Biodiversity Development Assessment Report

ST JAMES PRIMARY SCHOOL BDAR

JANUARY 2020

ngh environmental

Document Verification

Project Title: St James Primary School BDAR

Project Number:	19-409
Project File Name:	St James Primary School BDAR

Revision	Date	Prepared by (name)	Reviewed by (name)	Approved by (name)
Final 1.0	30/08/19	B. True (BAAS18115)	Mitch Palmer (BAAS17051)	Mitch Palmer (BAAS17051)
Final 1.1	23/01/2020	Mitch Palmer (BAAS17051)	Mitch Palmer (BAAS17051)	Mitch Palmer (BAAS17051)

NGH Environmental Pty Ltd (ACN: 124 444 622. ABN: 31 124 444 622)

www.nghenvironmental.com.au e: ngh@nghenvironmental.com.au

Sydney Region
18/21 mary st
surry hills nsw 2010 (t 02 8202 8333)

Canberra - NSW SE & ACT
8/27 yallourn st (po box 62)
fyshwick act 2609 (t 02 6280 5053)

Bega - ACT and South East NSW
89-91 auckland st (po box 470)
bega nsw 2550 (t 02 6492 8333)

Newcastle - Hunter and North Coast
2/54 hudson st
hamilton nsw 2303 (t 02 4929 2301)

Wagga Wagga - Riverina and Western NSW
suite 1, 39 fitzmaurice st (po box 5464)
wagga wagga nsw 2650 (t 02 6971 9696)

Brisbane
suite 4, level 5, 87 wickham terrace
spring hill qld 4000 (t 07 3129 7633)

CONTENTS

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

APZ	Asset Protection Zone
BAM	Biodiversity Assessment Methodology
BC Act	Biodiversity Conservation Act 2016 (NSW)
BV	Biodiversity Values
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
BOS	Biodiversity Offset Scheme
DA	Development Application
DBH	Diameter at Breast Height
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ha	hectares
HBT	Hollow-bearing Tree
km	kilometres
m	Metres
LEP	Local Environment Plan
MNES	Matters of National environmental significance under the EPBC Act (*c.f.*)
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage
SAII	Serious and Irreversible Impact
sp/spp	Species/multiple species
TEC	Threatened Ecological Community
VIS	Vegetation Integrity Score

EXECUTIVE SUMMARY

Upgrades including the expansion of existing facilities and the addition of an Early Learning Centre is proposed for St James Primary School, Kotara NSW (the proposal). The proposal would develop approximately 1.53 ha within the 2.94 ha development site. This Biodiversity Development Assessment Report (BDAR) has been prepared by NGH Environmental for Webber Architects on behalf of the Catholic Diocese of Maitland and Newcastle.

This development application is being assessed under Part 4 of the EP&A Act. An initial flora and fauna assessment by NGH Environmental determined that the development exceeded the NSW Biodiversity Offset Scheme (BOS) Thresholds for the clearing of native vegetation and triggered the requirement for the preparation of a BDAR. The area of clearing met the threshold for a small area development and a streamlined BDAR can be undertaken. The Biodiversity Assessment Methodology (BAM) is the required assessment methodology for developments that trigger the NSW BOS, under the NSW *Biodiversity Conservation Act 2016.* This report follows the field work methodologies and assessment format required by the BAM.

One PCT was identified within the development site - PCT 1568 *Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast*. 0.6 ha of this vegetation would be impacted by the proposal resulting in the generation of 4 ecosystem credits.

Twenty-nine threatened species credit species were predicted to occur for this vegetation type from the BAM Calculator. All bar three were excluded from assessment based primarily on lack of habitat features, habitat degradation, and lack of habitat connectivity in the landscape. Targeted surveys were undertaken for three species (all threatened forest owls) not excluded, but none of these species were detected within the development site.

No federally listed entities were detected or are considered likely to occur within the development site and be impacted by the proposal. Accordingly, a referral to the federal Department of Environment and Energy is not required.

Mitigation and management measures will be put in place to adequately address impacts associated with the proposal, both direct and indirect.

The retirement of the credits generated will be carried out in accordance with the NSW Biodiversity Offsets Scheme under the *Biodiversity Conservation Act 2016*. With the retirement of credits and effective implementation of the mitigation measures, the proposal is consistent with the requirements of the BAM.

1 INTRODUCTION

Alterations and additions are proposed for St James Primary School, Kotara South NSW 2289 (the proposal). The vegetation removal required for the development is being assessed under Part 4 of the EP&A Act. A desktop assessment by NGH Environmental determined that the development exceeded the Biodiversity Offset Scheme (BOS) Thresholds for the clearing of native vegetation. As such, this triggered the requirement for the preparation of a Biodiversity Development Assessment Report (BDAR). This BDAR assesses the impacts of the proposal according to the NSW Biodiversity Assessment Methodology (BAM) and determines potential offset requirements for the proposal.

The following terms are used in this document:

- **Development footprint** – The area of land that is directly impacted on by the proposal. Including Asset Protection Zones (APZ), new buildings, footpaths, carparking, garden landscaping and driveway crossovers.
- **Development site** – The area of land that is subject to a proposed development. The development site is approximately 2.94 ha. The development site is the area surveyed for this assessment.
- **Subject land** – all land within the affected lot boundaries.
- **Buffer area** – All land within 1500 m of the outside edge of the boundary of the development site.

1.1 THE PROPOSAL

The proposal includes alterations and additions to the existing primary school to increase the capacity of the primary school to 630 students and to provide further living spaces and facilities within the existing St James Primary School. Additionally, a 79 place Early Learning Centre is proposed.

The proposal would involve undertaking alterations and additions to a number of existing buildings, demolishing other buildings and constructing single and two storey new buildings, as well as ancillary works such as car parking, landscaping, fencing and APZ.

The development site will have relocated vehicular access from single driveway located on Vista Parade, adjacent to the western boundary of the site. The pedestrian entry will be located at the middle of the Vista Road frontage of the development site. The pedestrian entry serves the childcare centre and the school.

A school child drop off area will be located in a one way traffic flow area at the northern end of the vehicular access. The child care centre will have a car park and short stay drop off area located off the internal access, to the south of the child care centre building (some of this car park will also be used for school staff parking). The main school staff parking area will be located to the rear of the child care centre, also off the internal driveway. A dedicated one way lay by style drop down pick up area for school students will also be constructed within the school grounds.

The single storey childcare centre will address Vista Parade and provide casual surveillance of the childcare centre car park and Vista Parade beyond. The main entrance of the building addresses Vista Parade. The existing building addressing Vista Parade will remain.

Landscaping will be undertaken along Vista Parade frontage to provide a more visual attractive setting and selected screening while permitting casual surveillance of the site from the street. The landscaping will be undertaken throughout the balance of the site to provide screening of adjacent residential properties, an

attractive interface to the adjacent shared pedestrian path/cycleway and a transitional interface to the vegetated public land (Kullaba Reserve) to the north.

The child care centre ground level open car park is proposed to have a minimum of 20 parking spaces for use by the Centre including 2 disabled parking spaces, 13 School staff parking spaces, and 4 out of school hours care spaces, and the school ground level open car park is proposed to have a 18 parking spaces including 2 disabled parking spaces.

An APZ is required for the proposal that extends 23 m south and 47 m north-east of the proposed development footprint. The APZ is wholly contained within the development site.

1.2 THE DEVELOPMENT SITE

1.2.1 Site location

The development site is located on Lot 12 DP 560852 and Lot 131 DP 262057, 30 Vista Parade, Kotara South (Figure 1-1).

The site is bound by Vista Parade to the west, residences to the north and south, and public recreation (Kullaba Reserve) to the east. The development site is approximately 2.94 ha across both allotments.

The proposal area is zoned R2 Low Density Residential under the Newcastle Local Environment Plan (LEP) 2012. The site occurs within a residential area with surrounding land use including residences, sports field and urban bushland.

1.2.2 Site description

The development site is approximately 2.94 ha in size and comprises the grounds of St James Primary School and a treed area to the north east (Lot 131 DP 262057).

Vegetation within the grounds of the school is limited to landscaped areas or trees retained for aesthetic value or other purpose. More than 90% are species indigenous to NSW with the remainder non-NSW or exotic species. Of the native species, many are indicative of the vegetation types likely to have occurred prior to human development such as Sydney Blue Gum *Eucalyptus saligna* and Turpentine *Syncarpia glomulifera*. Others, including River Oak *Casuarina cunninghamiana* subsp. *cunninghamiana* and an unidentified Scribbly Gum, are likely to have been planted.

Remnant vegetation is located within much of Lot 131 DP 262057. Various Eucalypts and tall native shrubs comprise the canopy. The dense midstorey contains many moisture and shade tolerant natives including vines, however, invasive Privet *Ligustrum* spp. is the dominant feature. Typical of disturbed bushland, the understorey comprises a mix of native and exotic forbs, grasses and graminoids.

No aquatic or other features such as rock outcropping are present.

1.2.3 Trigger for a Biodiversity Development Assessment Report

Native vegetation clearing for the proposal comprises some of those landscaped areas described above as well as thinning to Lot 131 DP 262057 for the purpose of establishing an APZ with an inner and out protection area. The minimum lot size of the development site is 400 m^2, meaning that clearing of native vegetation in excess of 0.25 ha would trigger the requirement for a BDAR.

In consideration of the landscaped areas requiring clearing and the thinning of Lot 131 DP 262057, whilst not perfectly quantifiable as there are practical unknowns, it is considered highly likely that more than 0.25 ha of native vegetation would be cleared. For instance, clearing of landscaped areas containing native vegetation is estimated to contribute 0.15 ha to the threshold and clearing for the APZ is estimated to contribute 0.17 ha, surpassing the threshold. There is also consideration of the removal of native groundcover in cleared areas that would become carparking or other facilities.

However, the amount of clearing of native vegetation is less than 1 ha and not within an area classed as high biodiversity on the biodiversity values map (DPE 2019). Therefore, the development meets the requirements of a small area development and a streamlined BDAR is required.

Table 1-1 Biodiversity Offset Scheme Thresholds

<table>
<tr><th colspan="2">Threshold</th><th>Application to the Proposal</th><th>Threshold Exceeded?</th></tr>
<tr><td colspan="2"><table>
<tr><th>Minimum lot size associated with the property</th><th>Threshold for clearing of native vegetation</th></tr>
<tr><td>Less than 1 ha</td><td>0.25 ha or more</td></tr>
<tr><td>1 ha to less than 40 ha</td><td>0.5 ha or more</td></tr>
<tr><td>40 ha to less than 1000 ha</td><td>1 ha or more</td></tr>
<tr><td>1000 ha or more</td><td>2 ha or more</td></tr>
</table></td><td>The minimum lot size for the property is 400 m^2. The threshold for clearing is 0.25 ha. A minimum of 0.32 ha would be cleared by the development.</td><td>Yes. Area clearing threshold exceeded.</td></tr>
<tr><td colspan="2">Areas of Outstanding Biodiversity Value</td><td>None occur in the development site.</td><td>No</td></tr>
<tr><td colspan="2">Significant impact on threatened species, populations or ecological communities</td><td>Threatened species assessed in the BDAR.</td><td>No</td></tr>
<tr><td colspan="2">Activity on land identified as being of high biodiversity value on the Biodiversity Values Map</td><td>The development site does not impact on any land classed as land of high biodiversity value</td><td>No</td></tr>
</table>

1.3 STUDY AIMS

This BDAR has been prepared by NGH Environmental for Webber Architects on behalf of the Catholic Diocese of Maitland and Newcastle.

The aim of this BDAR is to address the requirements of the BAM, as required by the biodiversity offset scheme. The report has followed the streamlined assessment methodology for small area development.

1.4 SOURCE OF INFORMATION USED IN THE ASSESSMENT

The following information sources were used in this BDAR:

- Proposal layers, construction methodology and concept designs provided by Webber Architects
- Newcastle Local Environment Plan 2012

- NSW OEH's Threatened Species Profiles
  http://www.environment.nsw.gov.au/threatenedspeciesapp/
- Australian Government's Species Profiles and Threats (SPRAT) database
  http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
- Commonwealth Department of Environment and Energy Protected Matters Search Tool

  Accessed online at http://environment.gov.au/epbc/protected-matters-search-tool
- NSW OEH's Biodiversity Assessment Method (BAM) calculator (http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx).
- NSW OEH's BioNet threatened biodiversity database

  Accessed online via login at http://www.bionet.nsw.gov.au/.
- OEH BioNet Vegetation Classification Database (OEH 2019)

  Accessed online via login at http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx
- Office of Environment and Heritage (OEH) (2017a). Biodiversity Assessment Method.
- NSW Government SEED Mapping

  https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU
- NSW Biodiversity Values Map
  https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

Figure 1-1 Site Map

2 LANDSCAPE FEATURES

2.1 IBRA BIOREGIONS AND SUBREGIONS

The development site falls within the Sydney Basin East Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and the Wyong IBRA subregion. The bioregion is a temperate climate characterised by a warm climate and no dry season. It covers the coastal fall of the Sydney Basin, rolling hills and sandstone plateau outliers.

The Wyong subregion was entered into the BAM Calculator for this assessment.

2.2 NATIVE VEGETATION

As determined by aerial imagery and GIS Mapping, approximately 247.53 ha of native vegetation occurs in the surrounding 1500 m buffer area. This vegetation in the landscape surrounding the development site is predominantly dry and wet sclerophyll forest. Dominant canopy species include Blackbutt Euc*alyptus pilularis*, Sydney Red Gum *Angophora costata* and Spotted Gum *Corymbia maculata*.

2.3 CLEARED AREAS

Within the 1500 m buffer area around the development site, 590.7 ha occurs as cleared areas. This is comprised of residential and urban areas and cleared open space such as sporting fields.

2.4 RIVER AND STREAMS

No natural rivers and streams occur within the development site. However, Styx Creek, which is a small man man-made creek that is fully concreted, runs adjacent to the northern boundary of the development site. Watershed from the development site is likely to flow into Styx Creek during rain events.

2.5 WETLANDS

No wetlands occur in or adjacent to the development site. The nearest important wetland listed under the EPBC Act is Hunter Estuary Wetlands located over 11km northeast of the development site. There is no apparent connectivity to this or any other wetland.

2.6 CONNECTIVITY FEATURES

The development site occurs on the south-western edge of a 7.5 ha patch of bushland within a highly cleared, urban environment. As this patch is bound by residential and commercial development, connectivity is not contiguous with other native vegetation in the surrounding area but is part of a network of patches that forms a steppingstone pattern of connectivity in the landscape. Through this network of patches, it is foreseeable for highly mobile fauna, predominantly birds, to traverse the landscape from larger remnants of native vegetation at Glenrock in the southeast and Blackbutt Reserve in the northwest.

2.7 AREAS OF GEOLOGICAL SIGNIFICANCE

No karsts, caves, crevices or cliffs or other areas of geological significance occur in or adjacent to the development site.

2.8 AREAS OF BIODIVERSITY VALUE

The development site is not listed as an area of biodiversity value under the BC Act 2016.

2.9 SITE CONTEXT COMPONENTS

Method applied

The proposal conforms to the definition of a *site-based development* under the Biodiversity Assessment Methodology. The site-based streamlined development assessment methodology has been used in this BAM assessment.

Percent Native Vegetation Cover

The 1500 m buffer area around the development site comprises an area of 838.23 ha. Native vegetation mapped within the 1500 m buffer area is calculated to be an area of 247.53 ha. This determines the percent native vegetation cover in the landscape to be 29.5%. This value was entered into the BAM Calculator for the assessment.

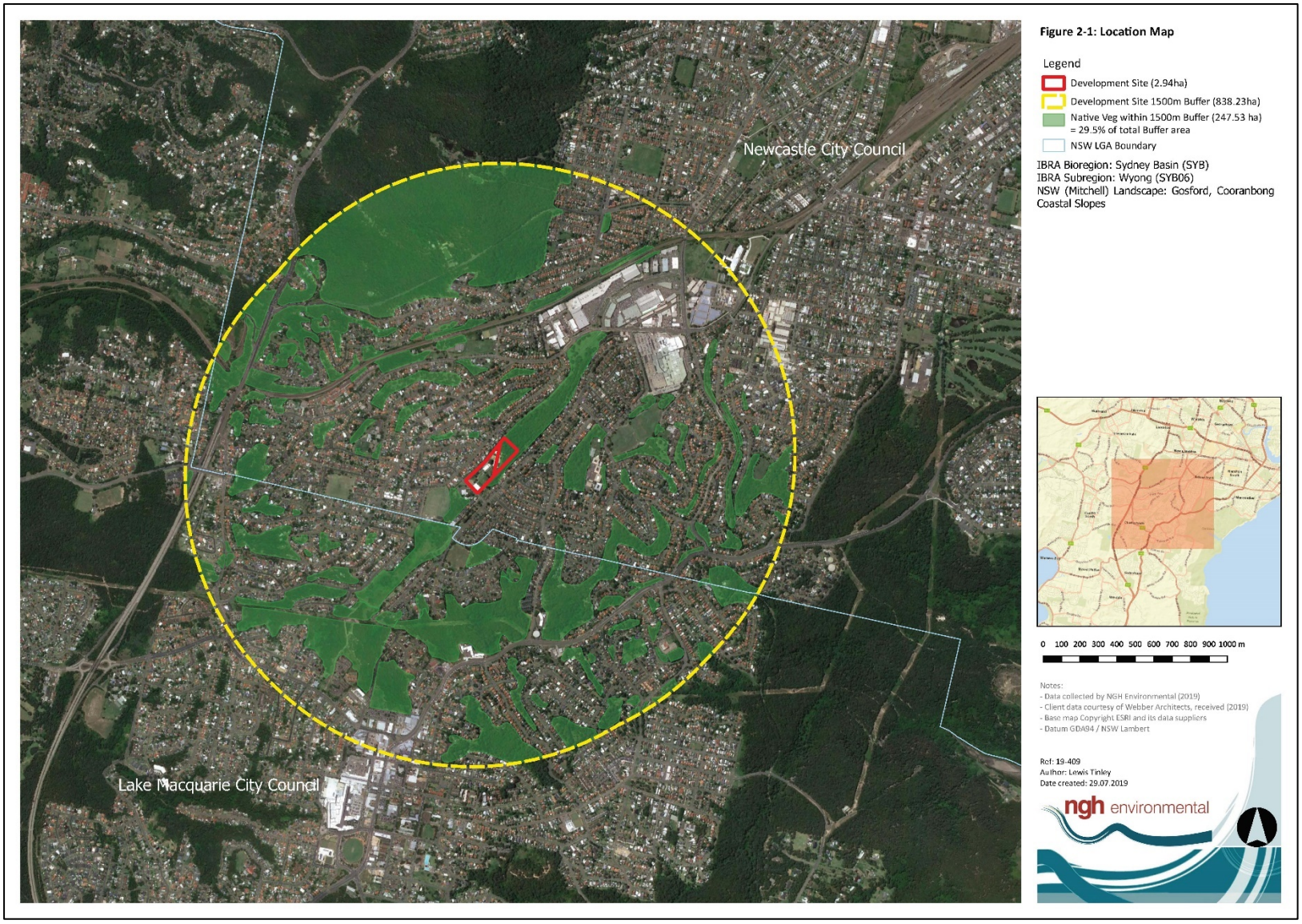


Figure 2-1 Location map

3 NATIVE VEGETATION

3.1 PLANT COMMUNITY TYPES (PCTS)

3.1.1 Methods to assess PCTs

Floristic survey

A Random Meander (Cropper 1993) and three vegetation integrity plots under the BAM were undertaken on 2nd July 2019 to survey vegetation within the development site. These methods provide good coverage in terms of area and microhabitats and maximises opportunities for detecting rare or sparsely distributed species.

Plant Community Types (PCTs) were identified according to the OEH BioNet Vegetation Classification (OEH 2019). Botanical nomenclature follows Harden (1990-2002) and the PlantNet website, updated with recent changes recognised in Angiosperm Phylogeny Group (2016) and the Australian Plant Census.

3.1.2 PCTs identified on the development site

One native Plant Community Type (PCT) was identified in the development site. This was:

- *PCT 1568 Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast*

Table 3-1 Description of PCT 1568 Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast

Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast			
Vegetation formation	Wet Sclerophyll Forests (Shrubby sub-formation)		
Vegetation class	North Coast Wet Sclerophyll Forests		
Vegetation type	**PCT ID**	1568	
	Common Community Name	Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	
Approximate extent within the development site	Zone 1: 0.39 ha Zone 2: 0.39 ha Zone 3: 0.19 ha		
Species relied upon for PCT identification	***Species name***		***Relative cover***
	Turpentine *Syncarpia glomulifera*		5%
	Sydney Blue Gum *Eucalyptus saligna*		4%
	White Mahogany *Eucalyptus acmenoides*		5%
	Cheese Tree *Glochidion ferdinandi*		2.5%
	Lilly Pilly *Acmena smithii*		0.5%
	Rough Fruit Pittosporum *Pittosporum revolutum*		0.2%

Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast		
	Native Yam *Dioscorea tranversa*	1%
	Large Mock-olive *Notelaea longifolia*	0.2%
	Settler's Twine *Gymnostachy anceps*	0.2%
Justification of evidence used to identify the PCT	Four PCTs were shortlisted based on the species identified within the development site and reference to local mapping (VIS ID 4513, OEH 2017b). These were; • 1566: White Mahogany - Turpentine moist shrubby tall open forest; • 1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast; • 1573: Sydney Blue Gum - Lilly Pilly mesic tall open forest of coastal ranges and tablelands escarpment; and • 1584: White Mahogany - Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley. The plot data collected contained similar numbers of characteristic species of all four PCTs (8-9), however, with more weight attributed to canopy and shrub species rather than common groundcover species, PCT 1568 was determined to be the strongest fit. This decision was also informed by observations of vegetation within the development site that was not captured within a plot, of which Sydney Blue Gum *Eucalyptus saligna* was present. Reference mapping also indicated that PCT 1568 is likely to be present.	
TEC Status	This PCT is not considered to represent a TEC listed under the BC Act and/or EPBC Act.	
Estimate of percent cleared in the bioregion	40%	

Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast

Examples

Figure 3-1 Example of PCT 1568 Zone 1 (top) and Zone 2 (above) in the development site

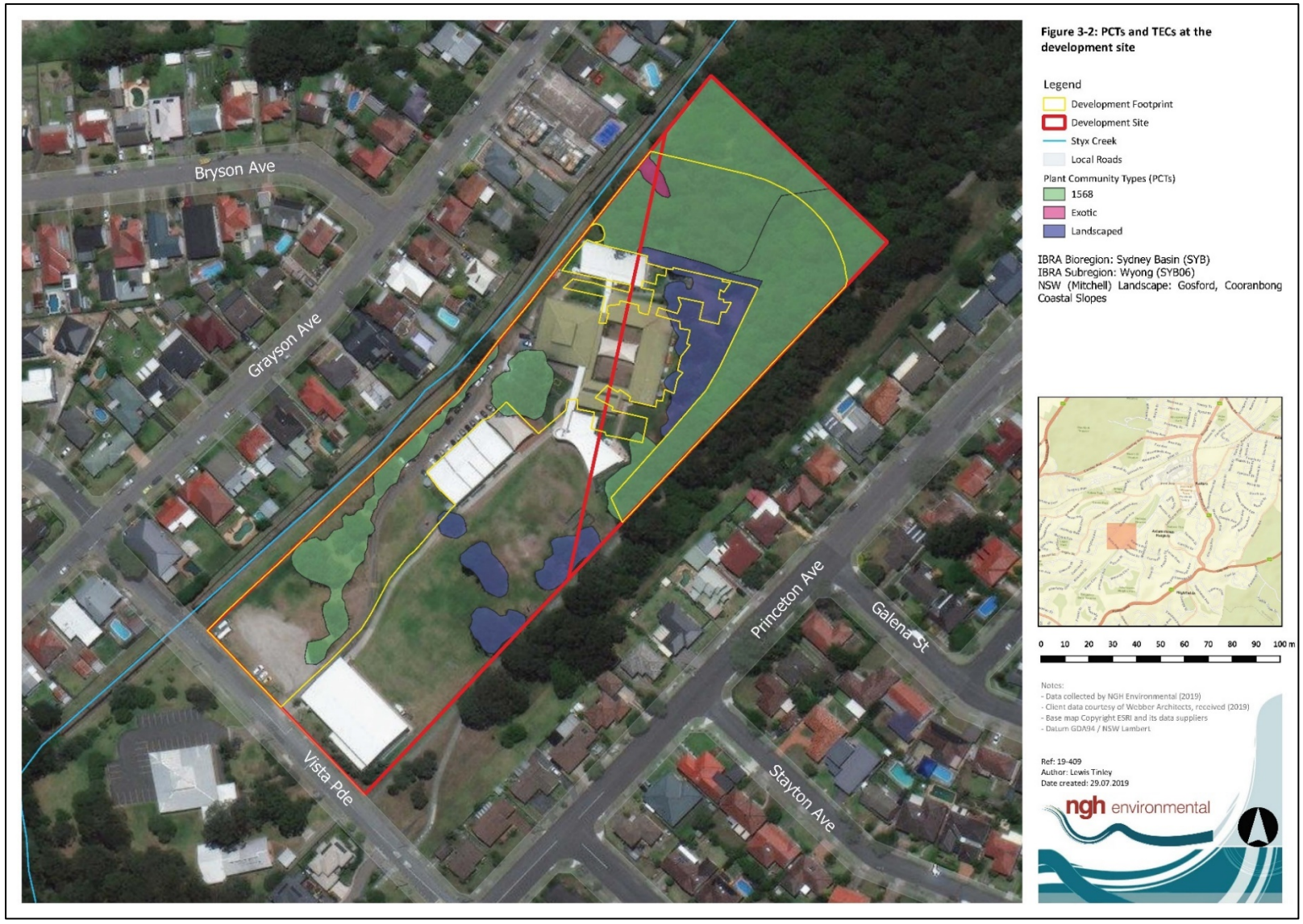


Figure 3-2 PCTs and TECs at the development site

3.2 VEGETATION INTEGRITY ASSESSMENT

3.2.1 Vegetation zones and survey effort

The vegetation within the development site was clipped to the development footprint and stratified into five zones based on condition. These are:

- Zone 1: PCT 1568_Forest_Moderate: Forest areas where an APZ would be implemented to the north- east of the proposed development footprint. This zone is 0.25 ha in size. According to the BAM, a minimum of one vegetation integrity plot is required to be undertaken in a zone of this size. One vegetation integrity plot was undertaken on the 2nd July 2019.
- Zone 2: PCT 1568_Forest_Low: Forest areas where an APZ would be implemented to the south and east and east of the proposed development footprint. This zone is 0.35 ha in size and similar in nature to Zone 1 but has higher exotic cover and lower native species cover. According to the BAM, a minimum of one vegetation integrity plot is required to be undertaken in a zone of this size. One vegetation integrity plots was undertaken on the 2nd July 2019.
- Zone 3: PCT 1568_Maintained: Areas containing a mix of naturally occurring and planted native species including those that line the current entranceway to the school and feature gardens. This zone is 0.19 ha in size. One vegetation integrity plot was undertaken on 2nd July 2019.
- Zone 4: Landscaped areas including gardens that contain a mix of native and exotic species. This zone is 0.26 ha in size. This zone was established through random meander on 2nd July 2019. As this zone will not be impacted and carried forward in this assessment, no plots are required.
- Zone 5: A small area of exotic groundcover with no native mid or overstory. This zone is 0.001 ha in size. This zone was established through random meander on 2nd July 2019. As this zone does not represent a native PCT, no plots are required. This zone is not carried forward in this assessment.

3.2.2 Vegetation integrity assessment results

The results of the plot field data can be found in Appendix A.

The plot data from the vegetation integrity survey plots was entered into the BAM calculator by an accredited assessor. Note that only zones 1-3 are entered into the BAM calculator as these zones represent a native PCT (in this case PCT 1568) that would be impacted.

Table 3-2 Table of vegetation integrity score for the vegetation zone within the development site.

Zone ID	Area (ha)	Patch Size (ha)	Composition score	Structure score	Function score	Vegetation Integrity Score
1 – PCT 1568_Forest_Moderate	0.25	70	64.7	56.6	63.8	**61.6**
2 – PCT 1568_Forest_Low	0.35	70	57.3	31.4	47	**43.9**
3 – PCT 1568_Maintained	0.19	70	30	5.1	20.9	**14.7**

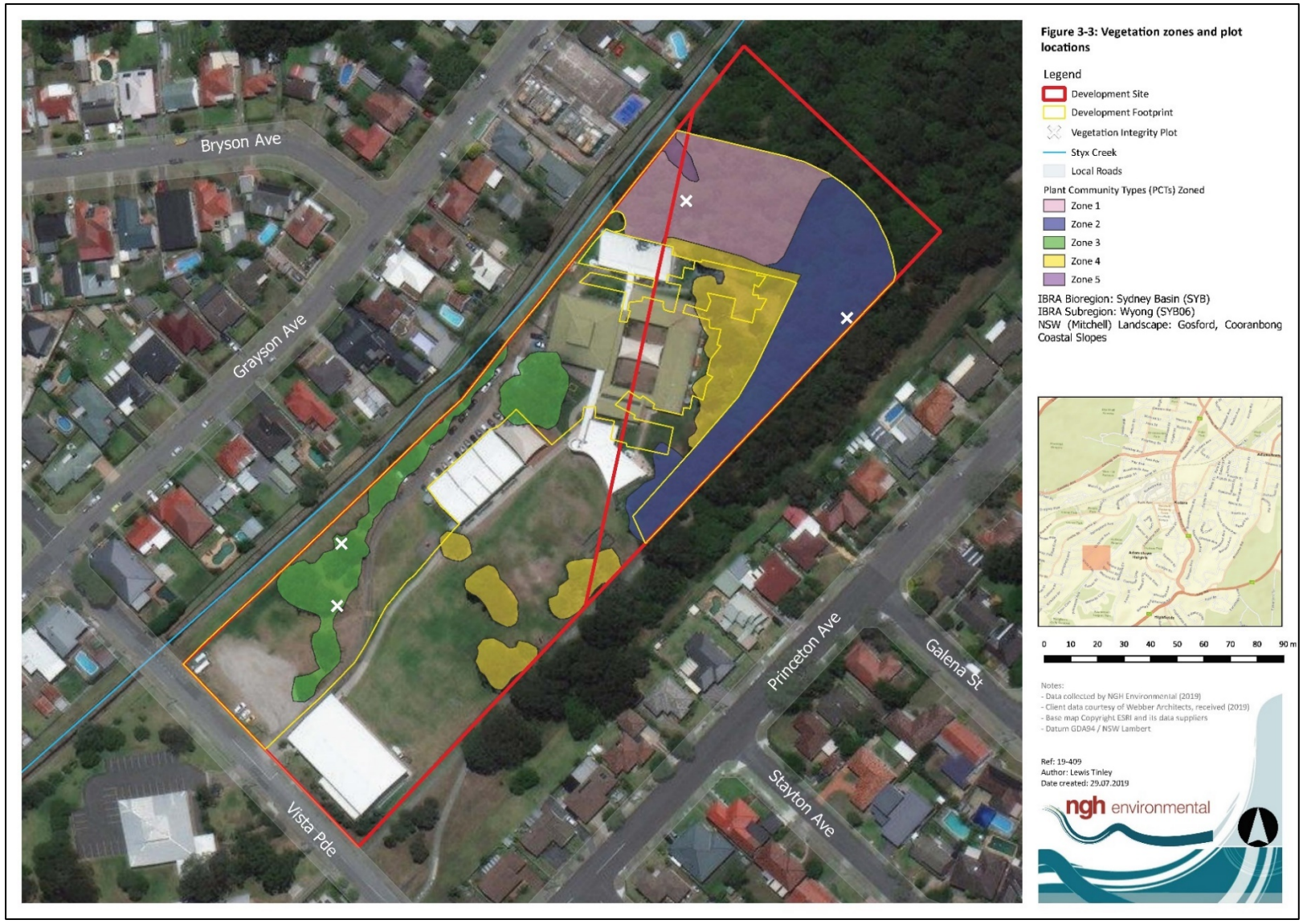


Figure 3-3 Vegetation Zones and Plot Locations

4 THREATENED SPECIES

4.1 ECOSYSTEM CREDIT SPECIES

The following ecosystem credit species were returned by the calculator as being associated with the PCT 1568.

Table 4-1 Predicted Ecosystem Credit Species

Ecosystem credit species	Associated PCT	NSW listing status	EBPC listing status
Callocephalon fimbriatum Gang-gang Cockatoo	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Calyptorhynchus lathami Glossy Black-cockatoo	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Daphoenositta chrysoptera Varied Sittella	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Dasyurus maculatus maculatus Spot-tailed Quoll	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Endangered	Endangered
Glossopsitta pusilla Little Lorikeet	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Haliaeetus leucogaster White-bellied Sea Eagle	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Migratory
Lathamus discolor Swift Parrot	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Critically Endangered	Critically Endangered
Lophoictinia isura Square-tailed Kite	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Miniopterus australis Little Bent-winged Bat	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Miniopterus schreibersii oceanensis Eastern Bent Wing Bat	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Mormopterus norfolkensis Eastern Freetail-bat	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed

Ecosystem credit species	Associated PCT	NSW listing status	EBPC listing status
Ninox connivens Barking Owl	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Ninox strenua Powerful Owl	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Phascolarctos cinereus Koala	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Vulnerable
Pteropus poliocephalus Grey-headed Flying-fox	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Vulnerable
Ptilinopus superbus Superb Fruit Dove	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Saccolaimus flaviventris Yellow-bellied Sheathtail-Bat	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed
Tyto novaehollandiae Masked Owl	1568: Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	Vulnerable	Not listed

4.1.1 Species excluded from the assessment

All species listed above were considered to have the potential to occur in the development site on occasion and were included in the assessment.

4.2 SPECIES CREDIT SPECIES

4.2.1 Candidate species to be assessed

The BAM Calculator predicted the following species credit species to occur at the development site (Table 4-2). Under Section 6.4.1.17 of the BAM, a species credit species can be considered unlikely to occur on a development site (or within specific vegetation zones) if following field assessment, it is determined that the habitat is substantially degraded such that the species is unlikely to utilise the development site (or specific vegetation zones). Species excluded based on the absence or degradation of suitable habitat within the development site are highlighted in Table 4-2.

Table 4-2 Predicted Species Credit Species

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
FAUNA							
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. 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.	High	Vulnerable	Not listed	One hollow-bearing tree present in development site.	Excluded	Hollow-bearing tree deemed unsuitable; habitat is highly degraded. Species unlikely to breed in a thin, highly disturbed remnant of wet sclerophyll forest.
Calyptorhynchus lathami Glossy Black-cockatoo (Breeding)	In spring and summer, tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, lower altitudes in drier, more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages. Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground	High	Vulnerable	Not listed	One hollow-bearing tree present in development site.	Excluded	Hollow-bearing tree deemed unsuitable; habitat is highly degraded. Species unlikely to breed in a thin, highly disturbed remnant of wet sclerophyll forest.
Cercartetus nanus Eastern Pygmy Possum	Range from rainforest through sclerophyll forest and woodland to heath. Woodland and heath preferred with an abundance of nectar producing species. Feeds on	High	Vulnerable	Not listed	Highly limited foraging habitat available.	Excluded	Habitat not preferential and highly degraded.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
	nectar from banksias, eucalypts and bottlebrushes.						
Chalinolobus dwyeri Large-eared Pied Bat	Found in well-timbered areas containing gullies. 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. Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	Very High	Vulnerable	Vulnerable	Habitat constraints not present.	Excluded	No suitable breeding or roosting habitat.
Haliaeetus leucogaster White-bellied Sea-eagle (Breeding)	Large areas of open water including larger rivers, swamps, lakes, and the sea. Coastal dunes, tidal flats, grassland, heathland, woodland, and forest. Breeding habitat mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat.	High	Vulnerable	Not listed	Habitat constraints not present.	Excluded	No suitable habitat.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines						
Hoplocephalus bitorquatus Pale-headed Snake	Can spend weeks at a time hidden in tree hollows. Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. Shelter during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees. Frogs are main prey.	Moderate	Endangered	Critically Endangered	Associated vegetation type present. Trees for sheltering.	Excluded	Unlikely to inhabit a thin patch of wet sclerophyll forest that is highly degraded and lacks primary foraging opportunities (frogs).
Lathamus discolor Swift Parrot (Breeding)	Mapped Important Areas	Moderate	Endangered	Critically Endangered	Development site not within mapped important areas.	Excluded	Not within mapped important areas
Litoria brevipalmata Green-thighed Frog	Occur in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. It prefers wetter forests in the south of its range but extends into drier forests.	Moderate	Vulnerable	Not listed	Associated vegetation type present. Preferred habitat not present but occurs in a range of habitats.	Excluded	Habitat degraded, lacks reasonable opportunities for breeding. Species would be unable to persist.
Lophoictinia isura Square-tailed Kite (Breeding)	In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east,	Moderate	Vulnerable	Not listed	Breeding habitat not present.	Excluded	No suitable breeding habitat.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
	including the NSW south coast, arriving in September and leaving by March. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.						
Miniopterus australis Little Bent-winged Bat (Breeding)	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally well-timbered areas. Roost in caves, tunnels, abandoned mines, stormwater drains, culverts, bridges and buildings during the day. Breed in caves, tunnels, mines or culverts.	Very High	Vulnerable	Not listed	No breeding habitat.	Excluded	No suitable breeding or roosting habitat.
Miniopterus schreibersii oceanensis Eastern Bent Wing Bat (Breeding)	Caves are primary roosting habitat, but also use derelict mines, stormwater tunnels, buildings and other man-made structures. Breed in central maternity caves. Hunt in forested areas, catching moths and other flying insects above canopy.	Very High	Vulnerable	Not listed	No breeding habitat.	Excluded	No suitable breeding or roosting habitat.
Mixophyes iteratus Giant Barred Frog	The Giant Barred Frog is distributed along the coast and ranges from Eumundi in south-east Queensland to Warrimoo in the Blue Mountains. Declines appear to have occurred at the margins of the species' range, with no recent records south of the Hawkesbury River and	Moderate	Endangered	Endangered	Styx Creek not suitable habitat.	Excluded	No suitable breeding or roosting habitat.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
	disappearances from a number of streams in QLD. Giant Barred Frogs are found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation.						
Myotis macropus Southern Myotis (Breeding)	Roost close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage. Forage over streams and pools. Breed in central maternity caves. Hunt in forested areas, catching moths and other flying insects above canopy.	High	Vulnerable	Not listed	Hollow-bearing trees present, but not within 200m of a suitable waterway for foraging.	Excluded	Habitat components not present.
Ninox connivens Barking Owl (Breeding)	Woodland and open forest, including fragmented remnants and partly cleared farmland. Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	High	Vulnerable	Not listed	One hollow-bearing tree present within Zone 1.	Included	Potential breeding habitat present.
Ninox strenua Powerful Owl (Breeding)	Widely distributed throughout the eastern forests, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter	High	Vulnerable	Not listed	One hollow-bearing tree present within Zone 1.	Included	Potential breeding habitat present.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
	at breast height of 80-240 cm) that are at least 150 years old.						
Petaurus norfolcensis Squirrel Glider	Mature or old-growth Box, Box-Ironbark woodlands and River Red Gum forest. Mixed species stands with a shrub or Acacia mid-storey. Requires abundant tree hollows. Large HBTs, <50 m apart.	High	Vulnerable	Not listed	Within geographic range and associated vegetation type present. Three hollow-bearing trees.	Excluded	Small patch size and lack of connectivity means likelihood of occurrence is low. Mid and understory highly degraded such that foraging opportunities very limited. Likely to be outcompeted by disturbance tolerant marsupial species.
Petrogale penicillata Brush-tailed Rock wallaby	In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north.	Very High	Endangered	Vulnerable	Habitat constraints not present.	Excluded	No suitable habitat.
Phascogale tapoatafa Brush-tailed Phascogale	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. Forages preferentially in rough-barked trees of 25 cm DBH or greater. Nest and shelter in tree hollows with	High	Vulnerable	Not listed	Associated vegetation type present and three hollow-bearing trees.	Excluded	Both males and females require large home ranges (40-100 ha). Given lack of connectivity, development site unlikely to form part of a home range.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
	entrances 2.5 – 4 cm wide and use many hollows over short time span.						
Phascolarctos cinereus Koala (Breeding)	Eucalypt forest and woodlands. Riparian/refuge habitat during dry periods.	High	Vulnerable	Vulnerable	Associated vegetation type present.	Excluded	No evidence of breeding Koala observed. Unlikely to utilise development site given lack of connectivity with surrounding habitat.
Planigale maculata Common Planigale	Inhabit rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water. Habitat includes hollow logs, under bark, rocks, cracks in soil, grass tussocks or building debris.	High	Vulnerable	Not listed	Associated vegetation type present.	Excluded	Unlikely to occur in a highly degraded/modified wet sclerophyll forest with poor connectivity.
Pteropus poliocephalus Grey-headed Flying-fox (Breeding)	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps, urban gardens and fruit crops. Camps < 20 km of food source, close to water, in vegetation with dense canopy, often in gullies.	High	Vulnerable	Vulnerable	No breeding camps present.	Excluded	No suitable habitat.
Tyto novaehollandiae Masked Owl (Breeding)	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its	High	Vulnerable	Not listed	One suitable hollow-bearing tree present within Zone 1.	Included	Potential breeding habitat present.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
	distribution. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.						
FLORA							
Corybas dowlingii Red Helmet Orchid	Sheltered areas such as gullies and southerly slopes in tall open forest on well-drained gravelly soil at elevations of 10-200 m.	Moderate	Endangered	Not listed	Associated vegetation type present.	Excluded	Habitat not suitable as not a well drained area. Habitat highly degraded.
Cryptostylis hunteriana Leafless Tongue Orchid	The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	High	Vulnerable	Vulnerable	Associated vegetation type present.	Excluded	Habitat highly degraded, unlikely to be present in dense patches of vegetation.
Cynanchum elegans White-flower Wax Plant	Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree	High	Endangered	Endangered	Associated vegetation type present.	Included	Low, condition suitable habitat present.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
	Leptospermum laevigatum – Coastal Banksia *Banksia integrifolia* subsp. *integrifolia* coastal scrub; Forest Red Gum *Eucalyptus tereticornis* aligned open forest and woodland; Spotted Gum *Corymbia maculata* aligned open forest and woodland; and Bracelet Honeymyrtle *Melaleuca armillaris* scrub to open scrub.						
Diuris praecox Rough Doubletail	Known from between Bateau Bay and Smiths Lake. Grows on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey. Exists as subterranean tubers most of the year. It produces leaves and flowering stems in winter.	Moderate	Vulnerable	Vulnerable	Associated vegetation type present.	Excluded	Habitat highly degraded, unlikely to be present in dense patches of vegetation.
Melaleuca groveana Grove's Paperbark	Widespread, scattered populations in coastal districts north of Yengo National Park to southeast Queensland. Also found as a disjunct population near Torrington on the northern tablelands. grows in heath and shrubland, often in exposed sites, in low coastal hills, escarpment ranges and tablelands on outcropping granite, rhyolite and sandstone on rocky outcrops and cliffs. It also occurs in dry scrubby open forest and woodlands.	High	Vulnerable	Not listed	Associated vegetation type present	Included	Low, condition suitable habitat present.

Species credit species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW Listing Status	National Listing Status	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
Rhodamnia rubescens Scrub Turpentine	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	High	Critically Endangered	Not listed	Associated vegetation type present.	Included	Habitat present.
Tetratheca juncea Black-eyed Susan	Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. It generally prefers well-drained sites below 200m elevation and annual rainfall between 1000 - 1200mm.	High	Vulnerable	Vulnerable	Associated vegetation type present.	Excluded	Habitat highly degraded and likely unsuitable. Needs well drained, skeletal sandy soils that are not present within the development site.

4.2.2 Candidate species requiring confirmation of presence or absence

The species listed in Table 4-3 are those that are considered to have habitats present at the development site. Surveys have been conducted for these species and the results are summarised in Table 4-3. Details of the survey methodologies and results are provided for each surveyed species are provided in section 4.2.3.

Table 4-3 Summary of species credit species surveyed at the development site

Species Credit Species	Biodiversity risk weighting	Survey Period	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
FAUNA					
Ninox connivens Barking Owl	2.0	May-Dec	Surveyed July 2019	No	n/a
Ninox strenua Powerful Owl	2.0	May - Aug	Surveyed July 2019	No	n/a
Tyto novaehollandiae Masked Owl	2.0	May - Aug	Surveyed July 2019	No	n/a
FLORA					
Cynanchum elegans White-flower Wax Plant	2.0	All year	Surveyed July 2019	No	n/a
Melaleuca groveana Grove's Paperbark	2.0	All year	Surveyed July 2019	No	n/a
Rhodamnia rubescens Scrub Turpentine	3.0	All year	Surveyed July 2019	No	n/a

4.2.3 Survey methods and results

Nocturnal Birds (Barking Owl, Powerful Owl, Masked Owl)

SURVEY EFFORT

Surveys were undertaken on the evenings of the 17th and 18th July 2019. The temperature during surveys fluctuated between 9.1ºC and 20.9ºC with no rain and very little wind.

Call Playback was used to detect nocturnal birds. This method involved broadcasting pre-recorded calls of the target species to elicit a response from individuals of that species if present in the area (such as approaching the call or calling back in reply to the played call).

The call playback method typically involved an initial listening period of 10 to 15 minutes, followed by a spotlight search for 10 minutes to detect any animal in the immediate vicinity. The calls of each target species were then played intermittently for 5 minutes, followed by a 10-minute listening period. After all the calls have been played, another 10 minutes of spotlighting and listening was conducted in the vicinity to check for birds that are attracted by the calls but are not vocalising.

Owls typically call most frequently in the early evening and before dawn and surveys should be undertaken at these times (Kavanagh and Peake 1993). Wet and windy weather is to be avoided, as owls are most vocal on calm dry nights (Debus 1995).

Given the small size of the site, it's location in an urban area subject to light and noise pollution, and that only one suitable hollow is present, 2 nights of call playback survey were considered adequate.

SURVEY RESULTS

None of the target Owl species were detected within the development site. During the stag watching and spotlighting phase of the first night's survey, a Brush-tailed Possum *Trichosorus vulpecula* was observed utilising the one potential hollow within Zone 1. Given this and general factors such as small patch size, noise and light pollution, it is considered unlikely the target Owls would utilise this tree for breeding.

Flora (Scrub Turpentine, Grove's Paperbark, White-flowered Wax Plant)

SURVEY EFFORT

Targeted searches for these species were undertaken on the 2nd July 2019. The development site was surveyed using the parallel field traverse survey technique in accordance with the NSW Guide to Surveying Threatened Plants (OEH, 2016).

SURVEY RESULTS

No Scrub Turpentine were detected within the development site during the targeted survey.

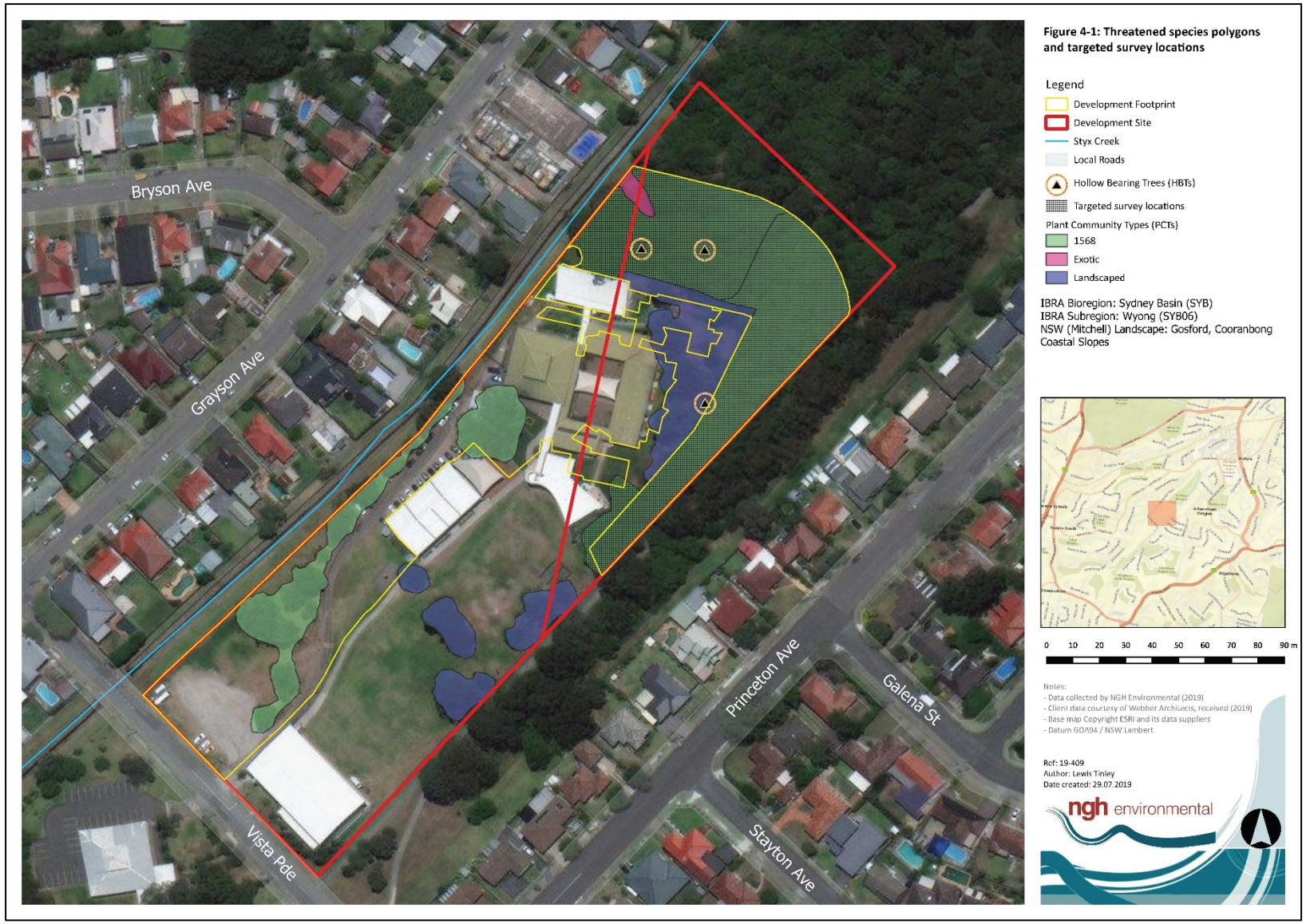


Figure 4-1 Threatened species survey locations

4.3 ADDITIONAL HABITAT FEATURES RELEVANT TO PRESCRIBED BIODIVERSITY IMPACTS

4.3.1 Occurrences of karst, caves, crevices and cliffs

No karsts, caves, crevices or cliffs occur within the development site.

4.3.2 Occurrences of rock

No rocky outcrops occur within the development site.

4.3.3 Occurrences of human made structures and non-native vegetation

Non-native vegetation has been incorporated into the various landscaped areas throughout the development site, including species such as Cadaghi *Corymbia torelliana* and Norfolk Island Hibiscus *Lagunaria patersonia*. Only within Zone 2 are non-native trees and shrubs proposed to be removed which has been assessed as being part of PCT 1568.

Human structures are present in the form of the existing school blocks and associated infrastructure.

4.3.4 Hydrological processes that sustain and interact with the rivers, streams and wetlands

No rivers, streams or wetlands occur within the development site. The nearest watercourse is a constructed stormwater channel named Styx Creek which flows northeast and ultimately terminates at Throsby Creek, over 6 km from the development site.

5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An EPBC protected matters report was undertaken on the 28 June 2019 (10km buffer of the development site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site (Appendix C). Relevant to Biodiversity these include:

- Wetlands of International Importance
- Threatened Ecological Communities
- Threatened species
- Migratory species

The potential for these MNES to occur at the site are discussed below.

5.1 WETLANDS OF INTERNATIONAL IMPORTANCE

No wetlands of international importance occur within or adjacent to the proposal area. The nearest wetland of international importance and the only one returned from the protected matters report is Hunter Estuary Wetlands located over 10 km northeast from the development site. There is no apparent connectivity to this wetland.

5.2 THREATENED ECOLOGICAL COMMUNITIES

Three endangered ecological communities were identified to have the potential to occur within the search area by the protected matters report. These are;

- Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered
- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community – Endangered
- Subtropical and Temperate Coastal Saltmarsh – Vulnerable

The vegetation within the development site has little to no affinity with the vegetation characteristic of these three TECs. As such, none of these communities are considered to have potential to occur within the development site.

5.3 THREATENED SPECIES

Seventy-seven threatened species (flora and fauna) were identified in the PMST report as having the potential to occur within the development site. A habitat assessment was undertaken for these species to determine the likelihood the species being present in the proposal area (Appendix E). The development site lacks habitat for the vast majority of the returned species, with marginal habitat present for two flora and four fauna species. However, the two flora species were not detected during the survey and they would be readily identifiable all year round. The fauna species, if they were to visit the development site would be extremely rare visitors at best given the lack of connectivity in the landscape and degraded habitat present.

5.4 MIGRATORY SPECIES

Seventy-five listed migratory species were returned from the protected matters report, including wetland and marine. Based on a habitat assessment, none of these species are considered likely to frequent the development site (Appendix E).

6 AVOID AND MINIMISE IMPACTS

6.1 AVOIDING AND MINIMISING IMPACTS ON NATIVE VEGETATION AND HABITAT

6.1.1 Site selection – consideration of alternative locations

The construction aspect of the proposal is wholly contained within the existing grounds of St James Primary School. Sufficient space is available to complete the proposal such that other sites were not considered nor required.

6.1.2 Proposal planning phase – detailed design

The final site layout has been able to avoid complete clearing of the native vegetation within the development site in terms of siting buildings, carparks and infrastructure. The vegetation clearing required for implementation of the APZ to the north-east and south of the school is an unavoidable impact. Much of this clearing will be of exotic vegetation, however, some native canopy would need to be removed to achieve the required hazard reduction. Large, significant trees, including those with hollows, would be avoided if possible.

The final design footprint is detailed in Figure 6-1.

Figure 6-1 Final project footprint

7 IMPACTS UNABLE TO BE AVOIDED

7.1 DIRECT IMPACTS

The construction and operational phases of the proposal has the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts such as habitat clearance and installation and existence of infrastructure. Direct impacts are shown in Figure 7-1.

Table 7-1 Potential impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	Consequence
Direct impacts				
Habitat clearance for permanent and temporary construction facilities	0.82 ha (0.32 ha of native vegetation)	Once	Construction Phase; Long term	• Direct loss of native flora and fauna habitat • Injury and mortality of fauna during clearing of fauna habitat and habitat trees • Disturbance to stags, fallen timber, and bush rock
Impact to native vegetation	0.82 ha (0.32 ha of native vegetation)	Once	Construction Phase; Long term	• Degradation of PCT 1568
Displacement of resident fauna	Unknown	Regular	Construction Phase; Short Term	• Direct loss of native fauna • Decline in local fauna populations
Injury or death of fauna	Unknown	Regular	Construction Phase; Short Term	• Direct loss of native fauna • Decline in local fauna populations
Removal of habitat features e.g. HBTs	Up to 3 HBTs	Once	Construction Phase; Short Term	• Direct loss of native fauna • Decline in local fauna populations

7.1.1 Changes in vegetation integrity scores

To implement the APZ, some larger Eucalypts and native shrubs such as Paperbarks will need to be removed from PCT 1568 Zone 1 and Zone 2. This is to achieve the required foliage cover as set out in the Bushfire Assessment for the proposal (Newcastle Bushfire Consulting 2019). The future vegetation integrity score for zones 1 and 2 were entered into the BAM Calculator as follows:

- Composition of tree, shrub, grass, forb and fern growth forms was kept the same as observed within the collected vegetation integrity plot. It is not anticipated that there will be a decrease in diversity in these growth forms. The Other growth form category includes vines and scramblers to which a decrease in diversity is anticipated. The Other growth form category has been reduced by 50%.

- Structure of tree canopy was reduced to 30%. No exact metric for targeted canopy cover is given in the Bushfire Assessment for either the Inner Protection Area (IPA) or Outer Protection Area (OPA), however, some targets are given such as maintaining a minimum 2-5 metre canopy separation in the IPA. A reduction to 30% as an average across the IPA and OPA (which encompasses zones 1 and 2) is considered suitable to achieve the requirements of the Bushfire Assessment and *Planning for Bushfire Protection* (NSW RFS 2006).
- Structure of all remaining growth form groups was kept at the maximum allowed by the BAM Calculator as they do not conflict with the specifications in the Bushfire Assessment.
- Function data has been entered to reflect the establishment of the APZ and reduction in fuel loads including litter cover and coarse woody debris.

The development footprint has been designed to minimise the removal of mature trees. Where possible, remnant eucalyptus trees would be incorporated to remain in the landscaped design of the school grounds. However, to allow for new vehicle access, car parking and the proposed Early Learning Centre, an area of remnant and landscaped native trees, shrubs and groundcovers would be removed. This area is mapped as PCT 1568 Zone 3 and is assessed as having a future integrity score of 0.

The change in vegetation integrity scores as a result of the above calculations are shown in Table 7-2 below.

Table 7-2 Table of current and future vegetation integrity scores for each vegetation zone within the development site.

Zone	Current Vegetation Integrity Score	Future Vegetation Integrity Score	Change in Vegetation Integrity Score
1	61.6	43.5	**-18.1**
2	43.9	26.2	**-17.7**
3	14.7	0	**-14.7**

7.1.2 Loss of species credit species habitat or individuals

No species credit species were detected in the development site throughout targeted surveys. No loss of species credit species habitat is considered to occur.

7.1.3 Loss of hollow-bearing trees

Three hollow-bearing trees were identified within the development site within Zone 1 and 2. It is recommended that these trees be retained but in reality, they may need to be to be removed to fulfil the requirements of the APZ. On this basis, this assessment has assumed all three would be removed.

7.2 INDIRECT IMPACTS

Indirect impacts can occur when the activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities or threatened species habitat beyond the development footprint (Figure 6-1). Table 7-3 below details the type, frequency, intensity, duration and consequence of the direct and indirect impacts of the proposal.

Table 7-3 Potential impacts to biodiversity during the construction and operational phases

Nature of impact	Impact	Reason	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)				
Inadvertent impacts on adjacent habitat or vegetation	Possible	The development site is adjacent to and Zoned RE1: Public recreation named Kullaba Reserve	None	None
Reduced viability of adjacent habitat due to edge effects	Possible	The development site is adjacent to and Zoned RE1: Public recreation named Kullaba Reserve	None	None
Reduced viability of adjacent habitat due to noise, dust or light spill	Possible	The development site is adjacent to and Zoned RE1: Public recreation named Kullaba Reserve	None	None
Transport of weeds and pathogens from the site to adjacent vegetation	Unlikely	Kullaba Reserve contains high levels of weed cover currently. Any pathogens present within the development site are also likely to be present within Kullaba Reserve.	n/a	n/a
Increased risk of starvation, exposure and loss of shade or shelter	Unlikely	The development site is adjacent to and Zoned RE1: Public recreation named Kullaba Reserve. It is unlikely the proposal would exacerbate this impact given adjacent resource availability.	n/a	n/a
Loss of breeding habitats	Possible	Proposal may remove three HBTs. Dense, sub-canopy vegetation would be removed that is ideal for nesting/breeding for commonly occurring birds and mammals.	None	None

Nature of impact	Impact	Reason	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)				
Trampling of threatened flora species	Unlikely	No threatened flora known to be present at the development site.	n/a	n/a
Inhibition of nitrogen fixation and increased soil salinity	Possible	There will be a marginal reduction in nitrogen fixing species with Zone 1 and 2.	None	None
Fertiliser drift	Unlikely	Fertilisers unlikely to be applied.	n/a	n/a
Rubbish dumping	Unlikely	Development site within a highly populated school ground.	n/a	n/a
Wood collection	Unlikely	Development site surrounded by urban areas.	n/a	n/a
Bush rock removal and disturbance	Unlikely	Development site surrounded by urban areas. No bush rock present.	n/a	n/a
Increase in predatory species populations	Unlikely	Development site within urban environment. No increase in predatory animals expected.	n/a	n/a
Increase in pest animal populations	Unlikely	Development site within urban environment. No increase in pest animals expected.	n/a	n/a
Increased risk of fire	Unlikely	Zone 1 and 2 will be thinned to establish an APZ.	n/a	n/a
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds	Unlikely	No specialist breeding and foraging habitat present in site.	n/a	n/a
Barriers to fauna movement	Unlikely	Development site in urban environment with poor	n/a	n/a

Nature of impact	Impact	Reason	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)				
		connectivity. The proposal is unlikely to exacerbate this. No physical barriers would be constructed.		

7.3 IMPACTS TO MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

No EPBC Act entities are considered likely to occur at the development site and be impacted by the proposal.

8 MITIGATING AND MANGING IMPACTS

8.1 MITIGATION MEASURES

A general summary of the key measures required to mitigate the impacts of the proposal are provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure and an analysis of the consequences of any residual impacts are provided in Table 8-1.

8.1.1 Direct Impacts from the clearing of vegetation and habitats

1. Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, with the presence of a trained ecologist or wildlife handler; and
2. Appropriate landscape plantings of local indigenous species and non-invasive species;
3. If removed, install hollows of felled trees onto younger trees in retained vegetation; and
4. Enforce site speed limits to reduce impacts of vehicle strikes on fauna.

8.1.2 Indirect impacts

1. Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed such as in Zone 1;
2. Sediment barriers and spill management protocols to control the quality of water runoff from the site into the receiving environment;
3. Temporary fencing to protect significant environmental features such as trees to be retained;
4. Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas; and
5. Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.

Table 8-1 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	• Pre-clearing checklist • Tree clearing procedure	Construction	Regular	Contractor	Low	Species not detected during pre-clearing surveys may be impacted.
Impacts on native vegetation and habitat						
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	• Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing. • No stockpiling or storage within dripline of any mature trees • In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance	Construction	Regular	Contractor	Low	Impacts to retained vegetation if protocols not followed (low risk)
Temporary fencing to protect vegetation to be retained	• Prior to construction commencing, exclusion fencing and signage would be installed around vegetation to be retained, particularly on boundary of APZ (Zone 1 and 2).	Construction	Regular	Contractor	Low	Impacts to retained vegetation if protocols not followed (low risk)
Hygiene protocols to prevent the spread of weeds or	• Site Weed hygiene protocol in relation to plant, machinery, and fill	Construction, Operation	Regular	Contractor	Low	Weed encroachment (low risk)

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
pathogens between infected areas and uninfected areas						
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	• Site induction • Toolbox talks	Construction	Regular	Contractor	Low	Impacts to native vegetation if staff training not being followed (low risk)

9 SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

9.1 POTENTIAL SERIOUS AND IRREVERSIBLE IMPACT ENTITIES

The principles used to determine if a development will have serious and irreversible impacts, include impacts that:

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or
- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

9.1.1 Threatened ecological communities

No threatened ecological communities listed as potential SAII entities are considered to occur in the development site.

9.1.2 Threatened species

No threatened flora or fauna species listed as potential SAII entities are considered to occur in the development site.

9.1.3 Additional potential entities

There are no further species considered to be potential SAII entities.

10 REQUIREMENT TO OFFSET

10.1 IMPACTS REQUIRING AN OFFSET

10.1.1 Ecosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

a) a vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community, or
b) a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
c) a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset and the ecosystem credits required are documented in Table 10-1 and shown on The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix E.

Table 10-1 PCTs and vegetation zones that require offsets

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
1	1568	Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	0.35	61.6	**2**
2	1568	Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	0.25	43.9	**2**

10.1.2 Species credits

No species credit species were detected on site and no species offset credits are required for the development.

10.1.3 Offsets required under the EPBC Act

No species listed on the EPBC Act have been identified as having the potential to be significantly impacted by the development. As such, the proposal is not considered to require offsets in accordance with the EPBC Offsets Policy.

Figure 10-1 Impacts requiring an offset, not requiring an offset and not requiring assessment

11 CONCLUSIONS

NGH Environmental has prepared this BDAR for Webber Architects on behalf of the Catholic Diocese of Maitland and Newcastle for the proposed expansion and new Early Learning Centre at St James Primary School, Kotara NSW. The purpose of this BDAR was to address the requirements of the BAM. In this BDAR, biodiversity impacts have been assessed through:

- Identification of PCTs on the development site;
- Comprehensive mapping and assessment completed in accordance with the BAM;
- Mitigation measures which have been outlined to reduce the impacts to biodiversity; and
- The obligation to retire 4 Ecosystem Credits for impacts to Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast (PCT 1568).

The retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets scheme and will be achieved by satisfying the offset obligation via payment into the Biodiversity Conservation Fund using the offset payments calculator. Notification of payment satisfying the offset obligation to the Biodiversity Conservation Trust will be required to be provided to Council prior to construction commencing.

The proposal is not considered to significantly impact upon federally listed entities, therefore, a referral to the department of Environment and Energy.

12 REFERENCES

DPE (2019). Department of Planning and the Environment NSW Biodiversity Values Map. Accessed at:

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

Newcastle Bushfire Consulting (2019). Bushfire Assessment: Lot 12 DP 560852 & Lot 131 DP 262057, 30 Vista Parade, Kotara South.

NSW Rural Fire Services (2006). Planning for Bushfire Protection.

Office of Environment and Heritage (OEH 2016). NSW Guide to Surveying Threatened Plants

Office of Environment and Heritage (OEH 2017a). Biodiversity Assessment Methodology (BAM). Office of Environment and Heritage for the NSW Government, Sydney, NSW.

Office of the Environment and Heritage (OEH 2017b) Lower Hunter Vegetation Mapping, 2013. VIS_ID 4513. State Government of NSW and Office of Environment and Heritage.

Office of Environment and Heritage (OEH 2019). BioNet Vegetation Information System: Classification Database. Accessed online at http://www.environment.nsw.gov.au/research/Visclassification.htm

APPENDIX A VEGETATION INTEGRITY PLOT DATA

Survey results are presented for the plant community type identified in the development site (PCT)

PCT 1568 – Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast.

The foliage cover of species is based on visual estimates of foliage cover within a standard 20 metre x 20 metre plot.

Where uncertainty exists due to the unavailability of reproductive material, the taxon is identified to genus level only. Scientific nomenclature follows Harden (1990-2002) and the Sydney Royal Botanic Gardens PlantNet website, updated with recent changes accepted by the except where recent changes accepted by the Angiosperm Phylogeny Group (2016) and the Australian Plant Census (2017).

Plot 1

BAM Attribute (20x20m plot) Composition			BAM Attributes (1 x 1m Plots) Function			
	Stratum	Sum		Tape length	% cover	Average %
Count of Native Richness	Tree (TG)	5	Litter Cover	5m	25%	17.00%
	Shrub (SG)	1		15m	20%	
	Forb (FG)	4		25m	20%	
	Grass & grass like (GG)	5		35m	5%	
	Fern (EG)	0		45m	15%	
	Other (OG)	0	Bare ground cover	5m	40%	10%
	TOTAL	15		15m	1%	
BAM Attribute (20x20m plot) Structure				25m	1%	
	Stratum	Sum		35m	1%	
Count of cover abundance (native vascular plants)	Tree (TG)	16.5		45m	5%	
	Shrub (SG)	0.5	Cryptogam cover	5m	0%	0%
	Forb (FG)	0.4		15m	0%	
	Grass & grass like (GG)	1		25m	0%	
	Fern (EG)	0		35m	0%	
	Other (OG)	0		45m	0%	
	TOTAL Native	18.4	Rock Cover	5m	0%	0%
	TOTAL 'HTE'	80.1		15m	0%	
				25m	0%	
				35m	0%	
				45m	0%	

BAM Attribute (20 x 50m plot) Tree Stem Counts - Function			
DBH (cm)	**Euc**	**Non Euc**	**Hollows**
>80		1	
50-79	3		
30-49	5	1	
20-29			
10-19			
5-9			
<5			N/A
Length of logs (m)		0	

Structure and Composition

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Angophora floribunda	Rough-barked Apple	Myrtaceae	5	2		Tree (TG)	No		
Eucalyptus saligna	Sydney Blue Gum	Myrtaceae	4	1		Tree (TG)	No		
Syncarpia glomulifera	Turpentine	Myrtaceae	2	1		Tree (TG)	No		
Eucalyptus spp.		Myrtaceae	5	1		Tree (TG)	No		
Cynodon dactylon	Common Couch	Poaceae	0.5	50		Grass & grass like (GG)	No		
Hypochaeris radicata	Catsear	Asteraceae	0.1	10	*		No		
Stenotaphrum secundatum	Buffalo Grass	Poaceae	80	100	*		HTE		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	0.1	50	*		No		
Centella asiatica	Indian Pennywort	Apiaceae	0.1	10		Forb (FG)	No		
Sonchus oleraceus	Common Sowthistle	Asteraceae	0.1	5	*		No		
Pennisetum clandestinum	Kikuyu Grass	Poaceae	0.2	10	*		No		
Conyza spp.	A Fleabane	Asteraceae	0.1	10	*		No		

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Pratia purpurascens	Whiteroot	Lobeliaceae	0.1	10		Forb (FG)	No		
Dichondra repens	Kidney Weed	Convolvulaceae	0.1	10		Forb (FG)	No		
Trifolium repens	White Clover	Fabaceae (Faboideae)	0.1	10	*		No		
Medicago spp.	A Medic	Fabaceae (Faboideae)	0.2	10	*		No		
Eragrostis spp.	A Lovegrass	Poaceae	0.2	25	*	Grass & grass like (GG)	No		
Portulaca spp.		Portulacaceae	0.1	5	*	Forb (FG)	No		
Setaria spp.		Poaceae	0.1	50	*	Grass & grass like (GG)	No		
Sporobolus spp.	Rat's Tail Couch	Poaceae	0.1	50	*	Grass & grass like (GG)	No		
Bothriochloa spp.	Redgrass, Bluegrass	Poaceae	0.1	100	*	Grass & grass like (GG)	No		
Axonopus spp.		Poaceae	0.1	25	*		No		
Callistemon spp.		Myrtaceae	0.5	1		Shrub (SG)	No		
Ehrharta erecta	Panic Veldtgrass	Poaceae	0.1	25	*		HTE		
Lagunaria patersonia	Norfolk Island Hibiscus	Malvaceae	0.5	1		Tree (TG)	No		
Romulea rosea var. australis	Onion Grass	Iridaceae	0.1	50	*		No		

Plot 2

BAM Attribute (20x20m plot) Composition			BAM Attributes (1 x 1m Plots) Function			
	Stratum	Sum		Tape length	% cover	Average %
Count of Native Richness	Tree (TG)	6	Litter Cover	5m	95%	95.00%
	Shrub (SG)	6		15m	95%	
	Forb (FG)	5		25m	95%	
	Grass & grass like (GG)	5		35m	95%	
	Fern (EG)	1		45m	95%	
	Other (OG)	8	Bare ground cover	5m	1%	1%
	TOTAL	31		15m	1%	
BAM Attribute (20x20m plot) Structure				25m	1%	
	Stratum	Sum		35m	1%	
Count of cover abundance (native vascular plants)	Tree (TG)	78.2		45m	1%	
	Shrub (SG)	21.3	Cryptogam cover	5m	0%	0%
	Forb (FG)	0.6		15m	0%	
	Grass & grass like (GG)	2.8		25m	0%	
	Fern (EG)	0.25		35m	0%	
	Other (OG)	0.9		45m	0%	
	TOTAL Native	104.05	Rock Cover	5m	0%	0%
	TOTAL 'HTE'	15.1		15m	0%	
				25m	0%	
				35m	0%	
				45m	0%	

BAM Attribute (20 x 50m plot) Tree Stem Counts - Function			
DBH (cm)	**Euc**	**Non Euc**	**Hollows**
>80	3		1
50-79	11		1
30-49	7		1
20-29	5		
10-19			
5-9			
<5			N/A
Length of logs (m)			

Composition and Structure

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Eucalyptus propinqua	Small-fruited Grey Gum	Myrtaceae	30	6		Tree (TG)	No		
Eucalyptus acmenoides	White Mahogany	Myrtaceae	5	2		Tree (TG)	No		
Syncarpia glomulifera	Turpentine	Myrtaceae	2.5	4		Tree (TG)	No		
Eucalyptus spp.		Myrtaceae	40	6		Tree (TG)	No		
Melaleuca styphelioides	Prickly-leaved Tea Tree	Myrtaceae	20	20		Shrub (SG)	No		
Acacia spp.	Wattle	Fabaceae (Mimosoideae)	0.5	2		Shrub (SG)	No		
Glochidion ferdinandi	Cheese Tree	Phyllanthaceae	0.5	5		Tree (TG)	No		
Gahnia clarkei	Tall Saw-sedge	Cyperaceae	0.2	1		Grass & grass like (GG)	No		
Pittosporum undulatum	Sweet Pittosporum	Pittosporaceae	0.25	5		Shrub (SG)	No		
Clerodendrum tomentosum	Hairy Clerodendrum	Lamiaceae	0.2	5		Tree (TG)	No		

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Gymnostachys anceps	Settler's Twine	Araceae	0.2	5		Forb (FG)	No		
Breynia oblongifolia	Coffee Bush	Phyllanthaceae	0.1	3		Shrub (SG)	No		
Pittosporum revolutum	Rough Fruit Pittosporum	Pittosporaceae	0.25	5		Shrub (SG)	No		
Dioscorea transversa	Native Yam	Dioscoreaceae	0.1	5		Other (OG)	No		
Clematis glycinoides	Headache Vine	Ranunculaceae	0.1	10		Other (OG)	No		
Smilax australis	Lawyer Vine	Smilacaceae	0.2	10		Other (OG)	No		
Eustrephus latifolius	Wombat Berry	Luzuriagaceae	0.1	10		Other (OG)	No		
Adiantum aethiopicum	Common Maidenhair	Adiantaceae	0.25	10		Fern (EG)	No		P
Stephania japonica	Snake vine	Menispermaceae	0.1	5		Other (OG)	No		
Glycine clandestina	Twining glycine	Fabaceae (Faboideae)	0.1	25		Other (OG)	No		
Polyscias sambucifolia	Elderberry Panax	Araliaceae	0.2	5		Shrub (SG)	No		
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	1	10		Grass & grass like (GG)	No		
Pseuderanthemum variabile	Pastel Flower	Acanthaceae	0.1	5			No		
Geitonoplesium cymosum	Scrambling Lily	Luzuriagaceae	0.1	25		Other (OG)	No		
Oplismenus imbecillis		Poaceae	0.1	50		Grass & grass like (GG)	No		
Dichondra repens	Kidney Weed	Convolvulaceae	0.1	25		Forb (FG)	No		
Hardenbergia violacea	False Sarsaparilla	Fabaceae (Faboideae)	0.1	5		Other (OG)	No		
Carex appressa	Tall Sedge	Cyperaceae	0.5	5		Grass & grass like (GG)	No		
Commelina cyanea	Native Wandering Jew	Commelinaceae	0.1	5		Forb (FG)	No		
Stellaria media	Common Chickweed	Caryophyllaceae	0.1	5	*		No		
Ehrharta erecta	Panic Veldtgrass	Poaceae	5	100	*		HTE		
Ligustrum sinense	Small-leaved Privet	Oleaceae	1	25	*		HTE		
Ligustrum lucidum	Large-leaved Privet	Oleaceae	1	10	*		HTE		

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Verbena bonariensis	Purpletop	Verbenaceae	0.2	50	*		No		
Ochna serrulata	Mickey Mouse Plant	Ochnaceae	1	50	*		HTE		
Pratia purpurascens	Whiteroot	Lobeliaceae	0.1	25		Forb (FG)	No		
Senna pendula var. glabrata		Fabaceae (Caesalpinioideae)	0.5	5	*		No		
Oxalis spp.		Oxalidaceae	0.1	5		Forb (FG)	No		
Eragrostis curvula	African Lovegrass	Poaceae	5	100	*		HTE		
Asparagus plumosus	Climbing Asparagus Fern	Asparagaceae	0.1	50	*		HTE		
Asparagus aethiopicus	Asparagus Fern	Asparagaceae	0.5	50	*		HTE		
Imperata cylindrica	Blady Grass	Poaceae	1	50		Grass & grass like (GG)	No		
Bidens pilosa	Cobbler's Pegs	Asteraceae	0.2	50	*		No		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	0.25	25	*		No		
Lantana camara	Lantana	Verbenaceae	1	10	*		HTE		
Lonicera japonica	Japanese Honeysuckle	Caprifoliaceae	0.5	50	*		HTE		

Plot 3

BAM Attribute (20x20m plot) Composition			BAM Attributes (1 x 1m Plots) Function			
	Stratum	Sum		Tape length	% cover	Average %
Count of Native Richness	Tree (TG)	3	Litter Cover	5m	25%	25.00%
	Shrub (SG)	1		15m	20%	
	Forb (FG)	0		25m	20%	
	Grass & grass like (GG)	3		35m	10%	
	Fern (EG)	0		45m	50%	
	Other (OG)	0	Bare ground cover	5m	1%	3%
	TOTAL	7		15m	1%	
BAM Attribute (20x20m plot) Structure				25m	1%	
	Stratum	Sum		35m	1%	
Count of cover abundance (native vascular plants)	Tree (TG)	6		45m	10%	
	Shrub (SG)	0.25	Cryptogam cover	5m	0%	0%
	Forb (FG)	0		15m	0%	
	Grass & grass like (GG)	75.1		25m	0%	
	Fern (EG)	0		35m	0%	
	Other (OG)	0		45m	0%	
	TOTAL Native	81.35	Rock Cover	5m	0%	2%
	TOTAL 'HTE'	50.3		15m	0%	
				25m	0%	
				35m	0%	
				45m	10%	

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	**Euc**	**Non Euc**	**Hollows**
>80			
50-79		2	
30-49	2		
20-29			
10-19			
5-9			
<5			N/A
Length of logs (m)			

Composition and Structure

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Casuarina cunninghamiana subsp. cunninghamiana	River Oak	Casuarinaceae	5	2		Tree (TG)	No		P
Eucalyptus robusta	Swamp Mahogany	Myrtaceae	0.5	1		Tree (TG)	No		
Melaleuca linariifolia	Flax-leaved Paperbark	Myrtaceae	0.25	1		Shrub (SG)	No		
Eucalyptus spp.		Myrtaceae	0.5	1		Tree (TG)	No		
Bothriochloa macra	Red Grass	Poaceae	0.1	100		Grass & grass like (GG)	No		
Taraxacum officinale	Dandelion	Asteraceae	0.1	5	*		No		
Conyza spp.	A Fleabane	Asteraceae	0.1	5	*		No		
Hypochaeris radicata	Catsear	Asteraceae	0.1	10	*		No		
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	0.1	10	*		No		
Heliotropium amplexicaule	Blue Heliotrope	Boraginaceae	0.1	5	*		HTE		
Stenotaphrum secundatum	Buffalo Grass	Poaceae	50	50	*		HTE		

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Oxalis corniculata	Creeping Oxalis	Oxalidaceae	0.1	5	*		No		
Eragrostis curvula	African Lovegrass	Poaceae	0.1	50	*		HTE		
Cynodon dactylon	Common Couch	Poaceae	50	100		Grass & grass like (GG)	No		
Sporobolus spp.	Rat's Tail Couch	Poaceae	25	25	*	Grass & grass like (GG)	No		
Gamochaeta coarctata		Asteraceae	0.1	5	*		No		
Hypochaeris radicata	Catsear	Asteraceae	0.1	5	*		No		
Romulea rosea var. australis	Onion Grass	Iridaceae	0.1	25	*		No		
Sonchus oleraceus	Common Sowthistle	Asteraceae	0.1	0.1	*		No		
Setaria parviflora		Poaceae	0.1	0.1	*		No		
Soliva sessilis	Bindyi	Asteraceae	0.1	0.1	*		No		
Richardia brasiliensis	Mexican Clover	Rubiaceae	0.1	2	*		No		
Hyparrhenia hirta	Coolatai Grass	Poaceae	0.1	10	*		HTE		

Plot 4

BAM Attribute (20x20m plot) Composition			BAM Attributes (1 x 1m Plots) Function			
	Stratum	Sum		Tape length	% cover	Average %
Count of Native Richness	Tree (TG)	6	Litter Cover	5m	99%	99.00%
	Shrub (SG)	7		15m	99%	
	Forb (FG)	3		25m	99%	
	Grass & grass like (GG)	2		35m	99%	
	Fern (EG)	3		45m	99%	
	Other (OG)	8	Bare ground cover	5m	1%	1%
	TOTAL	29		15m	1%	
BAM Attribute (20x20m plot) Structure				25m	1%	
	Stratum	Sum		35m	1%	
Count of cover abundance (native vascular plants)	Tree (TG)	33.2		45m	1%	
	Shrub (SG)	7.6	Cryptogam cover	5m	0%	0%
	Forb (FG)	0.3		15m	0%	
	Grass & grass like (GG)	0.2		25m	0%	
	Fern (EG)	22.1		35m	0%	
	Other (OG)	0.8		45m	0%	
	TOTAL Native	64.2	Rock Cover	5m	0%	0%
	TOTAL 'HTE'	76.1		15m	0%	
				25m	0%	
				35m	0%	
				45m	0%	

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	**Euc**	**Non Euc**	**Hollows**
>80			
50-79	5		
30-49	7		
20-29	11		
10-19	18		
5-9	10		
<5	12		N/A
Length of logs (m)		3	

Composition and Structure

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Eucalyptus propinqua	Small-fruited Grey Gum	Myrtaceae	20	5		Tree (TG)	No		
Eucalyptus spp.		Myrtaceae	5	2		Tree (TG)	No		
Syncarpia glomulifera	Turpentine	Myrtaceae	5	2		Tree (TG)	No		
Glochidion ferdinandi	Cheese Tree	Phyllanthaceae	2.5	10		Tree (TG)	No		
Pittosporum undulatum	Sweet Pittosporum	Pittosporaceae	2	3		Shrub (SG)	No		
Pittosporum revolutum	Rough Fruit Pittosporum	Pittosporaceae	0.1	3		Shrub (SG)	No		
Ficus coronata	Creek Sandpaper Fig	Moraceae	0.1	2		Shrub (SG)	No		
Melaleuca styphelioides	Prickly-leaved Tea Tree	Myrtaceae	5	20		Shrub (SG)	No		
Acmena smithii	Lilly Pilly	Myrtaceae	0.5	10		Tree (TG)	No		
Notelaea longifolia	Large Mock-olive	Oleaceae	0.2	5		Tree (TG)	No		
Myrsine variabilis		Myrsinaceae	0.2	5		Shrub (SG)	No		
Archontophoenix cunninghamiana	Bangalow Palm	Arecaceae	0.1	1		Other (OG)	No		P

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Geitonoplesium cymosum	Scrambling Lily	Luzuriagaceae	0.1	10		Other (OG)	No		
Gymnostachys anceps	Settler's Twine	Araceae	0.1	10		Forb (FG)	No		
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	0.1	2		Grass & grass like (GG)	No		
Morinda jasminoides	Sweet Morinda	Rubiaceae	0.1	10		Other (OG)	No		
Dioscorea transversa	Native Yam	Dioscoreaceae	0.1	10		Other (OG)	No		
Smilax australis	Lawyer Vine	Smilacaceae	0.1	10		Other (OG)	No		
Pseuderanthemum variabile	Pastel Flower	Acanthaceae	0.1	6			No		
Asplenium australasicum	Bird's Nest Fern	Aspleniaceae	0.1	1		Fern (EG)	No		P
Oplismenus imbecillis		Poaceae	0.1	10		Grass & grass like (GG)	No		
Eustrephus latifolius	Wombat Berry	Luzuriagaceae	0.1	10		Other (OG)	No		
Dianella caerulea	Blue Flax-lily	Phormiaceae	0.1	1		Forb (FG)	No		
Centella asiatica	Indian Pennywort	Apiaceae	0.1	1		Forb (FG)	No		
Smilax glyciphylla	Sweet Sarsparilla	Smilacaceae	0.1	1		Other (OG)	No		
Cyclosorus dentatus	Binung	Thelypteridaceae	0.2	3			No		
Syagrus romanzoffiana	Cocos Palm	Arecaceae	0.1	2	*		No		
Cissus antarctica	Water Vine	Vitaceae	0.1	1		Other (OG)	No		
Adiantum hispidulum	Rough Maidenhair	Adiantaceae	0.1	1			No		P
Hymenosporum flavum	Native Frangipani	Pittosporaceae	0.1	1		Shrub (SG)	No		
Passiflora edulis	Common Passionfruit	Passifloraceae	0.1	1	*		No		
Breynia oblongifolia	Coffee Bush	Phyllanthaceae	0.1	1		Shrub (SG)	No		
Ligustrum lucidum	Large-leaved Privet	Oleaceae	25	100	*		HTE		
Ligustrum sinense	Small-leaved Privet	Oleaceae	25	200	*		HTE		
Lantana camara	Lantana	Verbenaceae	0.5	5	*		HTE		
Ochna serrulata	Mickey Mouse Plant	Ochnaceae	25	200	*		HTE		
Cinnamomum camphora	Camphor Laurel	Lauraceae	0.1	3	*		HTE		

Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?	EPBC Status	BCA Status
Nephrolepis cordifolia	Fishbone Fern	Davalliaceae	20	200		Fern (EG)	No		
Nephrolepis cordifolia	Fishbone Fern	Davalliaceae	2	5		Fern (EG)	No		
Senna pendula var. glabrata		Fabaceae (Caesalpinioideae)	2	5	*		No		
Asparagus aethiopicus	Asparagus Fern	Asparagaceae	0.5	5	*		HTE		

APPENDIX B PLOT PHOTOS

Plot 1 – PCT 1568 Zone 2 Maintained	**Plot 1 – PCT 1568 Zone 2 Maintained**
	
Plot 2 - PCT 1568 Zone 1 Forest	**Plot 2 - PCT 1568 Zone 1 Forest**
	
Plot 3 - PCT 1568 Zone 1 Forest	**Plot 3 - PCT 1568 Zone 1 Forest**
	

APPENDIX C FAUNA SPECIES RECORDED

Fauna species recorded within the development site.

Scientific Name	Common Name
Cacatua galerita	Sulphur-crested Cockatoo
Corvus coronoides	Australian Raven
Cracticus tibicen	Australian Magpie
Grallina cyanoleuca	Magpie-lark
Manorina melanocephala	Noisy Miner
Ocyphaps lophotes	Crested Pigeon
Platycercus eximius	Eastern Rosella
Rhipidura leucophrys	Willy Wagtail
Trichoglossus moluccanus	Rainbow Lorikeet
Cracticus torquatus	Grey Butcherbird
Pelecanus conspicillatus	Australian Pelican
Neochmia temporalis	Red-browed Finch
Pardalotus punctatus	Spotted Pardalote
Malurus cyaneus	Superb Fairy-wren
Dacelo novaeguineae	Laughing Kookaburra
Trichosorus vulpecula	Brush-tailed Possum
Psophodes olivaceous	Eastern Whipbird

APPENDIX D EPBC PROTECTED MATTERS SEARCH

Australian Government
Department of the Environment and Energy

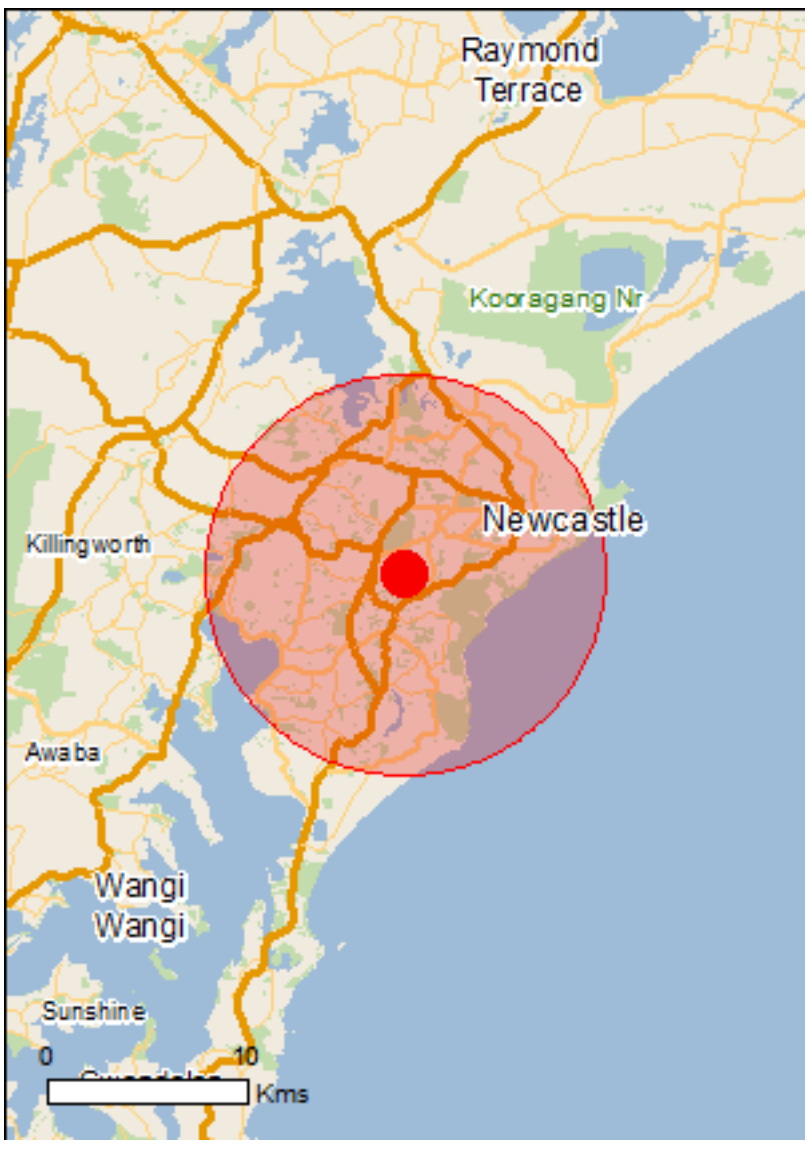
EPBC Act Protected Matters Report

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

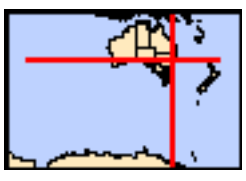
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 28/06/19 12:46:28



Coordinates
Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	77
Listed Migratory Species:	75

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	14
Commonwealth Heritage Places:	None
Listed Marine Species:	98
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	6
Regional Forest Agreements:	1
Invasive Species:	47
Nationally Important Wetlands:	5
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Hunter estuary wetlands	Within Ramsar site

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Central Hunter Valley eucalypt forest and woodland	Critically Endangered	Community may occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or

Name	Status	Type of Presence
		related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat may occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Angophora inopina		
Charmhaven Apple [64832]	Vulnerable	Species or species habitat known to occur within area
Caladenia tessellata		
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Commersonia prostrata		
Dwarf Kerrawang [87152]	Endangered	Species or species habitat may occur within area
Corunastylis insignis		
Wyong Midge Orchid 1, Variable Midge Orchid 1 [84692]	Critically Endangered	Species or species habitat likely to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Cynanchum elegans		
White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Diuris praecox		
Newcastle Doubletail [55086]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus camfieldii		
Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus parramattensis subsp. decadens		
Earp's Gum, Earp's Dirty Gum [56148]	Vulnerable	Species or species habitat may occur within area
Grevillea parviflora subsp. parviflora		
Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
Grevillea shiressii		
[19186]	Vulnerable	Species or species habitat known to occur within area
Melaleuca biconvexa		
Biconvex Paperbark [5583]	Vulnerable	Species or species habitat known to occur within area
Phaius australis		
Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Rutidosis heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat known to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area
Tetratheca juncea Black-eyed Susan [21407]	Vulnerable	Species or species habitat known to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
[Sousa chinensis](#) Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat known to occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area
[Monarcha trivirgatus](#) Spectacled Monarch [610]		Species or species habitat known to occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat known to occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area
[Arenaria interpres](#) Ruddy Turnstone [872]		Roosting known to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Roosting known to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat known to occur within area
[Calidris ruficollis](#) Red-necked Stint [860]		Roosting known to occur within area
[Calidris tenuirostris](#) Great Knot [862]	Critically Endangered	Roosting known to occur within area
[Charadrius bicinctus](#) Double-banded Plover [895]		Roosting known to occur within area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
[Charadrius mongolus](#) Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area

Name	Threatened	Type of Presence
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -
Commonwealth Land - Australian & Overseas Telecommunications Corporation
Commonwealth Land - Australian Broadcasting Corporation
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Commonwealth Bank of Australia

Name
Commonwealth Land - Commonwealth Trading Bank of Australia
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Telstra Corporation Limited
Defence - ADF CAREERS REFERENCE CENTRE
Defence - OFFICES

Listed Marine Species

[Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Breeding likely to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area

Name	Threatened	Type of Presence
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Sterna albifrons Little Tern [813]		Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney		Species or species

Name	Threatened	Type of Presence
Seahorse [66240]		habitat likely to occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Reptiles		

Name	Threatened	Type of Presence
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Stenella attenuata		
Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus		
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Awabakal	NSW
Blue Gum Hills	NSW
Glenrock	NSW
Hexham Swamp	NSW
Hunter Wetlands	NSW
Tingira Heights	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis		
Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis		
European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata		
Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus		
Eurasian Tree Sparrow [406]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Hexham Swamp	NSW
Jewells Wetland	NSW
Kooragang Nature Reserve	NSW
Lake Macquarie	NSW
Shortland Wetlands Centre	NSW

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-32.94775 151.70114

Acknowledgements

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

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

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

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

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

APPENDIX E EPBC HABITAT ASSESSMENT

The tables in this appendix present the habitat evaluation for threatened species, ecological communities and endangered populations listed for the locality identified as potentially occurring in the area according to the Commonwealth EPBC *Protected Matters Search Tool*.

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

Presence of habitat:

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

Marginal: Habitat present that could be used by the species on occasion but not preferred.

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

Likelihood of occurrence

Recorded: The species was observed in the study area during the current survey

High: It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.

Moderate: Potential habitat is present in the study area. Species Low to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration. The species is known to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.

Low: It is Low that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.

Potential to be impacted

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

Moderate: The proposal could impact this species or its habitats however the impacts are considered manageable such that no direct or indirect impacts are likely. No Assessment of Significance (AoS) is necessary for this species.

High: The proposal is likely to impact this species or its habitats. An Assessment of Significance (AoS) has been applied to these entities

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Flora	**EPBC**				
Angophora inopina Charmhaven Apple	V	A small to large tree, up to 8 m high, often multi-stemmed, and with persistent shortly fibrous bark throughout. Adult leaves are moderately glossy, leathery and opposite, 4 – 11 cm long. Inflorescences (groups of buds, flowers or fruits) are compound and terminal; the stalk of each group is bristly. Fruits are also bristly, vaguely ribbed, cup- or pear-shaped, usually 3-celled, 11 – 15 mm long, and 9 – 2 mm in diameter. Endemic to the Central Coast region of NSW. The known northern limit is near Karuah where a disjunct population occurs; to the south populations extend from Toronto to Charmhaven with the main population occurring between Charmhaven and Morisset. Occurs most frequently in four main vegetation communities: (i) Eucalyptus haemastoma–Corymbia gummifera–Angophora inopina woodland/forest; (ii) Hakea teretifolia–Banksia oblongifolia wet heath; (iii) Eucalyptus resinifera–Melaleuca sieberi–Angophora inopina sedge woodland; (iv) Eucalyptus capitellata–Corymbia gummifera–Angophora inopina woodland/forest.	Absent	Low	Low

[1] Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's Species Profiles and Threats database (SPRAT) unless otherwise stated.

OEH threatened species database: http://www.threatenedspecies.environment.nsw.gov.au/index.aspx
SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Caladenia tessellata Thick Lip Spider Orchid	V	The Thick Lip Spider Orchid is from a group of orchids characterised by five long spreading petals and sepals around a broad down-curled labellum ('lip'). It has cream-coloured petals with reddish stripes, and the yellowish labellum is broad with a few darker stripes. The long, sparsely-hairy, narrow leaf is about 6 cm long and 5 mm wide. Column base with two prominent yellow glands. The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW Flowers appear between September and November (but apparently generally late September or early October in extant southern populations). Generally found in grassy sclerophyll woodland on clay loam or sandy soils.	Absent	Low	Low
Commersonia prostrata Dwarf Kerrawang	E	Dwarf Kerrawang is a ground-hugging shrub that forms mats to more than 1 m across. Its leaves are up to 4 cm long and 2.5 cm wide, on 5 to 20 mm long leaf-stalks. The leaves have irregular, rounded teeth and scattered star-shaped hairs on the lower surface. The flowers are star-shaped, 3 to 4 mm across, and are produced in clusters of three to 12 flowers. Flowers are initially white, becoming pale pink with age. Flowering is mainly between October and November. Dwarf Kerrawang occurs on the Southern Highlands and Southern Tablelands (one plant at Penrose State Forest, one plant at Tallong, a small population near the Corang and about 2000 plants at Rowes Lagoon), a larger population in the Thirlmere Lakes area (particularly among the dying reeds at the edge of the water), and on the North Coast (less than 100 plants at the Tomago sand beds north of Newcastle).	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Corunastylis sp. Charmhaven	CE	Corunastylis sp. Charmhaven (NSW896673) is recently described species of terrestrial orchid (Weston in litt. 2012). It is similar to Corunastylis archeri (syn. Genoplesium archeri) but differs from C. archeri in having fewer, larger flowers (6-9 flowers, 6 mm across, versus 10-20 flowers, 4.5–5 mm across in C. archeri), borne on a shorter inflorescence (1.4 cm long versus 2–3.5 cm long in C. archeri). Flowering has been observed from February to May. Corunastylis sp. Charmhaven (NSW896673) is currently only known from the Wyong Shire of NSW where it is restricted to a few locations in the Charmhaven, Warnervale and Tooheys Road. It occurs within low woodland to heathland with a shrubby understorey and ground layer. Dominants include Black She-oak (Allocasuarina littoralis), Prickly Tea-tree (Leptospermum juniperinum), Prickly-leaved Paperbark (Melaleuca nodosa), Narrow-leaved Bottlebrush (Callistemon linearis) and Zig-zag Bog-rush (Schoenus brevifolius).	Absent	Low	Low
Cryptostylis hunteriana Leafless Tongue Orchid	V	The Leafless Tongue Orchid has no leaf. It produces an upright flower-stem to 45 cm tall, bearing five to 10 flowers between November and February. The species occurs mostly in coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest. It prefers open areas in the understorey of forested communities. The soils include moist sands, moist to dry clay loam and occasionally in accumulated eucalypt leaves. The larger populations typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black Sheoak (Allocasuarina littoralis); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta).	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Cynanchum elegans White-flowered Wax Plant	E	A climber or twiner with a highly variable form. Mature stems have a fissured corky bark and can grow to 10 metres long and 3.5 cm thick. The leaves are paired (or rarely in threes), ovate to broadly ovate in shape, 1.5 to 10.5 cm long, and 1.5 to 7.5 cm wide. The flowers are white, tubular, and up to 4 mm long and 12 mm wide. The fruit is a dry pointed pod to 8 cm long, which contains up to 45 seeds with long silky hairs attached to one end. The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree Leptospermum laevigatum – Coastal Banksia Banksia integrifolia subsp. integrifolia coastal scrub; Forest Red Gum Eucalyptus tereticornis aligned open forest and woodland; Spotted Gum Corymbia maculata aligned open forest and woodland; and Bracelet Honeymyrtle Melaleuca armillaris scrub to open scrub. Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. Flowering occurs between August and May, with a peak in November.	Absent	Low	Low
Diuris praecox Rough Doubletail	V	A terrestrial herb with two or three linear leaves, 15 - 35 cm long. Occurs between Ourimbah and Nelson Bay. There are records of the species in Munmorah State Conservation Area and Wyrrabalong National Park. Grows on hills and slopes of near-coastal districts in open sclerophyll forests which have a grassy to fairly dense understorey. Exists as subterranean tubers most of the year. It produces leaves and flowering stems in winter. Flowers from July to early September.	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Eucalyptus camfieldii Camfield's Stringybark	V	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Occurs in poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Grows in coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of E. oblonga Narrow-leaved Stringybark, E. capitellata Brown Stringybark and E. haemastoma Scribbly Gum.	Absent	Low	Low
Eucalyptus parramattensis subsp. decadens	V	A woodland tree, up to 15 m, but usually to about 8 – 10m in height. Bark sheds in large plates to leave a smooth, granular and mottled white or grey surface. Juvenile and adult leaves are disjunct. Juvenile leaves are narrow-lanceolate to lanceolate, dull green both sides. Adult leaves are usually lance-shaped to about 15 cm long and 2 cm wide. Inflorescences are 7–flowered. Buds are ovoid 4 – 10mm long, 4 – 6 mm in diameter with a scar present. Fruit is hemispherical or globose 4 – 9 mm long, 5 – 9 mm in diameter, with the disc flat or slightly raised, usually with four exserted valves. There are two separate meta-populations of E. parramattensis subsp. decadens. The Kurri Kurri meta-population is bordered by Cessnock—Kurri Kurri in the north and Mulbring—Abedare in the south. Large aggregations of the subspecies are located in the Tomalpin area. The Tomago Sand beds meta-population is bounded by Salt Ash and Tanilba Bay in the north and Williamtown and Tomago in the south. Flowers from November to January. Generally, occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high.	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Grevillea parviflora subsp. Parviflora Small-flower Grevillea	V	A low spreading to erect shrub, usually less than a metre high. Sporadically distributed throughout the Sydney Basin with the main occurrence centred around Picton, Appin and Bargo (and possibly further south to the Moss Vale area). Separate populations are also known further north from Putty to Wyong and Lake Macquarie on the Central Coast and Cessnock and Kurri Kurri in the Lower Hunter. Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Canopy species vary greatly with community type but generally are species that favour soils with a strong lateritic influence including Eucalyptus fibrosa, E. parramattensis, Angophora bakeri and Eucalyptus sclerophylla. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Often occurs in open, slightly disturbed sites such as along tracks. Flowering has been recorded between July to December as well as April to May.	Absent	Low	Low
Grevillea shiressii	V	A tall shrub to 2 - 5 m high. Known only from two populations near Gosford, on tributaries of the lower Hawkesbury River north of Sydney (Mooney Mooney Creek and Mullet Creek). Both populations occur within the Gosford Local Government Area. Grows along creek banks in wet sclerophyll forest with a moist understorey in alluvial sandy or loamy soils on Hawkesbury sandstone. Inhabits tall scrub or wet sclerophyll forest or shrub associations with Eucalyptus deanei, Syncarpia glomulifera, Angophora floribunda, Tristaniopsis laurina and Lomatia myricoides. Flowers mainly late winter to Spring (July-December), with seed released at maturity in October.	Marginal, wet sclerophyll forest present but degraded	Low, species not detected.	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Melaleuca biconvexa Biconvex Paperbark	V	Biconvex Paperbark is a shrub or small tree, usually up to 10 m tall, though occasionally as high as 20 m. The bark is that of a typical paperbark. The leaves are small, to 18 mm long and 4 mm wide; each leaf has a centre-vein in a groove and the leaf blade curves upwards on either side of this centre-vein. Leaf placement is distinctive, with each pair of leaves emerging at right angles from the branch. Each pair is offset at right angles to the previous pair so the branch has a squarish appearance when looked at 'end-on'. This species' white flowers are usually clustered in dense heads and the fruit is urn-shaped and 3 - 5 mm in diameter. Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Flowering occurs over just 3-4 weeks in September and October and Resprouting occurs following fire.	Marginal, wet sclerophyll forest present but degraded	Low, species not detected.	Low
Phaius australis Southern Swamp Orchid	E	This orchid has flower stems up to 2 m tall and large broad leaves with a pleated appearance, both arising from a fleshy bulb near ground level. The large, showy flowers, with up to 20 per stem, have four petals which are white on the outside and brown with white or yellow veins on the inside. The central tongue of the flower is pink and yellow with lobes slightly curved inwards. Occurs in Queensland and north-east NSW as far south as Coffs Harbour. Historically, it extended farther south, to Port Macquarie. Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas. Flowering September-October.	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Prasophyllum sp. Wybong	CE	Prasophyllum sp. Wybong (C. Phelps ORG 5269) is a terrestrial orchid that grows to approximately 30 cm high. It has a single dull-green basal leaf that is tubular and fleshy. The single flower spike has numerous fragrant flowers. Endemic to NSW, it is known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. Most populations are small, although the Wybong population contains by far the largest number of individuals. A perennial orchid, appearing as a single leaf over winter and spring. Flowers in spring and dies back to a dormant tuber over summer and autumn. Known to occur in open eucalypt woodland and grassland.	Absent	Low	Low
Pterostylis gibbosa Illawarra Greenhood	E	Pterostylis - the greenhoods - is a large genus of ground-dwelling orchids with mostly green flowers. The Illawarra Greenhood has a rosette of rounded leaves at the base of the stem, each to 35 mm long. In addition, there are up to six leaves that sheath the flower stem, which may be 45 cm high and bear up to seven flowers. The flowers are bright glossy green with transparent patches in the hood. The very broad black labellum ('lip' petal) protrudes from the front of the flower. Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). In the Illawarra region, the species grows in woodland dominated by Forest Red Gum Eucalyptus tereticornis, Woollybutt E. longifolia and White Feather Honey-myrtle Melaleuca decora. Near Nowra, the species grows in an open forest of Spotted Gum Corymbia maculata, Forest Red Gum and Grey Ironbark E. paniculata. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark E. crebra, Forest Red Gum and Black Cypress Pine Callitris endlicheri. Spring flowering.	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Rutidosis heterogama Heath Wrinklewort	V	Recorded from near Cessnock to Kurri Kurri with an outlying occurrence at Howes Valley. On the Central Coast it is located north from Wyong to Newcastle. There are north coast populations between Wooli and Evans Head in Yuraygir and Bundjalung National Parks. It also occurs on the New England Tablelands from Torrington and Ashford south to Wandsworth south-west of Glen Innes. Grows in heath on sandy soils and moist areas in open forest and has been recorded along disturbed roadsides.	Absent	Low	Low
Syzygium paniculatum Magenta Lilly Pilly	V	A tree to 15 m tall but is generally 3–8 m high and shrubby in form. Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. Has been recorded in widely scattered small populations along the NSW coast from Booti Booti (near Forster) in the north to Conjola State Forest (near Jervis Bay) in the south. Found in rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas. Rainforests are often remnant stands of littoral or gallery rainforest. Associated species include Alphitonia excelsa, Acmena smithii, Cryptocarya glaucescens, Toona ciliata Eucalyptus saligna, Ficus fraseri, Syzygium oleosum, Acmena smithii, Cassine sp., F. blique, Glochidion ferdinandi, Endiandra sieberi, Synoum glandulosum, Podocarpus elatus, Notelaea longifolia, Guioa semiglauca and Pittosporum undulatum. Is thought to tolerate wet and dry conditions on sands. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities. Flowers December to March, with fruit ripe from March to May, occasionally to September.	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Tetratheca juncea Black-eyed Susan	V	A low shrub that grows in clumps of single or multiple stems up to 1 m long. Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. Grows in forests with an overstorey of Angophora costata, Eucalyptus haemastoma, E. globoidea, Corymbia gummifera, and E. capitellata. Only T. thymifolia is known to grow in association with this species. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. While the species prefers cooler southerly aspects, it has been found on slopes with a variety of aspects. It generally prefers well-drained sites and occurs on ridges, although it has also been found on upper slopes, mid- slopes and occasionally in gullies. Flowering occurs between July and December with the peak flowering period occurring between the start of September to the end of October. Seeds are produced in late spring and mature from November to February. Very cryptic.	Absent	Low	Low
Thesium australe Austral Toadflax	V	Austral Toadflax is a small, straggling herb to 40 cm tall. Leaves are pale green to yellow-green, somewhat succulent, 1 - 4 cm long and 0.5 - 1.5 mm wide. Flowers are minute and white, emerging where the leaves meet the stems and appearing in spring. The fruit is small and nut-like, developing in summer. This species is often hidden amongst grasses and herbs. Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (Themeda australis). Flowering spring and summer.	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Ecological Communities					
Central Hunter Valley eucalypt forest and woodland	CE	The Central Hunter Valley eucalypt forest and woodland ecological community is an open forest or woodland—typically with a tree canopy dominated by eucalypt species; an open to sparse mid-layer of shrubs; and a ground layer of native grasses, forbs and small shrubs. Typically occurs on lower hillslopes and low ridges, or valley floors in undulating country; on soils derived from finer grained sedimentary rocks. The woodland or forest canopy is dominated by one or more of the following four eucalypt species: – narrow-leaved ironbark (Eucalyptus crebra), spotted gum (Corymbia maculata (syn. Eucalyptus maculata), slaty gum (Eucalyptus dawsonii) and grey box (Eucalyptus moluccana). Under certain circumstances a fifth species, Allocasuarina luehmannii (bulloak or buloke), may be part of the mix of dominants—i.e. in sites previously dominated by one or more of the four eucalypt species. A number of other tree species may be sub-dominant or locally dominant within a limited area of a patch. These include rough-barked apple (Angophora floribunda), Blakely's red gum (Eucalyptus blakelyi), slaty red gum (Eucalyptus glaucina) and forest red gum (Eucalyptus tereticornis). Other characteristic canopy species include kurrajong (Brachychiton populneus subsp. populneus), black cypress-pine (Callitris endlicheri) and cooba (Acacia salicina). White box (Eucalyptus albens) and grey gum (Eucalyptus punctata) are also often present. An open to-sparse mid-layer of shrubs such as wattles (Acacia species) and native blackthorn (Bursaria spinosa subsp. spinosa) may be present. A ground layer is present, although it may vary in development and composition, as a sparse-to-thick layer of native grasses and/or other predominantly native groundcover (small shrubs and ferns, daisies, lilies, orchids and other flowers).	Absent	Low	Low

Species	Status	Description of habitat[1]	Presence of habitat	Likelihood of occurrence	Possible impact?
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	E	This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which Casuarina glauca (Swamp Oak) is the dominant species northwards from Bermagui. Other trees including Acmena smithii (Lilly Pilly), Glochidion spp. (Cheese Trees) and Melaleuca spp. (Paperbarks) may be present as subordinate species and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and Melaleuca ericifolia is the only abundant tree in this community south of Bermagui. Associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Generally, occurs below 20 m (rarely above 10 m) elevation. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Often fringes treeless floodplain lagoons or wetlands with semi-permanent standing water.	Absent	Low	Low
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	V	Coastal Saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pans. This community occurs in the intertidal zone along the NSW coast.	Absent	Low	Low

V = Vulnerable, E = Endangered, CE = Critically Endangered

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Birds					
Anthochaera phrygia Regent Honeyeater	CE	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important. For example, the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events. There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Regent Honeyeaters usually nest in horizontal branches or forks in tall mature eucalypts and Sheoaks.	Absent	Low	Low

[2] Information sourced from species profiles on NSW OEH's threatened species database or the Australian Government's Species Profiles and Threats database (SPRAT) unless otherwise stated.

OEH threatened species database: http://www.threatenedspecies.environment.nsw.gov.au/index.aspx
SPRAT: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Botaurus poiciloptilus Australasian Bittern	E	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.)	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Calidris canutus Red Knot	E	The Red Knot is a non-breeding migratory visitor from Arctic regions of Siberia. It is capable of flying non-stop between north-eastern China and northern Australia. Birds arrive between September and October and leave between March and April, with a small number of individuals overwintering. In NSW it is recorded in small numbers along some of the major river estuaries and sheltered embayments of the coastline, in particular the Hunter River estuary. This environment is used as a staging area for birds to rest and replenish fat resources; large numbers arrive in September then most move south to Victoria by October. The Red Knot is a rare visitor to wetlands away from the coast with a few records (mostly during southward migration) as far west as Lake Menindee and the Riverina. Mainly occurs in small numbers on intertidal mudflats, estuaries, bays, inlets, lagoons, harbours and sandflats and sandy beaches of sheltered coasts. It is occasionally found on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms and is a rare visitor to terrestrial saline wetlands and freshwater swamps. Birds roost on sandy beaches, spits, islets and mudflats close to feeding grounds, usually in open areas. Rarely found on inland lakes or swamps.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Calidris ferruginea Curlew Sandpiper	CE	The Curlew Sandpiper is distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Absent	Low	Low
Calidris tenuirostris Great Knot	CE	A medium-sized bulky wader with a straight, dark-brown bill and yellowish-brown legs. It has a striped crown with an indistinct white eyebrow. Its upperparts are grey, with dark feather tips; its underparts are white. The rump is pure white, the tail is tipped with grey. Breeding plumage consists of darker upperparts with black and chestnut markings. In NSW, the species has been recorded at scattered sites along the coast down to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Charadrius leschenaultii Greater Sand Plover	V	The non-breeding Greater Sand-plover (i.e. as expected in Australia) has a grey-brown crown, nape, back and breast patches. The lores, bill and upper wing are dark, with dusky ear-coverts. There is prominent white plumage on the forehead, chin, throat and underparts, including the underwing. The legs and feet are greenish-grey; this helps distinguish it from the very similar Lesser Sand-plover, which has dark grey legs. Birds have a hunched, horizontal stance when relaxed, and a more upright extended stance when alert. When breeding in the Northern Hemisphere, the plumage on the breast, crown and nape changes to a dull brick-red and the ear coverts become black. Elements of this plumage may be visible in some Australian birds just after arrival in spring or prior to departure in autumn, and in some overwintering birds. In NSW, the species has been recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries. Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Roosts during high tide on sandy beaches and rocky shores; begin foraging activity on wet ground at low tide, usually away from the edge of the water; individuals may forage and roost with other waders.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Charadrius mongolus Lesser Sand Plover	E	Found along the east coast of Queensland and northern NSW. Individuals are rarely recorded south of the Shoalhaven estuary, and there are few inland records. Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms.	Absent	Low	Low
Dasyornis brachypterus Eastern Bristlebird	E	There are three main populations: Northern - southern Queensland/northern NSW, Central - Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula and Southern - Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border. Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all of these vegetation types are fire prone. Age of habitat since fires (fire-age) is of paramount importance to this species. The Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years; however, habitat in northern NSW requires frequent fires to maintain habitat condition and suitability. The northern fire regimes is between 3-6 years and of variable intensity depending on the habitat condition.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Diomedea antipodensis Antipodean Albatross	V	A large Albatross species, with breeding confined to New Zealand. Juveniles are very similar in appearance to juvenile Wandering Albatross. Breeding females have chocolate-brown upperparts with white 'waves' on their back, a white face mask and throat, a broad brown breast-band with a white lower breast and belly with brown undertail-coverts, and a white underwing with a dark tip. Breeding males are whiter than the females but never as white as the whitest Wandering Albatross. Both sexes have a pink bill. The species ranges across the southern Pacific Ocean, east to the coast of Chile and west to eastern Australia.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Dimoedea antipodensis gibsoni Gibsons Albatross	V	A large Albatross species, with breeding confined to New Zealand. Similar plumage to the Wandering Albatross although it is rare for Gibson's Albatross to get as white. Gibson's Albatross is also smaller than the Wandering Albatross, with males reaching up to 7.5kg and females reaching up to 5.5kg. Females are also browner than males. Bill length ranges from 138-162mm. Plumage varies widely, with the amount of white dependent upon the sex, age and population characteristics at its breeding site island. Males are white above and below, including crown. They have white upperparts; breast has varying densities of fine black wavy lines. Tail white, sometimes tipped black. Outer wing and trailing edge black. Underwing white, extreme tips always black. Legs and webbed feet are a pale flesh colour, while the bill is pink, tipped yellow. Females are similar to males however have brown speckles or striations on the crown. Essentially endemic to the Auckland Islands of New Zealand. The non-breeding range is poorly known however the species probably disperses across the southern Pacific. The species is regularly encountered on trans-Tasman shipping routes and at seas off Sydney, and regularly occurs off the NSW coast usually between Green Cape and Newcastle.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Diomedea exulans Wandering Albatross	E	The Wandering Albatross is the largest of albatrosses with the greatest wingspan of living birds (up to 3.5m). Plumage varies widely, with the amount of white dependent upon the sex, age (generally whiter with age) and population characteristics at its breeding island. Males are white above and below, including crown. They have white upperparts; breast has varying densities of fine black wavy lines. Tail white, sometimes tipped black. Outer dorsal wing and trailing edge black. Underwing white, extreme tip always black. Legs and webbed feet are a pale flesh colour, while the powerful bill is pink, tipped yellow. Females are similar to males however always have brown speckles or striations on the crown. A series of plumage phases are passed through as young birds reach full adult plumage, which can take up to nine years. The Wandering Albatross visits Australian waters extending from Fremantle, Western Australia, across the southern water to the Whitsunday Islands in Queensland between June and September. It has been recorded along the length of the NSW coast. At other times birds roam the southern oceans and commonly follow fishing vessels for several days.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Diomedea sanfordi Northern Royal Albatross	E	Adult Northern Royal Albatross have a white head, neck, body and tail, sharply contrasting against the black wings. The underwing is white except for a dark trailing edge and a large dark tip. Juvenile Northern Royal Albatrosses have indistinct brown mottling on the crown and pronounced black mottling on the lower back and rump, and a narrow black terminal band on the tail. The bill is large, with a bulbous tip, pinkish coloured horn and a diagnostic black cutting edge on the upper mandible. In breeding birds, the bill may flush to a brighter pink. The iris is brown, and the feet and legs are pinkish to blueish-white, with blueish webs. The Northern Royal Albatross ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia. The Northern Royal Albatross feeds regularly in Tasmanian and South Australian waters, and less frequently in NSW waters.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Erythrotriorchis radiatus Red Goshawk	V	The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers. Breeding is likely to be in spring and summer in southern Queensland and NSW. The birds lay clutches of 1-2 eggs between July and September, in a stick nest in a tall tree (>20 m tall) within 1 km of a watercourse or wetland. Young fledge around November and December.	Absent	Low	Low
Fregetta grallaria White-bellied Storm-Petrel	V	A small, compact storm-petrel with a square cut tail, white forehead, face and underparts and a broad dark mark through the eye. Upperparts are dark grey. Various colour phases have been observed, including a dark phase, having sooty plumage, with only the rump and belly showing white. A wide oceanic distribution in the south Pacific and Atlantic Oceans, ranging into tropical waters from various breeding grounds. Known to breed at various island groups including Lord Howe Island.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Grantiella picta Painted Honeyeater	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Absent	Low	Low
Lathamus discolor Swift Parrot	CE	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Migrates to the Australian south-east mainland between March and October. No breeding in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera, Mugga Ironbark E. sideroxylon, and White Box E. albens.	Marginal, some feed trees present.	Low, would be an extreme vagrant.	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Limosa lapponica baueri Bar-tailed Godwit	V	A large long-necked wader (up to 39 cm) with a distinctive very long and upturned bill which is dark with a pinkish base. The head has a distinct brown eye-stripe bordered above by a white to off-white band extending past the eye. The crown and upper parts are pale brownish-grey narrowly streaked black and white. The under body is white with a pale brownish wash and fine dark streaks on the breast. In flight the upper wing is greyish-brown with dark brown and off-white streaks. In spring or autumn individuals may be in full or part breeding plumage where the head, neck and underparts are mostly rufous brown with black streaks on sides of breast and some wing and mantle feathers are strongly patterned rufous-brown and buff. Identified from the Black-tailed Godwit by the upturned bill, larger size, striped and scalloped neck and underparts and in flight the lack of conspicuous white wing bar and white rump stripe. It is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Less frequently it occurs in salt lakes and brackish wetlands, sandy ocean beaches and rock platforms.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Limosa lapponica menzbieri Northern Siberian Godwit	CE	The bar-tailed godwit (northern Siberian) is a large migratory shorebird. It has a length around 37-39 cm, a wingspan of 62-75 cm and body mass between 250 - 450 g. It has a long neck with a very long upturned bill which is characterized by a dark tip and pinkish base. All non-breeding plumages have a uniform upper pattern, with a dark back and upper rump. It is distinguishable from other godwits by the dark barring on the lower white rump, upper-tail and lining of the underwing. The sexes differ with females being larger and with longer bills than males and having a duller breeding plumage. Males and females exhibit marked variation in plumages with males having a deep rufous head and neck. Juveniles are similar to non-breeding adults with the exception that the crown is more heavily streaked. Found in coastal areas of NSW.	Absent	Low	Low
Macronectes giganteus Southern Giant Petrel	E	A large seabird up to 100cm in length with a wingspan between 150 and 210cm. The species is sexually dimorphic, with males larger than females. Within populations, two colour morphs occur. The most common is the dark morph with a white head and neck, and a dark grey-brown body. There is also a white morph with scattered black feathers. The Southern Giant Petrel has a circumpolar pelagic range from Antarctica to approximately 20° S and is a common visitor off the coast of NSW.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Macronectes halli Northern Giant-Petrel	V	A large seabird up to 95cm in length with a wingspan of 150-210cm. The species is sexually dimorphic, with males markedly larger and heavier-billed than females. A single colour morph exists, comprising white about the bill and face, a dark grey-brown body, and mottling at the borders. The Northern Giant-Petrel has a circumpolar pelagic distribution, usually between 40-64ºS in open oceans. Their range extends into subtropical waters (to 28ºS) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn.	Absent	Low	Low
Numenius madagascariensis Eastern Curlew	CE	In NSW the species occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast. 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. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Pachyptila turtur subantarctica Fairy Prion (southern)	V	The fairy prion (southern) breeds on Macquarie Island and a number of other subantarctic islands outside of Australia. There are 80 to 250 breeding pairs in Australia and a global population of 80 000. In Australia, breeding is recorded on two rock stacks off Macquarie Island and on the nearby Bishop and Clerk Island. The population may have been larger prior to the arrival of black rats on Macquarie Island. The subspecies digs burrows among rocks or low vegetation in which to nest. Burrows may be dug below mat forming herbs. Feeds by plucking food from the ocean surface. Some individuals may migrate towards New Zealand and southern Australia in winter.	Absent	Low	Low
Phoebetria fusca Sooty Albatross	V	The Sooty Albatross is dark brown to black in colour, with a slightly darker head than breast. There is a thin white cresent surrounding the eye, and the bill is glossy black with a pale yellow-orange stripe along the sides of the lower jaw. The feet and legs are pale grey. Juveniles are similar to adults, with a less pronounced bill stripe. Individuals are generally silent at sea however in display they may scream 'pee-pooo'. The Sooty Albatross occurs in the South Atlantic and southern Indian Oceans and has not been recorded in the Pacific Ocean between Australia and South America. In Australian waters, this species is generally recorded in winter off the south coast from Tasmania to Western Australia, while there are occasional sightings off the NSW coast, north of Grafton. The species has not been recorded in any NSW conservation reserves.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Pterodroma leucoptera leucoptera Gould's Petrel	E	Has a body length of 30 cm and a wingspan of 75 cm. The upper surface of their long narrow wings has a distinctive 'M' pattern. This together with a darker head, distinguishes them from other petrels of similar size. The underside of the wings and body are white with a dark edge to the wing that terminates in a diagonal bar. Both sexes are identical and immature birds fledge in adult plumage. Breeds on both Cabbage Tree Island, 1.4 km offshore from Port Stephens and on nearby Boondelbah island. The range and feeding areas of non-breeding petrels are unknown.	Absent	Low	Low
Pterodroma neglecta neglecta Kermadec Petrel	V	A medium-sized petrel. Several colour phases from dark brown over the whole body, with a few flecks of grey on the face to a lighter form which is sooty brown above with pale grey head and white underparts. The darker form is characteristic at Lord Howe Island. Tail short and square cut. White markings on upper wings. Bill short and black and legs and feet flesh-coloured. Eyes dark brown.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Rostratula australis Australian Painted Snipe	E	The Australian Painted Snipe is small freshwater wader, with a long bill that droops slightly at the tip. The female has a chestnut-black hood with a bold white eye-patch and a cream stripe along the middle of the crown. The back and wings are patterned bronzy-greenish-grey with a few cream streaks and the underparts are white. The male is slightly smaller and has greyer, less contrasting patterns, but also has large cream spots on the wings. The Australian Painted Snipe is restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche bulleri Buller's Albatross	V	One of the smallest albatrosses with a wingspan of 205 to 213 cm. The Buller's Albatross is similar to other grey-headed albatross, but has a striking black and yellow bill, a white forecap, black patch before the eye, a thin white crescent to the rear of and below the eye, and a mostly white underwing with a moderately broad sharply defined leading edge. Immature individuals are separated from the immature Grey-headed Albatross by the underwing pattern and lighter bill with a contrasting dark sub-terminal spot. This albatross only nests on islands off New Zealand. The northern subspecies (platei) nests on islands off Chatham Island with an estimated population of around 18,200 breeding pairs. The southern subspecies (bulleri) breeds on the Snares and Solander islands with a total population of around 13,600 breeding pairs. After breeding both subspecies migrate to the seas off Peru and Chile. In NSW waters it is a relatively common visitor between March and October, with few sightings outside this period.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche bulleri platei Northern Buller's Albatross	V	The Pacific Albatross is a small, rather lightly built albatross, with a wingspan of 205–213 cm. Males weigh slightly more than females (2.5–3.3 kg compared to 2.15–2.8 kg) (Marchant & Higgins 1990). The species has a long slender striking black and yellow bill, a neat grey hood, prominent silvery-white forecap, black patch before the eye, and a thin white crescent to the rear of or below the eye (Marchant & Higgins 1990). The underwings are mostly white, with a moderately broad, fairly straight and sharply defined black leading edge. The Pacific Albatross differs from Buller's Albatross in having a significantly wider bill, a silvery-grey (rather than white) forehead and forecrown, and a generally darker head and neck. The species' also have varied timing of breeding and length of incubation stints, however, this may be explained by location of sites and associated foraging opportunities, rather than genetics. The Pacific Albatross is a non-breeding visitor to Australian waters. Foraging birds are mostly limited to the Pacific Ocean and the Tasman Sea, although birds do reach the east coast of the Australian mainland. Occurrence within the Australian Fishing Zone is likely, however, the threat from longline injury is considered low.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche cauta Shy Albatross	V	The Shy Albatross (formerly Diomedea cauta) has a predominantly white body with dark grey wings and back. The brow is dark-grey or black and the sides of the head, neck and throat are grey. Having a wingspan up to 2.6m, the underwing is white with black edges and tip, with a characteristic black patch where the wing joins the body. The bill is grey with a yellow tip and black nasal groove, while the feet, toes and web are blue-grey. Juveniles have darker feet and greyer heads than adults. This species is circumpolar in distribution, occurring widely in the southern oceans. Islands off Australia and New Zealand provide breeding habitat. In Australian waters, the Shy Albatross occurs along the east coast from Stradbroke Island in Queensland along the entire south coast of the continent to Carnarvon in Western Australia. Although uncommon north of Sydney, the species is commonly recorded off southeast NSW, particularly between July and November, and has been recorded in Ben Boyd National Park.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche cauta steadi White-capped Albatross	V	The White-capped Albatross was formerly regarded as a subspecies of the Shy Albatross with this species complex readily identified from other Southern Ocean albatross by being the largest black-backed albatross with proportionally longer wings, slightly fuller body, stouter bill and less manoeuvrable flight. This species is virtually inseparable from the closely related Shy Albatross in the field. This species is slightly larger, with a longer bill, legs, tail and wings as well as the bill being overall duller and greyer in colouration with limited yellowish pigment (i.e. lacks yellow at the base of the upper bill) and the tendency to have a slightly darker tip. It can be separated from the Salvin's Albatross by lacking the grey hood and the grey-green bill, with a paler top and bottom. This species breeds on a number of islands in New Zealand waters. Virtually the entire population nests in the Auckland Islands, comprising between 75,000 and 117,000 breeding pairs. A small number of pairs nest on Bollons Island in the Antipodes Islands and occasionally on The Forty-Fours in the Chatham Islands. After breeding most birds remain in Australasian waters with some adults migrating across the Indian Ocean to seas off South Africa and Namibia. In NSW waters it is probably frequently overlooked due to the difficulties of separating it from the Shy Albatross. However, it appears to be a regular visitor principally occurring between March and December.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche eremita Chatham Albatross	E	The Chatham Albatross is a medium sized albatross, with a wing-span less than 2.1 m. The bright yellow bill has a distinctive black spot near the tip of the lower mandible, allowing discrimination from the similar Shy Albatross. The Chatam Albatross has a sooty grey wash over the crown, cheeks and neck, and a dark back and wings. Its blackish notch at the front of the wing, next to the body, is the darkest of the Shy Albatross complex. Breeding for the Chatham Albatross is restricted to Pyramid Rock, Chatham Islands, off the coast of New Zealand. The principal foraging range for this species is in coastal waters off eastern and southern New Zealand, and Tasmania.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche impavida Campbell Albatross	V	This species was formerly regarded as a subspecies of the Black-browed Albatross. It is similar to the more regularly encountered Black-browed Albatross but adults can be separated by the pale yellow (not dark brown) eyes, the heavier black brow (more extensive in front of the eye), the underwing having broad black margin, and the bill being a bright orange-yellow that may be reddish on the sides. Most immature individuals have darker underwings, a heavier black brow and a pale iris. This species nests only at Campbell Island and the adjacent Isle de Jeanette Marie south of New Zealand, with a total population estimated at 24,600 pairs. It ranges widely in Australasian seas. In NSW waters it is probably frequently overlooked due to the difficulties of separating it from the Black-browed Albatross. However, it appears to be a regular visitor occurring in most months of the year with peaks in winter during the non-breeding season.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Thalassarche melanophris Black-browed Albatross	V	The Black-browed Albatross (formerly Diomedea melanophris) is a large seabird with a wingspan of up to 2.4m. The upper wings, back and tail are black and the rest of the body and head is white. There is a small black brow over the dark eye and the bill is yellow, tipped with pink. The underwings are white with broad black margins. They are superb gliders, consistently flying in a wheeling pattern. They also rest on the sea and may be confused with sitting gannets. The Black-browed Albatross has a circumpolar range over the southern oceans and are seen off the southern Australian coast mainly during winter. This species migrates to waters off the continental shelf from approximately May to November and is regularly recorded off the NSW coast during this period. The species has also been recorded in Botany Bay National Park.	Absent	Low	Low

Thalassarche salvini Salvin's Albatross	V	Salvin's Albatross was formerly regarded as a subspecies of the Shy Albatross with this species complex readily identified from other Southern Ocean albatross by being the largest black-backed albatross with proportionally longer wings, slightly fuller body, stouter bill and less manoeuvrable flight. Adults can readily be identified by having a grey head and neck, wholly dark primaries on the underside of the wing resulting in lacking the white wedge shape close to the tip of the underwing, and an olive-brown beak which is ivory-coloured on the top and bottom and has a black spot near the tip of the lower bill. Juveniles are difficult to separate from other members of the group but tend not to occur in NSW waters as they fly across the Pacific Ocean to seas off Chile and Peru as soon as they fledge. The Buller's Albatross juvenile is similar but is smaller and slimmer with a less robust bill. This species principally nests on the Bounty Islands, with small numbers on the Western Chain Islets in the Snares Islands and a few pairs nesting on Pyramid Rock and The Forty-Fours in the Chatham Islands of New Zealand. A small number of pairs also nest on Iles Crozet in the French Southern Territories. The total population is estimated between 350,000 and 380,000 individuals, with 99% nesting on the Bounty Islands. It ranges widely through the South Pacific Ocean, particularly in the Humboldt Current off western South America. In NSW waters it is an uncommon visitor principally occurring between June and October, with the majority of sightings from waters south of Sydney.	Foraging, feeding or related behaviour likely to occur within area		

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Frogs					
Heleioporus australiacus Giant Burrowing Frog	V	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 ha in size. Individuals move into the breeding site either immediately before or following heavy rain and occupy these sites for up to 10 days. Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. When breeding, frogs will call from open spaces, under vegetation or rocks or from within burrows in the creek bank. Males show strong territoriality at breeding sites. This species breeds mainly in autumn but has been recorded calling throughout the year.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Litoria aurea Green and Golden Bell Frog	E	A relatively large, stout frog, ranging in size from approximately 45 mm to approximately 100 mm snout to vent length. Diagnostic features are a gold or creamish white stripe running along the side, extending from the upper eyelids almost to the groin, with a narrow dark brown stripe beneath it, from nostril to eye. It also has blue or bluish-green colour on the inside of the thighs. The colour of the body varies. Usually a vivid pea-green, splotched with an almost metallic brassy brown or gold. The backs of some individuals may be almost entirely green; in others golden-brown markings may dominate. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.), Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Litoria littlejohni Littlejohn's Tree Frog	V	Littlejohn's Tree Frog is pale brown, with dark speckles and a broad, dark band down its back. The belly is white or cream, and it has large orange patches on the groin, armpit and back of the thighs. It also has a brown bar from the tip of the snout through the nostrils to the top of the arm. This species does not have the white patch that extends from under the eye to the back of the jaw that is present on the very similar-looking Jervis Bay Tree Frog. The call is a "low reedy whistle". This species breeds in the upper reaches of permanent streams and in perched swamps. Breeding is triggered by heavy rain and can potentially occur all year but is usually from late summer to early spring when conditions are favourable.	Absent	Low	Low
Mammals					
Chalinolobus dwyeri Large-eared Pied Bat	V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. 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. Found in well-timbered areas containing gullies.	Absent, no roosting present and not in vicinity of potential roosting habitat.	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Dasyurus maculatus maculatus Spot-tailed Quoll	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common.	Absent	Low	Low
Petauroides volans Greater Glider	V	Arboreal nocturnal marsupial largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Petrogale penicillata Brush-tailed Rock-wallaby	V	In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Throughout their range, Brush-tailed Rock-wallabies feed on a wide variety of grasses and shrubs and have flexible dietary requirements. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night.	Absent	Low	Low
Phascolarctos cinereus Koala	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. 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.	Marginal, some forage present.	Low, unlikely given urbanised landscape and little connectivity.	Low
Potorous tridactylus tridactylus Long-nosed Potoroo	V	In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. Breeding peaks typically occur in late winter to early summer and a single young is born per litter. Adults are capable of two reproductive bouts per annum.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Pseudomys novaehollandiae New Holland Mouse	V	Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. It is a social animal, living predominantly in burrows shared with other individuals. Distribution is patchy in time and space, with peaks in abundance during early to mid stages of vegetation succession typically induced by fire.	Absent	Low	Low
Pteropus poliocephalus Grey-headed Flying-fox	V	The Grey-headed Flying-fox is the largest Australian bat, with a head and body length of 23 - 29 cm. It has dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. The wing membranes are black and the wingspan can be up to 1 m. It can be distinguished from other flying-foxes by the leg fur, which extends to the ankle. Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia. 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. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November.	Marginal, low quality forage only.	Moderate	Low, no camps impacted.
Migratory Terrestrial					

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Cuculus optatus Oriental Cuckoo	M	The Oriental Cuckoo is a large cuckoo with bold dark bars on white underside. The male has grey head, back and wings, with underside barred with black on white background. The female has two colour forms. The grey morph is similar to male with pinkish brown neck streaked with dark. Found in woodlands, forest and riparian area. Nests in cup shaped nests of other species such as honeyeaters, flycatchers.	Absent	Low	Low
Hirundapus caudacutus White-throated Needletail	M	This large swift has long curved wings and white markings. The plumage of the White-throated Needletail is predominantly grey-brown, glossed with green and the wings are long and pointed. The tail is short and square, with the protruding feather shafts giving a spiky appearance. The throat and undertail are white. White-throated Needletails arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. White-throated Needletails are non-breeding migrants in Australia. Breeding takes place in northern Asia.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Monarcha melanopsis Black-faced Monarch	M	The Black-faced Monarch has a distinctive black face that does not extend across the eyes, grey upperparts, wings and upper breast, contrasting with a rufous (red-orange) belly. The dark eye has a thin black eye ring and a lighter area of pale grey around it. The blue-grey bill has a hooked tip. Young birds are similar but lack the black face, have a black bill and tend to have a brownish body and wings. The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating. The Black-faced Monarch builds a deep cup nest of casuarina needles, bark, roots, moss and spider web in the fork of a tree, about 3 m to 6 m above the ground. Only the female builds the nest, but both sexes incubate the eggs and feed the young.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Monarcha trivirgatus Spectacled Monarch	M	The Spectacled Monarch is blue-grey above, with a black face mask that extends across both eyes in a 'clover-leaf' pattern, rufous (red-orange) breast, white underparts and a black tail with white outer tips. Immature birds lack the black face and have a grey throat. The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. It is much less common in the south. The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves. The Spectacled Monarch builds a small cup nest of fine bark, plant fibres, moss and spider web in a tree fork or in hanging vines, 1 m - 6 m above the ground, often near water.	Absent	Low	Low
Motacilla flava Yellow Wagtail	M	This species occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra. In the north of its range it is also found in large forest clearings. It breeds from April to August, although this varies with latitude.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Myiagra cyanoleuca Satin Flycatcher	M	The Satin Flycatcher is a small blue-black and white bird with a small crest. The sexes are dimorphic (have two forms). Males are glossy blue-black above, with a blue-black chest and white below, while females are duskier blue-black above, with an orange-red chin, throat and breast, and white underparts and pale-edged wing and tail feathers. The Satin Flycatcher is found along the east coast of Australia in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin Flycatcher nests in loose colonies of two to five pairs nesting at intervals of about 20 m - 50 m apart. It builds a broad-based, cup-shaped nest of shredded bark and grass, coated with spider webs and decorated with lichen. The nest is placed on a bare, horizontal branch, with overhanging foliage, about 3 m - 25 m above the ground.	Absent	Low	Low

Species	Status	Description of habitat[2]	Presence of habitat	Likelihood of occurrence	Possible impact?
Rhipidura rufifrons Rufous Fantail	M	The Rufous Fantail is a small, active bird which has a distinctive reddish brown rump and continuously fanned tail. The crown, face, neck and shoulders are grey-brown, shading to reddish brown on the lower back, rump and upper tail. The eyebrow is reddish-brown, the chin and throat are white, grading into a dappled black and white breast, and the rest of the underparts are white tinged red-brown. The wings are grey-brown and the tail feathers have red-brown bases, but are otherwise dark grey, tipped white. The Rufous Fantail is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas The Rufous Fantail builds a small compact cup nest, of fine grasses bound with spider webs, that is suspended from a tree fork about 5 m from the ground. The bottom of the nest is drawn out into a long stem.	Marginal	Low, extreme vagrant.	Low

V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory

APPENDIX F BAM CALCULATOR REPORT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00016591/BAAS18155/19/00016592	St James School	30/08/2019
Assessor Name	Report Created	BAM Data version *
	23/01/2020	13
Assessor Number	BAM Case Status	Date Finalised
	Finalised	05/09/2019
Assessment Revision	Assessment Type	
3	Part 4 Developments (Small Area)	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast								
1	1568_Forest_Moderate	18.1	0.3	0.25	High Sensitivity to Potential Gain	1.50		2
2	1568_Forest_Low	17.7	0.4	0.25	High Sensitivity to Potential Gain	1.50		2

3	1568_Maintained	14.7	0.2	0.25	High Sensitivity to Potential Gain	1.50		0
							Subtotal	**4**
							Total	**4**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00016591/BAAS18155/19/00016592	57	3	30/07/2019

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
		St James School	Open

Assessment Type	Date Finalised
Part 4 Developments (Small Area)	To be finalised

PCT list

Include	PCT common name	Credits
Yes	**1568 -** Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast	4

Species list

Include	Species	Credits

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Biodiversity payment summary report

IBRA sub region	PCT common name	Baseline price	Dynamic coefficient	Market coefficient	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Wyong	**1568 -** Blackbutt - Turpentine - Sydney Blue Gum mesic tall open forest on ranges of the Central Coast **Warning: This PCT has NO trades recorded**	$7,067.26	0.89595310	1.29971600	19.99%	$26.80	1.0000	$ 12,396.33	4	$49,585.31

Subtotal (excl. GST)	**$49,585.31**
GST	**$4,958.53**
Total ecosystem credits (incl. GST)	**$54,543.84**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price

No species available

Grand total	**$54,543.84**