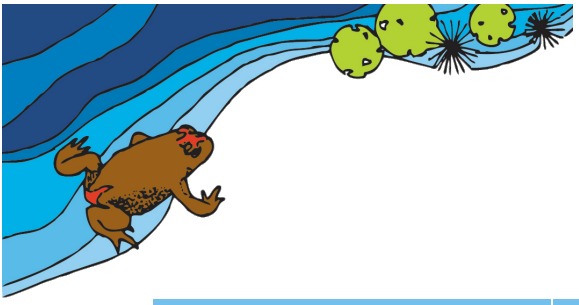
Scientific Name	Common Name	Conservation Status	Recorded AE
Birds			
Philemon corniculatus	Noisy Friarbird	Observed	O
Haliaeetus leucogaster	White-bellied Sea Eagle	Observed	O
Ninox strenua	Powerful owl	Observed	O
Tyto alba	Barn owl	Observed	O
Ardea pacifica	Pacific Heron	Observed	O
N=	54		

Scientific Name	Common Name	Conservation Status	Recorded AE
Fish			
Anguilla reinhardtii	Longfinned Eel		O
Gambusia holbrooki	Plague Minnow		O
N=	2		

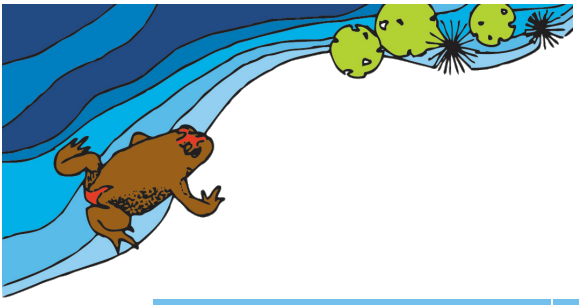
Scientific Name	Common Name	Conservation Status	Recorded AE
Mammals			
Petaurus breviceps	Sugar Glider		O
Pseudocheirus peregrinus	Common Ringtail Possum		S
Trichosurus vulpecula	Common Brushtail Possum		O
Macropus giganteus	Eastern Grey Kangaroo		S
Wallabia bicolor	Swamp Wallaby		O
Vulpes vulpes	Fox*		O
Oryctolagus cuniculus	Rabbit*		O
	Domestic Sheep*		O
Tachyglossus aculeatus	Echidna		S
Capra aegagrus hircus	Goat*		Z
Rattus rattus	Black rat*		O
N=	10		

Table 16: List of bird fauna detected on the site for July 2022

Scientific Name	Common Name	Conservation Status	Recorded AE
Birds			
1. Chenonetta jubata	Australian Wood Duck		O
1. Anas superciliosa	Pacific Black Duck		O
1. Falco cenchroides	Nankeen Kestrel		O
1. Porphyrio porphyrio	Purple Swamphen		O
1. Vanellus miles	Masked Lapwing		O
1. Columba livia	Rock Dove*		O
1. Calyptorhynchus funereus	Yellow-tailed Black-cockatoo		O
1. Eolophus roseicapilla	Galah		O
1. Cacatua tenuirostris	Long-billed Corella		O
1. Cacatua galerita	Sulphur-crested Cockatoo		O
1. Trichoglossus haematodus	Rainbow Lorikeet		O
1. Alisterus scapularis	Australian King-parrot		O
1. Platycercus elegans	Crimson Rosella		O
1. Platycercus eximius	Eastern Rosella		O
1. Podargus strigoides	Tawny Frogmouth		O
1. Dacelo novaeguineae	Laughing Kookaburra		O
1. Malurus cyaneus	Superb Fairy-wren		O
1. Acanthiza nana	Yellow Thornbill		O
1. Anthochaera carunculata	Red Wattlebird		O
1. Lichenostomus chrysops	Yellow-faced Honeyeater		O
1. Pachycephala pectoralis	Golden Whistler		O



Scientific Name	Common Name	Conservation Status	Recorded AE
	Birds		
1. Pachycephala rufiventris	Rufous Whistler		O
1. Grallina cyanoleuca	Magpie-lark		O
1. Rhipidura fuliginosa	Grey Fantail		O
1. Rhipidura leucophrys	Willie Wagtail		O
1. Coracina novaehollandiae	Black-faced Cuckoo-shrike		O
1. Cracticus torquatus	Grey Butcherbird		O
1. Strepera graculina	Pied Currawong		O
1. Corvus coronoides	Australian Raven		O
1. Hirundo neoxena	Welcome Swallow		O
1. Sturnus vulgaris	Common Starling*		O
1. Sturnus tristis	Common Myna*		
Microeca fascinans	Jacky winter		O
Myzomela sanguinolenta	Scarlet honeyeater		O
Pardalotus striatus	Striated Pardalote		O
Platalea regia	Royal Spoonbill		O
Threskiornis aethiopicus	Sacred Ibis		O
Threskiornis spinicollis	Straw-necked Ibis		O
Phaps chalcoptera	Bronzewing pigeon		O
Acanthiza chrysorrhoa	Yellow rumped thornbill		O
Haliastur sphenurus	Whistling kite		O
Lichenostomus leucotis	White-eared Honeyeater		O
Bubulcus ibis	Cattle egret		O



Scientific Name	Common Name	Conservation Status	Recorded AE
Birds			
Sphecotheres vieilloti	Figbird		O
Pelecanus conspicillatus	Pelican		O

Key

* = Introduced fauna

A – C = Anabat – Confident

A – Po = Anabat – Possible

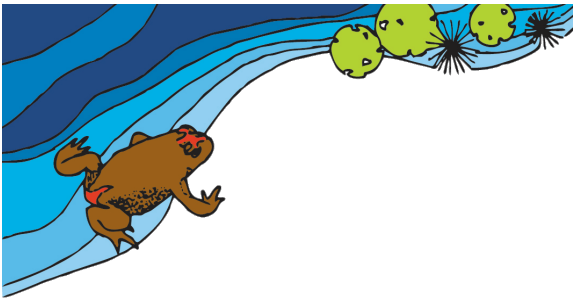
D = Diggings

O = Observed

S = Scats

W = Calls heard

Z = Animal remains



6.3 Fauna Summary

The fauna records include both the proposal area and the rest of Lot 2.

Mammals

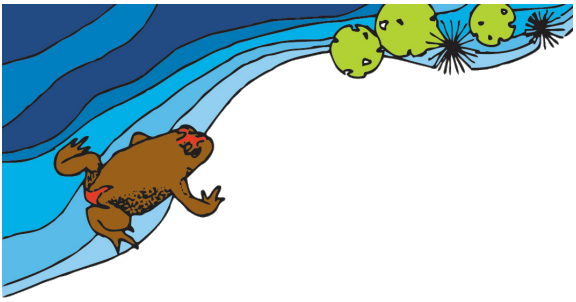
A total of 15 individual Common Brush Tail Possums as well as microbats were recorded on primarily on the site adjoining the proposal area between the 12th and 14th of April 2021. Approximately 20 individual Common Brush Tail Possums were recorded on site between the 25th and 29th of October 2021. Hair tubes only recorded Common Brushtail Possums (Table 17). Eastern Grey Kangaroos were observed in July 2022.

Table 17: Hair tube results July 2022

Trap site No.	Site	Date	Tube type and number	*Species*
1	Lot 2	15th July 2022	SH15	*Trichosurus vulpecula*
2	Lot 2	15th July 2022	LH12	
3	Lot 2	15th July 2022	LH39	*Trichosurus vulpecula*
4	Lot 2	15th July 2022	SH10	*Trichosurus sp.*
5	Lot 2	15th July 2022	LH34	*Trichosurus vulpecula*
6	Lot 2	15th July 2022	LH32	*Trichosurus sp.*
7	Lot 2	15th July 2022	SH02	*Trichosurus vulpecula*
8	Lot 2	15th July 2022	LH10	*Trichosurus vulpecula*
9	Lot 2	15th July 2022	LH01	*Trichosurus sp.*
10	Lot 2	15th July 2022	SH01	*Trichosurus vulpecula*

SH = small hair tube (60mm diameter).

LH = large hair tube (100mm diameter).



Koala survey results

No Koalas were detected using the drone survey method.

There were six instances in which the drone detected thermal signatures similar to that of a Koala (Appendix 7). While the thermal imaging did not match that of a typical Koala heat signature, it was validated in real time to increase confidence of any koala presence or absence on site. That means that two people walked to the site, with the drone flying above, to personally observe the animal with spotlight and binoculars. These heat signatures were found to be only that of Common Brush-tail Possums.

No Koala scats were detected using the SAT method.

The SAT method was conducted at many of the trees present on site. Brush-tail Possum scats were found across the site, but predominantly in the southeast corner of the site. During the SAT survey, an area with significant quantities of 'whitewash' and pellets were found beneath a tree branch. Upon inspecting the pellets, it was believed they belonged to a Barn Owl, which was consistent with a previous sighting of this species on site. However, this species was not confirmed during our spotlight or drone surveys.

No Koalas were detected using the spotlighting method.

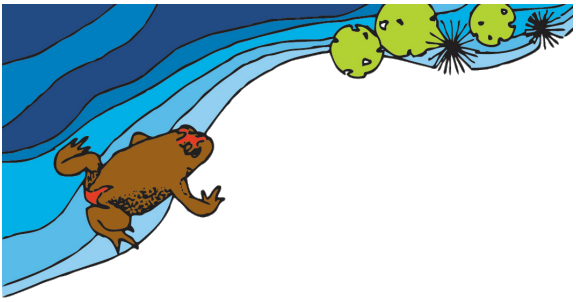
Reptiles

No reptile species were detected on the site in April 2021. During the October 2021 survey we found common lace monitor *Varanus varius* and eastern small-eyed snake *Rhinoplocephalus nigrescens* within the pasture area of the site. Two garden skinks *Lampropholis delicata* were observed in July 2022.

Frogs

One frog species was detected on the site between April 12th and 14th 2021. Several individual Common Eastern Froglets were heard on site.

Three frog species were detected on the site between October 25th and 29th 2021. The calls of Common Eastern Froglets, Pobblebonks and Spotted Grass Frogs were heard on site. Common Eastern Froglets and Spotted Grass Frogs were heard on site again in July 2022.



Birds

During the survey period from the 12th to 14th of April 2021, a total of 12 bird species were detected on the site. There was an abundance of Rainbow Lorikeets observed on site, as well several individuals seen to be nesting in hollow bearing trees on site. A Nankeen Kestrel was observed on site on the 12th and 13th April 2021 and appeared to be using the site as hunting grounds. Galahs, Sulphur Crested Cockatoos, and Corellas were observed flying over and roosting in the trees on site. Laughing Kookaburras and Red Wattlebirds were also heard and observed on site. A White-Bellied Sea Eagle was also observed flying over the site on the 12th and 14th April 2021.

During the survey period from the 25th to 29th of October 2021, a total of 53 bird species were detected on the site. There was an abundance of Rainbow Lorikeets and Galahs on site, with both species observed nesting in hollow bearing trees on site.

The survey of July 2022 found 45 species of birds, with welcome swallows and feral pigeons most abundant. There was a marked absence of small forest birds that rely on a shrub layer of vegetation.

6.4 Microbats

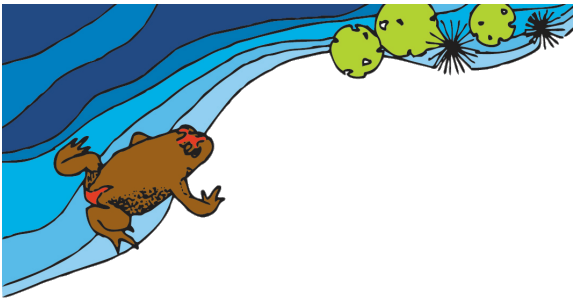
Four common bat species and three threatened bat species were detected on the site. Where calls were easily identifiable to species, they were classed as Confident. Where the calls were most likely to represent a particular species, they were classed as Probable. Where calls were likely to belong to a species but the quality or length of the call precluded a confident identification, they were classed as Possible. Where the calls could have belonged to two or more species, they were classified into a species group. Any calls of very poor quality, which could not be reliably placed into any species or species group category, were classified as Unknown. The vast majority of calls were of very good quality and the poor ones most likely represented bats flying just within the bat detector's outer detection limits.

A total of 796 call sequences were recorded, of which 236 call sequences were able to be analysed (ie were not 'noise' files or bat calls of short length). Of the bat calls, 69 call sequences (29 %) were able to be confidently identified (those classified as either definite or probable identifications) to species level (Table 3-1). Species recorded confidently within the site include:

- *Austronomus australis* (White-striped Free-tailed Bat)
- *Chalinolobus gouldii* (Gould's Wattled Bat)
- *Chalinolobus morio* (Chocolate Wattled Bat)
- *Micronomus norfolkensis* (Eastern coastal Free-tailed Bat) (V)
- *Ozimops ridei* (Ride's Free-tailed Bat)

Two other Vulnerable species noted as "possible" were *Saccolaimus flaviventris* and *Scoteanax rueppellii.*

Calls were also attributed to *Myotis macropus.*

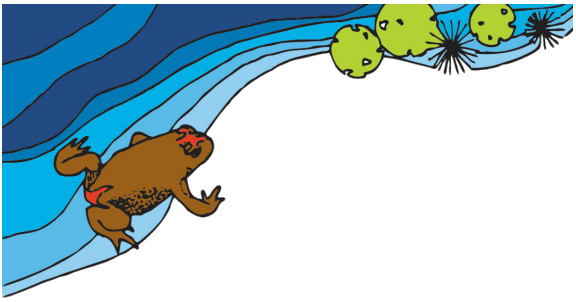


Foraging Habitat

This site provides potentially suitable foraging habitat for six of the eight possible threatened species. *Myotis macropus* (syn. *Myotis adversus*) has suitable foraging habitat in the form of open water bodies, although they are quite small. *Kerivoula papuensis* is only likely to forage in areas within a few kilometres of rainforest or rainforest gullies, so is unlikely to occur on the site.

Roosting Habitat

This site has 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, bridges, 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.



6.5 SEPP Biodiversity and Conservation 2021 - Koala Habitat Protection

From the associated Fact Sheet (March 2022) for the Biodiversity and Conservation SEPP 2021:

• 'Chapter 4 – Koala habitat protection 2021' contains the land-use planning and assessment framework from the Koala SEPP 2021 for koala habitat within Metropolitan Sydney and the South Coast and applies to all zones except RU1, RU2 and RU3 in the short term – it will apply to all zones once the Koala SEPP 2020 is repealed."

The site falls within the South Coast Koala management area.

The following five species were found in the proposal area: *Eucalyptus bosistoana, Eucalyptus eugenioides, Eucalyptus tereticornis, Allocasuarina littoralis,* and *Angophora floribunda* (Refer to Table 18).

The result is positive. More than 15% of the trees within the proposal area and on the site are Scheduled SEPP species (Refer to Table 19). The site is therefore potential Koala habitat.

One Koala has been recorded within 2 km of the site in the last 18 years. However, Koalas, or evidence of Koalas, was not seen on site and it is unlikely that any Koalas use the site. The site is not considered core Koala habitat.

Table 18. Koala tree survey results

Species	Count	Percentage of trees within PDA	Feed tree or use
Eucalyptus bosistoana	38	13.8%	High Use
Eucalyptus eugenioides	55	20%	High Use
Eucalyptus tereticornis	75	27.8%	High Preferred Use
Allocasuarina littoralis	24	8.7%	Occasional Use
Angophora floribunda	38	13.8%	Occasional Use
Total	230 of 275	84.1%	

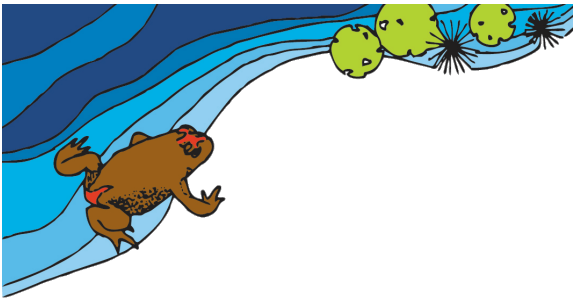
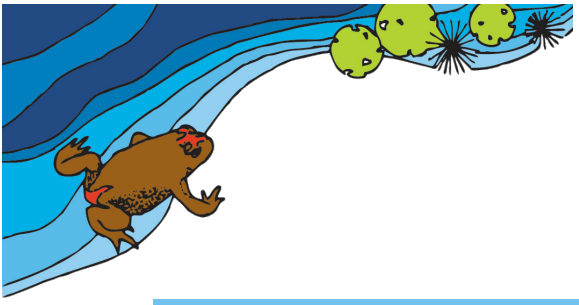


Table 19. Koala tree species for the South Coast Koala management area

From the Shoalhaven region to the Victorian border on the New South Wales south coast including Bega Valley, Eurododalla, Kiama and Shoalhaven Local Government Areas. The following species list is sourced from the NSW Department of Planning and Environment website: www.environment.nsw.gov.au, as of 17 May 2022. This list contains the same species as in Schedule 3 of the SEPP. https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021-0722#sch.3

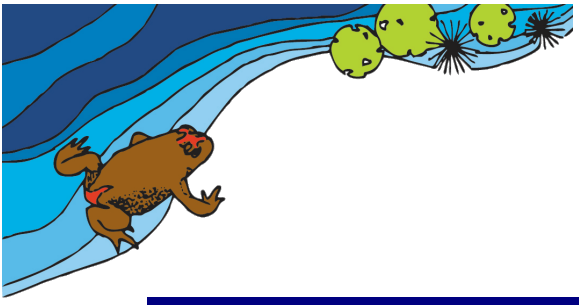
Scientific Name	Common Name
High Preferred Use	
Eucalyptus cypellocarpa	Monkey Gum
Eucalyptus globoidea	White Stringybark
Eucalyptus longifolia	Woollybutt
Eucalyptus maidenii	Maidens Blue Gum
Eucalyptus punctata	Grey Gum
Eucalyptus tereticornis	Forest Red Gum
	High Use
Eucalyptus bosistoana	Coast Grey Box
Eucalyptus consideniana	Yertchuk
Eucalyptus eugenioides	Narrow-leaved or Thin-leaved Stringybark
Eucalyptus tricarpa	Mugga or Red Ironbark
Significant Use	
Eucalpytus obliqua	Messmate
Eucalyptus saligna	Sydney Blue Gum
Occasional Use	
Allocasuarina littoralis	Black She-oak
Angophora floribunda	Rough-Barked Apple
Corymbia gummifera	Red Bloodwood
Corymbia maculata	Spotted Gum
Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus baueriana	Blue Box



Scientific Name	Common Name
Eucalyptus elata	River Peppermint
Eucalyptus fastigata	Brown Barrel
Eucalyptus muelleriana	Yellow Stringybark
Eucalyptus paniculata	Grey Ironbark
Eucalyptus pilularis	Blackbutt
Eucalyptus piperita	Sydney Peppermint
Eucalyptus sclerophylla	Hard-leaved Scribbly Gum
Eucalyptus sieberi	Silvertop Ash
Eucalyptus viminalis	Ribbon Gum

6.6 Feral fauna

Fox and black rat were observed on adjacent land. Both species are likely to visit the site on occasions.



7. Discussion of results

The work area is a disturbed pasture with mostly regrowth trees and a few hollow bearing trees.

The VI Score for the pasture where most of the works will occur is well below the threshold that indicates an intact or recoverable vegetation community. A number of trees to be removed have significant habitat value for both the site and the locality. However their relocation is manageable with a high expectation of minimal effect on local fauna.

Shrub diversity is moderate but abundance is low and sparsely distributed. Lack of shrub cover is likely to account for low species diversity, particularly reptiles and small birds.

The herb layer has varying density of groundcovers, mostly grasses. The site has avoided bushfire for some years so coarse woody debris is accumulating but is still sparse.

A total of sixty (60) trees will be impacted for the purpose of this proposal, including the protection of thirty-five (35) trees from root and structural damage, relocation of sixteen (16) hollow-bearing fauna habitat trees and removal of nine (9) other trees.

Weed indicator species are present, indicating a high disturbance regime across the site. Native faunal indicator species, small forest birds and magpie, are consistent with an open forest habitat. Feral indicator species, Red Fox, indicates that native fauna abundance for some species is likely to be low.

8. Impact on biodiversity

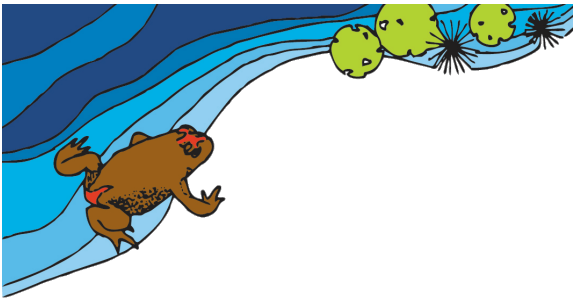
8.1 Avoid, minimise and offset under s 6.4(1) of the BC Act

6.4 Biodiversity conservation offsets under scheme

(1) For the purposes of the biodiversity offsets scheme, the biodiversity conservation measures to offset or compensate for impacts on biodiversity values **after** any steps taken to avoid or minimise those impacts are as follows—

c) the retirement of biodiversity credits,

d) other actions that benefit the biodiversity values of the impacted land or other biodiversity values.



The hierarchy of avoid, minimise and offset applies once a project has triggered entry into the Biodiversity Offset Scheme (BOS). However, even though this proposal does not require entry into the BOS, to avoid confusion, the considerations are addressed here.

The objectives of avoid, minimise and offset are addressed in this proposal as follows.

- Avoid: The works have been located away from the woodland area as much as is possible.
- Minimise: The line of access track has been designed so as to minimise impact on the watercourses and spotential sedimentation effects. Furthermore, the nature and scope of the soil conservation works is designed to minimise potential downstream effects on receiving environments on site and on adjoining lands. Hollow-bearing trees within the works footprint will be relocated on site so habitat value will be retained.
- Offset: in view of the avoid and minimise considerations above, and that the proposal does not trigger entry into the BOS, no offset is required.

Part 5 Activities Decision support tool

https://www.olg.nsw.gov.au/councils/land-management/biodiversity/biodiversity-assessment-and-approvals-navigator/

Part-5 Activities

If the activity is likely to significantly affect threatened species a Species Impact Statement or, if the proponent chooses, a Biodiversity Development Assessment Report, must be prepared. Where a Minister is the determining authority under Part 5, the Minister is required to consult the Minister for the Environment if the activity is likely to significantly affect threatened species, unless the Minister has 'opted in' to the Biodiversity Offset Scheme by engaging an accredited assessor to prepare a Biodiversity Development Assessment Report. If the determining authority under Part 5 is not a Minister, the determining authority is not to carry out the activity or grant approval to carry out the activity if it is likely to significantly affect threatened species without obtaining the concurrence of the Environment Agency Head. However, concurrence from the Environmental Agency Head is not required if a Biodiversity Development Assessment Report has been obtained.

For Part 5 activities, an activity is "likely to significantly affect threatened species" if it is carried out in an area of outstanding biodiversity value or likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3 of the *Biodiversity Conservation Act 2016*. The biodiversity offset scheme threshold trigger does not apply.

8.2 Environment Protection and Biodiversity Conservation Act 1999

8.2.1 Protected matters

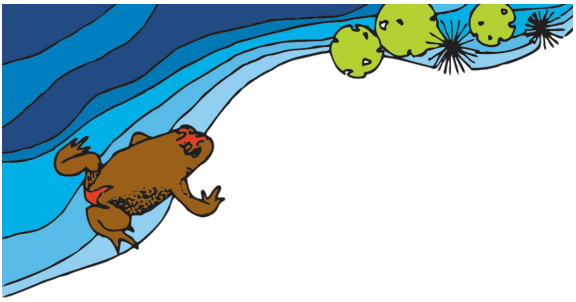
The Protected Matters Search Tool was used to find relevant Matters of National Environmental Significance (MNES) on or near the site.

https://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf

Relevant listed items include:

Scientific Name	Common Name	Comm. status
Thinornis cucullatus cucullatus	Eastern Hooded Dotterel	V
Numenius madagascariensis	Eastern Curlew	CE
Callocephalon fimbriatum	Gang-gang Cockatoo	E
Calyptorhynchus lathami	Glossy Black-Cockatoo	V
Lathamus discolor	Swift Parrot	CE
Anthochaera phrygia	Regent Honeyeater	CE
Dasyurus maculatus	Spotted-tailed Quoll	E
Phascolarctos cinereus	Koala	E
Petaurus australis	Yellow-bellied Glider	V
Petauroides volans	Greater Glider	V
Petauroides volans	Greater Glider	E
Pteropus poliocephalus	Grey-headed Flying-fox	V
Persicaria elatior	Tall Knotweed	V
Lowland Grassy Woodland in the South East Corner Bioregion		CE

The provisions of the EPBC Act apply to this proposal. The outcome is not significant, however, and does not require referral to the Commonwealth.



8.2.2 Criteria for Critically Endangered and Endangered Species

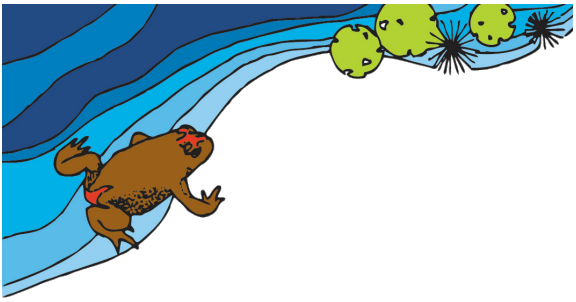
Relevant listed items include:

Scientific Name	Common Name	Comm. status
Numenius madagascariensis	Eastern Curlew	CE
Callocephalon fimbriatum	Gang-gang Cockatoo	E
Lathamus discolor	Swift Parrot	CE
Anthochaera phrygia	Regent Honeyeater	CE
Dasyurus maculatus	Spotted-tailed Quoll	E
Phascolarctos cinereus	Koala	E
Petauroides volans	Greater Glider	E

An action has, will have, or is likely to have a significant impact on a Critically Endangered or Endangered Species if it does, will, or is likely to:

Criterion	Assessment
a) lead to a long-term decrease in the size of a population, or	No. These species were not found to occur on the site, nor are likely to depend on the site for their life cycles.
b) reduce the area of occupancy of the species, or	No. The habitat will continue to occupy the site.
c) fragment an existing population into two or more populations, or	No. These species were not found to occur on the site.
d) adversely affect habitat critical to the survival or a species, or	No. These species were not found to occur on the site.
e) disrupt the breeding cycle of a population, or	No. These species were not found to occur on the site.
f) modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or	No. These species were not found to occur on the site.
g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat,* or	No.
h) interfere with the recovery of the species.	No. Unoccupied habitat on the site

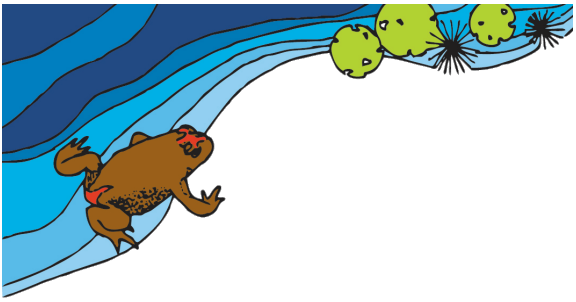
(*Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a critically endangered or endangered species by direct competition, modification of habitat, or predation.)



8.2.3 Criteria for Vulnerable Species

Relevant listed items include:

Scientific Name	Common Name	Comm. status
Thinornis cucullatus cucullatus	Eastern Hooded Dotterel	V
Calyptorhynchus lathami	Glossy Black-Cockatoo	V
Petaurus australis	Yellow-bellied Glider	V
Petauroides volans	Greater Glider	V
Pteropus poliocephalus	Grey-headed Flying-fox	V
Persicaria elatior	Tall Knotweed	V



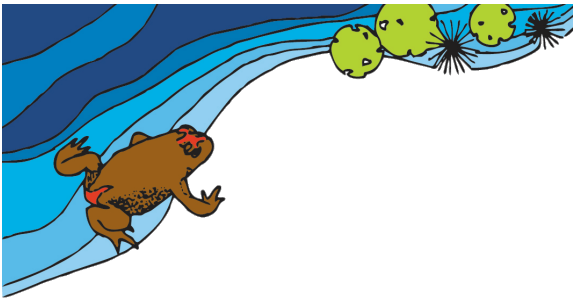
An action has, will have, or is likely to have a significant impact on a Vulnerable Species if it does, will, or is likely to:

Criterion	Assessment
a) lead to a long-term decrease in the size of an important population of a species, or	No. There is no important population of any of these species on the site.
b) reduce the area of occupancy of an important population, or	No. There is no important population of any of these species on the site.
c) fragment an existing important population into two or more populations, or	No. There is no important population of any of these species on the site.
d) adversely affect habitat critical to the survival of a species, or	No. The habitat on site available for thses species will be reduced by loss of a number of trees, some of which are habitat trees. There is no important population of any of these species on the site.
e) disrupt the breeding cycle of an important population, or	No. There is no important population of any of these species on the site.
f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or	No. The impact on the site is minor.
g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat,* or	No.
h) interfere substantially with the recovery of the species.	No. There is no important population of any of these species on the site.

An Important Population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:

a) key source populations either for breeding or dispersal,
b) populations that are necessary for maintaining genetic diversity, and/or
c) populations that are near the limit of the species range.

(*Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.)



8.2.4 Criteria Critically Endangered and Endangered Ecological Communities

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered ecological community if it does, will, or is likely to:

Criterion	Assessment
a) lead to a long-term adverse effect on an ecological community, or	No. The structure and function of the woodland will remain intact.
b) reduce the extent of a community, or	Yes. A number of trees will be removed for the works.
c) fragment an occurrence of the community, or	No. The works are at the periphery of the woodland. The local occurrence extends further across the locality.
d) adversely affect habitat critical to the survival of an ecological community, or	No. Species diversity in the local occurrence of the community will not be affected by the works.
e) modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the community's survival, or	No. Works are downhill of the woodland so any effect on soil and hydrology will not affect the woodland.
f) result in invasive species that are harmful to the critically endangered or endangered community becoming established in an occurrence of the community*, or	No. Revegetation of exposed soils with local native grasses will inhibit weed growth.
g) interfere with the recovery of an ecological community.	No. Cattle will be removed so graxzing pressure will be eliminated, enabling regeneration of the shrub layer on the upper slopes of the woodland.

(*Introducing an invasive species into the occurrence may result in that species becoming established. An invasive species may harm a critically endangered or endangered ecological community by direct competition, modification of habitat, or predation.)

8.3 Five-part test summary

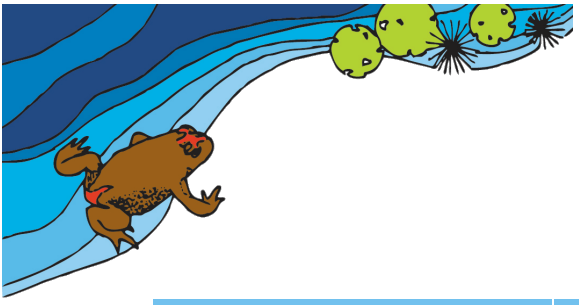
Habitat requirements for locally occurring threatened faunal species, and the presence or absence of such habitat on the site, is tabulated in Appendix 5.

Under Section 7.3 of the *Biodiversity Conservation Act 2016* 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 20. Summary of the five-part tests shown in full in Appendix 1.

Scientific Name	Common Name	NSW status	Result
Hieraaetus morphnoides	Little Eagle	V,P	No significant effect
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	No significant effect
Lophoictinia isura	Square-tailed Kite	V	No significant effect
Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P,2	No significant effect
Glossopsitta pusilla	Little Lorikeet	V,P	No significant effect
Lathamus discolor	Swift Parrot	E1,P,3	No significant effect
Ninox strenua	Powerful Owl	V,P,3	No significant effect
Tyto novaehollandia	Masked Owl	V,P,3	No significant effect
Daphoenositta chrysoptera	Varied Sittella	V	No significant effect
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	No significant effect
Phascolarctos cinereus	Koala	V,P	No significant effect
Petaurus australis	Yellow-bellied Glider	V,P	No significant effect
Petaurus norfolcensis	Squirrel Glider	V,P	No significant effect
Petauroides volans	Greater Glider	P	No significant effect
Petauroides volans	Greater Glider population in the Eurobodalla local government area	E2,P	No significant effect
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	No significant effect



Scientific Name	Common Name	NSW status	Result
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P	No significant effect
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P	No significant effect
Myotis macropus	Southern Myotis	V,P	No significant effect
Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P	No significant effect
Thesium australae	Austral toadflax	V	No significant effect
	Lowland Grassy Woodland in the South East Corner Bioregion	EEC	No significant effect

Key

P = Protected

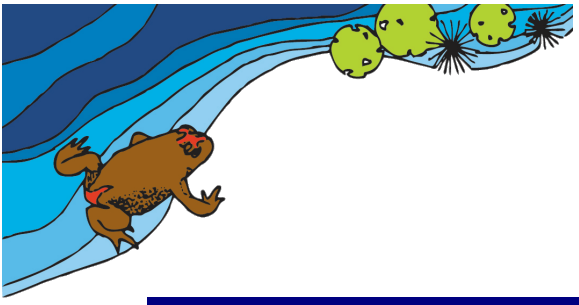
V = Vulnerable

E = Endangered

E1 = Endangered Species

CE = Critically Endangered

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



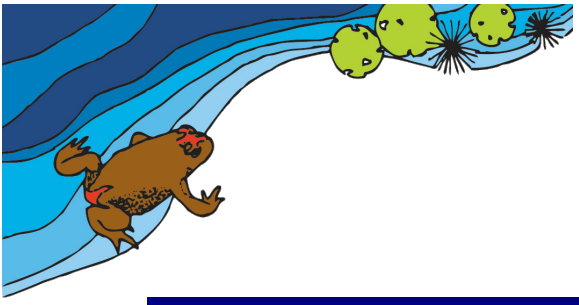
9. Conclusion and Recommendations

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

A Species Impact Assessment (SIS) is not required.

An approval may be issued with the following conditions as mitigation measures:

- Revegetation of exposed soils with native pasture grasses;
- Planting of replacement trees for those removed at a rate of 3:1;
- A preclearance survey is to be conducted for hollow-bearing trees to relocate resident fauna, and the hollows salvaged and relocated under the provisions of a Hollow Management Guideline document;
- Supervision daily by a Project Ecologist;
- Mitigation measures to be detailed in a Vegetation and Fauna Management Plan.



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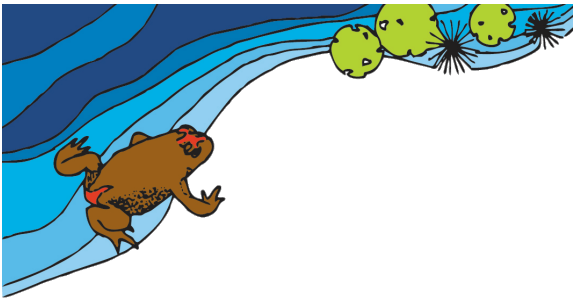

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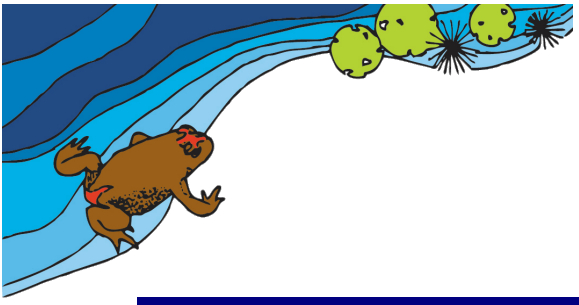


Appendix 1. Five-part tests

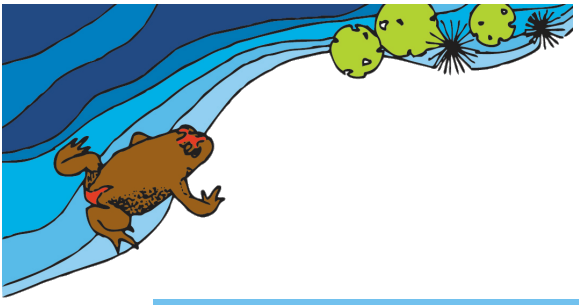
While the overall proposal incorporates mitigating considerations and offsets, these are not taken into account in determining the outcome of the **five-part** tests.

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
Hieraaetus morphnoides	Little Eagle	V,P
Haliaeetus leucogaster	White-bellied Sea-Eagle	V
Lophoictinia isura	Square-tailed Kite	V
Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P,2
Glossopsitta pusilla	Little Lorikeet	V,P
Lathamus discolor	Swift Parrot	E1,P,3
Ninox strenua	Powerful Owl	V,P,3
Tyto novaehollandia	Masked Owl	V,P,3
Daphoenositta chrysoptera	Varied Sittella	V
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V
Phascolarctos cinereus	Koala	V,P
Petaurus australis	Yellow-bellied Glider	V,P
Petaurus norfolcensis	Squirrel Glider	V,P
Petauroides volans	Greater Glider	P
Petauroides volans	Greater Glider population in the Eurobodalla local government area	E2,P
Pteropus poliocephalus	Grey-headed Flying-fox	V,P
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P



Scientific Name	Common Name	NSW status
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P
Myotis macropus	Southern Myotis	V,P
Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P
Thesium australae	Austral toadflax	V
	Lowland Grassy Woodland in the South East Corner Bioregion	EEC

Key

P = Protected

V = Vulnerable

E = Endangered

E1 = Endangered Species

CE = Critically Endangered

C = China-Australia Migratory Bird Agreement

J = Japan-Australia Migratory Bird Agreement

K = Republic of Korea-Australia Migratory Bird Agreement

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

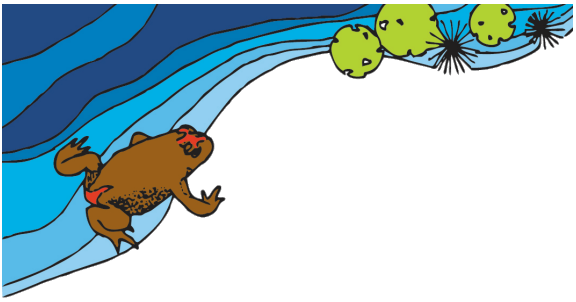
(1) For the purposes of this Part, development or an activity is **"likely to significantly affect threatened species"** if:

(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:

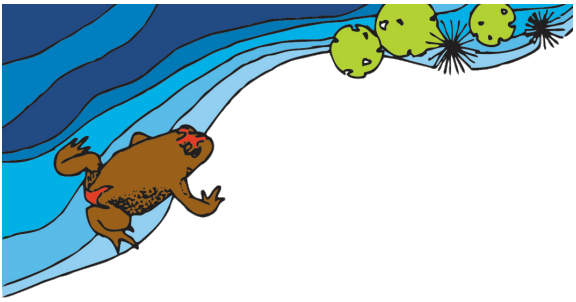
(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(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.



Diurnal Raptors

Scientific name	Common name	NSW status	Comm. status
Hieraaetus morphnoides	Little Eagle	V,P	-
Haliaeetus leucogaster	White-bellied Sea Eagle	V,P	-
Lophoictinia isura	Square-tailed Kite	V,P	-

Key

V = Vulnerable

P = Protected

Little Eagle *Hieraaetus morphnoides*

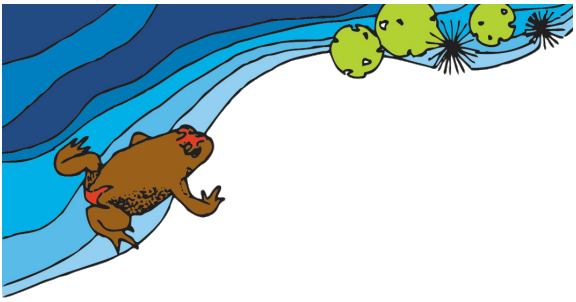
http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20131

- Occupies open eucalypt forest, woodland or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used.
- Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.
- Lays two or three eggs during spring, and young fledge in early summer.
- Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.

White-bellied Sea Eagle *Haliaeetus leucogaster*

https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20322

- Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.
- Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh.
- Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).
- Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have



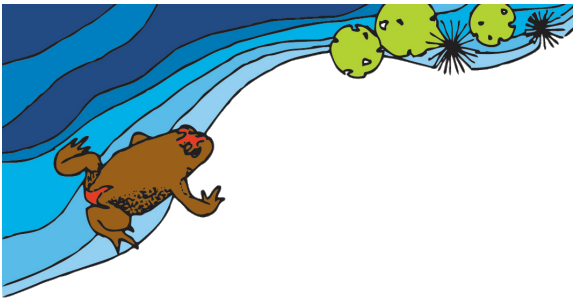
emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.

- Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.
- Hunts its prey from a perch or whilst in flight (by circling slowly, or by sailing along 10–20 m above the shore). Prey is usually carried to a feeding platform or (if small) consumed in flight, but some items are eaten on the ground.
- May be solitary, or live in pairs or small family groups consisting of a pair of adults and dependent young.
- Typically lays two eggs between June and September with young birds remaining in the nest for 65-70 days.

Square-tailed Kite *Lophoictinia isura*

https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10495

- Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.
- In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland.
- Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage.
- Appears to occupy large hunting ranges of more than 100km2.
- Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.



Woodland Birds and Nocturnal Raptors

Scientific name	Common name	NSW status	Comm. status
Callocephalon fimbriatum	Gang-gang Cockatoo	V,P	-
Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P	-
Glossopsitta pusilla	Little Lorikeet	V,P	-
Lathamus discolor	Swift Parrot	E1,P	CE
Ninox strenua	Powerful Owl	V,P	-
Tyto novaehollandiae	Masked Owl	V,P	-
Daphoenositta chrysoptera	Varied Sittella	V,P	-
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V,P	-

Key

CE = Critically Endangered

E1 = Endangered Species

E = Endangered

V = Vulnerable

P = Protected

Gang-gang Cockatoo ***Callocephalon fimbriatum***

https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10975

- In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests.
- In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands,particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas.
- May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland and occasionally in temperate rainforests.
- Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.

Glossy Black Cockatoo ***Calyptorhynchus lathami***

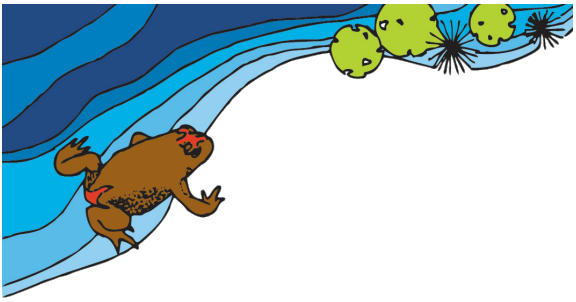
https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10140

- Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods.
- Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, Allocasuaraina diminuta, and A. gymnathera. Belah is also utilised and may be a critical food source for some populations.
- In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*).
- Feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina* species), shredding the cones with the massive bill.
- Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.

Little Lorikeet *Glossopsitta pusilla*

http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20111

- Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.
- Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.
- Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards.
- Gregarious, travelling and feeding in small flocks (<10), though often with other lorikeets. Flocks numbering hundreds are still occasionally observed and may have been the norm in past centuries.
- Roosts in treetops, often distant from feeding areas.
- Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like *Allocasuarina*.



Swift Parrot ***Lathamus discolor***

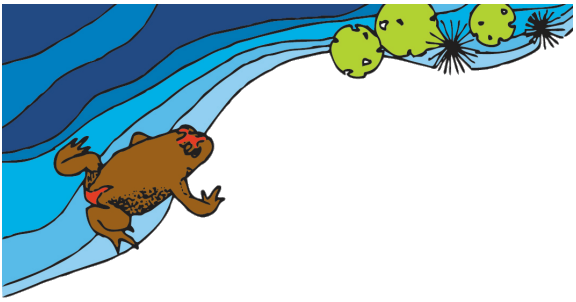
https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10455

- Migrates to the Australian south-east mainland between February and October.
- On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.
- Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*.
- Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*.
- Return to some foraging sites on a cyclic basis depending on food availability.
- Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum *Eucalyptus globulus*.

Powerful Owl ***Ninox strenua***

https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10562

- The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest.
- The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and a number of eucalypt species.
- The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. For example in southern NSW, Ringtail Possum make up the bulk of prey in the lowland or coastal habitat. At higher elevations, such as the tableland forests, the Greater Glider may constitute almost all of the prey for a pair of Powerful Owls. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet depending on the availability of preferred mammals. As most prey species require hollows and a shrub layer, these are important habitat components for the owl.



- Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats a mere 400 can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha.
- Powerful Owls nest in large tree hollows (at least 0.5 metres deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 metres) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him.
- Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter, but is slightly earlier in north-eastern NSW (late summer - mid autumn). Clutches consist of two dull white eggs and incubation lasts approximately 38 days.

Masked Owl ***Tyto novaehollandiae***

https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10820

- Lives in dry eucalypt forests and woodlands from sea level to 1100 metres.
- A forest owl, but often hunts along the edges of forests, including roadsides.
- The typical diet consists of tree-dwelling and ground mammals, especially rats.
- Pairs have a large home-range of 500 to 1000 hectares.
- Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.

Varied Sittella *Daphoenositta chrysoptera*

http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20135

- Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland.
- Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.
- Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.

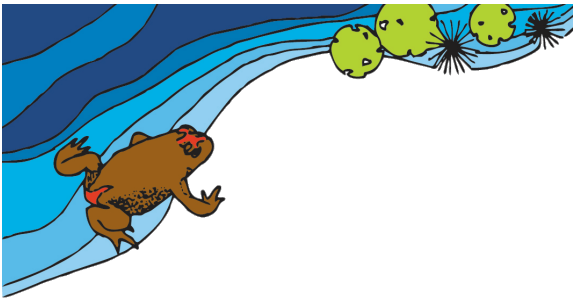
Dusky Woodswallow *Artamus cyanopterus cyanopterus*

http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20303

Habitat and ecology

- Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.
- Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. Also frequently hovers, sallies and pounces under the canopy, primarily over leaf litter and dead timber. Also occasionally take nectar, fruit and seed.
- Depending on location and local climatic conditions (primarily temperature and rainfall), the dusky woodswallow can be resident year round or migratory. In NSW, after breeding, birds migrate to the north of the state and to southeastern Queensland, while Tasmanian birds migrate to southeastern NSW after breeding.

  Migrants generally depart between March and May, heading south to breed again in spring. There is some evidence of site fidelity for breeding. Although dusky woodswallows generally breed as solitary pairs or occasionally in small flocks, large flocks may form around abundant food sources in winter. Large flocks may also form before migration, which is often undertaken with other species.
- Nest is an open, cup-shape, made of twigs, grass, fibrous rootlets and occasionally casuarina needles, and may be lined with grass, rootlets or infrequently horsehair, occasionally unlined. Nest sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post. Nest sites may be exposed or well concealed by foliage.



Koala

Scientific name	Common name	NSW status	Comm. status
Phascolarctos cinereus	Koala	V	E

Key

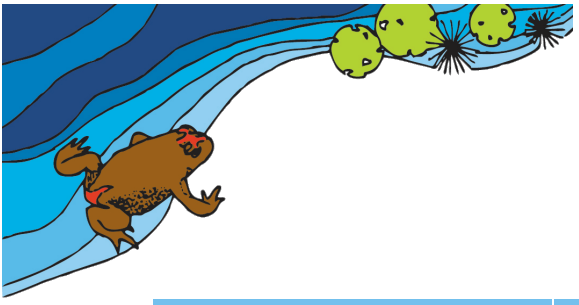
V = Vulnerable

E = Endangered

Koala *Phascolarctos cinereus*

http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10616

- Inhabit eucalypt woodlands and forests.
- Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.
- Inactive for most of the day, feeding and moving mostly at night.
- Spend most of their time in trees, but will descend and traverse open ground to move between trees.
- Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.
- Generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery.
- Females breed at two years of age and produce one young per year.



Scientific name	Common name	NSW status	Comm. status
Petaurus australis	Yellow-bellied Glider	V,P	

Habitat and ecology

- Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.
- orest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.
- Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein.
- Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar.
- Live in small family groups of two - six individuals and are nocturnal.
- Den, often in family groups, in hollows of large trees.
- Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.

https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10601

Scientific name	Common name	NSW status	Comm. status
Petaurus norfolcensis	Squirrel Glider	V,P	

Habitat and ecology

- Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.
- Prefers mixed species stands with a shrub or Acacia midstorey.
- Live in family groups of a single adult male one or more adult females and offspring.
- Require abundant tree hollows for refuge and nest sites.
- Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.

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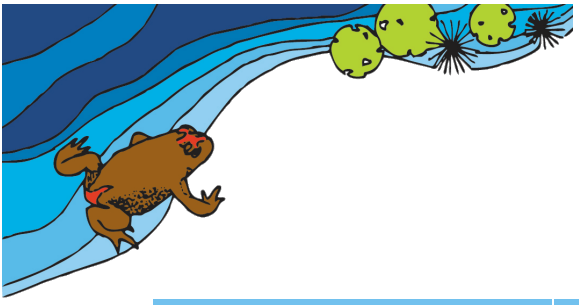

Scientific name	Common name	NSW status	Comm. status
Petauroides volans	Greater Glider	P	V
Petauroides volans	Greater Glider population in the Eurobodalla local government area	E2,P	V

Distribution

The Greater Glider occurs in eucalypt forests and woodlands along the east coast of Australia from noth east Queensland to the Central Highlands of Victoria. This population of Greater Gliders on the south coast of NSW is bounded by the Moruya River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west. These barriers greatly restrict dispersal of Greater Gliders and this population is therefore isolated from other occurrences of the species in Moruya State Forest and Deua National Park to the west. The boundaries of the population encompass an area of just over 6000 ha, half of which supports native vegetation. This vegetation occurs principally in two blocks of 2040 and 1120 ha, which are poorly connected by scattered trees. It is estimated that approximately 1800 ha of the native vegetation in the population area is of a type suitable for occupation by Greater Gliders. Of the total native vegetation in the population area, 25% is in Eurobodalla National Park, the remainder being primarily freehold.

Habitat and ecology

- Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe.
- Shelter during the day in tree hollows and will use up to 18 hollows in their home range.
- Occupy a relatively small home range with an average size of 1 to 3 ha.
- Give birth to a single young in late autumn or early winter which remains in the pouch for approximately 4 months and is independent at 9 months of age.
- Usually solitary, though mated pairs and offspring will share a den during the breeding season and until the young are independent.
- Can glide up to a horizontal distance of 100m including changes of direction of as much as 90 degrees.
- Very loyal to their territory.

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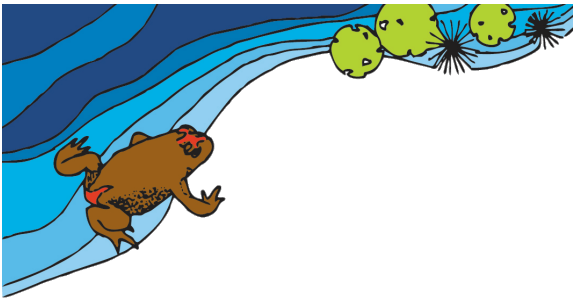


Grey-headed Flying-fox

Scientific name	Common name	NSW status	Comm. status
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V

Key

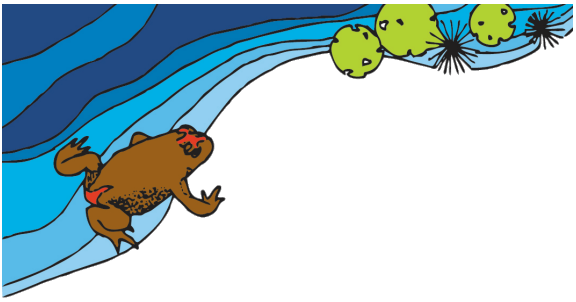
V = Vulnerable

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
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V,P	-
Mormopterus norfolkensis	Eastern Freetail-bat	V,P	-
Chalinolobus dwyeri	Large-eared Pied Bat	V,P	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P	-
Miniopterus orianae oceanensis	Eastern Bentwing-bat	V,P	-
Scoteanax rueppellii	Greater Broad-nosed Bat	V,P	Near Threatened

Key

V = Vulnerable

P = Protected

Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*

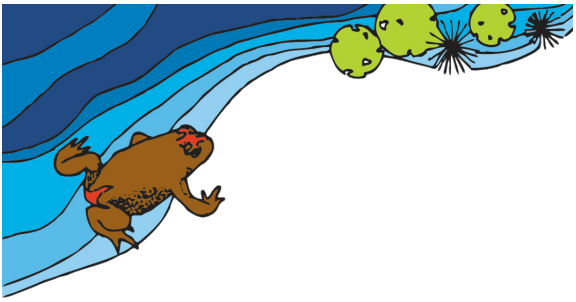
http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10741

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.

Eastern Freetail-bat *Mormopterus norfolkensis*

http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10544

Eastern Freetail-bat occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.



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.

Eastern False Pipistrelle *Falsistrellus tasmaniensis*

http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10331

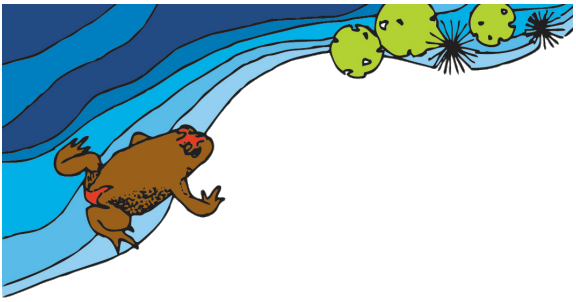
Prefers moist habitats, with trees taller than 20 metres. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.

Eastern Bentwing-bat *Miniopterus orianae 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.

This species has recently been renamed to *Miniopterus orianae oceanensis* or the large bent-winged bat, from Miniopterus schreibersii subsp. oceanensis or the eastern bent-wing bat.



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.

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. While some of these species have occurred in within a 5 km radius and the site contains potential foraging habitat for these species, the extent of habitat modification is minor. The proposal will involve the construction of soil conservation works. The proposal is unlikely to affect the life cycles of these species such that a viable local population will be placed at risk of extinction. These species will continue to forage on site and in the surrounding area.

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, or

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

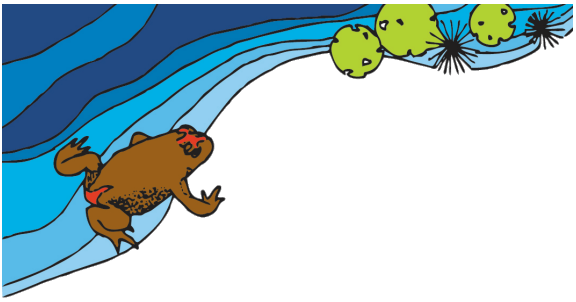
ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

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

c. in relation to the habitat of a threatened species, population 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

This proposal will involve the clearing of 6.419ha of exotic pasture, trees and native vegetation for the proposal.



The groundcover vegetation in the works area is predominately exotic and weed species, with the native vegetation being rare or absent.

Edge effect in the form of changes to soil hydrology and nutrient status may occur on the downslope side of any construction. Edge effect as invasion by exotic vegetation is possible.

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. The proposal will involve construction on an already partly and disturbed area. Connectivity will remain across the rest of the site in the form of a continuous woodland spanning across multiple properties and providing connectivity to large areas of quality woodland habitat to the north, south, west and east.

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

Negligible.

Criterion	Comment
Area and quality of habitat within the locality	The locality is an agricultural and woodland matrix. Areas of degraded or cleared natural vegetation occur on and surrounding agricultural landscape used for grazing. Areas of woodland stretch around these areas and provide habitat for local fauna species.
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. There are large areas of quality habitat north, east, west and south of the site.
Role of habitat to be affected in sustaining habitat connectivity in the locality	Site habitat provides additional connectivity to fragmented vegetation to the North, west, east and south. Development of the site is not expected to affect these species' ability to move across the landscape.
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 woodland zone is an area of endangered ecological community and shows signs of extensive long-term disturbance. Canopy species remain healthy while native understorey species remain dominated by exotic weed species.

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),

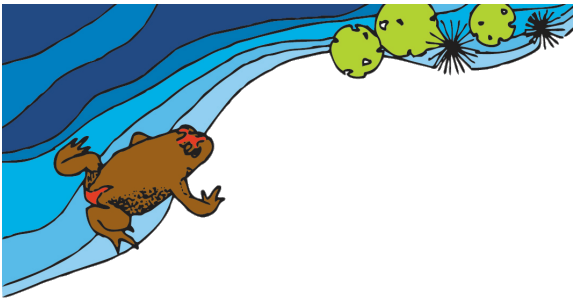
No. There is no such area declared for this site. This proposal will involve the construction of a road and erosion and sedimdent control ponds.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposed development will require the "Clearing of native vegetation", which is a key threatening process relevant to these species. Key threatening processes are listed under the *Biodiversity Conservation Act, 2016* and the *Commonwealth's EPBC Act, 1999*.

Conclusion

The proposed activity is unlikely to have a significant effect on the Little Eagle, Square-tailed Kite, Gang-gang Cockatoo, Glossy Black-Cockatoo, Little Lorikeet, Swift Parrot, Powerful Owl, Masked Owl, Varied Sittella, Dusky Woodswallow, Koala, Yellow-bellied Glider, Squirrel Glider, Greater Glider, Greater Glider population in the Eurobodalla local government area, Grey-headed Flying-fox, Eastern Coastal Freetail-bat, Eastern False Pipistrelle, Southern Myotis, Greater Broad-nosed Bat, Little Bent-winged Bat or Large Bent-winged Bat. Therefore, neither a BDAR, nor a SIS are recommended.



Threatened Ecological Community

Scientific name	NSW status	Comm. status
Lowland Grassy Woodland in the South East Corner Bioregion	Part 3 of Schedule 1 E	

Key

E = Endangered

Description

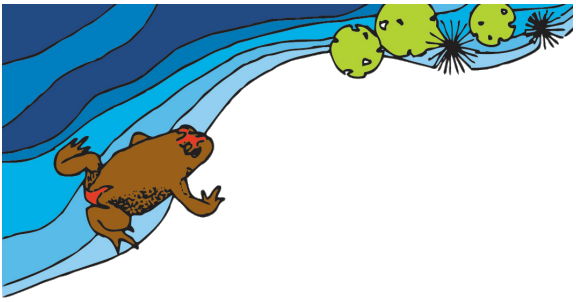
Lowland Grassy Woodland in the South East Corner bioregion is the name given to the ecological community associated with rainshadow areas of the south coast and hinterland of New South Wales. Typically the community comprises an open tree canopy, a near-continuous groundcover dominated by grasses and herbs, sometimes with layers of shrubs and/or small trees. Undisturbed stands of the community may have a woodland or forest structure. Small trees or saplings may dominate the community in relatively high densities after partial or total clearing. The community also includes 'derived' native grasslands which result from removal of the woody strata from the woodlands and forests.

Distribution

Lowland Grassy Woodland in the South East Corner bioregion is currently known to occur within the Bega Valley, Eurobodalla and Palerang Local Government Areas, but may occur elsewhere in the bioregion. Major occurrences are found to the west of Batemans Bay, around Moruya, in the Araluen valley, in the Cobargo - Bega – Candelo area, the Towamba Valley and near Tanja.

Habitat and ecology

- Lowland Grassy Woodland communities in the South East Corner bioregion are located in rainshadow areas receiving less rainfall than more elevated terrain that partially surrounds them, with mean annual rainfall typically in the range of 700-1100 mm.
- The community typically occurs in undulating terrain up to 500 metres in elevation on granitic substrates (e.g. adamellites, granites, granodiorites, gabbros, etc.) but may also occur on locally steep sites and on acid volcanic, alluvial and fine-grained sedimentary substrates.
- Contemporary tree-dominated stands of the community are largely relics or regrowth of originally taller forests and woodlands, which are likely to have had scattered shrubs and a largely continuous grassy groundcover. At some sites, mature trees may exceed 40 metres, although regrowth stands may be shorter than 10 metres.



a. in the case of a threatened species, whether the action proposed 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,

Not applicable. This five-part test is for an endangered ecological community.

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.

There is currently (Final Determination 2019) no published extent of this community.

http://www.environment.gov.au/biodiversity/threatened/communities/maps/pubs/82-map.pdf

Part of the local occurrence (approximately 2.7 km^2) of this endangered ecological community will be either removed or modified on the site.

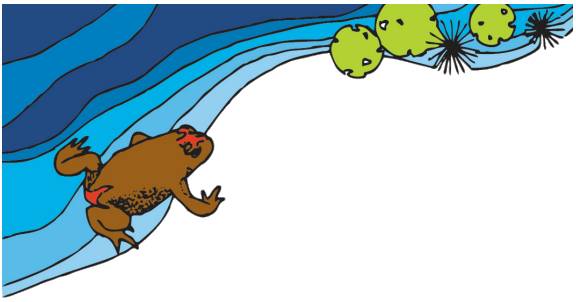
Local occurrence (on site) = 2.7 km^2.

Area of removal = 6.419 ha

This endangered ecological community appears to be reasonably extensive in the locality, so its local occurrence is unlikely to be placed at risk of extinction by the proposal. Furthermore, the native vegetation marked for removal occur on the outer fringes of the EEC. Due to the position of the trees, their removal will not impact or fragment the existing woodland on site from the woodland on surrounding properties. Their removal is unlikely to affect 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

No. The composition of this endangered ecological community will be retained on the site. The component species can be found throughout the site and on adjacent sites. The proposal is unlikely 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, population 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,

This proposal will involve the clearing of 6.419 ha of exotic pasture, trees and native vegetation for the proposal.

The groundcover vegetation in the works area is predominately exotic and weed species, with the native vegetation being rare or absent.

Edge effect in the form of changes to soil hydrology and nutrient status may occur on the downslope side of any construction. Edge effect as invasion by exotic vegetation is possible.

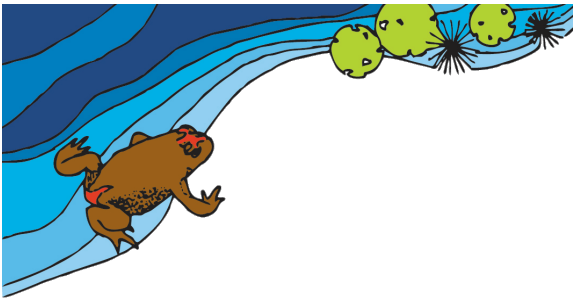
ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. The proposal will involve construction of soil conservation works comprising sediment basins and access works as road and batters. Connectivity will remain across the site. Continuous habitat will remain off-site in the locality to the north, west, south, and east.

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

Negligible.

Criterion	Comment
Area and quality of habitat within the locality	The locality is an agricultural and woodland matrix. Areas of degraded or cleared natural vegetation occur on and surrounding agricultural landscape used for grazing. Areas of woodland stretch around these areas and provide habitat for local fauna species.
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. There are large areas of variable quality habitat north, east, and south of the site.
Role of habitat to be affected in sustaining habitat connectivity in the locality	Site habitat provides additional connectivity to fragmented vegetation to the North, east, west and south. Development of the site is not expected to affect fauna species' ability to move across the landscape.
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 woodland zone is an area of endangered ecological community and shows signs of extensive long-term disturbance. Canopy species remain healthy while native understorey species are dominated by exotic weed species.



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),

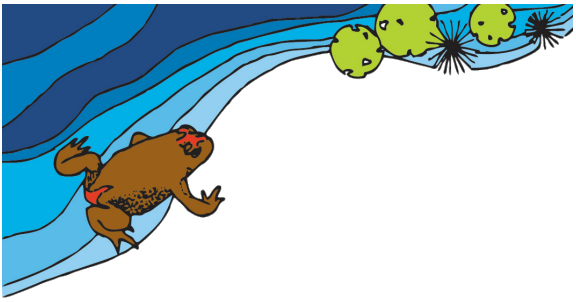
No. There is no such area declared for this site. The proposal will have no direct or indirect effect on any area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposed development will require the "Clearing of native vegetation", which is a key threatening process relevant to this community. Key threatening processes are listed under the *Biodiversity Conservation Act 2016,* and the Commonwealth's EPBC Act, 1999. However, the extent of clearing is minimal and contained to the southern edge of the woodland.

Conclusion

The proposed activity is unlikely to have a significant effect on Lowland Grassy Woodland in the South East Corner bioregion. Therefore, neither a BDAR nor a SIS is recommended.



Woodland plant Species

Scientific Name	Common Name	NSW status	Comm. status
Thesium australae	Austral toadflax	V	V

Key

V = Vulnerable

Habitat and ecology

- Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast.
- Often found in association with Kangaroo Grass (Themeda australis).
- A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass.

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. The species was not observed within the proposal area. The proposal is unlikely to have an adverse effect on the lifecycle of this species such that a local viable population would be placed at risk of extinction.

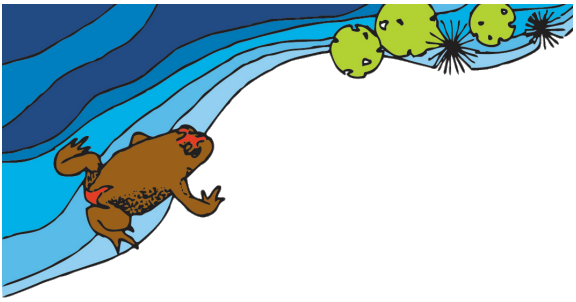
b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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, or

Not applicable. This test is for a 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 threatened species.



c. in relation to the habitat of a threatened species, population 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

This proposal will involve the clearing of 6.419 ha of exotic pasture, trees and native vegetation for the proposal.

The groundcover vegetation in the works area is predominately exotic and weed species, with the native vegetation being rare or absent.

Edge effect in the form of changes to soil hydrology and nutrient status may occur on the downslope side of any construction. Edge effect as invasion by exotic vegetation is possible.

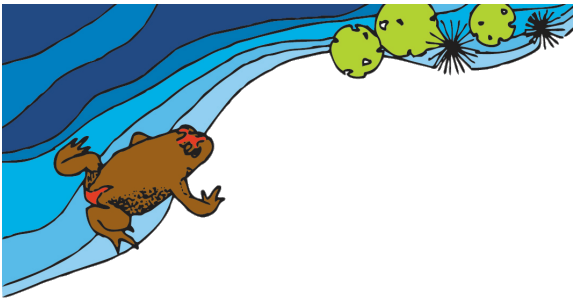
ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. The proposal will involve clearing pasture for construction, being previously disturbed and partly clear at present. Connectivity will remain across the rest of the site in the form of a continuous woodland spanning across multiple properties and providing connectivity to large areas of quality woodland habitat to the north, west, south and east.

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

Negligible.

Criterion	Comment
Area and quality of habitat within the locality	The locality is an agricultural and woodland matrix. Areas of degraded or cleared natural vegetation occur on and surrounding agricultural landscape used for grazing. Areas of woodland stretch around these areas and provide habitat for local fauna species.
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. There are large areas of quality habitat north, east, west and south of the site.
Role of habitat to be affected in sustaining habitat connectivity in the locality	Site habitat provides additional connectivity to fragmented vegetation to the North, west, east and south. Development of the site is not expected to affect these species' ability to move across the landscape.
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 woodland zone is an area of endangered ecological community and shows signs of extensive long-term disturbance. Canopy species remain healthy while native understorey species remain dominated by exotic weed species.



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),

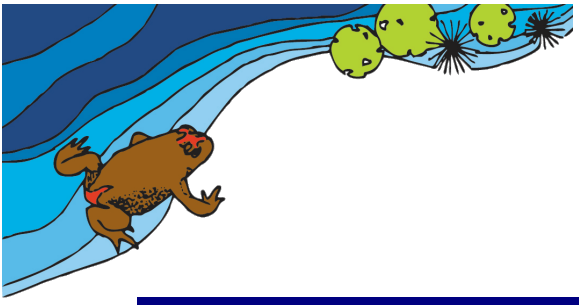
No. There is no such area declared for this site. The proposal will have no direct or indirect effect on any area of outstanding biodiversity value.This proposal will involve clearing for the construction of a road and erosion and sediment control ponds.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposed development will require the "Clearing of native vegetation", which is a key threatening process relevant to this species. Key threatening processes are listed under the *Biodiversity Conservation Act, 2016* and the *Commonwealth's EPBC Act, 1999*.

Conclusion

The proposed activity is unlikely to have a significant effect on Austral toadflax. Therefore, neither a BDAR nor a SIS is required.



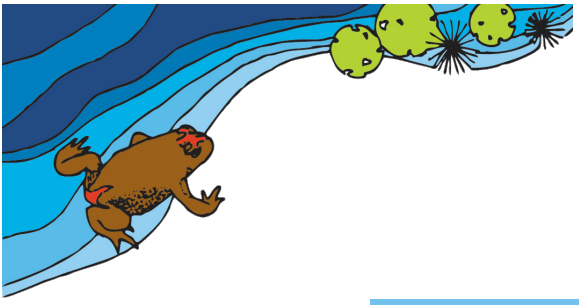
Appendix 2. Flora species list

The grid reference for this locality is 237895 East, 6020800 North (GDA 2020 MGA56)

* Denotes an introduced species

Plants recorded within or near the new erosion and sediment basins and associated road work proposal area.

Scientific Name	Common Name
* *Ammi majus*	Bishop's-weed
* *Anthoxanthum odoratum*	Sweet Vernal Grass
* *Bidens pilosa*	Cobblers Pegs
* *Briza maxima*	Quaking Grass
* *Briza subaristata*	Chilean quaking grass
* *Ehrharta erecta*	Panic Veldtgrass
* *Gamochaeta americana*	Cudweed
* *Hypochaeris radicata*	Flatweed
* *Ligustrum sinense*	Small-leaved Privet
* *Lolium perenne*	Perennial Ryegrass
* *Ochna serrulata*	Mickey Mouse Plant
* *Paspalum urvillei*	Vasey Grass
* *Pyracantha angustifolia*	Orange Firethorn
* *Rosa rubiginosa*	Sweet Briar
* *Senecio madagascariensis*	Fireweed
* *Sida rhombifolia*	Paddy's Lucerne
* *Sporobolus africanus*	Parramatta Grass
* *Taraxacum officinalis*	Common Dandelion
* *Verbena bonariensis*	Purpletop
Acacia falcata	Hickory wattle
Acacia longifolia	Sydney golden wattle
Allocasuarina littoralis	Black she-oak
Angophora floribunda	Rough-barked Apple
Caesia parviflora var. parviflora	Pale Grass-lily
Carex (longibrachiata)	Australian sedge
Commelina cyaena	Scurvy weed



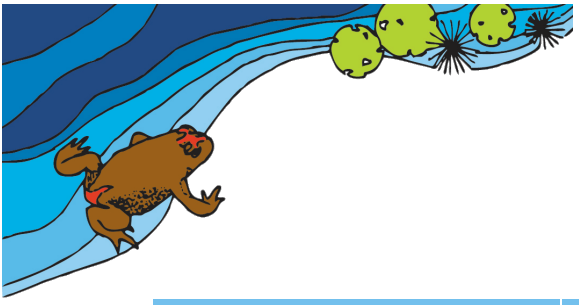
Scientific Name	Common Name
Cynodon dactylon	Common couch
Dichelachne inaequiglumis	
Dichondra repens	Kidney Weed
Einadia hastata	Berry Saltbush
Entolasia marginata	Bordered Panic
Eragrostis leptostachya	Paddock Lovegrass
Eucalyptus bosistoana	Coast grey box
Eucalyptus eugenioides	Thin-leaved Stringybark
Eucalyptus tereticornis	Forest Red Gum
Glycine tabacina	Glycine
Grona (Desmodium) varians	Slender Tick-trefoil
Juncus usitatus	Common Rush
Leucopogon juniperinus	Prickly Beard-heath
Microlaena stipoides	Weeping grass
Oxalis (yellow flowered group)	
Pandorea pandorana	Wonga wonga vine
Pittosporum undulatum	Native Daphne
Plantago lanceolata	Lambs Tongue
Plectranthus parviflorus	Cockspur flower
Rytidosperma tenuius	Purplish wallaby grass
Solanum prinophyllum	Forest Nightshade
Themeda australis	Kangaroo Grass

Table 21 Tree species identified

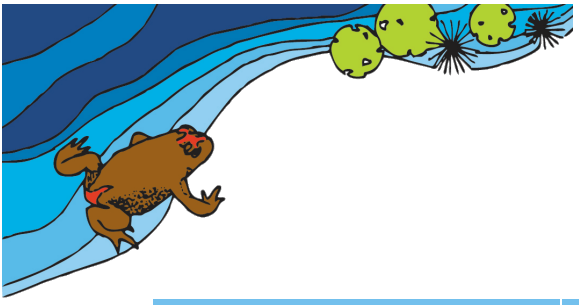
Species name	Common name	Count
Eucalyptus tereticornis	Forest Red Gum	207
Eucalyptus bosistoana	Coast Grey Box	50
Eucalyptus eugenioides	Thin-leaved Stringybark	185
Angophora floribunda	Rough-barked Apple	76
Eucalyptus sieberi	Silvertop Ash	5
Acacia implexa	Hickory Wattle	6
Allocasuarina littoralis	Black She-oak	29
Pittosporum undulatum	Sweet Pittosporum	1
Grevillea robusta	Silky Oak	1
Exocarpus cupressiformis	Native Cherry	9
Ligustrum sinense	Small-leaved Privet	1
	Unidentified species	28
	Stags (dead)	26
	Total	624

Table 22 Consolidated Plant List of species recorded within the works proposal area

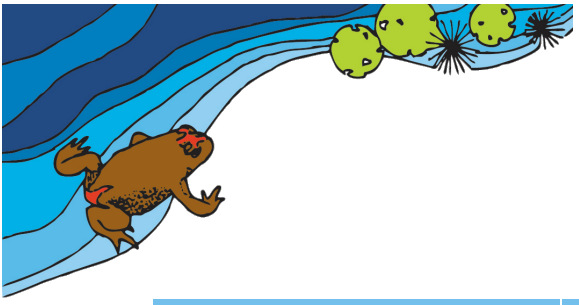
Botanical name	Common name	Grassland Plot 1 NE quarter of site	Grassland-swales-small dams	Woodland Plot 2 Hilltop	Weed status
MAGNOLIOPSIDA					
DICOTYLEDONS					
AMARANTHACEAE					
Alternanthera denticulata		Y	Y (dam)		
APIACEAE					
Centella asiatica			Y	Y	
ASTERACEAE					
* Aster subulatus		Y			E
* Cirsium vulgare	Spear Thistle	Y	Y		E
* Conyza sp. (bonariensis)	Fleabane	Y	Y		E
Euchiton sphaericum				Y	
* Gnaphalium americanum	Cudweed			Y	E
* Hypochaeris radicata	Flatweed	Y	Y	Y	E
* Pseudognaphalium luteoalbum	Jersey Cudweed		Y	Y	
* Senecio madagascariensis	Fireweed	Y	Y		WONS
* Sonchus oleraceus	Common Sowthistle		Y		E
* Taraxacum officinale	Catsear	Y	Y	Y	E
CAMPANULACEAE					
Wahlenbergia gracilis	Bluebell		Y	Y	
CASUARINACEAE					
Casuarina glauca	Swamp Oak	Y			



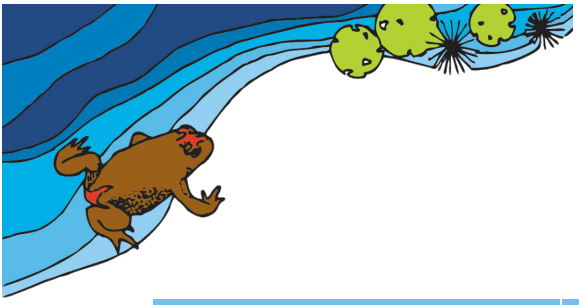
Botanical name	Common name	Grassland Plot 1 NE quarter of site	Grassland-swales-small dams	Woodland Plot 2 Hilltop	Weed status
CONVOLVULACEAE					
Dichondra repens	Kidney Weed		Y	Y	
FABACEAE					
Acacia implexa	Hickory		Y		
Acacia parvipinnula	Silver-stem Wattle				
Oxytes brachypodum (syn. Desmodium brachypodum)	Tick-trefoil		Y		
Glycine sp.	Glycine		Y	Y	
Zornia dyctiocarpa var. dyctiocarpa	Zornia		Y		
GERANIACEAE					
Geranium solanderi			Y		
HYPERICACEAE					
Hypericum gramineum	Small St. John's Wort		Y	Y	
LOBELIACEAE					
Lobelia purpurascens	Whiteroot		Y	Y	
LYTHRACEAE					
Lythrum hyssopifolia	Hyssop Loosestrife	Y	Y (swales)		
MYRTACEAE					
Angophora floribunda	*Rough-barked Apple*		Y		
Angophora subvelutina	Broadleaf Apple		Y		



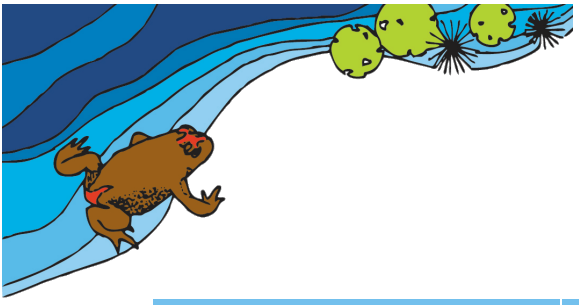
Botanical name	Common name	Grassland Plot 1 NE quarter of site	Grassland-swales-small dams	Woodland Plot 2 Hilltop	Weed status
Eucalyptus eugenioides	Thin-leaved Stringybark		Y		
Eucalyptus tereticornis	Forest Red Gum		Y		
ONAGRACEAE					
Epilobium sp.	Willow-herb		Y (dam, swales)	Y	
Ludwigia peploides subsp. Montevidensis	Water Primrose		Y (dam, swales)		
OXALIDACEAE					
Oxalis sp.	Oxalis			Y	(?)
PLANTAGINACEAE					
* Callitriche (stagnalis)	Starwort		Y (dam)		E
Gratiola pedunculata			Y (swales)		
* Plantago lanceolata	Lambs Tongue	Y	Y		E
POLYGONACEAE					
Persicaria decipiens	Knotweed	Y	Y		
Rumex brownii	Swamp Dock		Y		
* Rumex crispus	Dock	Y	Y		E
POTAMOGETONACEAE					
Potamogeton tricarinatus	Pondweed		Y (dam)		
RHAMNACEAE					
Cryptandra (amara)			Y		
ROSACEAE					



Botanical name	Common name	Grassland Plot 1 NE quarter of site	Grassland-swales-small dams	Woodland Plot 2 Hilltop	Weed status
* Rubus anglocandicans	Blackberry				HTE
SOLANACEAE					
* Solanum americanum	Nightshade	Y	Y		E
VERBENACEAE					
* Verbena bonariensis	Purpletop		Y		E
* Verbena officinalis	Common Verbena	Y	Y		E
* Verbena rigida	Veined verbena		Y		E
MONOCOTYLEDONS					
ANTHERICACEAE					
Dichopogon fimbriatus	Chocolate Lily		Y		
COMMELINACEAE					
Commelina cyanea	Scurvy weed		Y		
CYPERACEAE					
Carex longebrachiata		(Y)	Y	Y	
Carex appressa		Y	Y (dam, swales)		
* Cyperus brevifolius					E
* Cyperus eragrostis	Umbrella Sedge	Y	Y		HTE
Cyperus gracilis	Slender Flat-sedge		Y		
Cyperus sanguinolentus		Y	Y	Y	
* Cyperus sesquiflorus		Y	Y		E
Cyperus sphaeroideus			Y		
Fimbristylis dichotoma	Common Fringe-sedge		Y	Y	



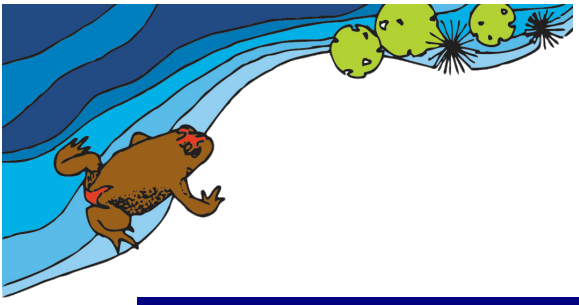
Botanical name	Common name	Grassland Plot 1 NE quarter of site	Grassland-swales-small dams	Woodland Plot 2 Hilltop	Weed status
* Isolepis prolifera			Y		E
Eleocharis dietrichiana		Y	Y (dam, swales)		
HYPOXIDACEAE					
Hypoxis hygrometrica	Golden Weathergrass		Y	Y	
JUNCACEAE					
* Juncus acutus	Sharp Rush		Y (swale, on W bdy)		HTE
Juncus articulatus			Y (dam, swales)		
* Juncus cognatus	Forked rush	Y			E
Juncus prismatocarpus	Branching rush				
Juncus subsecundus			Y (dam)		
ORCHIDACEAE					
Spiranthes sinensis	Ladies' Tresses	Y	Y		
POACEAE					
* Axonopus fissifolius	Carpet Grass	Y	Y	Y	E
Bothriochloa macra	Red Grass		Y	Y	
* Briza maxima	Blowfly Grass		Y	Y	E
* Briza minor	Shivery Grass		Y	Y	E
* Cenchrus clandestinus	Kikuyu	Y	Y		HTE
Cymobopogon refractus	Barbwire Grass			Y	
* Cynodon dactylon	Common Couch	Y	Y	Y	(E)
*Echinochloa crus-galli	Barnyard Grass	Y	Y		E
Ehrharta erecta	Panic Veldtgrass	Y	Y		E



Botanical name	Common name	Grassland Plot 1 NE quarter of site	Grassland-swales-small dams	Woodland Plot 2 Hilltop	Weed status
Eragrostis leptostachya	Paddock Lovegrass	Y	Y	Y	
Eragrostis sp.	Lovegrass		Y	Y	
* Holcus lanatus	Yorkshire Fog	Y	Y		E
Lachnagrostis filiformis		Y	Y		
Lolium perenne	*Perennial Ryegrass*	Y	Y		E
Microlaena stipoides	Weeping Grass		Y	Y	
* Paspalum dilatatum	Paspalum	Y	Y		
Paspalum distichum	Water Couch		Y (dam, swales)		
* Phalaris sp.	Phalaris	Y	Y		E
Rytidosperma (racemosa)	Wallaby Grass		Y		
* Setaria parviflora	Pigeon Grass	Y	Y		E
Sporobolus creber	Western Rat-tail Grass			Y	
Themeda triandra	Kangaroo Grass		Y		

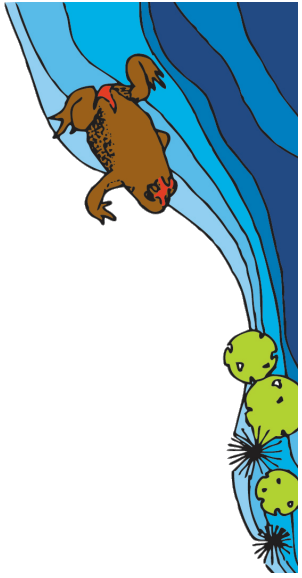
Key

	Weed on the site / Exotic	HTE	High Threat Exotic	WONS	Weed of National Significance



Appendix 3. Vegetation survey data

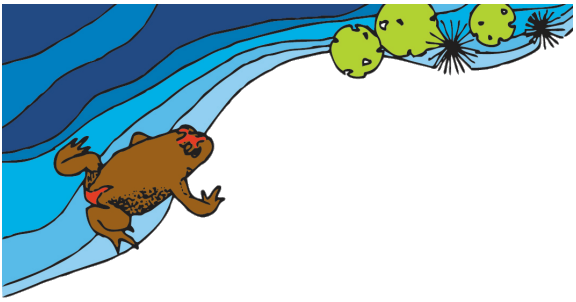
- Plots 1,2 Woodland
- Plots 3-10 Grassland (Pasture)



BAM Site - Field Survey Form				Site Sheet no: Plot 1 (woodland)					
		Survey Name	Plot Identifier	Recorders					
Date:	28 Oct 21		Plot 1, Woodland SE corner	WF, DM					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 238023	Northing: 6020609	Dimensions	20 x 50		Orientation of midlinefrom the 0 m point	247			
Vegetation Class	Coastal Valley Grassy Woodlands						Confidence: H M L		
Plant Community Type	PCT 834					EEC: Lowland Grassy Woodlan	Confidence: H M L		
Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.									
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.									

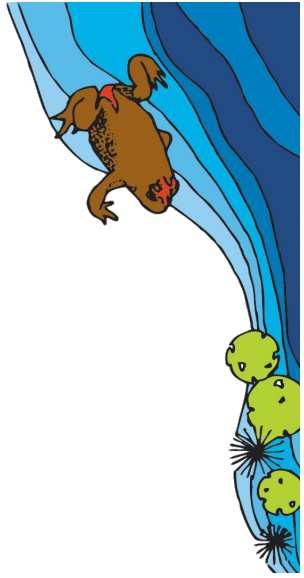
BAM Attribute (400 m² plot)		Sum values		BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
Count of Native Richness	Trees	2		dbh	Euc*	Non Euc	Hollows	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
	Shrubs	2		large trees for Euc* & Non Euc - 80 + cr	89, 110		0	
	Grasses etc.	9		50-79 cm	63, 65, 73		0	
	Forbs	6		30 - 49 cm	37, 31, 48		0	*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*.
	Ferns	0		20 - 29 cm			0	
	Other	3		10 - 19 cm			0	†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of Cover of native vascular plants by growth form group	Trees	60		5 - 9 cm			n/a	
	Shrubs	0.02		< 5 cm		(4X3) + 7	n/a	
	Grasses etc.	63.77		Length of logs (m) (≥ 10 cm diameter, >50 cm in length)	14m as total length			total = 28
	Forbs	6.12						
	Ferns	0		Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30…, 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree where the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
	Other	0.52						
High Threat Weed cover		23.01						

BAM Attribute (1 x 1 m plo	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 6 15 12 6	2 4 1 2 2	0 2 0 1 0	0 5 0 0 3
Average of the 5 subplots	8.8	2.2	.6	1.6



- Vegetation integrity survey plot data – Plot 1 – Sheet 2

20 x 20						
400 m^2 plot: Sheet ___ of __		**Survey Name**	**Plot Identifier**	**Recorders**		
Date	28 Oct 21		Plot 1, Woodland, SE corner	WF, DM		
GF Code	*Top 3 native species in each growth form group: Full species name mo*			N, E or H.T.E	Cover	Abund
	All other native and exotic species: Full species name wher practicable					
TG	Eucalyptus eugenioides			N	35	2
TG	Eucalyptus tereticornis			N	25	2
SG	Acacia mearnsii - slender sapling			N	0.01	1
SG	Pittosporum undulatum - 1 seedling			N	0.01	1
GG	Bothriochloa macra			N	10	100
GG	Carex inversa			N	0.25	15
GG	Carex sp.			N	0.02	25
GG	Cynodon dactylon			N	40	100
GG	Cyperus gracilis			N	5	100
GG	Eragrostis leptostachya			N	1	20
GG	Microlaena stipoides			N	5	100
GG	Oplismenus aemulus			N	2	50
GG	Poa sp.			N	0.5	30
FG	Commelina cyanea			N	0.001	5
FG	Dichondra repens			N	5	50
FG	Einadia hastata			N	0.1	10
FG	Lobelia purpurascens			N	0.01	25
FG	Rumex brownii			N	1	5
FG	Solanum prinophyllum			N	0.01	5
OG	Desmodium varians			N	0.25	15
OG	Glycine clandestina			N	0.02	20
OG	Glycine tabacina			N	0.25	15
	* Cirsium vulgare			E	0.01	10
	* Conyza sp.			E	0.002	10
	* Facelis retusa			E	0.001	5
	* Gamochaeta americana			E	0.02	20
	* Hypochaeris radicata			E	0.01	20
	* Leontodon saxatilis			E	0.05	20
	* Lysimachia arvensis			E	0.01	10
	* Oxalis (corniculata)			E	0.05	20
	* Plantago lanceolata			E	0.01	20
	* Plantago majus			E	0.001	5
	* Polycarpon tetraphyllum			E	0.002	10
	* Solanum nigram			E	0.01	5
	* Sonchus oleracea			E	0.01	20
	* Ehrharta erecta			HTE	5	100
	* Ligustrum sinense			HTE	3	8
	* Paspalum dilatatum			HTE	15	25
	* Senecio madagascarensis			HTE	0.01	10
GF Code: see Growth Form definitions in Appendix 1			N: native, E: exotic, H.T.E: high threat exotic		circle code if 'top 3'.	
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or						
a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m						



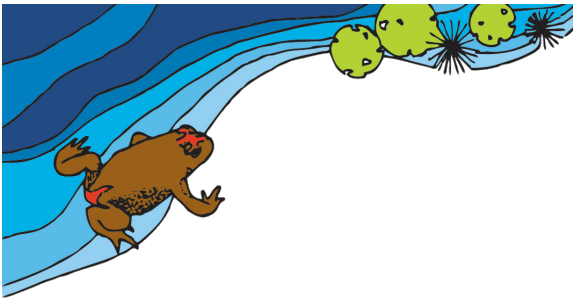
BAM Site - Field Survey Form				Site Sheet no: 2 Woodland					
		Survey Name	Plot Identifier	Recorders					
Date:	27 Oct 21		Plot 2 Woodland, N vacant Lot	WF, DM					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting. 237844	Northing: 6020995	Dimensions	20 x 50		Orientation of midlinefrom the 0 m point	95			
Vegetation Class	Coastal Valley Grassy Woodlands						Confidence: H M L		
Plant Community Type	834					EEC:	Confidence: H M L		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values	BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
Count of **Native Richness**	Trees	5	**dbh**	Euc*	Non Euc	Hollows	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
	Shrubs	4	large trees for Euc* & Non Euc - 80 + cr	0			
	Grasses etc.	9	50-79 cm	71, 64, 68, 59, 78		78	
	Forbs	15	30 - 49 cm	44, 42, 32, 36, 47, 32, 40, 37, 42, 42, 41			*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*.
	Ferns	0	20 - 29 cm	28			
	Other	1	10 - 19 cm	14, 11, 11, 13, 10, 10, 14	12, 13		†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of **Cover** of native vascular plants by growth form group	Trees	86.1	5 - 9 cm	8, 7, 8, 9, 7, 9		n/a	
	Shrubs	7.1	< 5 cm	1, 1, 3, 4x 2-4	4, 14x 1-5, 1, 5x 2-4	n/a	
	Grasses etc.	54.2	**Length of logs (m)** (≥ 10 cm **diameter**, >50 cm in length)	38m			total = 38
	Forbs	6.6					
	Ferns	0					
	Other	0.5					
High Threat Weed cover		18.4					

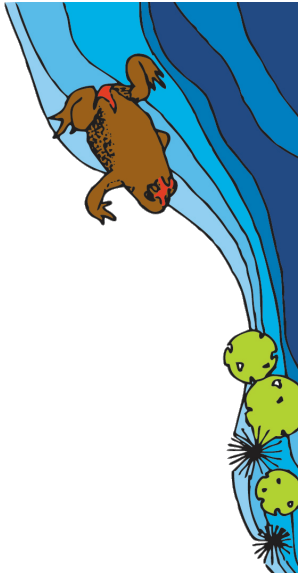
Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300.
For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree wher the tree is multi-stemmed.
The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m pl	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	90, 15, 15, 5, 15	5, 0, 0, 0, 0	0, 0, 0, 0, 0	1, 0, 0, 0, 0
Average of the 5 subplots	28	1	0	0.2



- Vegetation integrity survey plot data – Plot 2 – Sheet 2

20 x 20								
400 m² plot: Sheet ___ of __		**Survey Name**	**Plot Identifier**	**Recorders**				
Date	27 Oct 21		Plot 2 Woodland, N vacant Lot	WF & DM				
GF Code	*Top 3 native species in each growth form group: Full species name mo*			N, E or H.T.E	Cover	Abund	stratum	voucher
	All other native and exotic species: Full species name wher practicable							
TG	Angophora floribunda			N	50	10		
TG	Eucalyptus eugenioides			N	20	7		
TG	Grevillea robusta			N	0.1	1		
TG	Eucalyptus tereticornis			N	15	2		
TG	Casuarina glauca			N	1	1		
FG	Solanum prinophyllum			N	0.5	3		
FG	Caesia parviflora var. parviflora			N	0.3	3		
FG	Oxalis sp. (yellow flowered group) (O.perennans ?)			N	0.1	10		
FG	Euchiton sphaericus			N	0.5	15		
FG	Dichondra repens			N	2	20		
FG	Lythrum hyssopifolia			N	0.2	10		
FG	Pratia purpurescens			N	0.1	10		
FG	Geranium (solanderi)			N	0.1	5		
FG	Solanum americanum			N	0.1	5		
FG	Dianella longifolia			N	2	10		
FG	Wahlenbergia gracilis			N	0.1	5		
FG	Opercularia (diphylla)			N	0.3	10		
FG	Porantha microphylla			N	0.1	5		
FG	Brunoniella australis			N	0.1	3		
FG	Wahlenbergia (communis)			N	0.1	3		
GG	Cynodon dactylon			N	30	5		
GG	Juncus bufonius			N	0.1	5		
GG	Themeda triandra			N	5	50		
GG	Eragrostis brownii			N	0.1	5		
GG	Carex appressa			N	1	3		
GG	Lomandra longifolia			N	1	3		
GG	Rytidosperma tenuis			N	10	30		
GG	Poa sp.			N	5	10		
GG	Echinopogon caespitosus			N	2	5		
OG	Glycine clandestina			N	0.5	20		
SG	Acacia mearnsii			N	2	2		
SG	Leucopogon juniperinus			N	1	5		
SG	Hakea salicifolia			N	4	8		
SG	Pittosporum undulatum			N	0.1	1		
	* Agrostis (capillaris)			HTE	0.1	10		
	* Asparagus aethiopicius			HTE	0.1	1		
	* Bidens pilosa			HTE	0.1	3		
	* Cenchrus clandestinus			HTE	15	10		
	* Erharta erecta			HTE	3	50		
	* Olea europaea subsp. cuspidata			HTE	0.1	1		
	* Plectranthus caninus			E	0.2	5		
	* Plantago lanceolata			E	3	400		
	* Anagalis arvensis			E	0.25	20		
	* Facelis retusa			E	0.1	3		
	* Conyza sp.			E	0.1	10		
	* Setaria sp.			E	0.1	5		
	* Verbena bonariensis			E	1	20		
	* Cirsium vulgare			E	0.1	1		
	* Gamochaeta americana			E	0.1	15		
	* Paspalum urvelli			E	1	5		
	* Hypocharis radicata			E	0.5	50		
	* Aster subulata			E	0.1	5		
	* Sonchus oleracea			E	0.1	3		
	* Silene gallica			E	0.1	15		
	* Sida rhombifolia			E	1	5		
	* Dimorphotheca ecklonis			E	1	3		
	* Modiola caroliniana			E	0.1	3		
	* Phytolacca octandra			E	0.5	1		
	* Anthoxanthum odoratum			E	0.5	20		
	* Chlorophytum comosum			E	0.5	1		
	* Aloe maculata			E	0.5	3		
	* (Lamiaceae - silver foliage and red flowers)			E	0.2	3		
	* Petrorhagia nanteuilii			E	0.1	5		
	* Grona (Desmodium) varians			E	0.1	10		
	* Polycarpon tetraphyllum			E	0.1	20		
	* Juncus cognatus			E	0.1	5		
	* Sisyrinchium sp. A			E	0.1	5		
	* Phalaris (canariensis)			E	0.1	1		



BAM Site - Field Survey Form				Site Sheet no: 3					
		Survey Name	Plot Identifier	Recorders					
Date:	12 Jul 22	Moruya Hospital	Plot 3, Rd Res, N side (offsite), 10x40, 1	DM, MS					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 237976	Northing: 6020978	Dimensions	20 x 50. - separate from the 20x20		Orientation of midlinefrom the 0 m point	98			
Vegetation Class							Confidence: H M L		
Plant Community Type	Derived grassland					EEC: Lowland Grassy Woodlar	Confidence: H M L		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of **Native Richness**	Trees	0
	Shrubs	0
	Grasses etc.	**7**
	Forbs	**2**
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	**31.13**
	Forbs	**0.02**
	Ferns	0
	Other	0
High Threat Weed cover		**64.11**

BAM Attribute (20 x 50 m plot)	Euc*	Non Euc	Hollows
dbh			
large trees for Euc* & Non Euc - 80 + cr	0	0	
50-79 cm	0	0	
30 - 49 cm	0	0	
20 - 29 cm	0	0	
10 - 19 cm	0	0	
5 - 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥ 10 cm **diameter**, >50 cm in length)	0		

 # Tree Stems Count

Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.

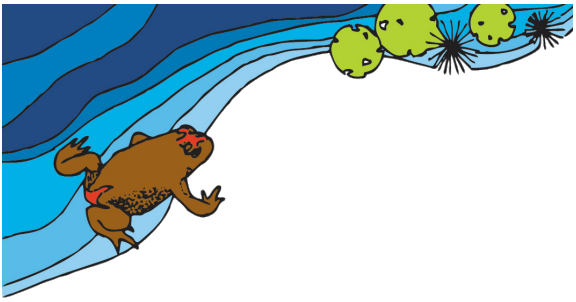
*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*.

†Record total number of stems by size class with hollows (including dead stems / trees)

total = 0

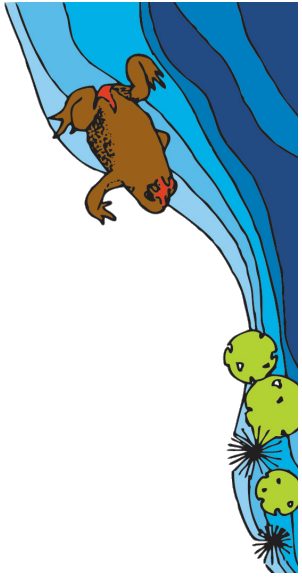
Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300.
For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree where the tree is multi-stemmed.
The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m pl	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	15 10 10 10 10	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	11	0	0	0



- Vegetation integrity survey plot data – Plot 3 – Sheet 2

400 m^2 plot: Sheet ___ of __		**Survey Name**	**Plot Identifier**	**Recorders**		
Date	12 Jul 22	Hospital	Plot 3, Rd Res, N side (offsite), 10x4(	DM, MS		
GF Code	*Top 3 native species in each growth form group: Full species name mo*			N, E or H.T.E	Cover	Abund
	All other native and exotic species: Full species name wher practicable					
	10x40 Plot + 10x100 Plot, N road reserve, offsite (for helicopter path)					
	Exotic pasture along boundary, remnant trees nearby (along fenceline					
GG	Cynodon dactylon			N	25	
GG	Sporobolus creber			N	5	
GG	Microlaena stipoides			N	0.01	
GG	Eragrostis sp. - narrow inflor.			N	1	
GG	Carex inversa			N	0.01	
GG	Fimbristylis dichotoma			N	0.1	
GG	Cymbopogon refractus			N	0.01	
FG	Dichondra repens			N	0.01	
FG	Rumex brownii			N	0.01	
	Trifolium repens			E	0.01	
	Plantago lanceolata			E	0.01	
	Hypochaeris radicata			E	0.01	
	Juncus cognatus			E	0.1	
	Cyperus brevifolius			E	0.1	
	Sporobolus africanus			E	0.2	
	Setaria sp.			E	4	
	Verbena officinalis			E	0.01	
	Cenchrus clandestinus - common on E end of plot			HTE	60	
	Paspalum dilatatum			HTE	0.1	
	Axonopus fissifolius			HTE	4	
GF Code: see Growth Form definitions in Appendix 1			N: native, E: exotic, H.T.E: high threat exotic	GF - circle code if 'top 3'.		
Cover: 0.1, 0.2, 0.3, …, 1, 2, 3 …, 10, 15, 20, 25, …, 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or						
a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m						



BAM Site - Field Survey Form				Site Sheet no: 4					
		Survey Name	Plot Identifier	Recorders					
Date:	12 Jul 22	Moruya Hospital	Plot 4, NE corner of site, pasture	DM, MS					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 238055	Northing: 6020871	Dimensions	20 x 50		Orientation of midline from the 0m point	347			
Vegetation Class							Confidence: H M L		
Plant Community Type	Derived grassland					EEC: Lowland Grassy Woodlan	Confidence: H M L		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

BAM Attribute (400 m² plot)	Sum values		BAM Attribute (20 x 50 m plot)	# Tree Stems Count			
Trees	1		dbh	Euc*	Non Euc	Hollows	
Shrubs	0		large trees for Euc* & Non Euc - 80 + cr	0	0		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
Count of Native Richness: Grasses etc.	10		50-79 cm	0	0		
Forbs	1		30 - 49 cm	0	0		*includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia.*
Ferns	0		20 - 29 cm	0	0		
Other	0		10 - 19 cm	0	0		†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of Cover of native vascular plants by growth form group: Trees	0.01		5 - 9 cm	0	0	n/a	
Shrubs	0		< 5 cm	2	0	n/a	
Grasses etc.	60.71		Length of logs (m) (≥ 10 cm diameter, >50 cm in length)	0			total = 0
Forbs	0.01						
Ferns	0		Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree where the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
Other	0						
High Threat Weed cover	35.3						

BAM Attribute (1 x 1 m plo	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	30 25 15 10 15	0 0 0 0 0	0 0 1 0 0	0 0 0 0 0
Average of the 5 subplots	19	0	.2	0

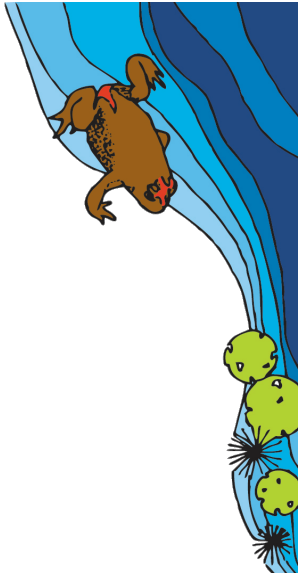
- Vegetation integrity survey plot data – Plot 4 – Sheet 2

20 x 20						
400 m² plot: Sheet ___ of __		**Survey Name**	**Plot Identifier**	**Recorders**		
Date	12 Jul 22	Moruya Hospi	Plot 4, NE corner	DM, MS		

GF Code	*Top 3 native species in each growth form group: Full species name ma*	N, E or H.T.E	Cover	Abund
	All other native and exotic species: Full species name wher practicable			
	20X50 plot, NE corner, oriented approx. N. Exotic pasture, no canopy.			
TG	Eucalyptus tereticornis - 1 seedling to 0.5m	N	0.01	1
GG	Carex appressa	N	8	
GG	Cynodon dactylon	N	40	
GG	Schoenus apogon	N	5	
GG	Cymbopon refractus	N	1	
GG	Fimbristylis dichotoma	N	0.1	
GG	Eragrostis sp. - narrow inflor.	N	3	
GG	Eragrostis sp2. - broad inflor.	N	3	
GG	Cyperus polystachyos	N	0.01	
GG	Sporobolus creber	N	0.5	
GG	Microlaena stipoides	N	0.1	
FG	Desmodium sp.	N	0.01	
	Sporobolus africanus	E	2	
	Hypochaeris radicata	E	2	
	Briza maxima	E	0.01	
	Juncus cognatus	E	0.1	10
	Axonopus fissifolius	HTE	35	
	Rubus anglocandicans	HTE	0.1	
	Paspalum dilatatum	HTE	0.1	
	Senecio madagascariensis	HTE	0.1	15

GF Code: see Growth Form definitions in Appendix 1 | N: native, E: exotic, H.T.E: high threat exotic | GF - circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

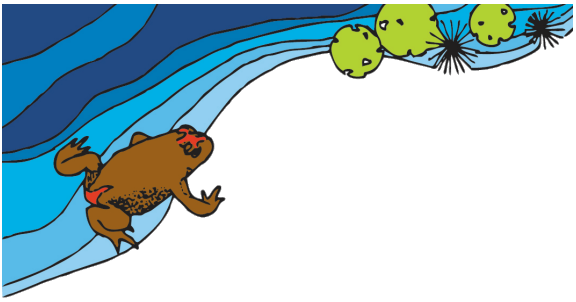


BAM Site - Field Survey Form				Site Sheet no: 5					
		Survey Name	Plot Identifier	Recorders					
Date:	13/07/2022	Moruya Hospital	Plot 5, S-aspect, along contour, pasture	DM, MS					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 238013	Northing: 6020772	Dimensions	20 x 50		Orientation of midlinefrom the 0 m point	278			
Vegetation Class							Confidence: H M L		
Plant Community Type	Derived grassland					EEC: Lowland Grassy Woodland	Confidence: H M L		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

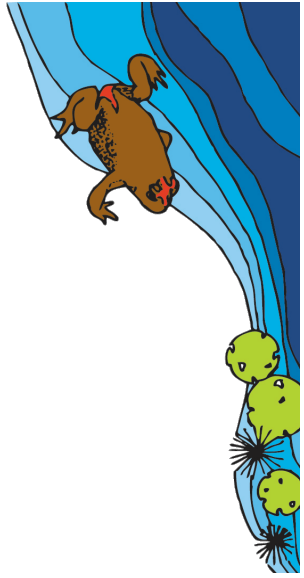
BAM Attribute (400 m² plot)	Sum values	BAM Attribute (20 x 50 m plot)	# Tree Stems Count			
Trees	0	**dbh**	Euc*	Non Euc	Hollows	
Shrubs	0	large trees for Euc* & Non Euc - 80 + cr	0	0	0	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
Count of **Native Richness** Grasses etc.	**10**	50-79 cm	0	0	0	
Forbs	**2**	30 - 49 cm	0	0	0	*includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia.*
Ferns	0	20 - 29 cm	0	0	0	
Other	0	10 - 19 cm	0	0	0	†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of **Cover** of native vascular plants by growth form group Trees	0	5 - 9 cm	0	0	n/a	
Shrubs	0	< 5 cm	0	0	n/a	
Grasses etc.	**50.455**	**Length of logs (m)** (≥ 10 cm **diameter,** >50 cm in length)	0			total = 0
Forbs	**0.07825**					
Ferns	0	Counts must apply to each size class when the number of living tree stems within the size classis ≤ 10. Estimatescan be used when the number of living tree stems within a class is >10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count /estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree where the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
Other	0					
High Threat Weed cover	**47.5125**					

BAM Attribute (1 x 1 m pl	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	2 5 3 5 5	2 3 1 1 1	1 0 2 3 2	0 0 0 0 0
Average of the 5 subplots	4	1.6	1.4	0



- Vegetation integrity survey plot data – Plot 5 – Sheet 2

20 x 20								
400 m^2 plot: Sheet ___ of __		**Survey Name**	**Plot Identifier**	**Recorders**				
Date	13 Jul 22	Moruya Hospi	Plot 5, S-aspect slope, along contour	DM, MS				
GF Code	*Top 3 native species in each growth form group: Full species name mo*			N, E or H.T.E	Cover	Abund	stratum	voucher
N, E, or HTE	*All other native and exotic species: Full species name wher practicable*			Q1	Ave (C1-C4)	Q2	Q3	Q4
	20X20 plot, S-aspect slope. Exotic pasture, no canopy.							
	NOTE: Plot was divided into 4 sub-plots of 10x10 (Q1-Q4) and cove							
N	Carex appressa			3	4.5	1	9	5
N	Cynodon dactylon			2	3.5	10	1	1
N	Schoenus apogon			40	35	25	35	40
N	Cymbopon refractus			3	2.5	2	3	2
N	Fimbristylis dichotoma			0.1	0.0525	0.01	0.1	0
N	Eragrostis sp. - narrow inflor.			2	1.75	1	2	2
N	Eragrostis sp2. - broad inflor.			2	1.75	1	2	2
N	Sporobolus creber			0.5	0.875	1	1	1
N	Microlaena stipoides			0.01	0.0275	0	0.1	0
N	Bothriochloa macra			0.5	0.5	0.5	1	0
N	Dichondra repens			0.01	0.0525	0	0.1	0.1
N	Lobelia pupurascens			0.01	0.2575	0.01	1	0.01
E	Verbena officinalis - 3 plants			0.05	0.04	0.01	0	0.1
E	Plantago lanceolata			0.05	0.0375	0.1	0	0
E	Gamochaeta americana			0.01	0.03	0.01	0.1	0
E	Sporobolus africanus			0.5	0.625	1	1	0
E	Leontodon taraxacoides			0.2	0.15	0.1	0.2	0.1
E	Setaria sp. (S.parviflora ?)			1	1.025	2	1	0.1
E	Briza maxima			0.04	0.01	0	0	0
E	Juncus cognatus - 15 plants			0.05	0.025	0.05	0	0
HTE	Senecio madagascariensis - 6 plants			0.5	0.225	0.1	0.2	0.1
HTE	Rubus anglocandicans			0.1	0.025	0	0	0
HTE	Paspalum dilatatum			0.05	1.0125	1	2	1
HTE	Axonopus fissifolius			45	46.25	55	40	45
	BRYOPHYTES (Not included in cover scores)							
	Racopylum cuspidatum			0.01	0.01	0.01	0.01	0.01
	Rossulabrum sp.			0.01	0.01	0.01	0.01	0.01
GF Code: see Growth Form definitions in Appendix 1			N: native, E: exotic, H.T.E: high threat exotic	GF - circle code if 'top 3'.				
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or								
a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m								

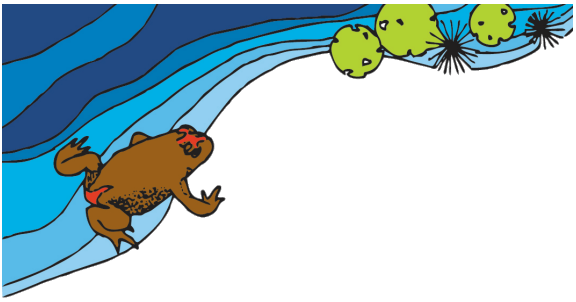


BAM Site - Field Survey Form				Site Sheet no: 6					
		Survey Name	Plot Identifier	Recorders					
Date:	13/07/2022	Moruya Hospital	Plot 6, S-aspect slope, pasture	DM, MS					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 237898	Northing: 6020805	Dimensions	20 x 50		Orientation of midlinefrom the 0 m point	270			
Vegetation Class							Confidence: H M L		
Plant Community Type	Derived grassland					EEC: Lowland Grassy Woodlan	Confidence: H M L		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

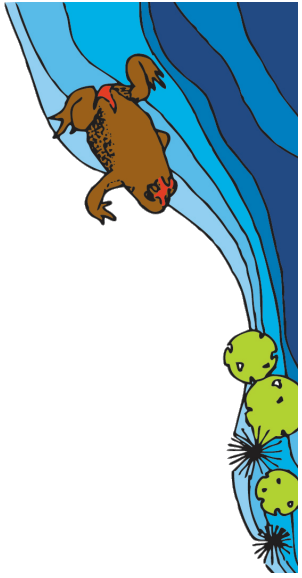
BAM Attribute (400 m² plo	Sum values		BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
Trees	0		dbh	Euc*	Non Euc	Hollows	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
Shrubs	0		large trees for Euc* & Non Euc - 80 + cr	0	0	0	
Count of Native Richness: Grasses etc.	11		50-79 cm	0	0	0	
Forbs	2		30 - 49 cm	0	0	0	*includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia*.
Ferns	0		20 - 29 cm	0	0	0	
Other	0		10 - 19 cm	0	0	0	†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of Cover of native vascular plants by growth form group: Trees	0		5 - 9 cm	0	0	n/a	
Shrubs	0		< 5 cm	0	0	n/a	
Grasses etc.	59.175		Length of logs (m) (≥ 10 cm diameter, >50 cm in length)	0			total = 0
Forbs	0.04						
Ferns	0		Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is >10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 2 stem per tree where the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
Other	0						
High Threat Weed cover	40.075						

BAM Attribute (1 x 1 m plo	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 2 3 3 2	1 1 1 0 1	1 1 1 0 .5	0 0 0 0 0
Average of the 5 subplots	3	.8	.7	0



- Vegetation integrity survey plot data – Plot 6 – Sheet 2

	20 x 20								
	400 m^2 plot: Sheet ___ of __		**Survey Name**	**Plot Identifier**	**Recorders**				
	Date	13 Jul 22	Moruya Hospi	Plot 6, S-aspect slope, W of Plot 3	DM, MS				
GF Group	GF Code	*Top 3 native species in each growth form group: Full species name mandatory*							
		All other native and exotic species: Full species name wher practicable			Q1	Average	Q2	Q3	Q4
		20X20 plot, S-aspect slope, oriented N. Exotic pasture, no canopy.							
		NOTE: Plot was divided into 4 sub-plots of 10x10 (Q1-Q4) and cove							
GG	N	Carex appressa			3	4	3	5	5
GG	N	Cynodon dactylon			1	2	3	3	1
GG	N	Schoenus apogon			50	46.25	55	35	45
GG	N	Cymbopon refractus			2	1			2
GG	N	Fimbristylis dichotoma				0.175	0.5	0.1	0.1
GG	N	Eragrostis sp. - narrow inflor.			1	2	5	1	1
GG	N	Eragrostis sp2. - broad inflor.			1	2	5	1	1
GG	N	Sporobolus creber			1	1.5	3	1	1
GG	N	Microlaena stipoides			0.1	0.175		0.1	0.5
GG	N	Bothriochloa macra				0.05		0.1	0.1
GG	N	Dichelachne sp.				0.025	0.1		
FG	N	Dichondra repens				0.0375		0.1	0.05
FG	N	Lobelia pupurascens			0.01	0.0025			
	E	Sporobolus africanus			1	0.5			1
	E	Leontodon taraxacoides			0.1	0.075		0.1	0.1
	E	Juncus cognatus			0.1	0.0275			0.01
	E	Plantago lanceolata				0.075	0.2	0.1	
	E	Gamochaeta americana			0	0.275		0.1	1
	E	Andropogon virginicus				0.0025			0.01
	E	Lysimachia arvensis			0.05	0.0125			
	HTE	Senecio madagascariensis - 5 plants			0.1	0.075		0.1	0.1
	HTE	Axonopus fissifolius			40	40	25	55	40
		BRYOPHYTES (Not included in cover scores)							
N		Racopylum cuspidatum			Y			Y	
N		Thuidiopsis sparsa							Y
N		Rossulabrum sp.			Y			Y	
	GF Code: see Growth Form definitions in Appendix 1			N: native, E: exotic, H.T.E: high threat exotic	GF - circle code if 'top 3'.				
	Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or								
	a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m								

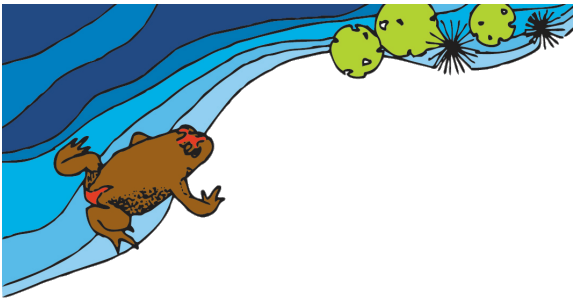


BAM Site - Field Survey Form				Site Sheet no: 7					
		Survey Name	Plot Identifier	Recorders					
Date:	13/07/2022	Moruya Hospital	Plot 7, N-aspect slope, pasture	DM, MS					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 237890	Northing: 6020915	Dimensions	20 x 50		Orientation of midline from the 0 m point	72			
Vegetation Class							Confidence: H M L		
Plant Community Type	Derived grassland					EEC: Lowland Grassy Woodlan	Confidence: H M L		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

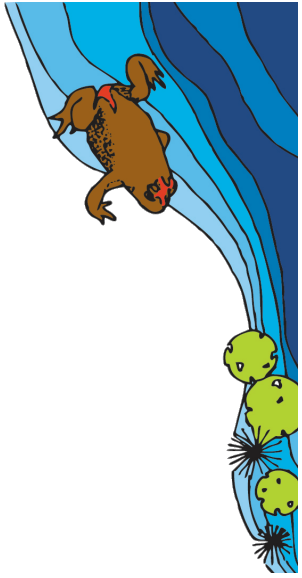
BAM Attribute (400 m² plot)		Sum values	BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
Count of Native Richness	Trees	1	dbh	Euc*	Non Euc	Hollows	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
	Shrubs	0	large trees for Euc* & Non Euc - 80 + cr	0	0		
	Grasses etc.	9	50-79 cm	0	0		
	Forbs	3	30 - 49 cm	0	0		*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*.
	Ferns	0	20 - 29 cm	0	0		
	Other	0	10 - 19 cm	0	0		†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of Cover of native vascular plants by growth form group	Trees	0.05	5 - 9 cm	0	0	n/a	
	Shrubs	0	< 5 cm	0	2	n/a	
	Grasses etc.	56.11	Length of logs (m) (≥ 10 cm diameter, >50 cm in length)	1			total = 1
	Forbs	0.12					
	Ferns	0	Counts must apply to each size class when the number of living tree stems within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is >10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree where the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
	Other	0					
High Threat Weed cover		40.1					

BAM Attribute (1 x 1 m pl	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 3 5 7 5	1 0 0 1 2	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	5	.8	0	0



- Vegetation integrity survey plot data – Plot 7 – Sheet 2

20 x 20						
400 m² plot: Sheet ___ of __		**Survey Name**	**Plot Identifier**	**Recorders**		
Date	13 Jul 22	Moruya Hospi	Plot 7, N-aspect slope	DM, MS		
GF Code	*Top 3 native species in each growth form group: Full species name mo*			N, E or H.T.E	Cover	Abund
	All other native and exotic species: Full species name wher practicable					
	20X20 plot, N-aspect slope, oriented N. Exotic pasture, no canopy.					
TG	Eucalyptus tereticornis - 5 seedlings to 0.5m			N	0.05	5
GG	Carex appressa			N	5	
GG	Cynodon dactylon			N	35	
GG	Schoenus apogon			N	2	
GG	Fimbristylis dichotoma			N	0.1	
GG	Eragrostis sp. - narrow inflor.			N	5	
GG	Eragrostis sp2. - broad inflor.			N	5	
GG	Sporobolus creber			N	2	
GG	Cyperus polystachyos			N	0.01	
GG	Cymbopon refractus			N	2	
FG	Dichondra repens			N	0.1	
FG	Lobelia pupurascens			N	0.01	
FG	Lagenophora sp.			N	0.01	
	Sporobolus africanus			E	0.1	
	Setaria sp. (S.parviflora ?)			E	0.1	
	Leontodon taraxacoides			E	2	
	Briza maxima			E	0.01	
	Juncus cognatus - 10 plants			E	0.1	10
	Plantago lanceolata			E	1	
	Gamochaeta americana			E	0.05	
	Axonopus fissifolius			HTE	40	
	Senecio madagascariensis - 12 plants			HTE	0.1	12
GF Code: see Growth Form definitions in Appendix 1			N: native, E: exotic, H.T.E: high threat exotic		GF - circle code if 'top 3'.	
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or						
a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m						



BAM Site - Field Survey Form				Site Sheet no: 8					
		Survey Name	Plot Identifier	Recorders					
Date:	14/07/2022	Moruya Hospital	Plot 8, SW-aspect slope, pasture	DM, MS					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 237748	Northing: 6020812	Dimensions	20 x 50		Orientation of midline from the 0 m point	275			
Vegetation Class							Confidence: H M L		
Plant Community Type	Derived grassland					EEC: Lowland Grassy Woodlan	Confidence: H M L		

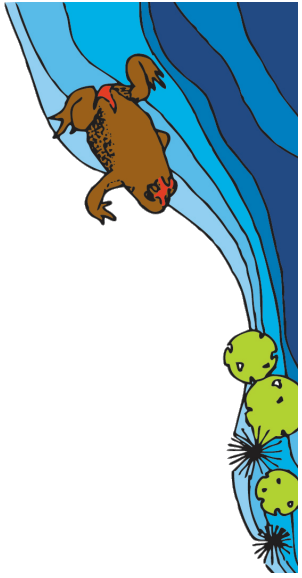
Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values	BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
Count of Native Richness	Trees	0	dbh	Euc*	Non Euc	Hollows	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
	Shrubs	0	large trees for Euc* & Non Euc - 80 + cr	0	0	0	
	Grasses etc.	**8**	50-79 cm	0	0	0	
	Forbs	0	30 - 49 cm	0	0	0	*includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia.*
	Ferns	0	20 - 29 cm	0	0	0	
	Other	0	10 - 19 cm	0	0	0	†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of Cover of native vascular plants by growth form group	Trees	0	5 - 9 cm	0	0	n/a	
	Shrubs	0	< 5 cm	0	0	n/a	
	Grasses etc.	**60.91**	**Length of logs (m)** (≥ 10 cm **diameter**, >50 cm in length)	0			total = 0
	Forbs	0					
	Ferns	0	Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree where the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
	Other	0					
High Threat Weed cover		**40.31**					

BAM Attribute (1 x 1 m pl	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 5 5 5 5	1 2 1 1 0	0 2 0 1 0	0 0 0 0 0
Average of the 5 subplots	5	1	0.6	0

- Vegetation integrity survey plot data – Plot 8 – Sheet 2

20 x 20						
400 m^2 plot: Sheet ___ of __		**Survey Name**	**Plot Identifier**	**Recorders**		
Date	14/07/2022	Moruya Hospi	Plot 8, SW-aspect slope, W of Plot 4	DM, MS		
GF Code	*Top 3 native species in each growth form group: Full species name mo*			N, E or H.T.E	Cover	Abund
	All other native and exotic species: Full species name wher practicable					
	20X20 plot, SW-aspect slope, oriented W. Exotic pasture, canopy tree					
GG	Carex appressa			N	0.2	
GG	Cynodon dactylon			N	50	
GG	Schoenus apogon			N	0.5	
GG	Fimbristylis dichotoma			N	0.01	
GG	Eragrostis sp. - narrow inflor.			N	5	
GG	Eragrostis sp2. - broad inflor.			N	5	
GG	Sporobolus creber			N	0.1	
GG	Microlaena stipoides			N	0.1	
	Leontodon taraxacoides			E	0.01	
	Juncus cognatus			E	0.1	30
	Plantago lanceolata			E	0.01	
	Axonopus fissifolius			HTE	40	
	Senecio madagascariensis			HTE	0.01	2
	Paspalum dilatatum			HTE	0.1	
	Cenchrus clandestinus			HTE	0.1	
	Stenotaphrum secundatum			HTE	0.1	
	BRYOPHYTES (Not included in cover scores)					
	Racopylum cuspidatum				Y	
	Thuidiopsis sparsa				Y	
	Rossulabrum sp.				Y	
	Agaricus sp.				Y	
GF Code: see Growth Form definitions in Appendix 1			N: native, E: exotic, H.T.E: high threat exotic	GF - circle code if 'top 3'.		
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or						
a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m						



BAM Site - Field Survey Form				Site Sheet no: 9					
		Survey Name	Plot Identifier	Recorders					
Date:	14/07/2022	Moruya Hospital	Plot 9, NW-aspect slope, pasture	DM, MS					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 237769	Northing: 6020891	Dimensions	20 x 50		Orientation of midlinefrom the 0 m point	265			
Vegetation Class							Confidence: H M L		
Plant Community Type	Derived grassland					EEC: Lowland Grassy Woodland	Confidence: H M L		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values	BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
Count of **Native Richness**	Trees	0	**dbh**	Euc*	Non Euc	Hollows	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
	Shrubs	0	large trees for Euc* & Non Euc - 80 + cr	0	0	0	
	Grasses etc.	**9**	50-79 cm	0	0	0	
	Forbs	0	30 - 49 cm	0	0	0	*includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia.*
	Ferns	0	20 - 29 cm	0	0	0	
	Other	0	10 - 19 cm	0	0	0	†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of **Cover** of native vascular plants by growth form group	Trees	0	5 - 9 cm	0	0	n/a	
	Shrubs	0	< 5 cm	0	0	n/a	
	Grasses etc.	**78.52**	**Length of logs (m)** (≥ 10 cm **diameter**, >50 cm in length)	0			total = 0
	Forbs	0					
	Ferns	0	Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree where the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
	Other	0					
High Threat Weed cover		**20.2**					

BAM Attribute (1 x 1 m pl	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	10 15 10 10 5	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	10	0	0	0

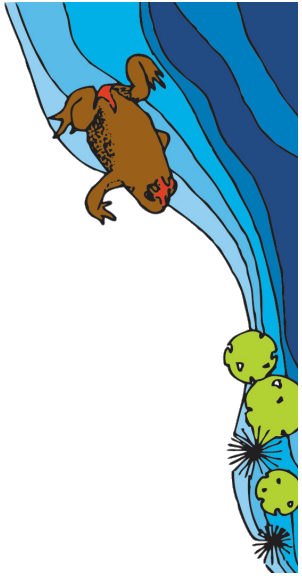
- Vegetation integrity survey plot data – Plot 9 – Sheet 2

20 x 20				
400 m² plot: Sheet ___ of ___	**Survey Name**	**Plot Identifier**	**Recorders**	
Date: 14/07/2022	Moruya Hospi	Plot 9, NW-aspect slope	DM, MS	

GF Code	*Top 3 native species in each growth form group: Full species name mo* *All other native and exotic species: Full species name wher practicable*	N, E or H.T.E	Cover	Abund
	20X20 plot, NW-aspect slope. Exotic pasture, no canopy.			
GG	Carex appressa	N	1	
GG	Cynodon dactylon	N	60	
GG	Schoenus (apogon)	N	15	
GG	Cymbopon refractus	N	0.1	
GG	Fimbristylis dichotoma	N	0.01	
GG	Eragrostis sp. - narrow inflor.	N	1	
GG	Eragrostis sp2 - broad inflor.	N	1	
GG	Sporobolus creber	N	0.5	
GG	Cyperus polystachyos	N	0.01	
	Setaria sp. (S.parviflora ?)	E	1	
	Leontodon taraxacoides	E	0.05	
	Juncus cognatus	E	0.1	25
	Verbena officinalis	E	1	
	Plantago lanceolata	E	0.01	
	Cyperus brevifolius	E	0.01	
	Oxalis corniculata	E	0.01	
	Axonopus fissifolius	HTE	15	
	Senecio madagascariensis	HTE	0.1	20
	Paspalum dilatatum	HTE	5	
	Cenchrus clandestinus	HTE	0.1	
	BRYOPHYTES etc (Not included in cover scores)			
	Rossulabrum sp.		Y	
	Agaricus sp.		Y	

GF Code: see Growth Form definitions in Appendix 1 | N: native, E: exotic, H.T.E: high threat exotic | GF - circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m



M Site - Field Survey Form				Site Sheet no: 10					
		Survey Name	Plot Identifier	Recorders					
Date:	14/07/2022	Moruya Hospital	Plot 10, N-aspect, S side, above dam, p	DM, MS					
Zone: 56	Datum: GDA 94	IBRA region	South East Corner (Sub: Bateman)	Photo #		Zone ID			
Easting: 237787	Northing: 6020647	Dimensions	20 x 50		Orientation of midlinefrom the 0 m point	60			
Vegetation Class							Confidence: H M L		
Plant Community Type	Derived grassland					EEC: Lowland Grassy Woodlan	Confidence: H M L		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values	BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
Count of Native Richness	Trees	1	dbh	Euc*	Non Euc	Hollows	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
	Shrubs	0	large trees for Euc* & Non Euc - 80 + cr	0	0		
	Grasses etc.	9	50-79 cm	0	0		
	Forbs	5	30 - 49 cm	0	0		*includes all species of *Eucalyptus, Corymbia, Angophora, Lophostemon* and *Syncarpia.*
	Ferns	0	20 - 29 cm	0	0		
	Other	0	10 - 19 cm	0	0		†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of Cover of native vascular plants by growth form group	Trees	0.1	5 - 9 cm	0	0	n/a	
	Shrubs	0	< 5 cm	0	12	n/a	
	Grasses etc.	33.51	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0			total = 0
	Forbs	0.05					
	Ferns	0	Counts must apply to each size class when the number of living tree stems within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is >10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree where the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
	Other	0					
High Threat Weed cover		66.2					

BAM Attribute (1 x 1 m plo	Litter cover (%)	Bare ground cover (%	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	5 5 5 10 10	1 1 2 0 0	1 1 0 0 1	0 0 0 0 0
Average of the 5 subplots	6	.8	.6	0

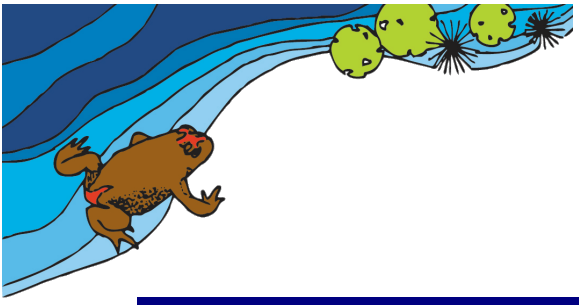
- Vegetation integrity survey plot data – Plot 10 – Sheet 2

20 x 20				
400 m² plot: Sheet ___ of ___		Survey Name	Plot Identifier	Recorders
Date	14/07/2022	Moruya Hospi	Plot 10, N-aspect slope, S side, abov	DM, MS

GF Code	*Top 3 native species in each growth form group: Full species name mo* *All other native and exotic species: Full species name wher practicable*	N, E or H.T.E	Cover	Abund
	20X20 plot, N-aspect slope. Exotic pasture, no canopy but seedlings p			
TG	Eucalyptus bosistoana - 9 seedlings to 0.5m	N	0.1	9
GG	Carex appressa	N	3	
GG	Cynodon dactylon	N	15	
GG	Schoenus apogon	N	1	
GG	Cymbopon refractus	N	3	
GG	Fimbristylis dichotoma	N	0.01	
GG	Eragrostis sp. - narrow inflor.	N	5	
GG	Eragrostis sp2. - broad inflor.	N	5	
GG	Sporobolus creber	N	1	
GG	Elymus scaber	N	0.5	
FG	Lagenophora sp.	N	0.01	
FG	Daucus glochidiatus	N	0.01	
FG	Veronica sp.	N	0.01	
FG	Hypericum gramineum	N	0.01	
FG	Desmodium sp.	N	0.01	
	Sporobolus africanus	E	0.1	
	Leontodon taraxacoides	E	0.1	
	Verbena officinalis	E	0.01	
	Plantago lanceolata	E	0.01	
	Hypochaeris radicata	E	0.01	
	Axonopus fissifolius	HTE	65	
	Senecio madagascariensis	HTE	0.2	12
	Paspalum dilatatum	HTE	1	
	BRYOPHYTES etc (Not included in cover scores)			
	Barbula sp.		Y	

GF Code: see Growth Form definitions in Appendix 1 | N: native, E: exotic, H.T.E: high threat exotic | GF - circle code if 'top 3'.

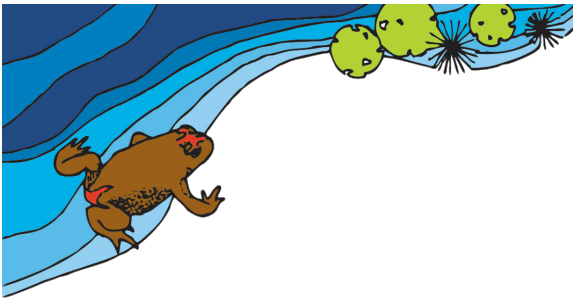
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m



Appendix 4. Expected fauna species for Eurobodalla

Mammals

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

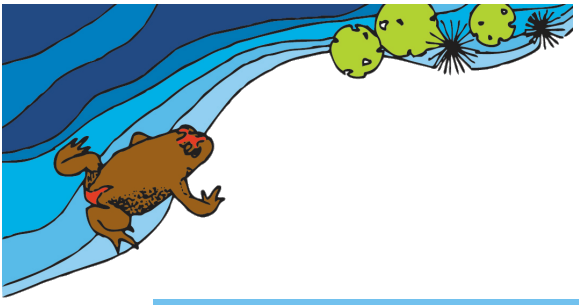


Frogs

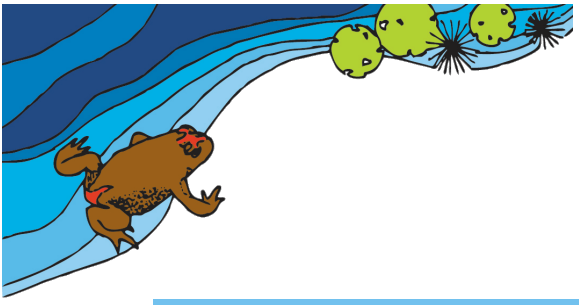
Scientific Name	Common Name
Litoria caerulea	Green Tree Frog
Litoria citropa	Blue Mountains Tree Frog
Litoria dentata	Bleating Tree Frog
Litoria fallax	Eastern Dwarf Tree Frog
Litoria jervisiensis	Jervis Bay Tree Frog
Litoria latopalmata	Broad-palmed Frog
Litoria peronii	Peron's Tree Frog
Litoria phyllochroa	Leaf-green Tree Frog
Litoria tyleri	Tyler's Tree Frog
Litoria verreauxii	Verreaux's Frog
Crinia signifera	Common Eastern Froglet
Limnodynastes dumerilii	Eastern Banjo Frog
Limnodynastes ornatus	Ornate Burrowing Frog
Limnodynastes peronii	Brown-striped Frog
Limnodynastes tasmaniensis	Spotted Grass Frog
Paracrinia haswelli	Haswell's Froglet
Uperoleia laevigata	Smooth Toadlet
Uperoleia tyleri	Tyler's Toadlet

Reptiles

Scientific Name	Common Name
Morelia spilota spilota	Diamond Python
Acanthophis antarcticus	Common Death Adder
Demansia psammophis	Yellow-faced Whip Snake
Dendrelaphis punctulatus	Common Tree Snake
Cacophis squamulosus	Golden-crowned Snake
Cryptophis nigrescens	Eastern Small-eyed Snake
Furina diadema	Red-naped Snake
Hemiaspis signata	Black-bellied Swamp Snake



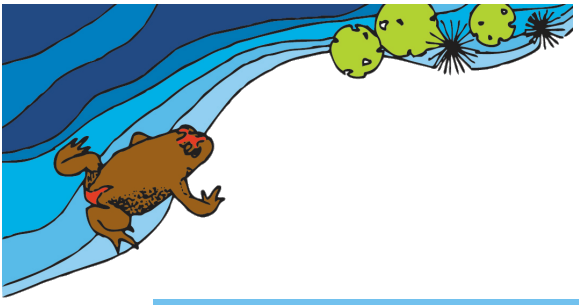
Scientific Name	Common Name
Notechis scutatus	Tiger Snake
Pseudechis porphyriacus	Red-bellied Black Snake
Pseudonaja textilis	Eastern Brown Snake
Parasuta dwyeri	Dwyer's Snake
Vermicella annulata	Bandy Bandy
Ramphotyphlops nigrescens	Blackish Blind Snake
Diplodactylus vittatus	Wood Gecko
Oedura lesueurii	Lesueur's Velvet Gecko
Phyllurus platurus	Broad-tailed Gecko
Underwoodisaurus milii	Thick-tailed Gecko
Lialis burtonis	Burton's Snake-lizard
Pygopus lepidopodus	Common Scaly-foot
Amphibolurus muricatus	Jacky Lizard
Pogona barbata	Bearded Dragon
Anomalopus swansoni	Punctate Worm-skink
Tiliqua scincoides	Eastern Blue-tongue
Carlia tetradactyla	Southern Rainbow-skink
Cryptoblepharus virgatus	Cream-striped Shinning-skink
Ctenotus robustus	Robust Ctenotus
Ctenotus taeniolatus	Copper-tailed Skink
Cyclodomorphus michaeli	Mainland She-oak Skink
Cyclodomorphus gerrardii	Pink-tongued Skink
Egernia cunninghami	Cunningham's Skink
Egernia saxatilis	Black Rock Skink
Liopholis whitii	White's Skink
Eulamprus quoyii	Eastern Water-skink
Eulamprus tenuis	Barred-sided Skink
Lampropholis delicata	Dark-flecked Garden Sunskink
Lampropholis guichenoti	Pale-flecked Garden Sunskink
Saproscincus mustelinus	Weasel Skink
Acritoscincus platynota	Red-throated Skink
Saiphos equalis	Three-toed Skink



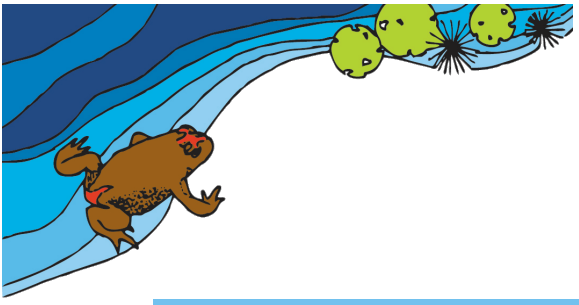
Scientific Name	Common Name
Varanus varius	Lace Monitor
Chelodina longicollis	Eastern Snake-necked Turtle

Birds

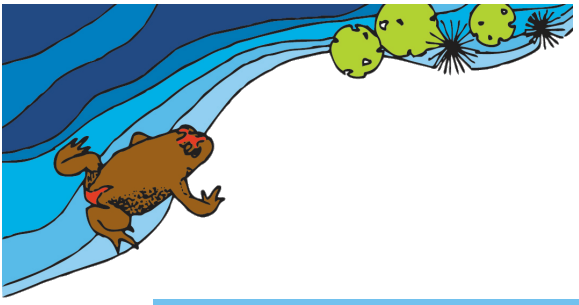
Scientific Name	Common Name
Coturnix ypsilophora	Brown Quail
Cygnus atratus	Black Swan
Chenonetta jubata	Australian Wood Duck
Anas platyrhynchos	Mallard
Anas superciliosa	Pacific Black Duck
Anas gracilis	Grey Teal
Anas castanea	Chestnut Teal
Tachybaptus novaehollandiae	Australasian Grebe
Podiceps cristatus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



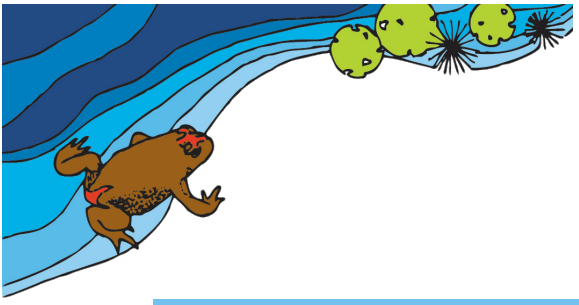
Scientific Name	Common Name
Aquila audax	Wedge-tailed Eagle
Haliaeetus leucogaster	White-bellied Sea-eagle
Circus approximans	Swamp Harrier
Accipiter fasciatus	Brown Goshawk
Accipiter cirrocephalus	Collared Sparrowhawk
Falco berigora	Brown Falcon
Falco longipennis	Australian Hobby
Falco cenchroides	Nankeen Kestrel
Gallirallus philippensis	Buff-banded Rail
Porphyrio porphyrio	Purple Swamphen
Gallinula tenebrosa	Dusky Moorhen
Fulica atra	Eurasian Coot
Gallinago hardwickii	Latham's Snipe
Himantopus himantopus	Black-winged Stilt
Elseyornis melanops	Black-fronted Dotterel
Vanellus miles	Masked Lapwing
Chroicocephalus novaehollandiae	Silver Gull
Columba livia	Rock Dove
Columba leucomela	White-headed Pigeon
Streptopelia chinensis	Spotted Turtle-dove
Macropygia amboinensis	Brown Cuckoo-dove
Chalcophaps indica	Emerald Dove
Phaps chalcoptera	Common Bronzewing
Ocyphaps lophotes	Crested Pigeon
Geopelia humeralis	Bar-shouldered Dove
Leucosarcia picata	Wonga Pigeon
Lopholaimus antarcticus	Topknot Pigeon
Calyptorhynchus funereus	Yellow-tailed Black-cockatoo
Eolophus roseicapilla	Galah
Cacatua tenuirostris	Long-billed Corella
Cacatua sanguinea	Little Corella
Cacatua galerita	Sulphur-crested Cockatoo



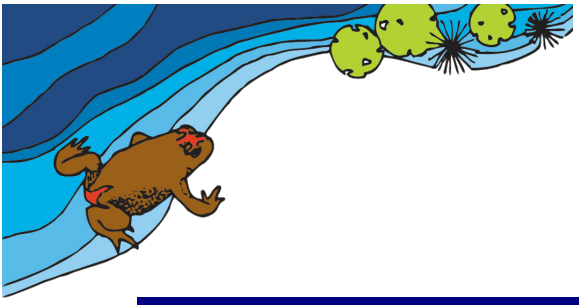
Scientific Name	Common Name
Trichoglossus haematodus	Rainbow Lorikeet
Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet
Glossopsitta concinna	Musk Lorikeet
Alisterus scapularis	Australian King-parrot
Platycercus elegans	Crimson Rosella
Platycercus eximius	Eastern Rosella
Cacomantis flabelliformis	Fan-tailed Cuckoo
Chalcites basalis	Horsfield's Bronze-cuckoo
Scythrops novaehollandiae	Channel-billed Cuckoo
Eudynamys scolopaceus	Asian Koel
Ninox novaeseelandiae	Southern Boobook
Tyto alba	Barn Owl
Podargus strigoides	Tawny Frogmouth
Eurostopodus mystacalis	White-throated Nightjar
Aegotheles cristatus	Australian Owlet-nightjar
Hirundapus caudacutus	White-throated Needletail
Dacelo novaeguineae	Laughing Kookaburra
Todiramphus sanctus	Sacred Kingfisher
Merops ornatus	Rainbow Bee-eater
Eurystomus orientalis	Dollarbird
Menura novaehollandiae	Superb Lyrebird
Ptilonorhynchus violaceus	Satin Bowerbird
Malurus cyaneus	Superb Fairy-wren
Malurus lamberti	Variegated Fairy-wren
Pardalotus punctatus	Spotted Pardalote
Sericornis frontalis	White-browed Scrubwren
Sericornis magnirostra	Large-billed Scrubwren
Gerygone mouki	Brown Gerygone
Gerygone albogularis	White-throated Gerygone
Cormobates leucophaea	White-throated Treecreeper
Acanthiza pusilla	Brown Thornbill
Acanthiza chrysorrhoa	Yellow-rumped Thornbill



Scientific Name	Common Name
Acanthiza nana	Yellow Thornbill
Acanthiza lineata	Striated Thornbill
Acanthiza reguloides	Buff-rumped Thornbill
Anthochaera carunculata	Red Wattlebird
Anthochaera chrysoptera	Little Wattlebird
Philemon corniculatus	Noisy Friarbird
Manorina melanophrys	Bell Miner
Manorina melanocephala	Noisy Miner
Meliphaga lewinii	Lewin's Honeyeater
Lichenostomus chrysops	Yellow-faced Honeyeater
Lichenostomus penicillatus	White-plumed Honeyeater
Melithreptus brevirostris	Brown-headed Honeyeater
Melithreptus lunatus	White-naped Honeyeater
Phylidonyris novaehollandiae	New Holland Honeyeater
Acanthorhynchus tenuirostris	Eastern Spinebill
Myzomela sanguinolenta	Scarlet Honeyeater
Microeca fascinans	Jacky Winter
Petroica rosea	Rose Robin
Eopsaltria australis	Eastern Yellow Robin
Psophodes olivaceus	Eastern Whipbird
Falcunculus frontatus	Crested Shrike-tit
Pachycephala pectoralis	Golden Whistler
Pachycephala rufiventris	Rufous Whistler
Colluricincla harmonica	Grey Shrike-thrush
Monarcha melanopsis	Black-faced Monarch
Myiagra rubecula	Leaden Flycatcher
Myiagra inquieta	Restless Flycatcher
Grallina cyanoleuca	Magpie-lark
Rhipidura rufifrons	Rufous Fantail
Rhipidura fuliginosa	New Zealand Fantail
Rhipidura leucophrys	Willie Wagtail
Dicrurus bracteatus	Spangled Drongo



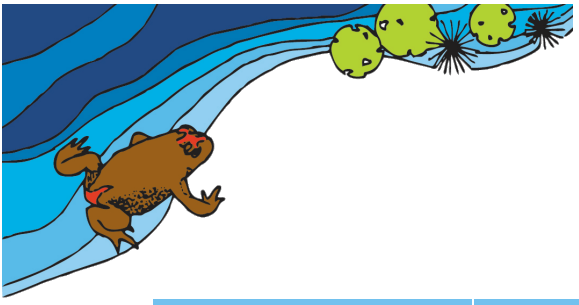
Scientific Name	Common Name
Coracina novaehollandiae	Black-faced Cuckoo-shrike
Coracina papuensis	White-bellied Cuckoo-shrike
Oriolus sagittatus	Olive-backed Oriole
Artamus cyanopterus	Dusky Woodswallow
Cracticus torquatus	Grey Butcherbird
Cracticus tibicen	Australian Magpie
Strepera graculina	Pied Currawong
Corvus coronoides	Australian Raven
Corcorax melanorhamphos	White-winged Chough
Struthidea cinerea	Apostlebird
Alauda arvensis	Eurasian Skylark
Anthus novaeseelandiae rogersi	Australasian Pipit
Passer domesticus	House Sparrow
Neochmia temporalis	Red-browed Finch
Taeniopygia bichenovii	Double-barred Finch
Dicaeum hirundinaceum	Mistletoebird
Hirundo neoxena	Welcome Swallow
Petrochelidon nigricans	Tree Martin
Petrochelidon ariel	Fairy Martin
Coracina tenuirostris	Cicadabird
Pycnonotus jocosus	Red-whiskered Bulbul
Acrocephalus australis	Australian Reed-warbler
Megalurus gramineus	Little Grassbird
Cisticola exilis	Golden-headed Cisticola
Zosterops lateralis	Silvereye
Turdus merula	Eurasian Blackbird
Sturnus vulgaris	Common Starling
Sturnus tristis	Common Myna



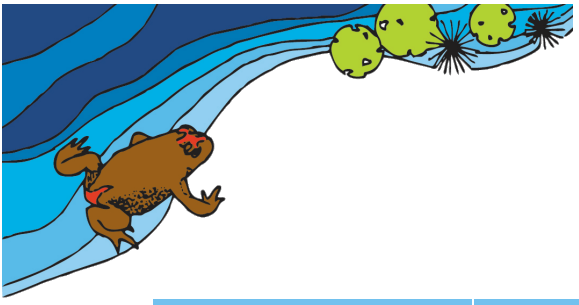
Appendix 5. Habitat requirements for locally-occurring threatened bird and mammal species

Birds

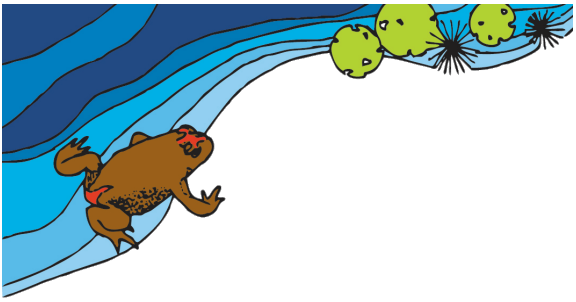
Common name *Scientific name* Schedule listing	Preferred habitat	Comment
Australasian Bittern *Botaurus poiciloptilus* BC Act, Sch. 2, Vul.	Inhabits wetlands that generally have permanent fresh water and dense vegetation of sedges, rushes and reeds.	No suitable natural habitat occurs on the site.
Spotted Harrier *Circus assimilis* 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 *Hieraaetus morphnoides* 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	Suitable natural habitat occurs on the site.
White-bellied Sea-Eagle *Haliaeetus leucogaster* BC Act Sch. 2, Vul.	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.	Suitable natural habitat occurs on the site.
Square-tailed Kite *Lophoictinia isura* 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.	Suitable natural habitat occurs on the site.
Pied Oystercatcher *Haematopus longirostris* BC Act, E	Intertidal zone.	No suitable natural habitat occurs on the site.
Eastern Hooded Dotterel *Thinornis cucullatus cucullatus*	Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally	No suitable natural habitat occurs on the site.



Common name *Scientific name* Schedule listing	Preferred habitat	Comment
BC Act, CE EPBC Act V	Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh.	
Eastern Curlew *Numenius madagascariensis* BC Act, not listed EPBC Act CE	It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts	No suitable natural habitat occurs on the site.
Gang-gang Cockatoo *Callocephalon fimbriatum* 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	Suitable natural habitat occurs on the site.
Glossy Black-cockatoo *Calyptorhynchus lathami* BC Act, Sch. 2, Vul.	Found in open forests with Allocasuarina species and hollows for nesting.	Suitable natural habitat occurs on the site.
Little Lorikeet *Glossopsitta pusilla* BC Act, Sch. 2, Vul.	Inhabits the open forests and dead timber alongside watercourses. Also occurs in eucalypt forest in mountainous regions.	Suitable natural habitat occurs on the site.
Swift Parrot *Lathamus discolor* 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 natural habitat occurs on the site.
Barking Owl *Ninox connivens* BC Act, Sch. 2, Vul.	Found in open forests, woodlands, dense scrubs, river red gums and other large trees near watercourses.	Suitable natural habitat occurs on the site.
Powerful Owl *Ninox strenua* BC Act, Sch. 2, Vul.	Pairs occupy permanent territories in mountain forests, gullies and forest margins, sparser hilly woodlands, coastal forests, woodlands and scrubs.	Suitable natural habitat occurs on the site.
Masked Owl *Tyto novaehollandiae* BC Act, Sch. 2, Vul.	Forests, open woodlands and farms with large trees, e.g. river red gums adjacent to cleared country.	Suitable natural habitat occurs on the site.
Sooty Owl *Tyto tenebricosa* 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.

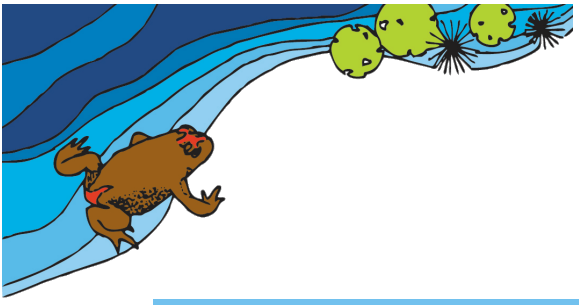


Common name *Scientific name* Schedule listing	Preferred habitat	Comment
Striated Fieldwren *Calamanthus fuliginosus*	Mainly a bird of ground and understorey vegetation, and can be found in swampy, coastal heathlands, tussocky grasslands, low shrubby vegetation and margins of swamps.	No suitable natural habitat occurs on the site.
Regent Honeyeater Anthochaera Phrygia BC Act, CE EPBC Act, C End.	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	No suitable natural habitat occurs on the site.
Speckled Warbler *Pyrrholaemus sagittatus* 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 *Daphoenositta chrysoptera* 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	Suitable natural habitat occurs on the site.
Dusky Woodswallow *Artamus cyanopterus cyanopterus* 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.	Suitable natural habitat occurs on the site.
Flame Robin *Petroica phoenicea* 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 *Stagonopleura guttata* 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.

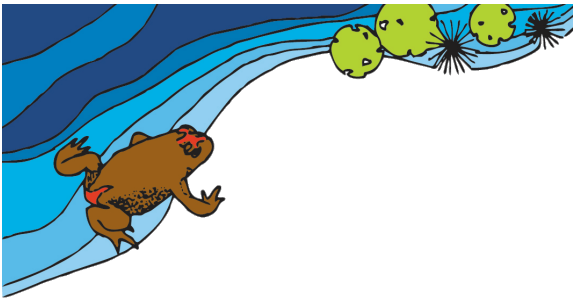


Mammals

Common name *Scientific name* Schedule listing	Preferred habitat	Comment
Spotted-tailed Quoll *Dasyurus maculatus* 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 *Phascolarctos cinereus* BC Act, Sch. 2, Vul.	Eucalypt forests rich in Swamp Mahogany (E. robusta), Forest Red Gum (E. tereticornis), and Grey Gum (E. punctata).	Suitable natural habitat occurs on the site.
Yellow-bellied Glider *Petaurus australis* 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.	Suitable natural habitat occurs on the site.
Squirrel Glider *Petaurus norfolcensis* 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.	Suitable natural habitat occurs on the site.
Greater Glider Petauroides Volans BC Act, not listed EPBC Act, V Greater Glider population in the Eurobodalla local government area BC Act, E2 endangered population EPBC Act, V	Tall open forest and woodlands with live and dead hollow-bearing trees for denning, feed trees, large trees, habitat connectivity across the landscape.	Suitable natural habitat occurs on the site.
Grey-headed Flying-fox *Pteropus poliocephalus* 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 Coastal Free-tail Bat *Micronomus norfolkensis* 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	Suitable foraging habitat occurs on the site.



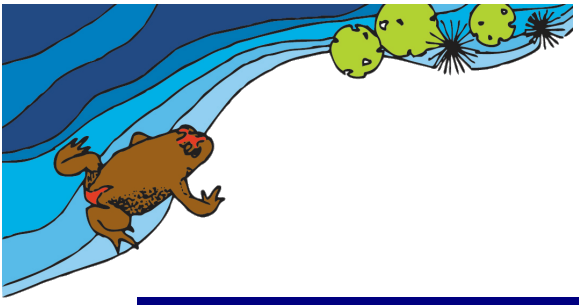
Common name *Scientific name* Schedule listing	Preferred habitat	Comment
	also roost under bark or in man-made structures.	
Large-eared Pied Bat *Chalinolobus dwyeri* BC Act, Sch. 2, Vul.	Found in well-timbered areas containing gullies.	Suitable foraging habitat occurs on the site.
Eastern False Pipistrelle *Falsistrellus tasmaniensis* 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.
Large Bent-winged Bat *Miniopterus orianae oceanensis* 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 *Myotis macropus* 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.	Suitable natural habitat occurs on the site.
Greater Broad-nosed Bat *Scoteanax rueppellii* 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.



10.1 Likelihood of Occurrence

- Factors determining the likelihood of occurrence for a particular species include:
- Specific habitat requirements (e.g. aquatic, seasonal, tree hollows, rock outcrop, woody debris, etc),
- Geological / edaphic (soil) characteristics,
- Known distribution (records),
- Climate.

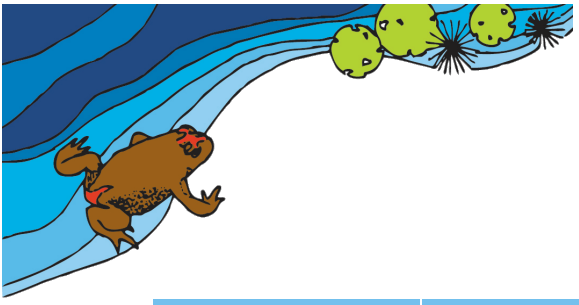
Probability	Description
Unlikely (none)	No suitable habitat or connectivity to suitable habitat offsite. Not known from local area. Not detected on site.
Low	Low value suitable habitat (e.g. highly disturbed conditions; Small habitat/forage areas; High-level weed-invasion; Cleared with fragmented regrowth). Not known from local area. Not detected on site.
Moderate	Moderate value suitable habitat (e.g. Disturbed, weed-invaded; Foraging/roosting habitat present; Habitat corridor). Not detected on site.
High	High value suitable habitat (e.g. breeding/foraging/roosting habitat present; Low or nil weed presence; Habitat corridor). Not detected on site.
Known	Species known to occur within the site (e.g. breeding and foraging habitat; foraging habitat; Habitat corridor). Detected on or adjacent to the site.



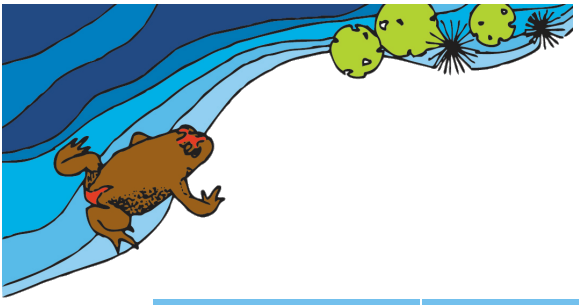
Appendix 6. Fauna survey methods for threatened species

Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
Glossy Black-Cockatoo (*Calyptorhynchus lathami*) (a diurnal bird)	Area search method (observers walk around an area of pre-determined size for a pre-determined length of time. A 1ha (200m x 500m) 20-minute search is the most common method) Birds can be identified by both sight and vocalisations, and are best surveyed early in the morning (at dawn), as overall activity decreases with time after dawn, and at dusk. Investigators should record species present within the site, flying overhead, outside the site in the same habitat or outside the site in different habitat. If possible, an estimate of the abundance of birds present should be made, in particular threatened species. The time spent searching is an important factor in the	**Search of suitable hollow bearing trees-** **Dates:** 12th to 14th April 2021. 25th to 29th October 2021. 11th – 15th July 2022. **Method:** Random search throughout day. **Search for evidence of Black-Cockatoos -** **Dates:** 12th to 14th April 2021. 25th to 29th October 2021. 11th – 15th July 2022 **Time:** Daylight hours **Method:** Opportunistic observations and identification of calls of species. A search for nests, feathers, scratchings and feeding signs of Black-Cockatoos. In particular, search for the birds or chewed She-oak cones.

Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	number of species that will be detected. Where signs of breeding on site are present, potential nest trees should be identified. Potential nest trees contain hollows that are; (i) at least 8m above the ground; and (ii) in stems with a diameter of at least 30 cm; and (iii) hollow diameter is at least 15 cm; and (iv) stem angle is at least 45 degrees, and may be near-vertical or vertical. **Survey month** All Year (Table 5.5 TBSA guidelines) All Year (BAM – C method) Reference: Draft TBSA guidelines 2004 and BAM – C	
White-bellied Sea-Eagle (*Haliaeetus leucogaster*) (a diurnal bird)	Area search method (observers walk around an area of pre-determined size for a pre-determined length of time. A 1ha (200m x 500m) 20-minute search is the most common method)	**Search for evidence of White-bellied Sea-Eagle -** Dates: 12th to 14th April 2021. 25th to 29th October 2021. 11th – 15th July 2022



Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	Birds can be identified by both sight and vocalisations, and are best surveyed early in the morning (at dawn), as overall activity decreases with time after dawn, and at dusk. Investigators should record species present within the site, flying overhead, outside the site in different habitat or outside the site in different habitat. If possible, an estimate of the abundance of birds present should be made, in particular threatened species. The time spent searching is an important factor in the number of species that will be detected. **Survey month:** All Year (Table 5.5 TBSA guidelines) All Year (BAM – C method)	**Method:** Random search throughout day. Opportunistic observations and identification of calls of species, and search for nests, feathers, scratchings and feeding signs of birds. **Search of nest trees -** Dates: 12th to 14th April 2021. 25th to 29th October 2021. 11th – 15th July 2022 Random search throughout day. A White-Bellied Sea-Eagle has been recorded flying over the site during the October 2021 site visit.



<table>
<tr><th>Targeted threatened species</th><th>Policy survey methods and effort and references</th><th>Moruya site survey methods and compliance with NSW policies.</th></tr>
<tr><td></td><td>Reference: Draft TBSA guidelines 2004 and BAM – C</td><td></td></tr>
<tr><td>Southern Myotis Myotis macropus

(a microbat)</td><td>Acoustic detector: one detector night is a single detector capable of recording and storing the calls of the target species automatically for an entire night. The detectors should be set recording before sunset and stopped after dawn, placed in positions that maximise the likelihood of recording bats and at least 50m apart. Justification for placing detectors less than 50m apart must be recorded in the BAR. Recorded calls should be analysed for target species by a specialist skilled in bat call identification.

Roost search (microbats): a search of a microbat roost is undertaken by looking for bats or signs of bats (urine stains, droppings, remains, and bat fly casings) in suitable roost habitat during the daytime. All roost searches should use a torch to shine in holes, cracks and crevices, and carry a handheld bat detector to locate (and identify) bats that may call. If bats are located</td><td>Anabat unit deployment information-

<table>
<tr><th>Date</th><th>Times</th><th>Temperatures (^OC)</th><th>Weather</th></tr>
<tr><td>12APR2021</td><td>5:30 pm to 6:30 pm</td><td>17 ^OC to 15 ^OC</td><td>Fine</td></tr>
<tr><td>13APR2021</td><td>5:40pm to 6:40pm</td><td>17ºC to 16ºC</td><td>Fine</td></tr>
<tr><td>14APR2021</td><td>5:30pm to 6:30pm</td><td>23ºC to 18</td><td>Fine</td></tr>
<tr><td>25OCT2021</td><td>7pm to 8am</td><td>10ºC to 19ºC</td><td>Fine</td></tr>
<tr><td>26OCT2021</td><td>7pm to 8am</td><td>6ºC to 19ºC</td><td>Fine</td></tr>
<tr><td>27OCT2021</td><td>7pm to 8am</td><td>13ºC to 22ºC</td><td>Fine</td></tr>
<tr><td>28OCT2021</td><td>7pm to 8am</td><td>13ºC to 27ºC</td><td>Fine</td></tr>
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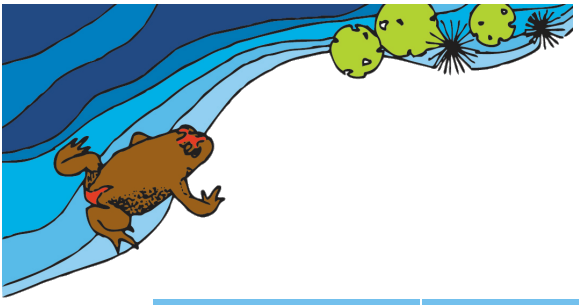
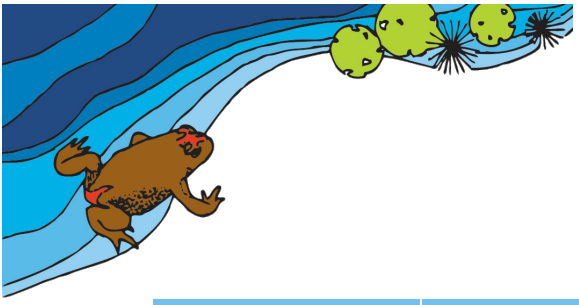
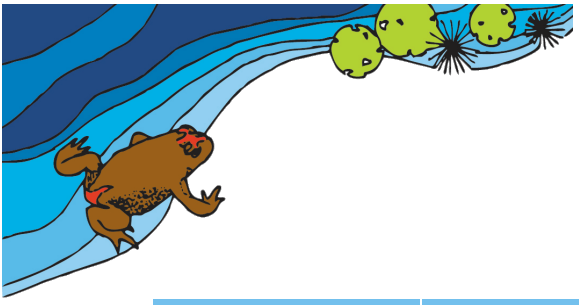


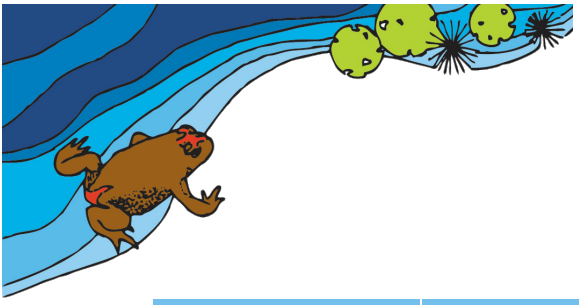
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	observers must confirm the identity of the species and determine if the roost is a maternity roost. The roosts of some species are cryptic and very rarely found despite searches (Pennay 2008). For these reasons roost searches should only be conducted in addition to other recommended survey methods.	ANABAT- April 2021: Two Anabat units used. October 2021: Two Anabat units used. One unit was placed near the dam at the southwest corner of the site and checked each morning. July 2022: No Anabat units deployed (winter season)
	Two sound activated recording devices utilised *for the entire night (a minimum of four hours)*, starting at dusk for two nights (Table 5.10 TBSA guidelines)	A call was recorded in October 2021 near the dam that was described as *Myotis* / *Nyctophilus*. Analysis of zero-crossings bat calls typically cannot reliable distinguish between *Myotis* and *Nyctophilus*. As the call was recorded near the dam and no calls with similar zero-crossings data were not recorded in the forest, it is considered that the call highly likely represent the call of Myotis.
	Spotlighting and transect walking For targeted survey near likely food resources: 2 x 1 hour spotlighting on two separate nights - All year Survey months: Oct – Mar (Table 5.10 TBSA guidelines) Oct – Mar (BAM-C).	



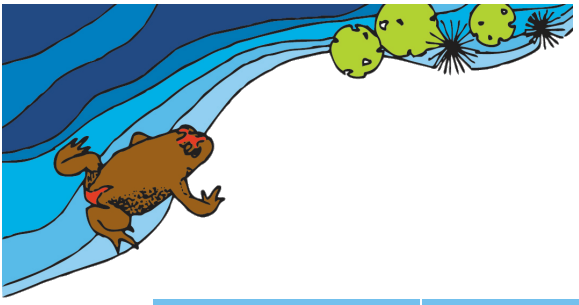
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	The surveyor may survey outside the times identified in this guide, for example due to spatial or temporal variation in temperature, or breeding seasons with timing documented and justified in the BAR. Reference: 'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method (2018).	
Powerful Owl (*Ninox Strenua*) (a nocturnal bird)	(Table 5.7 TBSA guidelines) - Call playback (Sites should be separated by 800 metres – 1km, and each site must have the playback session repeated as follows: At least 5 visits per site, on different nights are required for the Powerful Owl, Barking Owl and the Grass Owl;) Day habitat search (Search habitat for pellets, and likely hollows)	**Stag watch -** Dates: 12th to 14th April 2021. 25th to 29th October 2021. 11th – 14th July 2022 **Method:** Time: 30min before and 60min after dusk. Hollow bearing trees surveyed throughout the day. **Spotlighting -**



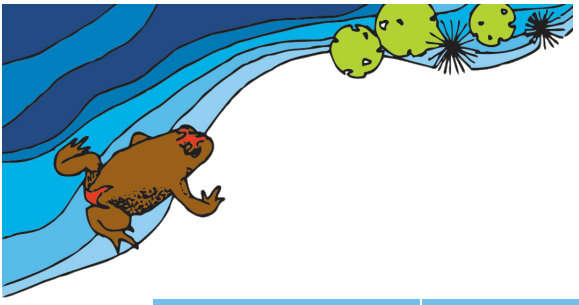
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	Owl pellets should be collected opportunistically at each survey site and sent to a specialist for identification. Roost site surveys should also be conducted, involving looking for signs of occupancy of large tree hollows, including stag-watching. Stag-watching (Observing potential roost hollows for 30mins prior to sunset and 60mins following sunset.) **Survey month** All detection methods, available all year (Table 5.7 TBSA guidelines) Over-use of call-playback surveys during the nesting period June – September is to be avoided (5.3.6 (ii)(b) TBSA guidelines). Reference: Draft TBSA guidelines 2004 and BAM – C	Dates: 12th to 14th April 2021 for a total of 1 hour. 25th to 29th October 2021 for a total of 32.7 hours. 11th – 14th July 2022 for a total of 23.7 hours. A Powerful Owl was observed within 1 km of the site. Targeted surveys focused on recording if Powerful Owls visit the site or if an active Powerful Owl nesting tree is present on the site or within the wider development footprint. **Call playback-** 25th to 29th October 2021. Undertaken on the site near the proposal area.
Greater Glider	(Table 5.8 TBSA guidelines)	**Method:** **Stag watch -**



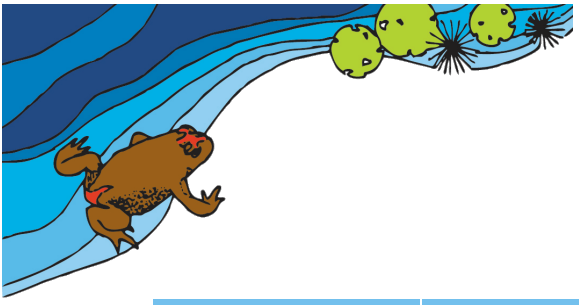
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
Medium-sized mammal (Arboreal mammal)	Large Elliott traps (100 trap nights over 3-4 consecutive nights) Arboreal Elliott traps (24 trap nights over 3-4 consecutive nights) Arboreal hair tubes (3 tubes in each of 10 habitat trees up to 100 hectares of stratification unit, for at least 4 days and 4 nights) Spotlighting on foot (2 x 1 hour and 1km up to 200 hectares of stratification unit, walking at approximately 1km per hour on 2 separate nights) Stag-watching (Observing potential roost hollows for 30 minutes prior to sunset and 60 minutes following sunset) **Survey month** All year (Table 5.8 TBSA guidelines)	Dates: 12th to 14th April 2021. 25th to 29th October 2021. 11th – 14th July 2022. Time: 30min before and 60min after dusk. Hollow bearing trees surveyed throughout the day. Presence of hollows recorded in the daytime. The hollow bearing trees were revisited during spotlighting. **Spotlighting -** Dates: 12th to 14th April 2021 for a total of 1 hour. 25th to 29th October 2021 for a total of 32.7 hours. 11th – 14th July 2022 for a total of 23.7 hours. **Pipe Traps -** Dates: 26th to 29th October 2021. 11th – 15th July 2022.



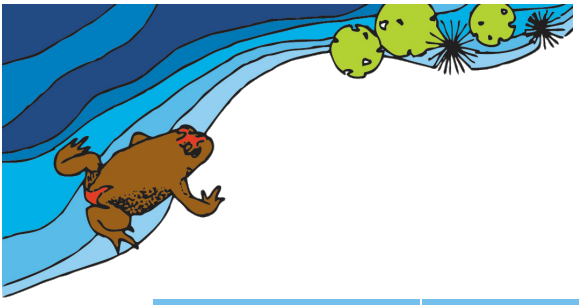
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	Reference: Draft TBSA guidelines 2004 and BAM – C	Bait: A mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Fixed at head height to a tree. Deployed pipe traps: 26th to 29th October 2021: 2 11th – 15th July 2022: 7 **Camera traps -** Dates: 26th to 29th October 2021. 11th – 15th July 2022. Bait: A mix of honey, oats, peanut butter and sesame oil scattered in field of view of camera. Honey water and chicken favoured soup were also sprayed in the field of view of the camera. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Attached to a tree approximately 4ft above the ground. Number of traps: 2 **Hair tubes -** Dates:



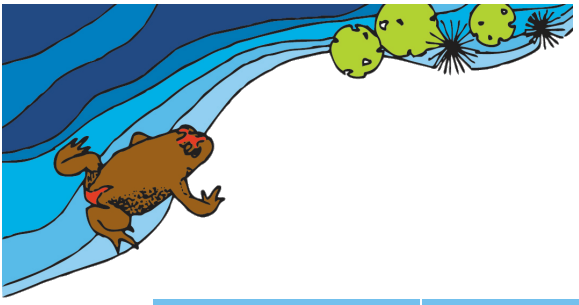
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
		26th to 29th October 2021. 11th – 15th July 2022. Bait: Mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Hair tubes were placed in pairs, one small and one large, on or near the same tree as the arboreal Elliot traps were placed. Number of traps 26th to 29th October 2021: • 19 large (6 on ground, 13 in tree) • 11 small HT (all in tree) Number of traps 11th – 15th July 2022: • 16 large (all in tree) • 16 small (all in tree) **Elliot traps -** Date: 26th to 29th October 2021. 11th – 15th July 2022 Bait: Bait: Mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner.



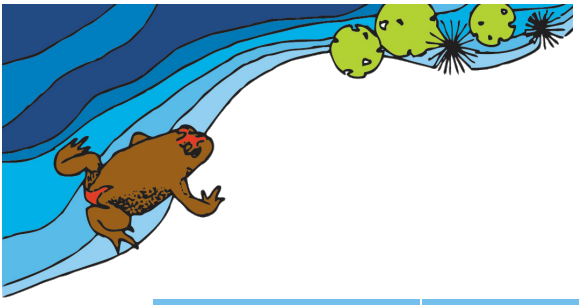
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
		Number of traps 26th to 29th October 2021: • 13 (10 in trees, 3 on ground). The Elliot trap was placed in close proximity to the two hair tubes at each trap station. Number of traps 11th – 15th July 2022: • 9 large (all in tree) • 7 small (all in tree)
Squirrel Glider (*Petaurus norfolcensis*) Medium-sized mammal (An arboreal mammal)	(Table 5.8 TBSA guidelines) Large Elliott traps (100 trap nights over 3-4 consecutive nights) Arboreal Elliott traps (24 trap nights over 3-4 consecutive nights) Arboreal hair tubes (3 tubes in each of 10 habitat trees up to 100 hectares of stratification unit, for at least 4 days and 4 nights) Spotlighting on foot (2 x 1 hour and 1km up to 200 hectares of stratification unit,	**Method:** **Stag watch -** Dates: 12th to 14th April 2021. 25th to 29th October 2021. 11th – 14th July 2022. Time: 30min before and 60min after dusk. Hollow bearing trees surveyed throughout the day. Presence of hollows recorded in the daytime. The hollow bearing trees were revisited during spotlighting. **Spotlighting -** Dates: 12th to 14th April 2021 for a total of 1 hour.



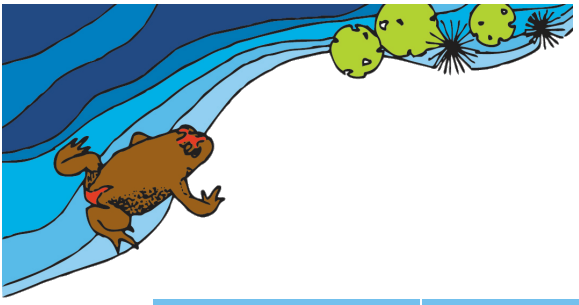
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	walking at approximately 1km per hour on 2 separate nights) Stag-watching (Observing potential roost hollows for 30 minutes prior to sunset and 60 minutes following sunset) DPE Species expert Advice: A minimum of 4 traps must be used for sites up to 1 ha, then an additional 2 traps for every ha of potential habitat thereafter. Where potential habitat is disconnected by gaps of 50 m or more, each vegetation patch should have a minimum of 4 traps for the first hectare, and 2 traps for every hectare thereafter. If suitable habitat within the site is over 10 ha, contact DPE for a modified trapping survey approach. Alternatives to this method would be the installation of arboreally mounted baited cameras facing towards the tree trunk. The baiting method should follow what is detailed above for trapping, however instead a baited canister should be installed on	25th to 29th October 2021 for a total of 32.7 hours. 11th – 14th July 2022 for a total of 23.7 hours. **Pipe Traps -** Dates: 26th to 29th October 2021. 11th – 15th July 2022. Bait: A mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Fixed at head height to a tree. Deployed pipe traps: 26th to 29th October 2021: 2 11th – 15th July 2022: 7 **Camera traps -** Dates: 26th to 29th October 2021. 11th – 15th July 2022. Bait: A mix of honey, oats, peanut butter and sesame oil scattered in field of view of camera. Honey water and chicken favoured soup were also sprayed in the field of view of the camera.



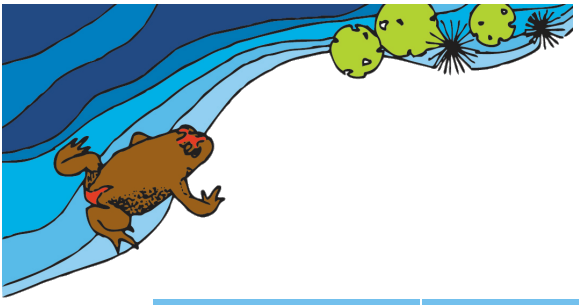
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	the tree trunk with small holes and capped at either end, to limit bait theft by other species. The bait and attractant used must remain effective and should be replaced/refreshed as regularly as possible. The baited canister should also be a standardised size or have a scale attached so that measurements of gliders captured on camera can be reviewed and compared to differentiate species. If species differentiation between the Squirrel Glider and similar species cannot be reliably confirmed via a captured photo a precautionary approach should be adopted and it should be assumed that the species is Squirrel Glider. Cameras must be spaced evenly across the most suitable habitat within the site and located so that potential den sites, foraging habitat, and movement pathways are targeted. Cameras must remain in place for a minimum of 4 weeks.	Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Attached to a tree approximately 4ft above the ground. Number of traps: 2 **Hair tubes -** Dates: 26th to 29th October 2021. 11th – 15th July 2022. Bait: Mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Hair tubes were placed in pairs, one small and one large, on or near the same tree as the arboreal Elliot traps were placed. Number of traps 26th to 29th October 2021: • 19 large (6 on ground, 13 in tree) • 11 small HT (all in tree) Number of traps 11th – 15th July 2022: • 16 large (all in tree) • 16 small (all in tree) **Elliot traps -**



Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	A minimum of 4 cameras must be used for sites up to 1 ha, then an additional 2 cameras for every ha of potential habitat thereafter. Where potential habitat is disconnected by gaps of 50 m or more, each vegetation patch should have a minimum of 4 cameras for the first hectare, and 2 cameras for every hectare thereafter. **Survey month** All year (Table 5.8 TBSA guidelines) Reference: Draft TBSA guidelines 2004 and BAM – C	Date: 26th to 29th October 2021. 11th – 15th July 2022 Bait: Bait: Mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Number of traps 26th to 29th October 2021: 13 (10 in trees, 3 on ground). The Elliot trap was placed in close proximity to the two hair tubes at each trap station. Number of traps 11th – 15th July 2022: • 9 large (all in tree) • 7 small (all in tree)
Brush-tailed Phascogale (*Phascogale tapoatafa*) Small mammal	Small Elliott traps (100 trap nights over 3-4 consecutive nights) Arboreal Elliott traps (24 trap nights over 3-4 consecutive nights)	**Method:** **Stag watch -** Dates: 12th to 14th April 2021. 25th to 29th October 2021.



Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
(An arboreal mammal)	Arboreal hair tubes (3 tubes in each of 10 habitat trees up to 100 hectares of stratification unit, for at least 4 days and 4 nights) Spotlighting on foot (2 x 1 hour and 1km up to 200 hectares of stratification unit, walking at approximately 1km per hour on 2 separate nights) DPE Species expert Advice: Spotlighting, Elliot traps, camera traps & hair tubes. Cameras should be set at head height or above and facing a branch or tree trunk Cameras must remain in place for at least four weeks Use a minimum of 4 cameras for each ha and then an additional 2 cameras for every ha of potential habitat thereafter.	11th – 14th July 2022. Time: 30min before and 60min after dusk. Hollow bearing trees surveyed throughout the day. Presence of hollows recorded in the daytime. The hollow bearing trees were revisited during spotlighting. **Spotlighting -** Dates: 12th to 14th April 2021 for a total of 1 hour. 25th to 29th October 2021 for a total of 32.7 hours. 11th – 14th July 2022 for a total of 23.7 hours. **Pipe Traps -** Dates: 26th to 29th October 2021. 11th – 15th July 2022. Bait: A mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Fixed at head height to a tree. Deployed pipe traps:

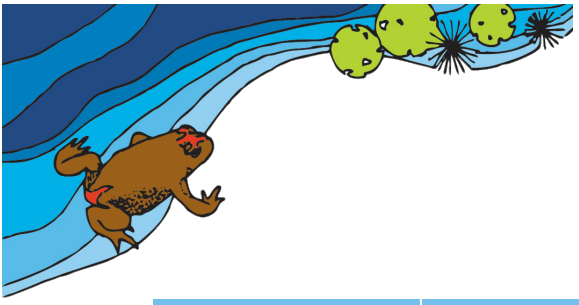


Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	Survey month (Table 5.8 TBSA guidelines) Reference: Draft TBSA guidelines 2004 and BAM – C	26th to 29th October 2021: 2 11th – 15th July 2022: 7 **Camera traps -** Dates: 26th to 29th October 2021. 11th – 15th July 2022. Bait: A mix of honey, oats, peanut butter and sesame oil scattered in field of view of camera. Honey water and chicken favoured soup were also sprayed in the field of view of the camera. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Attached to a tree approximately 4ft above the ground. Number of traps: 2 **Hair tubes -** Dates: 26th to 29th October 2021. 11th – 15th July 2022. Bait: Mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner.

Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
		Hair tubes were placed in pairs, one small and one large, on or near the same tree as the arboreal Elliot traps were placed. Number of traps 26th to 29th October 2021: • 19 large (6 on ground, 13 in tree) • 11 small HT (all in tree) Number of traps 11th – 15th July 2022: • 16 large (all in tree) • 16 small (all in tree) **Elliot traps -** Date: 26th to 29th October 2021. 11th – 15th July 2022 Bait: Bait: Mix of honey, oats, peanut butter and sesame oil. Location: The road reserve north and south of the site, and the Spring Forest in the southeast site corner. Number of traps 26th to 29th October 2021: 13 (10 in trees, 3 on ground). The Elliot trap was placed in close proximity to the two hair tubes at each trap station. Number of traps 11th – 15th July 2022: • 9 large (all in tree) • 7 small (all in tree)

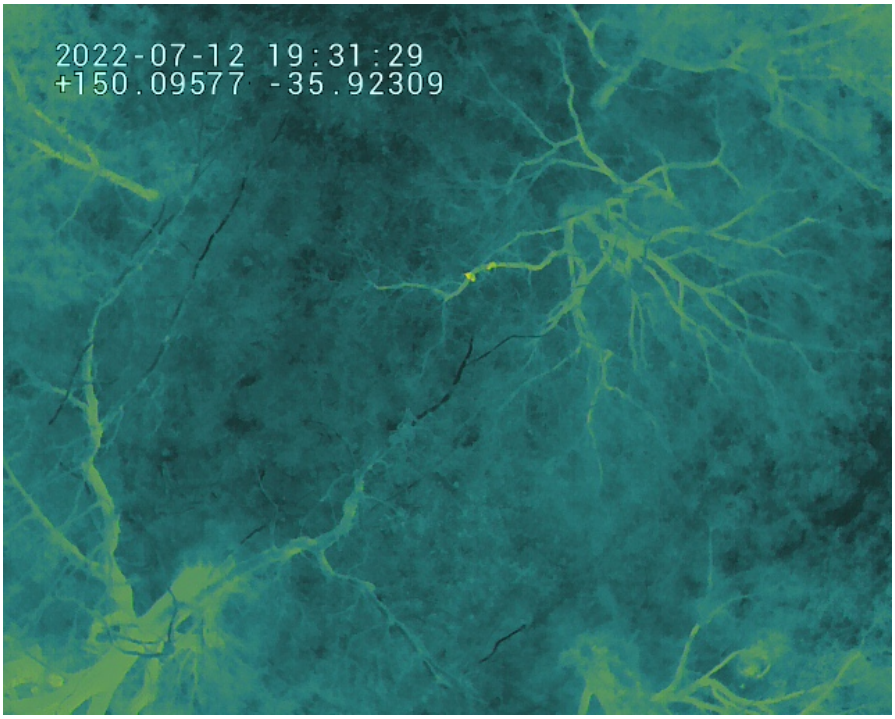
Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
		The suitable BAM-C survey months for the Brush-tailed phascogale are Dec – Jun. The depth of survey effort in April is unlikely to achieve adequacy. Thus, the Brush-tailed Phascogale is described as "assumed present" for this BDAR.
Koala Large mammal (an arboreal mammal)	Spotlighting on foot (2 x 1 hour and 1km up to 200 hectares of stratification unit, walking at approximately 1km per hour on 2 separate nights) Call playback (2 sites per stratification unit up to 200 hectares, plus an additional site per 100 hectares above 200 hectares. Each playback site must have the session conducted twice, on separate nights). **Survey month** All year (Table 5.7 and Table 5.8 TBSA guidelines)	**Stag watch -** Dates: 12th to 14th April 2021. 25th to 29th October 2021. 11th – 14th July 2022. Time: 30min before and 60min after dusk. Hollow bearing trees surveyed throughout the day. Presence of hollows recorded in the daytime. The hollow bearing trees were revisited during spotlighting. **Road inspection -** Dates: 12th to 14th April 2021. 25th to 29th October 2021. 11th – 14th July 2022.

Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
	Reference: Draft TBSA guidelines 2004 and BAM – C	Time: Morning and evening when driving to/from site. **Spotlighting -** Dates: 12th to 14th April 2021 for a total of 1 hour. 25th to 29th October 2021 for a total of 32.7 hours. 11th – 14th July 2022 for a total of 23.7 hours. **Search for indirect/direct evidence -** Dates: 12th to 14th April 2021. 25th to 29th October 2021. Time: Throughout the day. Searching for droppings and opportunistic observations. **Koala BAM Spot Assessment Technique (SAT) Survey** 12th – 13th July 2022. 10 survey sites based on 150m point grid across the site. 30 trees selected around the center tree and inspected for Koala droppings and opportunistic observations.



Targeted threatened species	Policy survey methods and effort and references	Moruya site survey methods and compliance with NSW policies.
		The method detailed in section 4.1.3 of the Koala: BAM Survey Guide. **Aerial Drone Survey** 12th – 13th July 2022. After dusk drone flight across entire site with the use of a thermal camera attachment on the drone and live feedback to the operator. **Call playback-** 25th to 29th October 2021. Undertaken on the site near the proposal area.
Austral Toadflax (a threatened plant)	Austral Toadflax survey (suitable habitat survey–Up to 2 days– The survey requirements for the Austral Toadflax are yet to be defined by DPE. Thus an accurate time cannot yet be allocated to this task. It may not be possible to satisfy this task within the proposed survey time.	Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method No surveys conducted within the specified survey months: Nov – Feb.

Appendix 7. Thermal drone survey sample images



DJI_0078_t

DJI_0122_T

DJI_0128_T

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Appendix 8. Endangered Ecological Community Lowland Grassy Woodland in the South East Corner Bioregion

Lowland Grassy Woodland communities in the South East Corner bioregion are located in rainshadow areas receiving less rainfall than more elevated terrain that partially surrounds them, with mean annual rainfall typically in the range of 700-1100 mm.

- The community typically occurs in undulating terrain up to 500 metres in elevation on granitic substrates (e.g. adamellites, granites, granodiorites, gabbros, etc.) but may also occur on locally steep sites and on acid volcanic, alluvial and fine-grained sedimentary substrates.
- Contemporary tree-dominated stands of the community are largely relics or regrowth of originally taller forests and woodlands, which are likely to have had scattered shrubs and a largely continuous grassy groundcover. At some sites, mature trees may exceed 40 metres, although regrowth stands may be shorter than 10 metres.

Appendix 9. 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.

No World Heritage Properties, National Heritage Places or Wetlands of International Importance are recorded for the area.

An assessment of the *Lowland Grassy Woodland in the South East Corner Bioregion* vegetation community under the EPBC Act is shown below.

1.1 Matters of National Environmental Significance

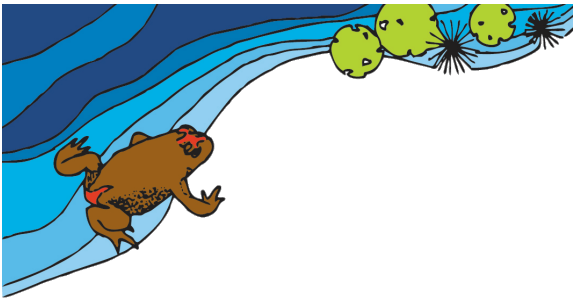
The Commonwealth government has published *Conservation Advice for Lowland Grassy Woodland in the South East Corner Bioregion* (2013).

The Advice provides "Key diagnostic characteristics and condition thresholds". Page eight (8) of the advice provides the following information:

"*The national ecological community is limited to patches that meet the following key diagnostic characteristics and condition thresholds:*

1.1.1 Step 1. Key diagnostic characteristics

- *The distribution is limited to New South Wales, south of (and including) the Clyde River catchment, and primarily within the South East Corner bioregion (IBRA 7).*
- *It typically occurs in coastal or near coastal areas with some more inland outliers around Araluen.*
- *It typically occurs at elevations below 500m asl.*
- *The tree canopy is typically dominated by Eucalyptus tereticornis (forest red gum) and/or Angophora floribunda (rough barked apple). Associated tree species include E. globoidea (white stringybark) and E. bosistoana (coastal grey box). Eucalyptus pauciflora (snow gum) or E. melliodora (yellow box) may be dominant in some areas. The tree canopy usually has a maximum projected foliage cover of 30%. A sub-canopy or mid-layer may be present, typically with Acacia mearnsii.*
- *It typically includes a grassy understorey of Themeda triandra (kangaroo grass) as well as other grasses and forbs. Occasionally it also has a shrub layer of Bursaria spinosa (sweet bursaria, blackthorn).*
- *It can also occur as a derived grassland. "*



AE Response:

The vegetation on the within or near the development footprint meets many of the key diagnostic characteristics.

The subject land is within the South East Corner bioregion (IBRA 7). It is near the coast and elevation varies between 5-55 metres above sea level.

Common tree species recorded within the subject land include *Eucalyptus tereticornis* (Forest Red Gum) and *Angophora floribunda* (Rough-barked Apple). *Eucalyptus bosistoana* (Coastal Grey Box) also occurs less commonly. Canopy trees are common within the forest / woodland area in the south-east corner of the subject land.

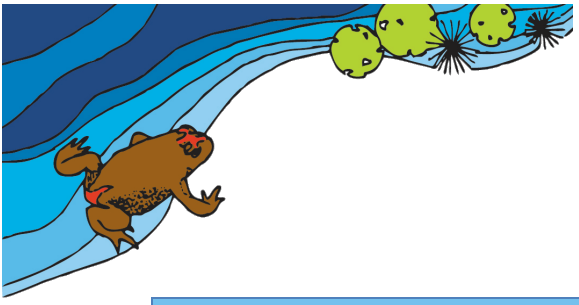
*Themeda t*riandra (Kangaroo grass) is present but rare, recorded as isolated plants and very small clumps (2-3 plants) on the east (elevated) side of the subject land.

Established pasture is present on more than 50% of the subject land. Although the original vegetation community is unknown, it is most likely that *Eucalyptus tereticornis* (Forest Red Gum) and *Angophora floribunda* (Rough-barked Apple) were originally common across the areas of pasture.

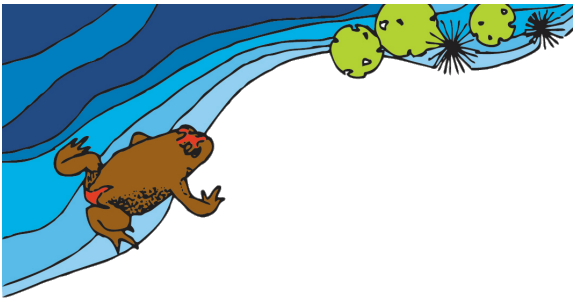
The latest SVTM_NSW_Extant_PCT mapping is consistent with this conclusion.

Table 23. Reproduced from page 9 of the EPBC Act 1999 Conservation Advice for Lowland Grassy Woodland in the South East Corner Bioregion

Step 2 Condition thresholds ***The ecological community comprises those patches of native vegetation that meet the key diagnostic characteristics and the following condition thresholds for Type A, B, C, D or E:***					
Patch type	**A – Woodland** with very diverse understorey	**B - Derived Grassland** where the tree canopy and mid layers were formerly present but have been cleared	**C – Woodland** with a dense Bursaria spinosa mid-layer	**D - Woodland** that is less diverse but contiguous with other native vegetation	**E - Woodland** that is less diverse but contains large trees with hollows
Patch size	≥ 0.25 ha		≥ 2 ha		



Step 2 Condition thresholds ***The ecological community comprises those patches of native vegetation that meet the key diagnostic characteristics and the following condition thresholds for Type A, B, C, D or E:***			
AND			
Native vegetation cover	≥50% of total vegetation cover in the understorey* is comprised of native species		
AND			
Species richness	≥ 15 native understorey* species from Appendix B present in patch	≥ 10 native understorey* species from Appendix B present in patch	
AND			
Other patch characteristics and values	n/a	is contiguous with other native vegetation# that is ≥ 5 ha in area.	at least one tree with hollows per hectare or at least one large tree (>80 cm dbh) per hectare
Notes: *** mid and ground layers.** **# any native vegetation where cover in each layer present is dominated by native species. In particular, this may include associated native grasslands that were previously the woodland.**			



1.1.2 Step 2. Condition thresholds

AE Response:

There are two broad vegetation types within or near the development footprint:

1. The Woodland. For the purposes of this report, it is assumed that trees were historically common across the subject land. The scattered trees or clumps of trees within the pasture are remnants of the woodland. The scattered trees including paddock trees and clumps of trees are mapped as part of the woodland; and
2. The pasture (derived grassland).

Each vegetation type will be compared individually to Step 2 Condition thresholds.

1. Woodland – consideration of 'Step 2. Condition thresholds'

Patch type

The onsite Woodland meets both patch types D and E, described as follows:

"D – Woodland that is less diverse but contiguous with other native vegetation"

"E – Woodland that is less diverse but contains large trees with hollows".

Patch size

The Woodland in the south-east corner of the subject land is approximately 4.5 ha in size and greater than the threshold patch size of 2 ha.

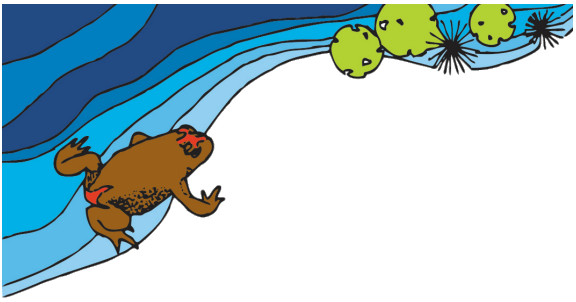
Native vegetation cover

A twenty (20)m x twenty(20)m plot was used to determine vegetation cover in the Woodland. The total native groundcover was 70%. However, *Cynodon dactylon* was the most common species, accounting for 40% of total ground cover.

If *Cynodon dactylon* is removed from the groundcover component, the total native groundcover value is 30%. This is well below the criteria value of 50%.

However, *Cynodon dactylon* is not listed as a characteristic plant species in the EPBC Conservation Advice for *Lowland Grassy Woodland in the South East Corner Bioregion*. Jewell *et al.* (2012) believe that it has been present in Australia for less than 500 years, and the earliest records date from1802-4.

The woodland therefore tentatively exceeds the native vegetation cover threshold, depending on the inclusion/exclusion of *Cynodon dactylon*.



Species richness

As the subject land is relatively large, species richness exceeds the criteria "10 native understorey* species from Appendix B present in patch".

Note: Appendix B is found in the *Conservation Advice for Lowland Grassy Woodland in the South East Corner Bioregion* (2013).

Conclusion regarding the Woodland

The Woodland achieves both 'Step 1. Key diagnostic characteristics' and 'Step 2. Condition thresholds', provided that *Cynodon dactylon* (Couch) is considered a native species. The botanical status of *Cynodon dactylon*, however, is further considered in the following Section.

1.1.3 Condition thresholds - Pasture / Grassland

Patch type:

The pasture on the subject land will be compared to Patch type "B – Derived Grassland."

Patch size:

The pasture is greater than 15 ha, so it exceeds the threshold patch size of 0.25 ha.

Native vegetation cover:

The total native vegetation cover in the groundcover can be assessed by examining the pasture plots within and near to the development footprint.

Table 24 below provides cover values for the most common groundcovers in each plot:

Plot 1 assessed the Woodland ('Spring Hill') in October 2021,

Plots 2-8 assessed the onsite Grassland during 12-14 July 2022,

Plot 9 assessed the offsite Grassland (N road reserve) during 12-14 July 2022.

The total average native groundcover across all grassland plots (2-8) was 57%.

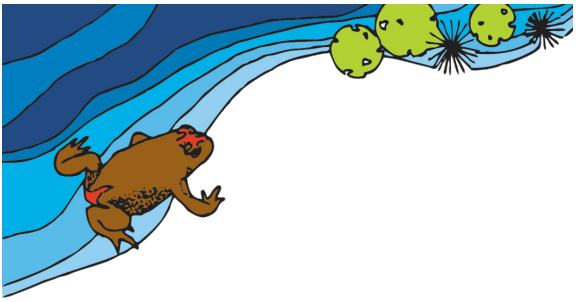
Again however, *Cynodon dactylon* was the most common groundcover, accounting for an average of 29% across all grassland plots (2-8) (and 31% across all onsite plots (1-8)).

If *Cynodon dactylon* is removed from the groundcover component, then the total average native groundcover is 28% across these plots (2-8). This is below the criteria value of 50%.

Table 24. Plot data

% Cover in Plots									
	Plot 1	**Plot 2**	**Plot 3**	**Plot 4**	**Plot 5**	**Plot 6**	**Plot 7**	**Plot 8**	**Plot 9**
Groundcover species									
**** Axonopus fissifolius***		**35**	**46.25**	**40**	**40**	**40**	**15**	**65**	**4**
Cynodon dactylon	**40**	**40**	**3.5**	**2**	**35**	**50**	**60**	**15**	**25**
Carex appressa		8	4.5	4	5	.2	1	3	
Schoenus apogon		5	35	46.25	2	.5	15		
Eragrostis sp.1/sp.2		3		2	5	5	1	5	
Cymbopogon refractus			2.5					3	
Bothriochloa macra	10								
Oplismenus aemulus									
** Ehrharta erecta*	5								
** Paspalum dilatatum*									
Cyperus gracilis	5								
Microlaena stipoides	5								
Sporobolus creber									5
** Setaria sp.*									4
** Cenchrus clandestinus*									60
Cumulative cover of the two main dominants	50	75	81.25	86.25	75	90	75	80	85

It is evident that *Cynodon dactylon* comprised a significant percentage of the overall cover in each plot. Given the unresolved doubt regarding the 'native' (alternatively 'weed') status of this species, the significance of its contribution must be considered in relation to assessment of the grassland; this has implications for the calculation of offsets and for future management of the subject land.



Species richness:

As the development site and adjoining area is relatively large, species richness exceeds the criteria "10 native understorey* species from Appendix B present in patch". Note Appendix B is found in the Conservation Advice for Lowland Grassy Woodland in the South East Corner Bioregion (2013).

Status of *Cynodon dactylon* (L.) Pers.

Although regarded as native by some authorities, significant doubt remains about its original provenance. Records of historical collections indicate that it has apparently spread from particular areas on the east coast, including Tasmania (as possible early introductions) to all States/Territories on the continent, also including Lord Howe Island, Norfolk Island, Christmas Island, the Cocos Islands and the Coral Sea Islands.

In many regions it has become an aggressive coloniser, including also in many countries around the world. *Cynodon dactylon* is currently regarded as a significant weed in most States, where it has invaded crops, urban bushland and even disturbed remote areas. More recently it has also become a particularly aggressive weed in bushland around Perth.

A relevant research paper on the origins of *Cynodon dactylon* in Australia was published in 1954 by F.N.Langdon. This short paper considers the evidence of mycological parasites and their presence in Cynodon populations from other parts of the world (e.g. India, South Africa, Philippines). He concludes that mycological evidence indicates *Cynodon dactylon* is most likely to have been introduced to the Australian continent, albeit at an early date.

Visitations to the Australian continent by Europeans included many expeditions, for example 1792-93 the French botanist Labillardière collected through the Recherche Bay, Southport, Bruny Island areas; La Pérouse to Botany Bay (1788); Banks and Solander to Sydney (1770), etc; and convict settlements, etc. Each of these was an opportunity for the potential introduction of *Cynodon dactylon* to the mainland. The earliest record of the Australian Virtual Herbarium (AVH) is 1829, somewhere in/around Hobart (founded 1804).

Brown collected specimens around Sydney in 1802-04. His list was published by Maiden (1916). In that list, Maiden included:

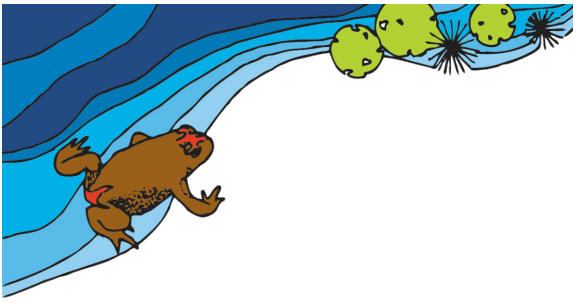
"*Panicum Dactylon* (*Cynodon dactylon*, the Couch Grass)".

However, this species had subsequently spread to most other states (more recently to WA) and in a later update the species was deemed naturalised and classified as 'native' by some authorities, although significant doubt has remained about this classification.

(R.H.Groves. Robert Brown and the naturalised flora of Australia. 2002. Cunninghamia 7(4): 623–629)

[https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.582.8504&rep=rep1&type=pdf]

Roche included a brief literature review on *Cynodon dactylon* in a research paper (2013) in which he also considers the paper by Langdon.



Langdon, F.N. (Dept. of Botany, University of QLD. 1954. The origin and distribution of *Cynodon dactylon* (l.) pers.

Roche, Matthew B. (University of QLD. 2013). Characterisation of vegetative bermudagrasses (*Cynodon spp.*) for turf use in Australia.

[https://astcs.com.au/wp-content/uploads/2021/02/Matt-Roche_MPhil_FINAL.pdf]

Additional references:

Official status of *Cynodon dactylon* in other States and by other authorities.

https://grassworld.myspecies.info/en/content/origin-and-distribution-cynodon-dactylon-lpers

https://keyserver.lucidcentral.org/weeds/data/media/Html/cynodon_dactylon_var._dactylon.htm

https://www.bushlandperth.org.au/weeds/couch-grass/

https://ausgrass2.myspecies.info/content/cynodon-dactylon

https://apps.des.qld.gov.au/species-search/details/?id=7812

https://avh.ala.org.au/occurrences/search?taxa=Cynodon%20dactylon%20var.%20dactylon#tab_mapView

Common names for *Cynodon dactylon*:

Couch grass, Bermuda grass, Quickgrass, Twitch grass, Bahama grass, Devil grass.

Synonymy:

Cynodon dactylon var. dactylon (L.) Pers
C. aristiglumis Caro & Sanchez
Capriola dactylon (L.) Kuntze
Dactylon officinale Vill.
Digitaria dactylon Scop.
Milium dactylon Moench
Panicum dactylon L.
Paspalum umbellatum Lam.

Conclusion:

The vegetation, both the woodland and the pasture proposed to be impacted meets the diagnostic and condition thresholds and requires referral to the Commonwealth.

1.2 Information sources

- BAM 2020
- BioNet TBDC
- BioNet Vegetation Classification (formerly known as the NSW Vegetation Information System Classification Database)
- BioNet Vegetation Classification (formerly known as the NSW Vegetation Information System Classification Database)
- BioNet Atlas (formerly known as the NSW Wildlife Atlas).
- BioNet NSW (Mitchell) Landscapes – Version 3.1
- NSW Interim Biogeographic Regions of Australia (IBRA region and subregion) – Version 7.

Appendix 10. 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 23 January 2023

NPWS GIS data licence number is CON95034

DG NSW Dept of Primary Industries Animal Care and Ethics Committee Approval expires 8 November 2023

DG NSW Dept of Primary Industries Animal Research Authority expires 8 November 2023

The Consultancy Team

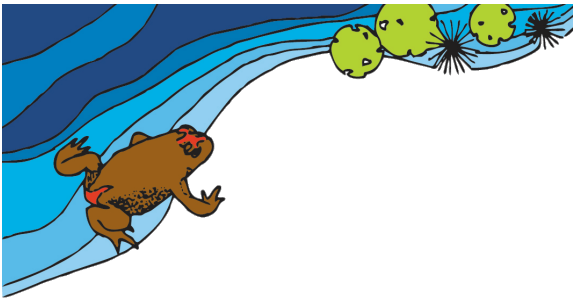
Dr Danny Wotherspoon

BSc, DipEd, MA, PhD, Grad Dip Bushfire Protection,

MECA NSW, MEPLA, MNELA, MESA, MEIANZ, White card.

Danny has practised as an ecological and bushfire consultant since 1991.

He is a consulting ecologist to private developers, State Government agencies and various City Councils on a regular basis, for development applications, government projects, and as expert witness in the NSW Land and Environment Court. Danny's PhD researched fragmented vegetation and fauna habitat use. He has special expertise in fauna habitat use. Danny has presented invited papers at international conferences since 2001 in Australia, China, South Africa, Sri Lanka and Israel on his PhD and other research, including golf course habitat management. Danny's scientific papers have been published in both international and Australian academic journals.



Mark Mackinnon

Qualifications: B Env. Sci. (Hons), Grad Dip Bushfire Protection

MEIANZ, White Card,

Accredited Practitioner Level 3 - Bushfire Planning & Design (BPAD), Accreditation number 36395.

Mark is a passionate and enthusiastic scientist who thrives in the field of natural resource management. He has experience in threatened species, fire ecology, bushfire management, pest plant and animals, and landscape restoration. In particular he specializes in ornithology and bushfire management. Mark has a number of specialized field-based skills including: nest box installation, simple and complex tree climbing, working at heights, general firefighter departmental fire accreditation, venomous snake and reptile handling, immunization to handle bat species, and an A - class bird banding licence with mist-net endorsement. Mark is also skilled in ArcGIS mapping, first-aid, four -wheel-driving.

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.

Dr Stephanie Clark

Qualifications: B Sc (Hons), PhD

Stephanie has over 30 years experience in the collection, identification and taxonomy of marine, estuarine, freshwater and terrestrial molluscs. She has conducted numerous targeted surveys for endangered and threatened species (particularly land and freshwater molluscs) in both Australia and the United States. She is particularly interested in the systematics, taxonomy, morphology (external and internal), population and conservation genetics and conservation of molluscs particularly terrestrial (especially the Helicoidea) and freshwater (especially the Hydrobiidae and related families) groups.

Jesse Cass

BSc (Zoology), MEScM (enrolled)

White Card, Working Safely at Heights

Botanist

Jesse has a bachelor degree and is currently studying his Masters of Environmental Science and Management, online at UNE, as a pathway for a PhD. He is practicing and learning plant identification, as well as fauna identification within the Sydney Basin. His role in Abel Ecology is to provide assistance on field visits and report writing, while gaining knowledge and experience in flora identification.