

Ingenia Holiday Parks (c-/Barker Ryan Stewart)

Merry beach: Bridge replacement



ENVIRONMENTAL ASSESSMENT

Job No: 240528

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Environmental Assessment, Merry Beach bridge replacement.

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EXECUTIVE SUMMARY

Introduction

Ingenia Holiday Parks engaged Coast Ecology to prepare an Environmental Assessment for the proposed bridge replacement on an unnamed watercourse at Merry Beach, which is in the local government area (LGA) of Shoalhaven City Council. The proposal requires reclamation (installation of a concrete section) and instream works. This environmental assessment has been prepared in accordance with the *Biodiversity Conservation Act 2016* (BC Act), the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Fisheries Management Act 1994* (FM Act), the *Marine Estates Management Act 2014* (MEM Act) and *State Environmental Planning Policy (SEPP) Resilience and Hazards 2021*.

Proposal

The existing concrete abutments, timber decking and log bearers would be removed and the exiting road pavement trimmed to suit the proposed new bridge deck. New, wider reinforced concrete abutments would be installed to suit a 6.2 m wide bridge. Six reinforced concrete piers would be installed (three at each end on the watercourse bank).

Existing Environment

The *subject site* includes approximately 8 m² of native riparian vegetation equivalent to PCT 4049 South Coast Floodplain Grassy Swamp Forest which falls under the definition of the following endangered ecological communities (EECs):

- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community (BC Act)
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community Endangered Ecological Community (EPBC Act)

The existing bridge within the subject site provides habitat for species of microbats that show preference for roosting under structures and/or over water.

Within PCT 4049, the vegetation is stunted regrowth only. As such, the subject site does not contain any mature vegetation suitable for the construction of stick nests by threatened birds of prey (White-bellied Sea Eagle or Eastern Osprey) nor does it contain trees with hollows for breeding or nesting habitat by hollow dependant species such as threatened forest owls, gliders or some species of microbats listed under the BC Act and or EPBC Act.

The subject site does provide habitat for amphibians, however it is not suitable for any threatened amphibians listed under the BC Act or EPBC Act, that were previously recorded in the broader locality. The grassy lawn is utilised by aquatic/intertidal bird species such as Eurasian Cootes, Australian Wood ducks and White-faced herons along with regular grazing by Eastern Grey Kangaroos.

The subject site is not defined as Key Fish Habitat under the DPI Policy and guidelines for fish habitat conservation and management (update 2013) and it is considered unlikely to provide habitat for threatened aquatic species listed under the FM Act. No protected marine vegetation listed under the FM Act occurs within the subject site.

Database searches of threatened species previously recorded were conducted using BioNet and the PMST for MNES to determine state and federally listed species that may occur in the locality.

Following surveys, no threatened flora species were recorded within the subject site during surveys or were considered likely to occur.

One threatened bird species was identified during surveys:

1. Black Bittern *Ixobrychus flavicollis* (V BC Act)

Three species of microbats were identified during surveys however only one was a 'probable' record while the other two were 'possible' records based on call sequence and frequency:

2. Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* (Probable) (V BC Act)
3. Large Bent-winged Bat *Miniopterus orianae oceanensis* (Possible) (V BC Act)
4. Eastern Cave Bat *Vespadelus troughtoni* (Possible) (V BC Act)

In addition, due to surveys being conducted outside of the required period, an additional microbat is also assumed to be present:

5. Southern Myotis *Myotis Macropus* (V BC Act)

All five threatened fauna species were assessed in accordance with the [Threatened Species Test of Significance Guidelines](#) as required under the BC Act. None of these species are listed under the EPBC Act.

Assessment of Significance (BC Act)

The proposal is considered unlikely to have an adverse effect on the life cycle of threatened species known or presumed to occur on the *Subject Site*, such that a viable local population of the species is likely to be placed at risk of extinction as:

- The proposed works require only minor clearing which would not significantly impact foraging opportunities for threatened species with a moderate likelihood of occurring, and the subject site was unlikely to provide breeding or roosting opportunities for these species.
- The proposal would result in the removal of 8 m² of Swamp Oak Floodplain Forest EEC, which is already partially isolated from other patches of this EEC by roads and the holiday park and has been already impacted by exotic invasion through edge effects. Thus, the proposal is unlikely to place this EECs local occurrence at risk of extinction.

As such, a species impact statement is not required. Mitigation measures are however provided to ensure threatened microbats are not impacted during construction works.

Assessment of Significance (EPBC Act)

Following a site inspection/desktop assessment and habitat assessment, the *Subject Site* does not provide habitat for any threatened or migratory species listed under the EPBC Act, however it does include the Coastal Swamp Oak (*C. glauca*) Forest EEC.

The Coastal Swamp Oak (*C. glauca*) Forest EEC was defined as a Class C within the *Subject Site* (DAWE, 2021) as it is a moderately sized patch of EEC with up to 50% exotic invasion. Class C is less likely to have the highest diversity, intact structure and ecological function. As such, the proposal is unlikely to adversely affect habitat critical to the survival of this EEC. In addition, as the *subject site* is at the southern end of an existing patch, it is unlikely to result in further fragmentation of this EEC.

Fisheries Management Act

The proposal would result in direct impacts to:

- Approximately 8m² of regrowth riparian vegetation
- The banks of a first order watercourse (where the proposed bridge abutments extend past the existing abutments).

Potential indirect impacts include:

- Increase in turbidity during construction, potentially impacting the health of aquatic flora and fauna without appropriate mitigation measures

The proposal does not result in any direct impacts to KFH, protected marine vegetation, threatened aquatic species or the removal or relocation of snags. As the bridge is replacing an existing bridge, and abutments are not proposed within the creek bed, it is unlikely to result in changes to flooding regimes, hydrology or additional shading,

The installation of new abutments on the bank of the unnamed watercourse would require dredging and reclamation, including the temporary construction of a coffer dam. Cofferdams would be constructed around each abutment, upstream and downstream of the abutment on the same bank, with a silt curtain installed around each abutment. As such, construction works would not require temporary blocking of fish passage. A part 7 permit application for dredging and reclamation is not required for the works as the unnamed watercourse is a 1st order watercourse under the Strahler ordering system and it is not mapped as key fish habitat. Mitigation measures have however been included to ensure that the works do not negatively impact the aquatic environment.

Marine Estate Management

The subject site is outside of but within the locality of the Batemans Marine Park (General Use Zone). As such, s56 of the MEM Act applies. The proposal is in accordance with the objectives of the MEM Act, however referral to Marine Estates is required.

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1. Introduction

Ingenia Holiday Parks engaged Coast Ecology to prepare an Environmental Assessment for the proposed bridge replacement on an unnamed watercourse at Merry Beach, which is in the local government area (LGA) of Shoalhaven City Council. The proposal requires reclamation (installation of a concrete section) and instream works. This environmental assessment has been prepared in accordance with the *Biodiversity Conservation Act 2016* (BC Act), the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Fisheries Management Act 1994* (FM Act), the *Marine Estates Management Act 2014* (MEM Act) and *State Environmental Planning Policy (SEPP) Resilience and Hazards 2021*.

1.1 Proposal

The existing concrete abutments, timber decking and log bearers would be removed and the exiting road pavement trimmed to suit the proposed new bridge deck.

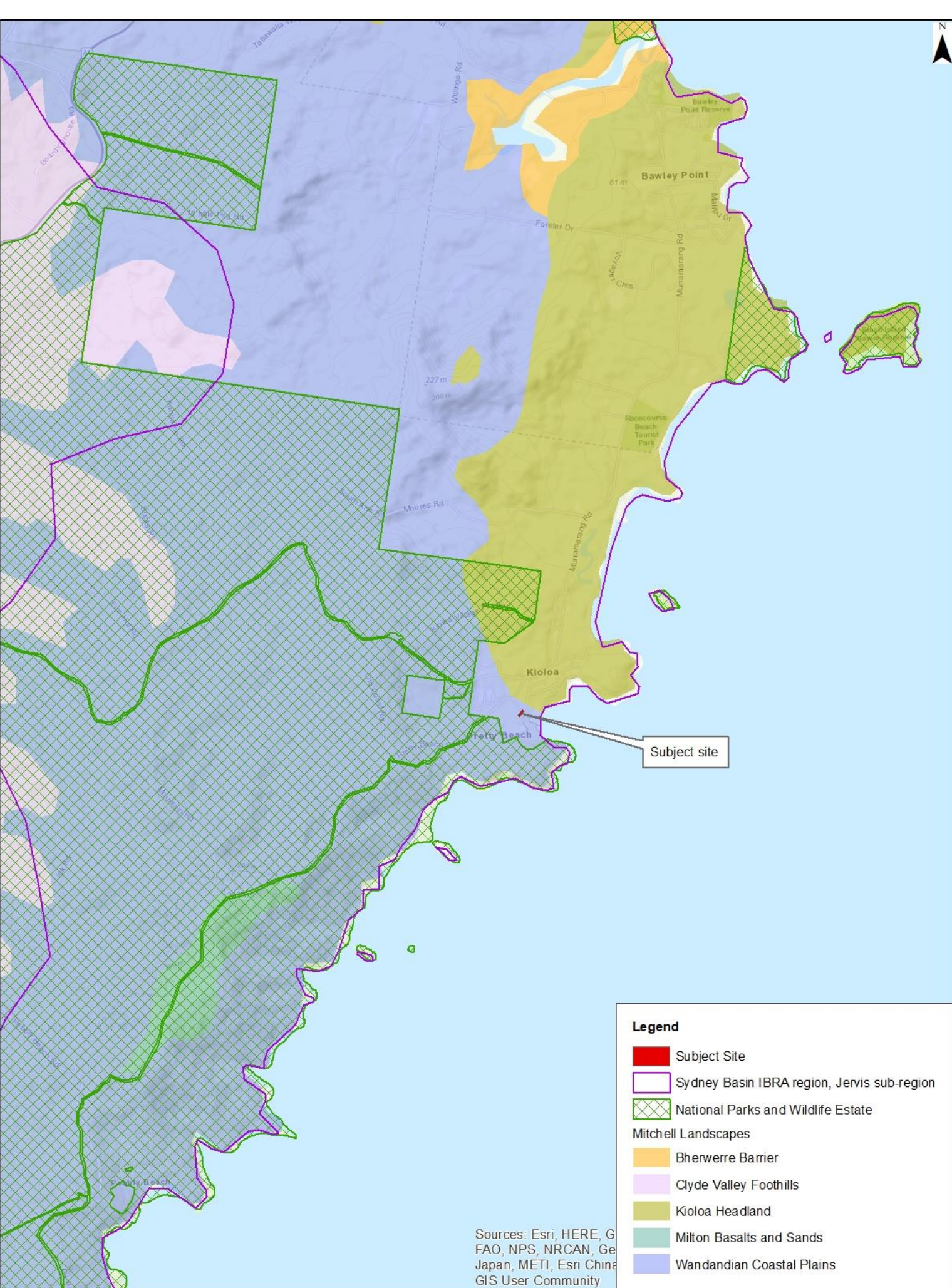
New reinforced concrete abutments (500 wide x 500 deep) would be installed to suit a 6.2 m wide bridge. Six reinforced concrete piers would be installed (three at each end on the watercourse bank). The new abutment would tie in with the road asphalt.

A coffer dam would be constructed around each the proposed abutments located at each end (which is in the same location as the existing abutments however slightly wider). The coffer dam would be constructed using large sandbags and dewatered using pumps with fish exclusion devices installed. Water within the dam would be pumped from the coffer dam onto nearby embankments to allow some filtration before the water seeps back into the unnamed watercourse.

1.2 Assessment Area

The *locality* is a 10 x 10 km area centred on the *Subject Site* and was used for threatened species database searches (Figure 1-1).

The *Subject Site* covers the new bridge footprint along with stockpile locations, dissipation areas (for the dewatering) and access areas (Figure 1-2).





2. Legislative context

2.1 Commonwealth legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The objective of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is to protect and manage prescribed matters of national environmental significance (MNES). Under the EPBC Act, proposed 'actions' that have the potential to significantly impact on MNES, the environment of Commonwealth land, or that are being carried out by an Australian Government agency, must be referred to the Commonwealth Minister for the Environment for assessment.

This environmental assessment concluded that there is unlikely to be any significant impacts to MNES due to the proposal and as such, referral to Department of Climate Change, Energy, the Environment and Water (DCCEEW) is not required (refer section 5.3).

2.2 NSW legislation

2.2.1 Fisheries Management Act 1994

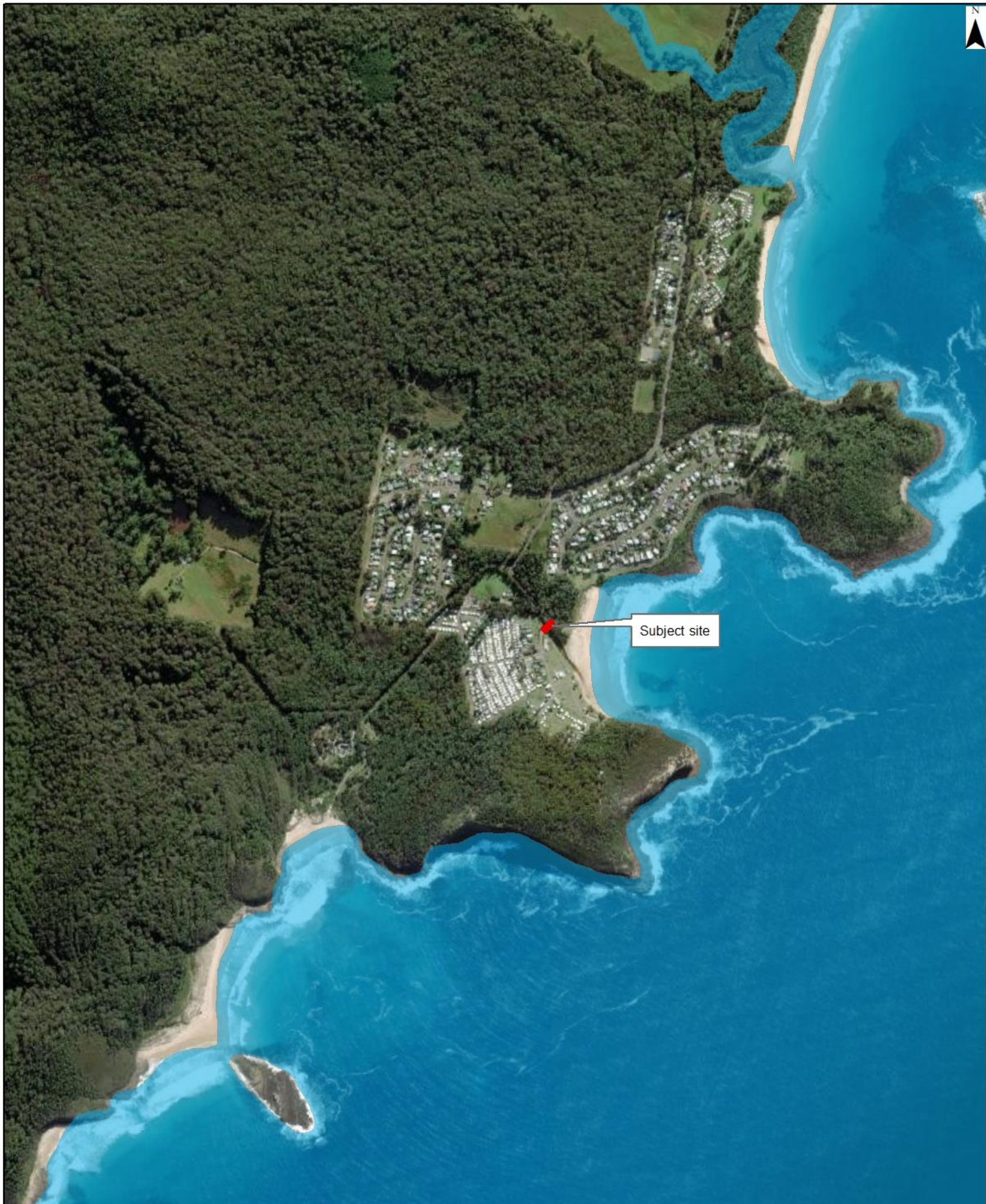
The FM Act provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The FM Act establishes mechanisms for:

- the listing of threatened species, populations and ecological communities or key threatening processes
- the declaration of critical habitat, and
- consideration and assessment of threatened species impacts in the development assessment process.

Section 4.4 of this report identifies threatened species, populations and ecological communities listed under Schedule 4, 4A and 5 of the FM Act which are predicted to occur in the locality. Threatened aquatic species identified in desktop studies were determined to have a 'low' likelihood of occurrence (Appendix B) and as such, an assessment of significance of impact in accordance with sections 221ZV and 221ZX of the FM Act was not required.

The installation of abutments on the bank does constitute reclamation under section 198A of the FM Act however as the unnamed watercourse is a 1st order stream and it is not mapped as key fish habitat (KFH) by The Department of Primary Industries Fisheries (DPI), (Figure 2-1), application for dredging and reclamation under part 7 of the FM Act is not required.

Under section 219 passage of fish is not to be blocked unless the activity is done in accordance with a permit issued under part 7 of the FM Act. The proposal does not require the blockage of fish passage as coffer dams would be constructed either side of the channel, allowing the watercourse to flow and fish passage to be maintained.



Legend

-  Subject Site
-  Key fish habitat mapping (DPI Fisheries)

Sources: Esri, Maxar, Earthstar Geographics, and the GIS User Community

2.2.2 Marine Estate Management Act 2014

The subject site is in the locality of the Batemans Marine Park and the unnamed watercourse that crosses the subject site flows into waters defined as General Use Zone (Figure 2-2).

Under s56 *Development affecting marine parks and aquatic reserves* of the MEM Act:

- (1) In determining a development application under Part 4 of the [Environmental Planning and Assessment Act 1979](#) for the carrying out of development on land that is in the locality of a marine park or an aquatic reserve, the consent authority must take into consideration the objects of this Act, the permissible uses of the area concerned under the regulations or the management rules and any advice given to it by the relevant Ministers about the impact on the marine park or aquatic reserve of development in the locality.
- (2) If the consent authority is of the opinion that development proposed in the development application is likely to have an effect on the plants or animals within the marine park or aquatic reserve and their habitat, the consent authority must consult with the relevant Ministers before finally determining the application.
- (3) A determining authority must not carry out, or grant an approval to carry out, an activity on land that is in the locality of a marine park or an aquatic reserve in purported compliance with Part 5 of the [Environmental Planning and Assessment Act 1979](#) unless—
 - (a) the determining authority has taken into consideration the purposes of marine parks or aquatic reserves, the regulations and any advice given to it by the relevant Ministers on the impact on the marine park or aquatic reserve of the carrying out of an activity in the locality, and
 - (b) if the determining authority is of the opinion that the proposed activity is likely to have an effect on the plants or animals within the marine park or aquatic reserve or their habitat, the determining authority has consulted with the relevant Ministers.

In accordance with s56 of the MEM Act, (1) and (2) above are considered in section 5.4 of this assessment.



2.2.3 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) aims to avoid, minimise and offset impacts on biodiversity from development and conserve biodiversity at a bioregional and state scale. It lists threatened species, populations and ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats.

The likelihood of occurrence of threatened species previously recorded in the locality is provided in Appendix B. Those threatened species with a moderate or higher likelihood of occurrence based on habitat features, were targeted during surveys. Recorded species or species assumed to be present (due to inadequate survey) were considered in an assessment of significance of impact (Appendix C). A summary of impacts is provided in section 5).

2.3 SEPPs

2.3.1 Resilience and Hazards SEPP 2021

The State Environmental Planning Policy (SEPP) Resilience and Hazards (formerly SEPP Coastal Management), gives effect to the objectives of the Coastal Management Act 2016 from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone.

Detailed interactive maps accompany the SEPP and were reviewed for the *Subject Site*.

The *Subject Site* is within the *Coastal Environment Area* and the *Coastal Use Area* (Figure 2-3). The impacts of the proposal on these coastal areas are considered further in section 5.5.

2.3.2 Biodiversity and Conservation SEPP 2021

Chapter 4 of Biodiversity and Conservation SEPP 2021 aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

Chapter 4 Koala Habitat Protection is considered in section 5.5 to ensure protection of Koalas.

Specifically, this assessment considers if the *Subject Site*:

1. *includes any trees belonging to the koala use tree species listed in Schedule 3 for the relevant koala management area?*

Shoalhaven City Council falls under the South Coast koala management area. No trees within the subject site are listed as primary feed trees on schedule 3 of the SEPP:

2. *Is the land core koala habitat*

core koala habitat means

(a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or

(b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

There are no past records of koalas within the *subject site* nor are there any past records on BioNet within the 10 x 10 km search area (locality), however they are listed as known to occur on the PMST for this area

The *subject site* and the broader locality, are not mapped as being within the NSW Koala Prioritization Project - Areas of Regional Koala Significance (ARKS) and there was no evidence of breeding females or a resident population within the *subject site*.

The *subject site* does not contain suitable koala habitat as there are no schedule 3 trees on the site.

3. *If the proposal is likely to have an impact on koalas or koala habitat, a koala assessment report must be prepared by a suitably qualified and experienced person, and should consider the likely and potential impacts of the development on koalas or koala habitat and the proposed management of those impacts*

The *subject site* does not provide core koala and it is unlikely to provide important foraging habitat. Therefore, the proposal is unlikely to have an impact on koalas or important koala habitat. No further assessment is required for impacts to this species.



2.4 Policy and guidelines

Policy and guidelines utilised for the assessment are discussed in the following sections.

2.4.1 Policy and Guidelines for Fish Habitat Conservation and Management

The *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) outlines policies and guidelines aimed at maintaining and enhancing fish habitat for the benefit of native fish species, including threatened species, in marine, estuarine and freshwater environments. It is applicable to all planning and development proposals and various activities that affect aquatic ecosystems in NSW.

One of the key objectives of the FM Act is to conserve KFH. KFH's are defined in the policy and guidelines to include all marine and estuarine habitats up to highest astronomical tide level (that reached by 'king' tides) and most permanent and semi-permanent freshwater habitats including rivers, creeks, lakes, lagoons, billabongs, weir pools and impoundments up to the top of the bank. Small headwater creeks and gullies (known as first and second order streams), that only flow for a short period after rain are generally excluded, as are farm dams constructed on such systems. Wholly artificial waterbodies such as irrigation channels, urban drains and ponds, salt and evaporation ponds are also excluded except where they are known to support populations of threatened fish or invertebrates.

The Department of Primary Industries (DPI) assess activity and development proposals in relation to consideration for the 'sensitivity' of the affected fish habitat. In this context, 'sensitivity' is defined by the importance of the habitat to the survival of fish and ability to withstand disturbance.

As discussed in section 2.2.1, the unnamed watercourse crossing the subject site is a 1st order watercourse under the Strahler ordering system, which are not included as KFH. As such, no further assessment is required regarding the type of KFH present.

In addition, 'Key Fish Habitat' maps have been compiled by NSW DPI on the basis of local government areas. The Subject Site is not defined as Key Fish Habitat (Figure 2-1).

2.4.2 Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings

Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge, 2003) provides guidelines for the planning, design, construction and maintenance of watercourse crossings aimed at minimising impacts on fish passage and aquatic biodiversity. The guidelines outlines types of potential impacts from instream structures and subsequently provides guidance on suitable crossing structures to avoid barriers to fish passage.

DPI considers proposals in relation to habitat sensitivity type and also waterway class. The waterway classification scheme has been adapted from Fairfull and Witheridge (2003) and factors in the functionality of the waterway as fish habitat (Table 2-1). Watercourses are classified using indicators such as:

- hydraulic geometry (stream shape and size),
- frequency of stream flows (perennial, intermittent or ephemeral),
- presence of aquatic habitat units (pools, riffles, vegetation, snags),
- presence of threatened or protected fish species and other native fish, and
- connection to adjacent habitats (e.g. floodplain wetlands).

Waterway class can be used to assess the impacts of certain activities on fish habitats in conjunction with the habitat sensitivity type. The waterway class scheme can also be used to make management recommendations to minimise impacts on different fish habitats.

Table 2-1. Classification of waterways for fish passage (Fairfull & Witheridge, 2003)

Classification	Characteristics of waterway class	Minimum Recommended Crossing type [1]
Class 1 Major key fish habitat	Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (e.g. river or major creek), habitat of a threatened or protected fish species or 'critical habitat'.	Bridge, arch structure or tunnel
Class 2 Moderate key fish habitat	Non-permanently flowing (intermittent) stream, creek or waterway (generally named) with clearly defined bed and banks with semi-permanent to permanent waters in pools or in connected wetland areas. Freshwater aquatic vegetation is present. TYPE 1 and 2 habitats present.	Bridge, arch structure, culvert [2] or ford.
Class 3 Minimal key fish habitat	Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (e.g. fish, yabbies). Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other CLASS 1-3 fish habitats.	Culvert [3] or ford

Classification	Characteristics of waterway class	Minimum Recommended Crossing type [1]
Class 4 Unlikely key fish habitat	Waterway (generally unnamed) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free standing water or pools post rain events (e.g. dry gullies or shallow floodplain depressions with no aquatic flora present).	Culvert [4], causeway or ford

The unnamed watercourse is best defined as Class 2 as it has areas of aquatic refuge, defined bed and banks, riparian vegetation and macrophytes. The minimum requirements are a bridge, culvert or ford. The proposed bridge meets the requirements of the minimum recommended crossing type.

3. Methods

3.1 Personnel

The contributor to the preparation of this report, their qualifications and roles are provided in Table 3-1.

Table 3-1: Personnel

Name	Role	Qualifications
Dr Kristy McQueen	Principal Ecologist – Field survey, report preparation, data management, map preparation, technical review, data entry and impact assessment.	– Doctor of Philosophy (PhD) – Marine Science, University of Newcastle – Bachelor of Science and Mathematics (1st class honours), University of NSW – Accredited BAM assessor BAAS 18068 – Advanced Plant Identification, University of NSW and Australian Museum – Australian River Assessment System (AusRivAS) Accreditation, University of Canberra – Native Plant Identification, Ryde TAFE

3.2 Background research

The aim of the background research is to review information on the presence or likelihood of occurrence of:

- Threatened terrestrial and aquatic species and their habitat
- Threatened ecological communities
- Important habitat for migratory species
- Areas of outstanding biodiversity value.

These results informed the identification of appropriate field survey effort and the groups likely to occur.

Records of threatened species, populations and ecological communities known or predicted to occur in the locality of the proposal were obtained from a range of databases as detailed in Table 3-2.

A search area of 10 km x 10 km was used for database searches (locality) and preliminary listings under the BC Act and the EPBC Act were considered. Threatened flora and fauna records from the 10 km x 10km BioNet Atlas database search are shown on Figure 3-2 and Figure 3-3 respectively.

Table 3-2: Database searches undertaken

Database	Search date	Area searched	Reference
Bionet Atlas of NSW Wildlife	25/06/2024	10 km x 10 km (North: -33.27 West: 151.38 East: 151.48 South: -33.37) Records < 20 years	NSW Department of Planning and Environment, https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet
BioNet Vegetation Classification database	25/06/2024	N/A	NSW Department of Planning and Environment, https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet
Aquatic threatened species list	25/06/2024	N/A	Department of Primary Industries (DPI) https://www.dpi.nsw.gov.au/fishing/threatened-species/what-current
Protected Matters Search Tool – searched	25/06/2024	10 km radius Filtered Presence – known (excluding marine fish and turtle species)	Department of Climate Change, Energy, the Environment and Water (DCCEEW) https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool
SEED Intersection Tool	25/06/2024	Landscape assessment area	The Central Resource for Sharing and Enabling Environmental Data in NSW https://geo.seed.nsw.gov.au/PublicViewer/index.html?viewer=PublicViewer&locale=en-AU
Fisheries Spatial Data Portal for: - Key Fish Habitat - Threatened aquatic species distributions - Coastal management areas identified by the Resilience and Hazards SEPP 2022	25/06/2024	Locality	NSW DPI https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=FisheriesDataPortal
State Vegetation Type Map	25/06/2024	Revised Plant Community type (PCT) classifications for eastern NSW (coast and tablelands bioregions)	NSW DPE Current Release C1.1.M1.1 (December 2022) https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map
Commonwealth Atlas of Groundwater Dependent Ecosystems (GDE)	25/06/2024	Locality	GDE Atlas Map: Water Information: Bureau of Meteorology (bom.gov.au)
National Flying-fox monitoring viewer	25/06/2024	Locality	Department of Agriculture, Water and the Environment https://www.environment.gov.au/web-gis-framework/apps/ffc-wide/ffc-wide.jsf
Core Koala Habitat identified by the Biodiversity and Conservation SEPP 2022 Koala Likelihood of occurrence mapping	25/06/2024	NSW	https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=KoalaSEPP.htm5

3.2.1 Stream order mapping

The Strahler ordering system (Strahler, 1952), as described in NSW Government Gazette no. 37 on 24 March 2006 was used to characterise the watercourses within the subject site.

The Strahler ordering system is a hierarchical numbering system based on the degree of branching within a watercourse and provides an indication of the complexity of a creek system. For the purposes of this order, watercourses are deemed to be continuous even if they lose definition and then reappear downstream. The methodology used is as follows:

- Starting at the top of a catchment, any watercourse which has no other watercourses flowing into it is classed as a first order stream (1).
- Where two first order streams join, the stream becomes a second order stream (2).
- If a second order stream is joined by a first order stream - it remains a second order stream.
- When two second order streams join, they form a third order stream (3).
- A third order stream does not become a fourth order stream until it is joined by another third order stream and so on.

The Strahler stream order of the unnamed watercourse in the subject site is a 1st order watercourse (Figure 2-1).

3.3 Vegetation assessment

3.3.1 Vegetation mapping

Native vegetation is defined as follows (section 1.6 of the BC Act and Part 5A 60B of the LLS Act):

(1) For the purposes of this Part, **native vegetation** means any of the following types of plants native to New South Wales—

- (a) trees (including any sapling or shrub or any scrub),
- (b) understorey plants,
- (c) groundcover (being any type of herbaceous vegetation),
- (d) plants occurring in a wetland.

(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.

(3) For the purposes of this Part, native vegetation extends to a plant that is dead or that is not native to New South Wales if—

- (a) the plant is situated on land that is shown on the native vegetation regulatory map as category 2-vulnerable regulated land, and
- (b) it would be native vegetation for the purposes of this Part if it were native to New South Wales.

Vegetation that does not meet this definition is defined as disturbed.

Revised Plant Community type (PCT) classifications for eastern NSW (coast and tablelands bioregions) have been used to inform the survey effort prior to field surveys. The State Vegetation Mapping defined the *subject site* as

- PCT O: Not Classified
- PCT 4049 South Coast Floodplain Grassy Swamp Forest (Figure 3-1).

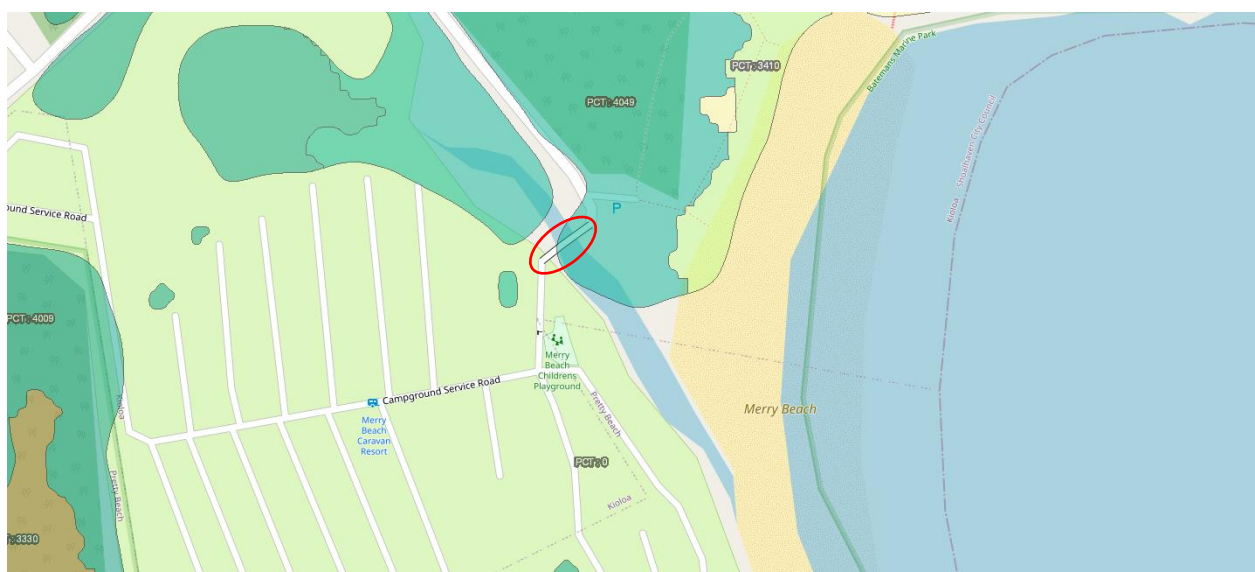


Figure 3-1. NSW State Vegetation Type Map

3.4 Vegetation survey and classification

Field surveys were undertaken within the *subject site* on 23 & 24 June 2024 using the following techniques:

Random meander surveys are a variation of the transect type survey and were completed in accordance with the technique described by Cropper (1993), whereby the recorder walks in a random meander throughout the *Subject site* recording dominant and key plant species (e.g. flora species list, threatened species, priority weeds), boundaries between various vegetation communities and condition of vegetation. The area of vegetation within the subject site is small so a random meander was used during surveys. Plot based surveys were not appropriate for this assessment.

3.5 Threatened species assessment

3.5.1 Habitat suitability assessment

A habitat suitability assessment was undertaken for each threatened and/or migratory species identified from the background searches, to assess the likelihood that they occur in the subject site (Appendix B). This required identifying the likely occurrence of threatened biodiversity based on the presence, condition and type of habitat and previous records, using the likelihood of occurrence criteria provided in Appendix B. It also included consideration of age, currency and location of nearby records, presence of key habitat features/constraints and information about species populations in the area. A species was considered likely to occur where:

- The subject site contains habitat features associated with the species; or
- Past surveys undertaken at the subject site indicate that the species is present.

The habitat suitability assessment was undertaken in the *subject site* to identify habitat features and was used to determine if targeted surveys were required for threatened species. The assessment was based on information provided in the habitat profile for the species. Threatened species with moderate or higher likelihood of occurrence were subject to further assessment.

3.5.2 Targeted flora surveys

Desktop assessment identified three threatened flora species (Appendix B; Figure 3-2), of which one was considered to have moderate to high likelihood of occurrence in the *Subject site*. This section of the report details the surveys undertaken for this threatened flora species (Table 3-3). The weather at the time of surveys was mostly fine with mild temperatures and moderate winds. Surveys were undertaken following a third consecutive La Niña, which consists of above average rainfall in eastern NSW, and as such the state was not in drought.

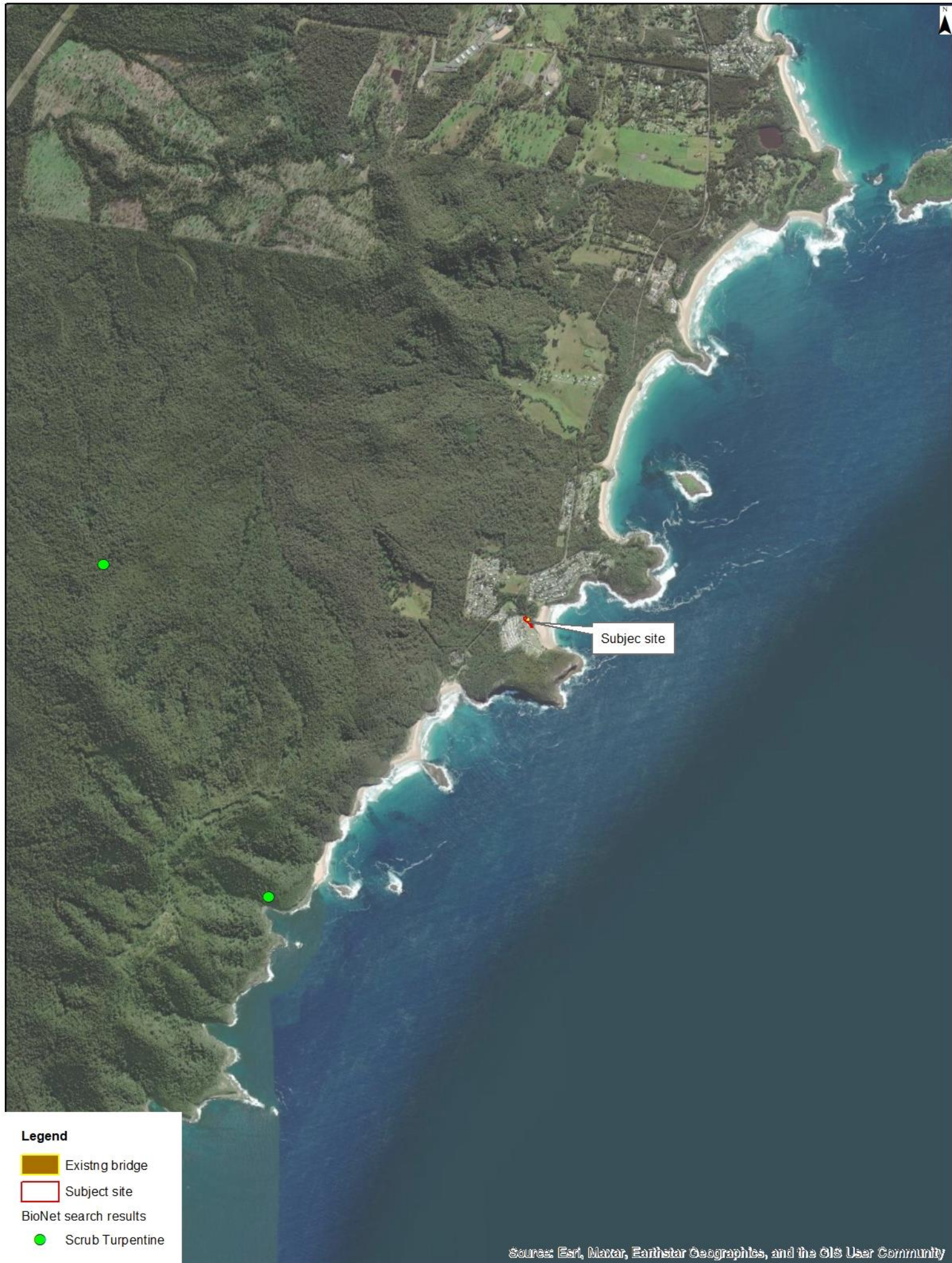
Surveys were undertaken in accordance with recommended survey guides including:

- DPIE (2020c), [Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method](#).

Table 3-3: Targeted threatened flora survey details

Scientific name	Status		Survey period	Minimum survey requirements (for 1.3 ha) (DPIE, 2020c)	Surveys completed
	State	Cth			
<i>Rhodamnia rubescens</i> Scrub Turpentine	E4A	CE	All year	Parallel field traverses (15 metres apart in open vegetation, 10 m apart in dense vegetation; DPIE, 2020c).	Yes 1 hour targeted survey on 23/06/2024.

V = Vulnerable



3.5.3 Targeted fauna surveys

Fauna Habitat Assessment

Fauna habitat assessments were undertaken to assess the likelihood of threatened fauna occurring within the proposal area. Desktop assessment identified 38 threatened fauna species and five migratory species (Appendix B; Figure 3-3), of which ten (six birds and four mammals) were considered to have moderate to high likelihood of occurrence in the *Subject site* based on fauna habitat assessments (Appendix B). The survey effort and timing for these ten species are provided in Table 3-4.

Fauna habitat characteristics assessed included:

- Structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources
- Presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, birds and reptiles
- Presence of old growth trees and or live or dead emergent trees suitable for bird (raptor) nesting
- Presence of large stick nests
- Presence of occupied nests (Gang gang cockatoo and Glossy black cockatoo)
- Presence of Flying Fox roost/breeding camps
- Presence of the ground cover vegetation, leaf litter, caves, rock outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians
- Presence of waterways (ephemeral or permanent) and water bodies
- Presence of culverts, tunnels or mines for microbat roosting.

A hand-held Garmin GPS was used to record locations of habitat features.

The following criteria were used to evaluate the condition of habitat values:

Good: A full range of fauna habitat components are usually present (for example, old-growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact;

Moderate: Some fauna habitat components are missing or greatly reduced (for example, old-growth trees and fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded; and

Low: Many fauna habitat elements in low quality remnants have been lost, including old growth trees (for example, due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive clearing.

The following survey guidelines were adhered to:

NSW survey guidelines:

- Department of Environment and Climate Change (2009) [Threatened species survey and assessment guidelines: field survey methods for fauna. Amphibians. \(nsw.gov.au\)](https://www.nsw.gov.au/protected-things/animals-and-plants/threatened-species/survey-guidelines).
- OEH (2018), ['Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method](#).
- DPIE (2020b), NSW [Survey Guide for Threatened Frogs - A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method](#).
- DPE (2022b), [Koala \(Phascolarctos cinereus\): Biodiversity Assessment Method Survey Guide | NSW Environment and Heritage](#)
- Department of Environment and Conservation [Threatened biodiversity survey and assessment - Guidelines for developments and activities \(2004 working draft\)](#).

Commonwealth survey guidelines (on the DCCEEW website):

- [Commonwealth of Australia \(2010a\), Survey Guidelines for Australia's Threatened Bats](#).
- [Commonwealth of Australia \(2010b\), Survey Guidelines for Australia's Threatened Birds](#).
- [Commonwealth of Australia \(2011b\), Survey Guidelines for Australia's Threatened Mammals](#).

Opportunistic Sightings

Opportunistic sightings of animals were recorded including diurnal birds. Evidence of animal activity such as scats, diggings, scratch marks, nests / dreys, burrows etc., was also noted where present. This provided indirect information on animal presence and activity.

Diurnal Bird Surveys

The area search is an effective method for detecting many bird species, regardless of whether the *Subject site* is small enough to permit a complete search or whether sampling of a larger site is required. Area searches involve searching a plot of predetermined size for a predetermined period of time. Each selected area is searched systematically, while stopping or moving to investigate sightings, calls or signs of presence. Area searches are the best of the random or systematic sampling methods to use to detect target species because of its easy application and flexibility of observer movement. Free movement allows the investigator to more thoroughly explore any noises, indicative signs or favoured habitat features, than other more structured searches such as transects and point counts. Also, the shape of the sample area can usually be tailored more easily to target preferred habitat compared with transect methods (Commonwealth of Australia, 2010b).

Two formal 20-minute diurnal bird area searches were completed by one ecologist during each site visit (on 23/06/24 at dusk and 24/06/24 at dawn). Bird surveys were completed by actively walking through the *Subject site* over a period of 20 minutes. All birds were identified to the species level, either through direct observation or identification of calls (Appendix A).

Habitat assessments were conducted to determine the likelihood that the proposal area might support breeding habitat for threatened bird species.

Microchiropteran Bat Surveys

Direct inspection of the underside of the bridge was conducted in search of microbat species roosting in cracks and crevices.

Ultrasonic detection using an Anabat Express bat detection was also used to record and identify the echolocation calls of microchiropterans utilising the bridge for roosting. The Anabat detector was positioned to face the underside of the bridge so roosting species can be detected leaving the bridge at dusk or re-entering at dawn. Anabat bat detector was set to record continuously overnight on the 23/06/24. This survey was not in accordance with survey guidelines as it was conducted outside of the required survey period (October to March) (DEC, 2004) and it was not for sufficient duration. However, it was undertaken to confirm presence of microbats, not to confirm absence. As such, threatened microbat species with suitable habitat in the subject site but not detected, were assumed to be present and assessed in an assessment of significance of impact in accordance with the BC Act (Appendix C).

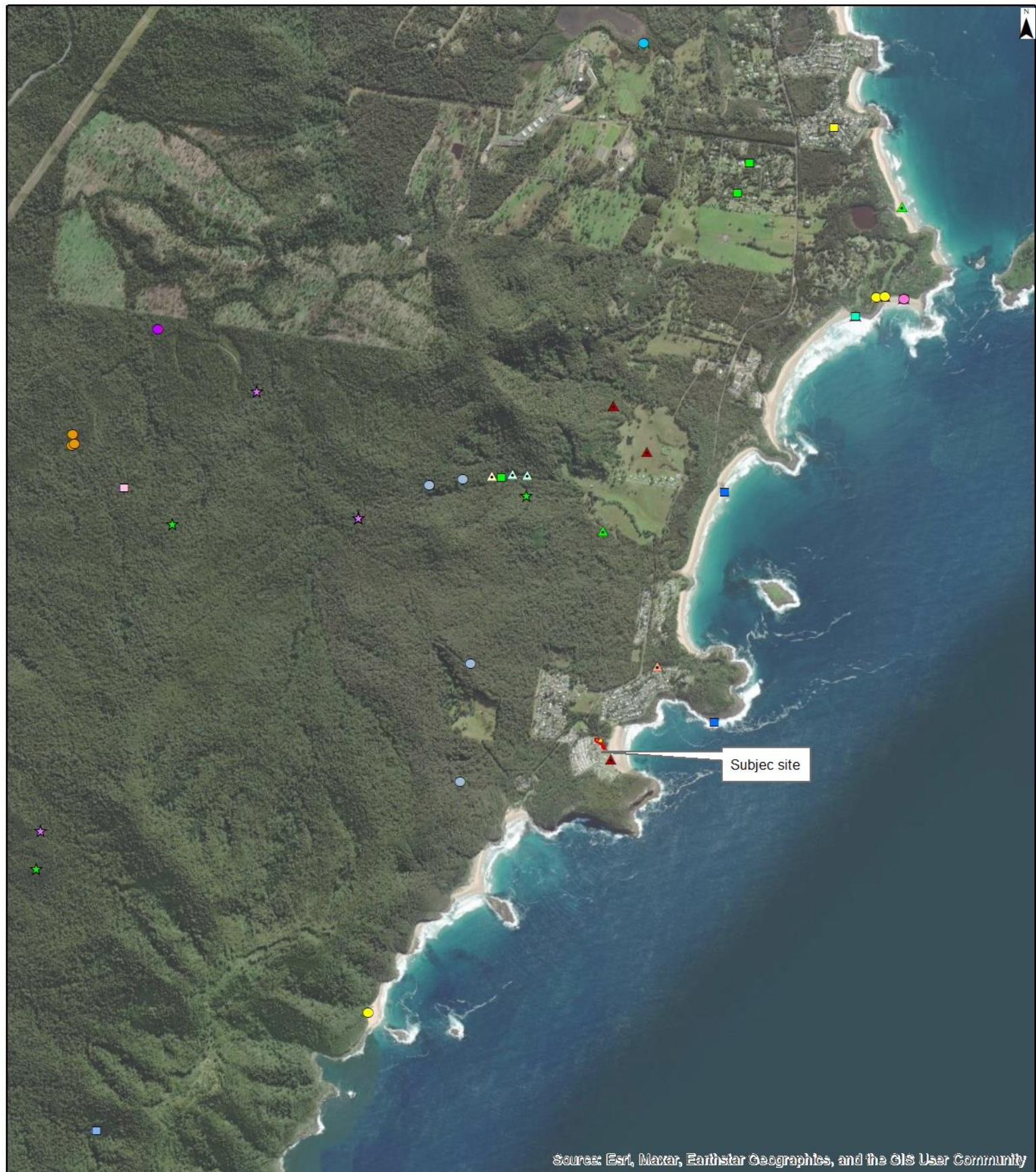
Although many microchiropteran bat species are detectable through use of Anabat call detection methodologies, the vocal differences between some species are too subtle to reliably differentiate between the various species occurring in a particular locality. The accuracy of results based on calls is recorded per species in Appendix A.

Table 3-4: Targeted threatened fauna survey details

Scientific name	Status		Survey period	Survey requirement	Survey complete?
	State	Cth			
<i>Birds</i>					
<i>Calyptorhynchus lathamii</i> South-eastern Glossy Black-Cockatoo	V,P,2		Jan - Sept	Habitat assessment to determine breeding/nesting opportunities (a) begging birds of any age or sex; or (b) lone adult males identified during the breeding season (April to August); or (c) an occupied nest. Area search < 1 ha = 20 minutes at dawn or dusk	Yes Habitat assessment 2 x 20 minute surveys conducted at dusk (23/06/24) and dawn (24/06/24).
<i>Daphoenositta chrysoptera</i> Varied Sittella	V,P		All year	Area search < 1 ha = 20 minutes at dawn or dusk	Yes 2 x 20 minute surveys conducted at dusk (23/06/24) and dawn (24/06/24).
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	V, P	C	July - Dec	Habitat assessment to detect large stick nests within 1 km of waterbodies. Area search < 1 ha = 20 minutes	Yes Habitat assessment 2 x 20 minute surveys conducted at dusk (23/06/24) and dawn (24/06/24).
<i>Hirundapus caudacutus</i> White-throated Needletail	P	C,J,K	N/A	Area search < 1 ha = 20 minutes at dawn or dusk. EPBC listed species	Yes 2 x 20 minute surveys conducted at dusk (23/06/24) and dawn (24/06/24).
<i>Ixobrychus flavicollis</i> Black Bittern	V		N/A		Yes 2 x 20 minute surveys conducted at dusk (23/06/24) and dawn (24/06/24).
<i>Pandion cristatus</i> Eastern Osprey	V,P,3	M	April - Nov	Habitat assessment to detect stick nests in trees > 15 m or artificial structures within 100 m of a floodplain for nesting. Area search < 1 ha = 20 minutes	Yes Habitat assessment 2 x 20 minute surveys conducted at dusk (23/06/24) and dawn (24/06/24).

Scientific name	Status		Survey period	Survey requirement	Survey complete?
	State	Cth			
<i>Mammals</i>					
<i>Micronomus norfolkensis</i> Eastern Coastal Free tailed Bat	V,P		Oct-Mar	Acoustic detection (4 nights x 4 hours/night)	No Surveys conducted outside of required survey period. Assumed present
<i>Myotis Macropus</i> Southern Myotis	V		Oct - March	Habitat assessment to identify habitat constraints (Waterbodies with permanent pools/stretchers 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site). Survey techniques: • Har trap or mist net (4 nights x 4 hours/night) • Acoustic detection (4 nights x 4 hours/night) • Roost search (30 min per structure)a	No Habitat assessment only. Surveys conducted outside of required survey period. Assumed present
<i>Miniopterus orianae oceanensis</i> Large Bentwing-bat	V,P		Dec - Feb	Habitat assessment for suitable roosting habitat (cave/mine/tunnel etc) One harp trap per cave/mine/tunnel (4 nights x 4 hours/night)	No Surveys conducted outside of required survey period. Assumed present
<i>Vespadelus troughtoni</i> Eastern Cave Bat	V,P		Nov - Jan	Habitat assessment to determine presence of roosting habitat (i.e. cliffs, rocky areas containing caves, overhangs or crevices, mines or tunnels) within 2 km. Survey techniques within 100m of breeding habitat: • Har trap or mist net (4 nights x 4 hours/night) • Roost search • Acoustic detection (4 nights x 4 hours/night) Radio tracking/roost search	No Habitat assessment only. Surveys conducted outside of required survey period. Assumed present

P = Protected, V = Vulnerable, M = Migratory (Species listed as being part of the bilateral migratory bird agreements with China (C), Japan (J) and Republic of Korea (K)).



Legend

Existing bridge	Diamond Firetail	Grey-headed Flying-fox	Ruddy Turnstone	Varied Sittella
Subject site	Eastern Coastal FT Bat	Masked Owl	Scarlet Robin	Wedge-tailed Shearwater
BioNet search results	Eastern Hooded Dotterel	New Zealand Fur-seal	Short-tailed Shearwater	White-bellied Sea-Eagle
Bar-tailed Godwit	Eastern Pygmy-possum	Pied Oystercatcher	Sooty Oystercatcher	White-footed Dunnart
Caspian Tern	Gang-gang Cockatoo	Powerful Owl	Southern Myotis	Yellow-bellied Glider

4. Existing Environment

The *Subject Site* occurs within the Sydney Basin IBRA region. IBRA bioregions are large, geographically distinct areas of land with common characteristics, such as climate, geology, landforms and ecosystems. The Sydney Basin bioregion features a shale/clay basin surrounded by sandstone plateau as well as rolling hills and coastal alluvial plains. It also exhibits some of the highest levels of species diversity in Australia largely because of the variety of rock types, topography and climates in the bioregion. The IBRA bioregions are further refined into subregions which are more localised and geomorphologically uniform. The proposal location is within the Jervis sub-region (Figure 1-1).

The nearest national park is Murramarang National Park to the east of the *Subject Site* (Figure 1-1). The Mitchell Landscapes were mapped in 2002 using a combination of land systems in the west of NSW and geology and a Digital Elevation Model (DEM) in the east of NSW. Mitchell Landscape of the *Subject Site* is Wandandian Coastal Plains (Figure 1-1). This is described as:

Undulating slopes and wide flat valleys with dendritic drainage on horizontal Permian lithic sandstone and pebbly siltstone, general elevation 20 to 80m, local relief <30m. Yellow and yellow-red deep texture-contrast soils with bleached topsoils and harsh clay subsoil. Open forest of spotted gum (Corymbia maculata), forest oak (Allocasuarina torulosa) with extensive macrozamia (Macrozamia sp.) and blady grass (Imperata cylindrica) understorey. Freshwater reed (Phragmites australis) swamps on wider valley floors, merging down valley with swamp oak (Casuarina glauca) communities especially in brackish water of estuaries where organic sands and mud support grey mangrove (Avicennia marina) and limited saltmarsh.

4.1 Plant community types

Most of the subject site consists of disturbed areas dominated by lawn grasses, with only a small portion (approximately 8 m²) of native vegetation present. This vegetation is consistent with the NSW State Vegetation mapping PCT 4049 South Coast Floodplain Grassy Swamp Forest, in that the canopy consists of Swamp Oak *Casuarina glauca*, Coastal Banksia *Banksia integrifolia*, Cheese Tree *Glochidion ferdinandi* and Bangalay *Eucalyptus botryoides*, the shrub layer consists of Sweet Pittosporum *Pittosporum undulatum*, Coffee Bush *Breynia oblongifolia*, Flax-leaved Paperbark *Melaleuca linariifolia* and Brush Muttonwood *Myrsine howittiana* and the lower stratum consists of Common Couch *Cynodon dactylon*, Tall Saw-sedge *Gahnia clarkei*, Sea Rush *Juncus kraussii* subsp. *australiensis*, Spiny-headed Mat-rush *Lomandra longifolia* and *Schoenoplectus subulatus*. A full species list is provided in Appendix A

PCT 4049 South Coast Floodplain Grassy Swamp Forest is described by the BioNet Vegetation Classification as:

A tall grassy open forest of low-lying slightly saline sites on coastal floodplain margins and headland soaks of the southern Sydney Basin and northern South East Corner bioregions. This PCT is distributed between Narooma and Wollongong at elevations of 2-25 metres asl in areas receiving 1000-1350 mm mean annual rainfall, commonly on organic-rich sandy clay alluvium. A mid-dense to dense tree canopy is commonly dominated by Casuarina glauca, occasionally with Eucalyptus longifolia, above a stratum of scattered small trees with occasional Melaleuca ericifolia or Melaleuca linariifolia. Smaller shrubs very frequently include Pittosporum undulatum, with Leucopogon juniperinus common and occasional patches of Kunzea ambigua. The ground layer is dominated by grasses and graminoids, commonly with Oplismenus imbecillis, Entolasia marginata, Microlaena stipoides, Echinopogon caespitosus, and tall Lomandra longifolia, Gahnia clarkei, Dianella caerulea and Carex longibrachiata. The vines Parsonsia straminea, Polymeria calycina and Glycine clandestina are also common, as are soft forbs Lobelia purpurascens, Dichondra repens, Viola hederacea, Hydrocotyle sibthorpioides and Lagenophora stipitata. This community may grade into PCT 4028 in nearby slightly lower, wetter parts of floodplains, and into PCT 4040 in more saline and permanently waterlogged areas.

Within the subject site, PCT 4049 occurs only along the edge of the unnamed watercourse on the northern side of the bridge (Figure 4-1; Plate 4.1 & Plate 4.2). This vegetation has been previously cleared within the subject site, and now consists of approximately 8 m² of regrowth vegetation or as cleared areas covered with exotic lawn species.

A summary of the legal status of the vegetation present, and the amount within the subject site is provided in Table 4-1.

Table 4-1: Plant community types and legal status

Plant community type (PCT)	Threatened ecological community	Area in Subject Site (m ²)
PCT 4049 South Coast Floodplain Grassy Swamp Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community (BC Act) Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community Endangered Ecological Community (EPBC Act)	8 m ²
Disturbed	N/A	1,589 m ²



Plate 4.1. PCT 4049 South Coast Floodplain Grassy Swamp Forest – Disturbed in subject site (north-western side)



Plate 4.2. PCT 4049 South Coast Floodplain Grassy Swamp Forest – Disturbed in subject site (north-eastern side)

4.2 Threatened ecological communities

PCT 4049 South Coast Floodplain Grassy Swamp Forest falls under the definition of the following two endangered ecological communities (EECs):

- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community (BC Act)
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community Endangered Ecological Community (EPBC Act)

4.2.1 Swamp Oak Floodplain Forest (BC Act)

The Swamp Oak Floodplain Forest EEC is described as (NSW Scientific Committee, 2011):

“Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community 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. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. Bioregions. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. Typically these forests, woodlands, scrubs and reedlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.

The subject site occurs close to the ocean and alongside a watercourse connecting to the ocean. As such, it is coastal, saline, and periodically inundated. It is dominated by woodland in the broader context, and reedlands within the subject site, all of which is consistent with the EEC.

*“Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions 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 (Keith and Bedward 1999). The understory is characterised by frequent occurrences of vines, *Parsonsia straminea* (common silkpod), *Geitonoplesium cymosum* (scrambling lily)*

and *Stephania japonica* var. *discolor* (snake vine), a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter. The composition of the ground stratum varies depending on levels of salinity in the groundwater. Under less saline conditions prominent ground layer plants include forbs such *Centella asiatica* (pennywort), *Commelina cyanea*, *Persicaria decipiens* (slender knotweed) and *Viola banksii*; graminoids such as *Carex appressa* (tussock sedge), *Gahnia clarkei* (a saw-sedge), *Lomandra longifolia* (spiny-headed mat-rush), *Oplismenus imbecillis*; and the fern *Hypolepis muelleri* (batwing fern). On the fringes of coastal estuaries, where soils are more saline, the ground layer may include the threatened grass species, *Alexfloydia repens*, as well as *Baumea juncea*, *Juncus kraussii* subsp. *australiensis* (sea rush), *Phragmites australis* (common reed), *Selliera radicans* and other saltmarsh species. The composition and structure of the understorey is also influenced by grazing history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic grasses, vines and forbs.”

The *subject site* has been modified though past clearing however dominant species *C. glauca*, *E. botryoides*, *B. integrifolia* and *G. ferdinandi* are present in the *subject site* and are consistent with the EEC.

In summary, PCT 4049 South Coast Floodplain Grassy Swamp Forest within the subject site falls under the definition of the Swamp Oak Floodplain Forest EEC based on species composition, soil type, landform, elevation and known distribution.

4.2.2 Coastal Swamp Oak (*Casuarina glauca*) Forest (EPBC Act)

To meet the Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland EEC listing under the EPBC Act, the following key diagnostic features are required (DAWE 2018):

Occurs from south-east Queensland to southern NSW within the South Eastern Queensland, NSW North Coast, Sydney Basin, or South East Corner bioregions.

Occurs in coastal catchments at elevations up to 50 m ASL, typically less than 20 m ASL, on coastal flats, floodplains, drainage lines, lake margins, wetlands and estuarine fringes where soils are at least occasionally saturated, water-logged or inundated. There are also minor occurrences on coastal dune swales or flats, particularly deflated dunes and dune soaks.

Occurs on soils derived from unconsolidated sediments (including alluvium), typically hydrosols (grey-black clay-loam and/or sandy loam soils) and sometimes organosols (peaty soils). It may occur in transitional soils (or catenas) where shallow unconsolidated sediments border lithic substrates.

Has an open woodland, woodland, forest, or closed forest structure, with a tree canopy that has a total crown cover of at least 10 per cent.

Has a canopy of trees dominated by *Casuarina glauca* (swamp-oak, swamp she-oak).

Typically occurs where groundwater is saline or brackish.

Typically occurs within 30km of the coast, but in some areas, such as along tidal river catchments, the ecological community can occur more than 100km inland.

Does not occur on rocky headlands, sea cliffs or other consolidated sediments.

The vegetation within the subject site meets these key diagnostic features.

DAWE (2018) provides a condition and threshold matrix designed to determine the relative importance of each patch of Coastal Swamp Oak (*Casuarina glauca*) Forest. This matrix is centered on the size of the patch, its connection with other patches, and the proportion of native vs exotic plant species it supports. The best patches (Class A) are large in size (>5 ha) and comprise >80 % native species cover. Small patches (0.5-2 ha) with <50 % exotic species cover, medium patches (2-5 ha) or small contiguous patches with <50 % exotic species cover, and large patches (>5 ha) with <80 % exotic species cover are the minimum allowable condition (Class C) recognised as forming part of the Coastal Swamp Oak (*Casuarina glauca*) Forest. Small patches (<0.5 ha) do not form part of this EEC at the Commonwealth level, irrespective of exotic species extent.

In summary, PCT 4049 within the *Subject Site* is defined as Class C as it is part of a medium patch (between 2-5 ha) and has a mostly native understorey (> 50%).



4.3 Habitat Assessment

The existing bridge within the subject site provides habitat for species of microbats that show preference for roosting under structures and/or over water.

Within PCT 4049, the vegetation is stunted regrowth only. As such, the subject site does not contain any mature vegetation suitable for the construction of stick nests by threatened birds of prey (White-bellied Sea Eagle or Eastern Osprey) nor does it contain trees with hollows for breeding or nesting habitat by hollow dependant species such as threatened forest owls, gliders or some species of microbats listed under the BC Act or EPBC Act.

The subject site does provide habitat for amphibians, however it is not suitable for any threatened amphibians listed under the BC Act or EPBC Act. The grassy lawn is utilised by aquatic/intertidal bird species such as Eurasian Cootes, Australian Wood ducks and White-faced herons along with regular grazing by Eastern Grey Kangaroos.

The *subject site* is not defined as Key Fish Habitat under the DPI Policy and guidelines for fish habitat conservation and management (update 2013) and it is considered unlikely to provide habitat for threatened aquatic species listed under the FM Act.

4.4 Threatened terrestrial species

Results of targeted threatened species surveys are provided in Table 4-2. Surveys identified a total of 22 flora species and 23 fauna species (Appendix A). No threatened flora species were recorded within the subject site during surveys.

One threatened bird species was identified during surveys:

1. Black Bittern *Ixobrychus flavicollis*

Three species of microbats were identified during surveys however only one was a 'probable' record while the other two were 'possible' records based on call sequence and frequency (refer Appendix A for further discussion):

2. Eastern Coastal Free-tailed Bat (Probable) *Micronomus norfolkensis*#
3. Large Bent-winged Bat (Possible) *Miniopterus orianae oceanensis*#
4. Eastern Cave Bat (Possible) *Vespadelus troughtoni*#

In addition, due to surveys being conducted outside of the required period, an additional microbat is also assumed to be present:

5. Southern Myotis *Myotis Macropus*

All five threatened fauna species have been assessed in accordance with the [Threatened Species Test of Significance Guidelines](#) as required under the BC Act. None of these species are listed under the EPBC Act.

Table 4-2: Threatened species surveys results

Scientific name	Status		Identification type	Results
	State	Cth		
<i>Rhodamnia rubescens</i> Scrub Turpentine	E4A	CE	Not recorded	This species was not recorded during targeted surveys undertaken during the species optimal survey period. As such, it has a low likelihood of occurring in the subject site and no further assessment has been undertaken.
<i>Birds</i>				
<i>Calyptorhynchus lathami</i> South-eastern Glossy Black-Cockatoo	V,P,2		Not recorded	This species was not recorded during targeted surveys undertaken during the species optimal survey period. As such, it has a low likelihood of occurring in the subject site and no further assessment has been undertaken.
<i>Daphoenositta chrysoptera</i> Varied Sittella	V,P		Not recorded	This species was not recorded during targeted surveys undertaken during the species optimal survey period. As such, it has a low likelihood of occurring in the subject site and no further assessment has been undertaken.
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	V, P	C	Not recorded	This species was not recorded during targeted surveys undertaken during the species optimal survey period and there was no suitable nesting habitat in the subject site. As such, this species has a low likelihood of occurring in the subject site and no further assessment has been undertaken.
<i>Hirundapus caudacutus</i>	P	C,J,K	Not recorded	This species was not recorded during targeted surveys undertaken during the species optimal survey period. As such,

Scientific name	Status		Identification type	Results
	State	Cth		
White-throated Needletail				it has a low likelihood of occurring in the subject site and no further assessment has been undertaken.
<i>Ixobrychus flavicollis</i> Black Bittern	V		Recorded	Recorded
<i>Pandion cristatus</i> Eastern Osprey	V,P,3	M	Not recorded	This species was not recorded during targeted surveys undertaken during the species optimal survey period and there was no suitable nesting habitat in the subject site. As such, this species has a low likelihood of occurring in the subject site and no further assessment has been undertaken.
<i>Mammal</i>				
<i>Micronomus norfolkensis</i> Eastern Coastal Free tailed Bat	V,P		Recorded	This species was recorded using ultrasonic detection and the call is unlikely to be confused with another species. This species has been assessed using a test of significance (Appendix C).
<i>Myotis Macropus</i> Southern Myotis	V		Assumed present	There is potential roosting habitat under the bridge for this species. This species was not detected using ultrasonic detection and was not observed during direct inspections of the underside of the bridge. However, as survey was outside of the optimal survey period and microbats can be difficult to detect as they are small and roost in small crevices the species is assumed to be present. This species has been assessed using a test of significance (Appendix C).
<i>Miniopterus orianae oceanensis</i> Large Bentwing-bat	V,P		Recorded (possible record only)	This species was recorded using ultrasonic detection however it is difficult to distinguish the call from <i>V. regulus</i> . This species has been assumed present and assessed using a test of significance (Appendix C).
<i>Vespadelus trouhntoni</i> Eastern Cave Bat	V,P		Recorded (possible record only)	This species was recorded using ultrasonic detection however it is difficult to distinguish the call from <i>V. vulturnus</i> . This species has been assumed present and assessed using a test of significance (Appendix C).

4.5 Groundwater dependent ecosystems

The Bureau of Meteorology's GDE Atlas (BOM, 2024) provides the following groundwater dependent ecosystem definitions:

- Aquatic ecosystems that rely on the surface expression of groundwater – this includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands and springs.
- Terrestrial ecosystems that rely on the subsurface presence of groundwater – this includes all vegetation ecosystems.
- Subterranean ecosystems – this includes cave and aquifer ecosystems.

Based on these definitions, GDEs explicitly include any ecosystem that uses groundwater at any time or for any duration to maintain its composition and condition.

GDEs can rely on groundwater for the maintenance of some or all their ecological functions. This dependence on groundwater can be variable, ranging from partial and infrequent dependence, ie. seasonal or episodic, to total, continual dependence however it is often difficult to determine the nature of this dependence (Serov et al, 2012 and references therein).

PCT 4049 is consistent with the GDE classifications for groundwater dependent wetlands (coastal floodplain swamps) in Appendix 2, Table 1 of the *Risk assessment guidelines for groundwater dependent ecosystems* (Serov et al. 2012), thus this PCT is likely to be dependent on groundwater. Vegetated parts of the *Subject Site* are mapped as low potential terrestrial GDE on the GDE atlas (Figure 4-2). As the hydrology within the *Subject site* is likely influenced by overland water flows, it is defined here as having a 'facultative' dependence on groundwater. Facultative GDEs require groundwater in some locations but not in others, particularly where an alternative source of water can be accessed to maintain ecological function (Serov et al, 2012 and references therein).

Potential impacts of the proposal on this GDE are considered in section 5.1.6.

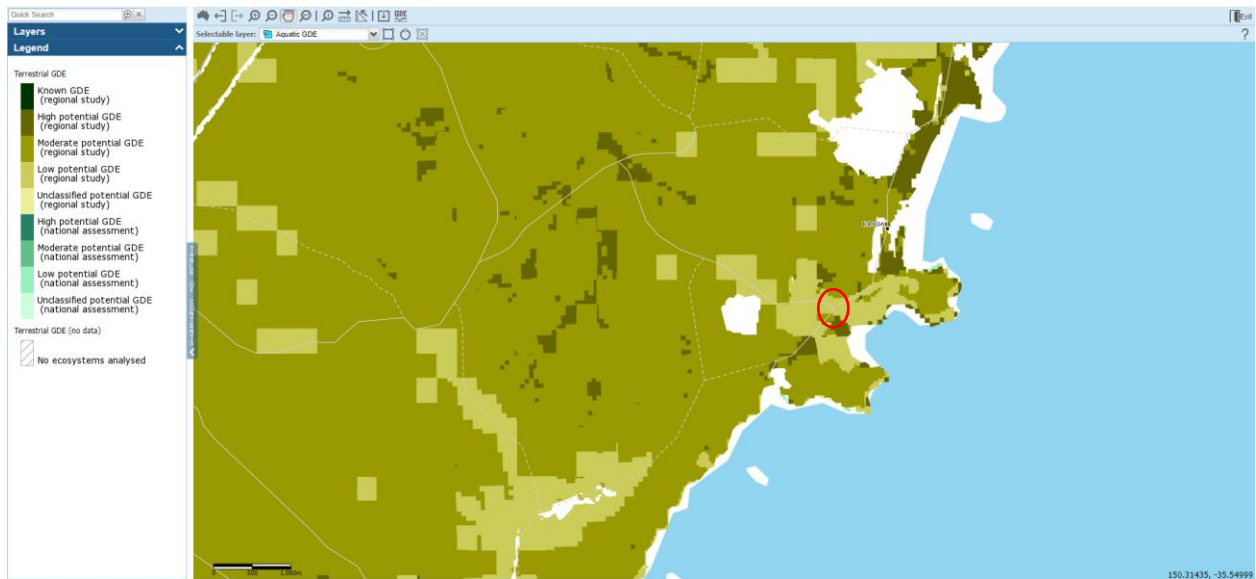


Figure 4-2. Groundwater Dependent Ecosystem (GDE) mapping (BOM)

4.6 Aquatic Results

The unnamed watercourse within the subject site is a 1st order watercourse under the Strahler system of stream classification and is not mapped by DPI Fisheries as KFH. As such, it is not defined as KFH for the purpose of this assessment and therefore does not require a permit for dredging and reclamation under part 7 of the FM Act.

The riparian vegetation on the northern side of the unnamed watercourse consists of PCT 4049, with lower middle and upper stratum species present. The southern side of the watercourse consists of emergent macrophytes only such as Sharp Rush *J. acutus* (exotic), Sea Rush *J. kraussii* and *Schoenoplectus subulatus* (Plate 4.3). Within the subject site, the riparian zone is highly modified from past disturbance from the construction of the existing bridge, resulting in regrowth of a few native species only, including Swamp Oak *C. glauca* and Flax-leaved Paperbark *M. linariifolia* (Plate 4.1 and 4.2).

No marine vegetation as defined by the FM Act (i.e. seagrass, saltmarsh or mangroves) occur within the subject site. The unnamed watercourse flows into the ocean however where it crosses the beach berm, it was less than 20 cm in depth at the time of sure. It is likely only to be connected to the ocean for fish passage during high tide events, high swell events and or following heavy rainfall. No fish species were observed within the watercourse during the site visit, however no trapping or targeted surveys within the creek were undertaken for this assessment. The depth of the water under the bridge was approximately 0.6 m, and the height of the bridge over the top of the water was approximately 0.9 m at the time of the site visit.

Following review of relevant databases, the subject site does not provide habitat for any aquatic threatened species listed under the FM Act (Appendix B). As such, no further assessment is required.

The subject site is not mapped on the acid sulfate soils risk mapping (Figure 4-3) and the substrate was sandy, indicating that the risk of exposing acid sulfate soils is low.



Plate 4.3. Aquatic habitat and riparian vegetation



Figure 4-3. Acid sulfate soil risk mapping (Source: Seed map)

4.7 Wildlife connectivity corridors

The *Subject Site* is bound by Merry Beach Road and Ingenia Holiday Park. The road is a minor road and does not limit fauna movement for more mobile species. As such, the subject site has partial connectivity to a large track of native vegetation that extends to the Murramarang National Park. The holiday park is a partial barrier to movement to the south for some less mobile fauna species.

The subject site is located at the southern boundary of the remnant patch of bushland and represents the southern end of the existing corridor.

4.8 Matters of national environmental significance

The impact of the proposal on MNES requires consideration in accordance with the EPBC Act.

A search of the EPBC Protected Matters Search Tool was completed for an area within 10 km of the *subject site* on 26/06/2024. A summary of results from database searches are provided in Table 4-3.

Table 4-3. Summary of Matters of National Environmental Significance within a 10 km radius of the proposal footprints (Protected Matters Search Tool)

MNES	Within 10 km radius
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Importance	None
Nationally Important Wetlands	Five: 1. Cormorant Beach 2. Durras Lake 3. Swan Lagoon 4. Meroo Lake Wetland Complex 5. Termeil Lake Wetland Complex
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Listed Endangered Ecological Communities (EEC's)	8 EECS: 1. Illawarra and south coast lowland forest and woodland ecological community (CE) 2. Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland Ecological Community (E) 3. River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (CE) 4. Illawarra-Shoalhaven Subtropical Rainforest of the Sydney Basin Bioregion (CE) 5. Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (CE) 6. Araluen Scarp Grassy Forest (E) 7. Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (E) 8. Lowland Grassy Woodland in the South East Corner Bioregion (CE)
Listed Threatened Species	94 (refer Annexure B)
Listed Migratory Species	59 (refer Annexure B)

No threatened or migratory species listed under the EPBC Act were determined to have a moderate or high likelihood of occurring within the subject site and no further assessment is required (Appendix B).

One EEC listed under the EPBC Act (Figure 4-1) was recorded with the *Subject site*:

- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland Ecological Community (E)

Sections 4.2.2 discuss the relationship between vegetation on the subject site and this EEC. In summary, the patch of PCT 4049 South Coast Floodplain Grassy Swamp Forest within the *subject site* is part of a medium patch (between 2-5 ha) and has a mostly native understorey (> 50%). It is therefore a Class C and meets the criteria for Coastal Swamp Sclerophyll Forest EEC under the EPBC Act.

The impact of the proposal on this EEC is considered in Appendix D and summarized in section 5.3.

5. Impact Assessment

Biodiversity values identified in this report that have not been avoided include:

- Clearing 8 m² of Swamp Oak Floodplain Forest EEC (BC Act and EPBC Act)
- Potential roosting habitat for Southern Myotis *Myotis macropus*:
- Direct impacts to a small area (8 m²) of potential foraging habitat for four threatened species.

The potential impacts likely to result from the proposal are considered in detail below.

5.1 Construction direct impacts

5.1.1 Removal of native vegetation and endangered ecological community (EEC)

The proposed bridge upgrade requires direct impact to approximately 8 m² of PCT 4049 South Coast Floodplain Grassy Swamp Forest through clearing required for construction of the bridge. This PCT is consistent with the following EECs:

- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community (BC Act)
- Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community Endangered Ecological Community (EPBC Act)

5.1.2 Threatened fauna impacts

The assessment of significance of impact of the proposal on threatened species listed under the BC Act (Appendix C) concluded that the proposal is unlikely to result in a significant impact on threatened species as:

- The proposed works require only minor clearing which would not significantly impact foraging opportunities for threatened species with a moderate likelihood of occurring, and the subject site was unlikely to provide breeding or roosting opportunities for these species.
- The proposal would result in the removal of 8 m² of Swamp Oak Floodplain Forest EEC, which is already partially isolated from other patches of this EEC by roads and the holiday park and has been already impacted by exotic invasion through edge effects. Thus, the proposal is unlikely to place this EECs local occurrence at risk of extinction.

Table 5-1: Summary of direct impacts on threatened fauna and habitat

Scientific name	Status		Potential occurrence on <i>Subject Site</i> (Moderate, High, Recorded)	Associated habitat in <i>Subject site</i>	Impact (ha)
	State	Cth			
<i>Ixobrychus flavicollis</i> Black Bittern	V		Known	PCT 4049	8m ²
<i>Micronomus norfolkensis</i> Eastern Coastal Free tailed Bat	V,P		Moderate foraging habitat Low roosting habitat	PCT 4049	8m ²
<i>Myotis Macropus</i> Southern Myotis	V		Moderate foraging habitat Low roosting habitat	Unnamed watercourse	0
<i>Miniopterus orianae oceanensis</i> Large Bentwing-bat	V,P		Moderate foraging habitat Low roosting habitat	PCT 4049	8m ²
<i>Vespadelus troughtoni</i> Eastern Cave Bat	V,P		Moderate foraging habitat Low roosting habitat	PCT 4049	8m ²

5.1.3 Threatened flora impacts

No threatened flora were recorded within the subject site.

5.1.4 Aquatic impacts

The proposal would result in direct impacts to:

- Approximately 8m² of regrowth riparian vegetation
- The banks of a first order watercourse (where the proposed bridge abutments extend past the existing abutments).

Potential indirect impacts include:

- Increase in turbidity during construction, potentially impacting the health of aquatic flora and fauna

The proposal does not result in any direct impacts to KFH, protected marine vegetation, threatened aquatic species or the removal or relocation of snags. As the bridge is replacing an existing bridge, and abutments are not proposed within the creek bed, it is unlikely to result in changes to flooding regimes, hydrology or additional shading.

While the proposal does not require instream piers, the installation of new abutments on the bank of the unnamed watercourse would require dredging and reclamation, including the temporary construction of a coffer dam. Coffers would be constructed around each abutment, upstream and downstream of the abutment on the same bank, with a silt curtain installed around each abutment. As such, construction works would not require temporary blocking of fish passage. A part 7 permit application for dredging and reclamation is not required for the works as the subject site is not mapped as KFH. Mitigation measures have however been included to ensure that the works do not negatively impact the aquatic environment.

5.1.5 Injury and mortality

There is potential to injure roosting microbats (Southern Myotis) during demolition of the existing bridge. This species was not recorded during direct inspection of the underside of the bridge nor using ultrasonic detection, however as a precautionary approach, mitigation measures have been included to ensure this species would not be impacted during demolition works.

The proposed works do not require the clearing of potential habitat trees (i.e. hollow bearing trees) and as such, the risk during construction of injuring nocturnal species that are denning or roosting in hollows is unlikely. Disturbed fauna including the threatened Black Bittern, are likely to migrate to adjoining bushland.

The proposal is unlikely to result in the creation of habitat such as new water or food sources, that would alter animal behaviour resulting in a higher mortality risk.

5.1.6 Groundwater dependent ecosystems

PCT 4049 is likely to be dependent on groundwater and while the *Subject Site* is mapped as low potential terrestrial GDE on the GDE atlas (Figure 4-2), the vegetation is likely to be facultative.

The proposal would result in an increase in width of the exiting bridge, and abutment footings would extend into the creek bank, however as the proposal does not require extensive excavation, it is unlikely to impact groundwater flows and impacts to groundwater and associated GDE's is unlikely.

5.2 Indirect and operational impacts

5.2.1 Aquatic

Indirect impacts during construction include increased turbidity and associated impacts to aquatic fauna. This can be mitigated through appropriate erosion and sediment control measures maintained throughout the demolition and construction works.

The operation of the bridge would not change from its exiting operation, and therefore no operational impacts are likely to the aquatic environment.

5.2.2 Wildlife connectivity and habitat fragmentation

The *Subject site* is located at the southern boundary of the existing patch of native vegetation. As such, the removal of a relatively small area of vegetation (8 m²) of vegetation is unlikely to negatively impact wildlife connectivity nor will it contribute further to fragmentation of habitat.

5.2.3 Injury and mortality

As the proposal will not impact important nesting habitat, there are unlikely to be any impacts on fauna because of the proposal. The risk of roadkill resulting from the proposal is unlikely to increase from the existing risk.

5.2.4 Invasion and spread of weeds and pest species

The *Subject site* has already been subject to weed invasion from edge effects due to construction and operation of Merry Beach Rd and the bridge. The existing weed invasion resulting from edge effects is low to moderate within the *Subject site*. One high threat weed species was recorded within the *subject site* during surveys:

- Sharp Rush *Juncus acutus* subsp. *acutus*

The following high threat weed was recorded outside of the subject site, within PCT 4049:

- Coastal Morning Glory *Ipomoea cairica*

There is potential for these invasive species to spread into adjoining bushland following disturbance during clearing and construction. Stabilising the soil following the completion of works would reduce the likelihood of this occurring (refer section 6).

There was no evidence of invasive fauna species within the subject site.

5.2.5 Invasion and spread of pathogens and disease

Plant pests are organisms which can affect the health of plants. These include insects, mites, roundworms and snails and germs such as fungi, viruses and bacteria. The DPE list four key threatening processes (KTPs) that relate to invasion by pathogens and disease:

1. Introduction and establishment of Exotic Rust Fungi of the order *Pucciniales* pathogenic on plants of the family Myrtaceae (Myrtle Rust)- a fungal disease which infects plants in the Myrtaceae family such as eucalyptus, willow myrtle, turpentine, bottlebrush, paperbark, tea tree and lilly pilly.
2. Infection of native plants by *Phytophthora cinnamomic* - a soil borne pathogen that spreads in plant roots and appears to be widespread in coastal forests.
3. Infection by Psittacine circoviral (beak and feather) disease (PCD) affecting endangered psittacine species
4. Infection of frogs by amphibian chytrid causing the disease chytridiomycosis.

There was no evidence of Myrtle Rust or other pathogens and disease affecting native vegetation during surveys. As such, the proposal is unlikely to contribute to PCD or an increase in or the spread of chytrid fungus in frogs.

In addition, the operation of the proposal will not change from the existing use and therefore will not increase the risk of spread of pathogens and disease.

5.2.6 Noise, light, dust and vibration

The proposal would result in temporary increase in noise, dust and vibration during construction. Noise and vibration during construction may result in disturbance to fauna, however there is suitable adjoining habitat for fauna movement.

As the proposal is the replacement of an existing bridge, the operation of the proposal would not result in additional impacts of noise, light and vibration from current operational impacts.

No night works are proposed so additional lighting during construction is not required, and no additional lighting is proposed as part of the proposal.

5.3 Assessment of significance summary

Assessments of significance have been undertaken for each threatened species/EEC listed under the BC Act and EPBC Act that had a moderate likelihood of occurrence and were assumed present (Appendix C and D respectively). A summary of the results of the assessment of significance under the BC Act and EPBC Act are provided Table 5 4 and Table 5 5.

Under the BC Act, assessment has determined that there is unlikely to be a significant impact on threatened species with moderate foraging habitat or known habitat in the subject site or significant impact on the Swamp Oak Floodplain Forest EEC and as such, a BDAR is not required.

Under the EPBC Act, the proposal would directly impact 8 m² of Class C EEC, but would not modify abiotic factors, alter the hydrological regime of the EEC or adversely affect habitat critical to the survival of this EEC. As such, referral to DCCEW is not required.

Table 5-2: Summary of BC Act significance assessments findings

BC Act significance assessments Threatened species	Significance assessment question					Likely significant impact?
	a	b	c	d	e	
<i>Ixobrychus flavicollis</i> Black Bittern	No	x	No	x	No	No
<i>Micronomus norfolkensis</i> Eastern Coastal Free tailed Bat	No	x	No	x	No	No
<i>Myotis Macropus</i> Southern Myotis	No	x	No	x	No	No
<i>Miniopterus orianae oceanensis</i> Large Bentwing-bat	No	x	No	x	No	No
<i>Vespadelus troughtoni</i> Eastern Cave Bat	No	x	No	x	No	No
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community	x	No	No	x	No	No

Y = Yes (negative impact), N = No (no or positive impact), X = Yes/No answer not applicable, ? = unknown impact.

Table 5-3: Summary of EPBC Act significance assessments findings

EPBC Act significance assessment Threatened species	Important population (per Significant Impact Guidelines 1.1 (DoE 2013))	Likely significant impact?
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community	Category C	No
Y = Yes (negative impact), N = No (no or positive impact), X = Yes/No answer not applicable, ? = unknown impact.		

5.4 Marine Parks

In accordance with s56 of the MEM Act, in the carrying out of development on land that is in the locality of a marine park, the consent authority must consider the objectives of Act. Assessment of each objective is provided below:

(a) to provide for the management of the marine estate of New South Wales consistent with the principles of ecologically sustainable development in a manner that—

(i) promotes a biologically diverse, healthy and productive marine estate, and

The proposal promotes a biologically diverse, healthy and productive marine estate by ensuring works are conducted in such a way as to avoid adverse impacts to aquatic flora and fauna. This includes the implementation of mitigation measures (section 6) that maintain good water quality in the unnamed watercourse during construction, thus limiting potential impacts to flora and fauna through shading and poor water quality. The construction and operation of the proposal does not obstruct fish passage and complies with DPLs *Fish Passage Requirements for Waterway Crossings* (section 2.4.2) through the proposed installation of a bridge (not a culvert or pipe).

(ii) facilitates—

- *economic opportunities for the people of New South Wales, including opportunities for regional communities, and*
- *the cultural, social and recreational use of the marine estate, and*
- *the maintenance of ecosystem integrity, and*
- *the use of the marine estate for scientific research and education,*

The existing bridge is currently dilapidated and becoming unsafe. Its replacement would continue to provide economic opportunities to the holiday park and recreational opportunities for the public that utilise the bridge, in addition to allowing access to south end of Merry Beach. The proposal would not alter the ecosystem integrity and does not directly have a role in scientific research/education.

(b) to promote the co-ordination of the exercise, by public authorities, of functions in relation to the marine estate,

(c) to provide for the declaration and management of a comprehensive system of marine parks and aquatic reserves.

Section (b) and (c) are not relevant to the proposal.

The consent authority must also consider:

- Permissible uses or management rules - Infrastructure development within the General Use Zone of the Batemans Marine Park requires a marine parks permit. It is noted that the subject site is outside of the boundary of this zone, however the application should be referred to Marine Parks at the Integrated Development Approvals (IDA) stage.
- Whether the proposal would have an effect on plants or animals within the Marine Park and their habitat – the proposal is unlikely to have an effect on plants and animals through the implementation of mitigation measures provided in this assessment (section 6).

5.5 Resilience and Hazards SEPP 2021

Coastal Environmental Area

2.10 Development on land within the coastal environment area

Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:

- a) *the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,*

The proposed works are minor and mitigation measures will ensure there is minimal impact on the biophysical, hydrological and ecological environment. The proposed works are unlikely to have an adverse impact on the integrity and resilience of surface or groundwater or the coastal environment.

b) *coastal environmental values and natural coastal processes,*

The proposed works will be undertaken with consideration of the natural coastal processes, with appropriate erosion and sediment control measures installed to ensure works do not result in excess turbidity in the 1st order watercourse.

c) *the water quality of the marine estate (within the meaning of the [Marine Estate Management Act 2014](#)), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,*

The proposed works are unlikely to impact the water quality through increased turbidity, mobilisation of metals/nutrients in the sediments as clearing and ground disturbance are minor and mitigation measures will be put in place prior to the commencement of works to ensure any potential impacts are minimised.

d) *marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,*

The proposed works will have minor impacts on native vegetation and fauna and their habitats. There are no marine vegetation, headlands or rock platforms in the subject site.

e) *existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*

The existing bridge provides access to the holiday park and the southern end of Merry Beach, which would be temporarily restricted during construction. Access over the dune to the middle section of the beach would not be restricted by the proposal.

f) *Aboriginal cultural heritage, practices and places,*

The proposed works are minor and are in a previously disturbed area. As such, they are unlikely to impact aboriginal cultural places.

g) *the use of the surf zone.*

The proposed works would not restrict access to the surf zone.

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

- a) *the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1), or*
- b) *if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
- c) *if that impact cannot be minimised—the development will be managed to mitigate that impact.*

The proposal is replacement works, not new infrastructure. Therefore, the design and siting are not relevant.

h) *This clause does not apply to land within the Foreshores and Waterways Area within the meaning of [Sydney Regional Environmental Plan \(Sydney Harbour Catchment\) 2005](#).*

N/A.

Coastal Use Area

2.11 Development on land within the coastal use area

(1) Development consent must not be granted to development on land that is within the coastal use area unless the consent authority—

(a) has considered whether the proposed development is likely to cause an adverse impact on the following—

- (i) existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
- (ii) overshadowing, wind funnelling and the loss of views from public places to foreshores,*
- (iii) the visual amenity and scenic qualities of the coast, including coastal headlands,*
- (iv) Aboriginal cultural heritage, practices and places,*
- (v) cultural and built environment heritage, and*

As the proposal is replacement of infrastructure, it will not alter the existing safe access to the foreshore long term, would not result in overshadowing or loss of views nor alter visual amenity. The proposed works are minor and are in a previously disturbed area. As such, they are unlikely to impact aboriginal cultural places.

(b) is satisfied that—

- (i) the development is designed, sited and will be managed to avoid an adverse impact referred to in paragraph (a), or*
- (ii) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or*
- (iii) if that impact cannot be minimised—the development will be managed to mitigate that impact, and*

The proposal is a bridge replacement and as such, is sited in the same location. The new design is wider than the exiting bridge, however the change in location is minor and unlikely to result in adverse impacts.

(c) has taken into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.

The proposed bridge is wider than the existing bridge, however it is still consistent with the surrounding coastal and built environment.

(2) This section does not apply to land within the Foreshores and Waterways Area within the meaning of [State Environmental Planning Policy \(Biodiversity and Conservation\) 2021](#), Chapter 6

N/A

6. Mitigation

Measures to minimize impacts on threatened species, habitats and biodiversity are included in Table 6-1.

Table 6-1: Mitigation measures

Impact	Mitigation measure	Timing and duration
Legislative requirements	- The proposed works should be referred to Marine Parks at IDA stage in accordance with s56 of the MEM Act. - A permit for dredging/reclamation is NOT required under part 7 of the FM Act.	Pre-construction
Edge effects on adjacent native vegetation and habitat	Exclusion zones are to be set up at the limit of the approved <i>Subject site</i> , and areas outside of this would be identified by 'No Go Zone' fencing so that contractors are aware that machinery is not permitted outside of the approved <i>Subject site</i> .	Pre-construction
Removal of native vegetation/EEC	Native vegetation removal will be minimised by clearly marking approved works area <i>in-situ</i> .	Pre-construction
	All efforts are to be made to retain any native trees within the <i>Subject site</i> . This may include using sensitive works methodologies around the root zone of trees.	Construction
	Laydown areas and stockpiling are to be limited to cleared, grassed areas away from retained trees and away from native vegetation	Pre-construction/construction
	The loss of native vegetation would be mitigated through: - Stabilising disturbed soils immediately after completion of works, using suitable jute matting, rocks and/or planting of native vegetation. Suitable species include: - Couch <i>Cynodon dactylon</i> - Sea Rush <i>Juncus kraussii</i> subsp. <i>Australiensis</i> <i>Schoenoplectus subulatus</i> - Flax-leaved Paperbark <i>Melaleuca linariifolia</i> - Swamp Oak <i>Casuarina glauca</i>.	Post construction
Impacts to threatened fauna	The underside of the bridge is to be inspected for microbats immediately prior to removal of the existing bridge each morning prior to demolition works. Any microbats found are to be collected, maintained throughout the day in a cool dry place safe from harm, and released at dusk. Any injured fauna is to be taken to the nearest vet (if required) at a cost to Ingenia Holiday Parks.	Construction
Impacts to aquatic habitat	- Coffer dams are to be constructed on each side of the watercourse, attached to the same bank so fish passage is not obstructed. - Silt curtains are to be placed around each coffer dam and secured to the same bank to contain excess turbidity. - Dewatering of the coffer dam is to use a pump fitted with fish exclusion mesh. - Extracted water is to be pumped to a dissipation area, with suitable erosion and sediment controls in place (i.e. sand bags, silt fencing etc, refer the Blue Book). The dissipation area is to be as far from the watercourse as practicably possible, to allow filtration of the water prior to it re-entering the watercourse downstream of the subject site. This reduces turbidity in the water column. - While the watercourse crossing the subject site is not mapped as acid sulfate soil risk, it is recommended that acidity of the water be monitored during dredging works to ensure acid sulfate soils are not exposed. This could be undertaken using simple litmus paper testing.	

7. References

- Commonwealth of Australia (2010a), [Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act - DCCEEW](#).
- Commonwealth of Australia (2010b), [Survey guidelines for Australia's threatened birds \(awe.gov.au\)](#).
- Commonwealth of Australia (2011a), [Survey Guidelines for Australia's threatened frogs \(awe.gov.au\)](#).
- Commonwealth of Australia (2011b), [Survey guidelines for Australia's threatened mammals \(awe.gov.au\)](#).
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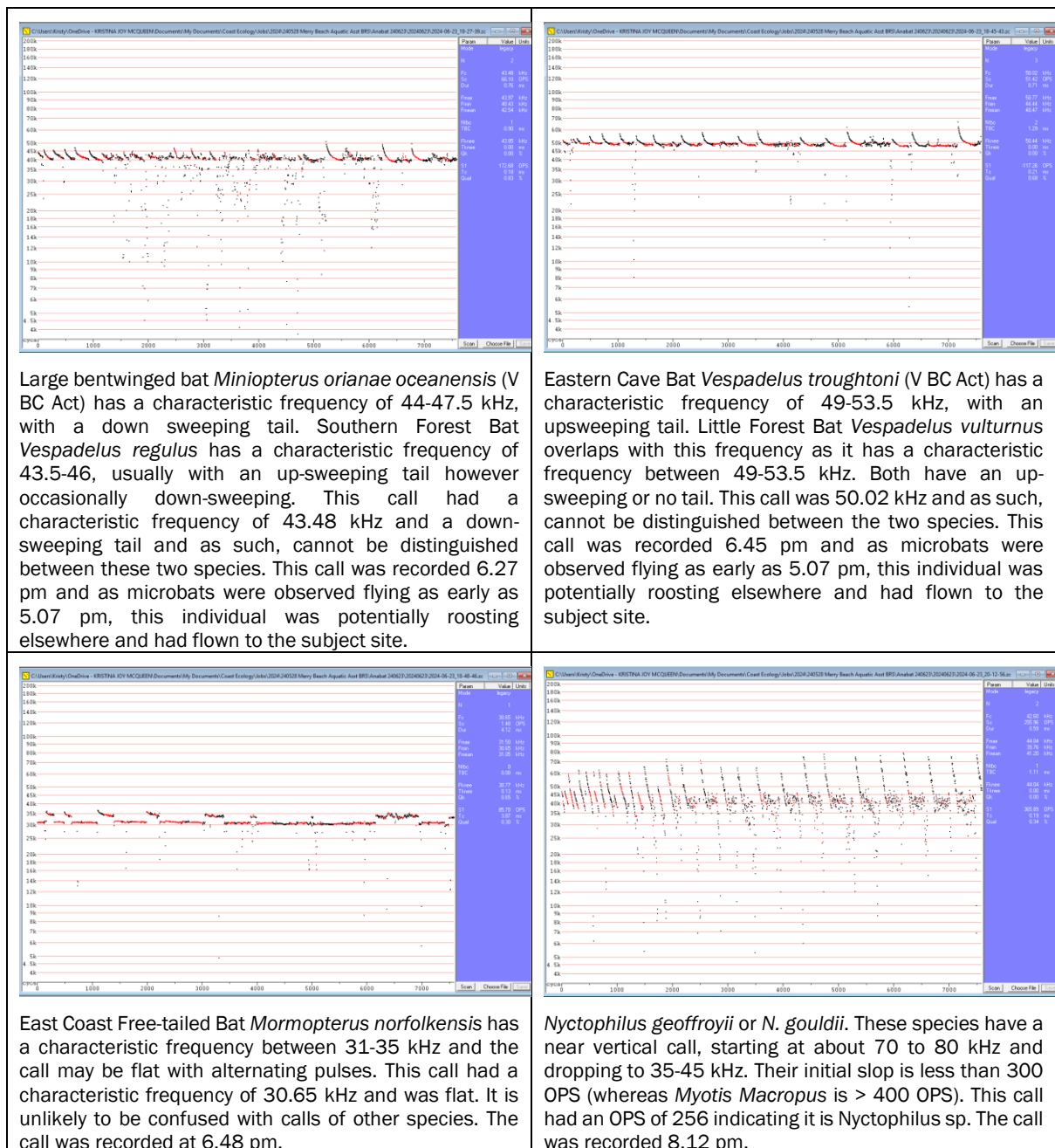
APPENDIX A: Survey results

Table A1. Species list

Scientific Name	Common name
Flora	
<i>Banksia integrifolia</i>	Coast Banksia
<i>Breynia oblongifolia</i>	Coffee Bush
<i>Cakile maritima</i>	Sea Rocket
<i>Casuarina glauca</i>	Swamp Oak
<i>Cynodon dactylon</i>	Common Couch
<i>Eucalyptus botryoides</i>	Bangalay
<i>Ficinia nodosa</i>	Knobby Club-rush
<i>Gahnia clarkei</i>	Tall Saw-sedge
<i>Glochidion ferdinandi</i>	Cheese Tree
<i>Hydrocotyle bonariensis</i>	Pennywort
<i>Hypolepis muelleri</i>	Harsh Ground Fern
<i>Ipomoea cairica</i>	Coastal morning glory
<i>Juncus acutus</i>	Sharp Rush
<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark
<i>Myrsine howittiana</i>	Brush Muttonwood
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Schoenoplectus subulatus</i>	
<i>Typha orientalis</i>	Broad-leaved Cumbungi
<i>Xanthium strumarium</i>	
<i>Zantedeschia aethiopica</i>	Arum Lily
Fauna	
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Chenonetta jubata</i>	Australian Wood Duck
<i>Cormobates leucophaea</i>	White-throated Treecreeper
<i>Crinia signifera</i>	Common Eastern Froglet
<i>Egretta novaehollandiae</i>	White-faced Heron
<i>Gallinula tenebrosa</i>	Dusky Moorhen
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Hirundo neoxena</i>	Welcome Swallow
<i>Ixobrychus flavicollis</i>	Black Bittern
<i>Macropus giganteus</i>	Eastern Grey Kangaroo
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat (Probable)
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat (Possible)
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat (Possible)
<i>Nyctophilus gouldi</i>	Gould's Long-eared Bat (Possible)
<i>Oryctolagus cuniculus</i>	Rabbit

Scientific Name	Common name
<i>Petaurus breviceps</i>	Sugar Glider
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Strepera graculina</i>	Pied Currawong
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
<i>Vanellus miles</i>	Masked Lapwing
<i>Vespadelus regulus</i>	Southern Forest Bat (Possible)
<i>Vespadelus troungtoni</i>	Eastern Cave Bat (Possible)
<i>Vespadelus vulturnus</i>	Little Forest Bat (Possible)

Table A2. Ultrasonic detection results 23/06/2024



APPENDIX B: Habitat Assessment

Table B1. Likelihood of occurrence criteria

Use the below criteria to determine the likelihood that a threatened species could occur in the *Subject site*. The criteria are designed for use in a BAR only and is not applicable for use in a BDAR (i.e., where the BAM-C is being used). Only recorded sightings from BioNet are valid for these criteria.

Likelihood	Criteria
Recorded	The species was observed in the <i>Subject site</i> during the current survey or has been recorded within the past five years (known from a reputable source).
High	A species is considered highly likely to occur in the <i>Subject site</i> if: There are previous credible records on BioNet within the <i>Subject site</i> from the last 10 years and suitable habitat is present. OR The species is highly mobile, is dependent on identified suitable habitat within the <i>Subject site</i> (i.e., for breeding or important life cycle periods such as winter flowering resources) and has been recorded recently (within five years) on BioNet in the locality. This also includes species known or likely to visit the <i>Subject site</i> during regular seasonal movements or migration.
Moderate	A species is considered moderately likely to occur in the <i>Subject site</i> if: Any suitable habitat (e.g., foraging) is present in the <i>Subject site</i>, the species is highly mobile and has been recorded in the locality in the last 10 years on BioNet. The species may be unlikely to maintain sedentary populations, however, may seasonally use resources within the <i>Subject site</i> opportunistically or during migration. The species is unlikely to be dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitat within the <i>Subject site</i>. OR The species is not highly mobile, is dependent on identified suitable habitat features (e.g., hollows, rocky outcrops) within the <i>Subject site</i> and has been recorded in the locality in the last 10 years on BioNet. OR For flora species that are associated with PCTs in the <i>Subject site</i> (see TBDC) or have been recorded in the locality in the last 10 years on BioNet – the associated PCT/habitat present in the <i>Subject site</i> is not degraded and the species was not targeted by surveys in accordance with the BAM and relevant survey guidelines. In addition, for flora species known to occur in disturbed areas (e.g., orchids), records from any time within the locality may warrant inclusion in this category.
Low	A species is considered to have a low likelihood of occurring in the <i>Subject site</i> if: For highly mobile species, the species may be an occasional visitor, but habitat similar to the <i>Subject site</i> is widely distributed in the locality, meaning that the species is not dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitats in the <i>Subject site</i> and the species has not been recorded in the locality in the last 10 years on BioNet. OR The species is not highly mobile, is dependent on identified suitable habitat features (e.g., hollows, rocky outcrops) within the <i>Subject site</i> and has not been recorded in the locality in the last 10 years on BioNet. OR For flora species that are associated with PCTs in the <i>Subject site</i> (see TBDC) and the species was not identified following targeted surveys in accordance with the BAM and relevant survey guidelines. Flora species that have been recorded in the locality on BioNet at any time, associated suitable habitat (see the TBDC) is not present in the <i>Subject site</i>, though similar habitats of the same vegetation formation is present in the <i>Subject site</i>.
Unlikely	Suitable habitat for the species is absent from the <i>Subject site</i> .

Table B2. Likelihood of occurrence assessment

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
<i>Cryptostylis hunteriana</i> Leafless Tongue Orchid	V	V	Species	None	Nov-Jan	Unlike other <i>Cryptostylis</i> spp., <i>Cryptostylis hunteriana</i> has a poorly developed root system and is unlikely to spread vegetatively. Plants form from seed (from within a population or blown in) and grow to become a persistent tuber, which can remain dormant for a number of years and not produce above ground material. <i>Cryptostylis hunteriana</i> has been reported emerging 1-3 years after fire. References: Bell, A.J. Notes on population size and habitat of the vulnerable <i>Cryptostylis hunteriana</i> (Orchidaceae). Poor winter and spring rainfall may hamper flowering. Flowers between October and Nov in northern populations (north of Hunter Valley) and progressively later further south (Nov - Dec on the Central Coast to Dec to Late January on the South Coast). Species seems to flower well in periods when the understorey is more open. Unit of measure: Area	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (<i>Eucalyptus sclerophylla</i>), Silvertop Ash (<i>E. sieberi</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Black Sheoak (<i>Allocasuarina littoralis</i>); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (<i>C. subulata</i>) and the Tartan Tongue Orchid (<i>C. erecta</i>). Little is known about the ecology of the species; being leafless it is expected to have limited photosynthetic capability and probably depends upon a fungal associate to meet its nutritional requirements from either living or dead organic material. In addition to reproducing from seed, it is also capable of vegetative reproduction and thus forms colonies which can become more or less permanent at a site. Identifiable only when in flower between Nov and Feb. May not flower every year depending on climatic conditions.	PMST	Low No suitable habitat as no associated vegetation occurs in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
<i>Genoplesium vernale</i> East Lynne Midge-orchid	V	V	Species		Nov-Dec		The East Lynne Midge Orchid is currently known from only a narrow belt, approximately 12 km wide, of predominantly Dry Sclerophyll Forest from north Moruya to 24 km north of Ulladulla. The species occurs primarily on National Park and Forests Corporation NSW estate. The East Lynne Midge Orchid grows in dry sclerophyll woodland and forest extending from close to the coast to the adjoining coastal ranges. Confined to areas with well-drained shallow soils of low fertility, often occurring near the crests of ridges and on low rises where the ground cover is more open and sedge dominated rather than being shrubby. Each plant produces a single leaf-like stem that emerges from an underground tuber. The orchid stems can appear from late October and take only a few weeks to produce flowers. Many stems that emerge do not produce flowers. The species generally flowers between early November and mid December. The fruit then take several weeks to ripen. The old fruiting stems (as well as non fruiting stems) then persist until late winter, at which time they wither and the	PMST	Low No suitable habitat as no associated vegetation or soil type occurs on the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							plant dies back to a small, dormant underground tuber. Has some limited ability to re-colonise previously disturbed sites.		
<i>Rhodamnia rubescens</i> Scrub Turpentine	E4A	CE	Species	None	All year	Parallel field traverses (15 metres apart in open vegetation, 10 m apart in dense vegetation; DPIE, 2020c).	Shrub or small tree to 25 m high with reddish/brown, fissured bark. Young stems densely covered in fine hairs. Leaves 5–10 cm long, 2–5 cm wide, upper surface green and sparsely hairy, lower surface paler and sparsely to densely hairy. Leaves strongly 3-veined from base with moderately dense, translucent oil dots. Petiole 4–9 mm long. Inflorescences 1–3 per axil, usually 3-flowered with petals 4–6 mm diam. and white. Fruit globose, 5–8 mm diam., red turning black. 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. Populations of <i>R. rubescens</i> typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000–1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	2 BioNet PMST	Low Not recorded within the subject site during surveys.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.		
<i>Birds</i>									
<i>Anthochaera Phrygia</i> Regent Honeyeater	E4A,P	CE	Dual Ecosystem Foraging only Species breeding	As per Important Habitat Map Species sensitive to degraded habitat.	N/A	No survey required. The species is assessed for species credits via the Important Habitat Map in BOAMS. Area search < 1 ha = 20 minutes at dawn or dusk	Non-breeding flocks of the Regent Honeyeater forage in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast. 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. Nomadic and/or possibly migratory; coastal visitor mostly March – August.	PMST	Low Site not mapped as important habitat and no suitable foraging habitat occurs within the subject site.
<i>Arenaria interpres</i> Ruddy Turnstone		V	N/A	None	N/A	N/A	The Ruddy Turnstone is widespread within Australia during its non-breeding period of the year. It is found in most coastal regions, with occasional records of inland populations. It strongly prefers rocky shores or beaches where there are large deposits of rotting seaweed. The Ruddy Turnstone breeds on the coasts of Europe, Asia	1 BioNet PMST	Low No suitable habitat as there are no rocky reefs or beach areas within the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							and North America, generally north of 60° latitude. An estimated 3.58%–5.38% of the global population live in Australia and New Zealand. The Australian population is estimated at 14 000 In NSW, the Hunter estuary is the only site of international importance. The Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches.		
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	V,P,3		Dual Ecosystem Foraging only Species Breeding	None Hollow bearing trees Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger. Species sensitive to degraded habitat.	Oct - Jan	Habitat assessment to determine breeding/nesting opportunities. (a) lone adult males identified during the breeding season (October to January); or (b) an occupied nest. Area search < 1 ha = 20 minutes at dawn or dusk	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (<i>Eucalyptus pauciflora</i>) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in	5 BioNet PMST	Low No suitable breeding habitat (hollow bearing trees) and no associated vegetation assemblages in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.		
<i>Calyptorhynchus lathamii</i> South-eastern Glossy Black-Cockatoo	V,P,2		Dual Ecosystem Foraging only Species Breeding	Presence of Allocasuarina and casuarina species Hollow bearing trees Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground. Species sensitive to degraded habitat.	Jan - Sept	Habitat assessment to determine breeding/nesting opportunities (a) begging birds of any age or sex; or (b) lone adult males identified during the breeding season (April to August); or (c) an occupied nest. Area search < 1 ha = 20 minutes at dawn or dusk	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i> , and <i>A. gymnathera</i> . Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (<i>Casuarina cristata</i>). Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.	PMST	Low Not recorded during surveys, no suitable breeding habitat (hollow bearing trees) and only one juvenile <i>Casuarina glauca</i> occurs in the subject site.
<i>Daphoenositta chrysoptera</i> Varied Sittella	V,P		Ecosystem	None	All year	Area search < 1 ha = 20 minutes at dawn or dusk	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	1 BioNet	Low Not recorded during surveys and no suitable habitat as the subject site does

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. Generation length is estimated to be 5 years.		not contain eucalypt forest.
<i>Haematopus fuliginosus</i> Sooty Oystercatcher	V,P		Species	within 100 m of estuarine areas and the ocean	Aug - Jan	Survey during the breeding period of August to January to reliably detect presence/absence because they may be highly mobile at other times. Unit of measure: Area	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories. The nest is a shallow scrape on the ground, or small mounds of pebbles, shells or seaweed when nesting among rocks.	3 BioNet	Low No suitable habitat as there are no rocky headlands or reefs in the subject site.
<i>Haematopus longirostris</i> Pied Oystercatcher	E1,P	-	N/A	N/A	N/A	N/A	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although	1 BioNet	Low No suitable habitat as there are no intertidal flats or beaches in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones. Two to three eggs are laid between August and January. The female is the primary incubator and the young leave the nest within several days.		
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	V, P	C	Dual Ecosystem Foraging only Species Breeding	Waterbodies - Within 1km of rivers, lakes, dams, creeks and coastlines Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	July - Dec	Habitat assessment to detect large stick nests within 1 km of waterbodies. Area search < 1 ha = 20 minutes	The White-bellied Sea-Eagle is distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. It also extends inland along some of the larger waterways, especially in eastern Australia. The White-bellied Sea-Eagle feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion and offal. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland,	7 BioNet	Low Not recorded during surveys, no suitable nesting trees and no suitable foraging habitat within the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion. Hunts its prey from a perch or whilst in flight (by circling slowly, or by sailing along 10–20 m above the shore). Prey is usually carried to a feeding platform or (if small) consumed in flight, but some items are eaten on the ground. May be solitary, or live in pairs or small family groups consisting of a pair of adults and dependent young. Typically lays two eggs between June and September with young birds remaining in the nest for 65-70 days.		
<i>Hirundapus caudacutus</i> White-throated Needletail	P	C,J,K	Ecosystem	None	N/A	Area search < 1 ha = 20 minutes at dawn or dusk. EPBC listed species	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the	PMST	Low Not recorded during surveys, no past records in the locality on

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							ground. The White-throated Needletail is widespread in eastern and south-eastern Australia. After breeding in eastern Siberia, north-eastern China and Japan, the species leaves the breeding grounds between late August and October, flying singly or in scattered flocks and enter Australia via the Torres Strait, usually during September and October.		BioNet and this species is mostly aerial.
<i>Ixobrychus flavicollis</i> Black Bittern	V		Ecosystem	Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	N/A		The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night.	N/A	Recorded

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again. Generally solitary, but occurs in pairs during the breeding season, from December to March. Like other bitterns, but unlike most herons, nesting is solitary. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks. Between three and five eggs are laid and both parents incubate and rear the young.		
<i>Lathamus discolor</i> Swift Parrot	E1,P,3	CE	Dual Ecosystem Foraging Species Breeding	None As per important habitat map	N/A	Check important habitat map for this species. Habitat assessment to detect preferred feed trees. Area search < 1 ha = 20 minutes at dawn or dusk	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i>, Spotted Gum <i>Corymbia maculata</i>, Red Bloodwood <i>C. gummifera</i>, Mugga Ironbark <i>E.</i>	PMST	Low Not on important habitat map and no suitable foraging habitat in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							<i>sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> . Return to some foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum <i>Eucalyptus globulus</i> . Identifiable from March to September.		
<i>Ninox strenua</i> Powerful Owl	V,P		Dual Ecosystem Species	Hollow bearing trees - Living or dead trees with hollow greater than 20cm diameter	May - Aug	Habitat assessment to detect suitable hollow bearing trees >20 cm diameter. Look for signs of breeding (a) presence of male and female OR (b) calling to each other (duetting) OR (c) find nest Minimum 2 nights stagwatching as this species does not respond well to call playback	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine <i>Syncarpia glomulifera</i> , Black She-oak <i>Allocasuarina littoralis</i> , Blackwood <i>Acacia melanoxylon</i> , Rough-barked	1 BioNet	Low No suitable breeding habitat (hollow bearing trees) and no associated vegetation assemblages in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							Apple <i>Angophora floribunda</i>, Cherry Ballart <i>Exocarpus cupressiformis</i> and a number of eucalypt species. The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. There may be marked regional differences in the prey taken by Powerful Owls. For example in southern NSW, Ringtail Possum make up the bulk of prey in the lowland or coastal habitat. At higher elevations, such as the tableland forests, the Greater Glider may constitute almost all of the prey for a pair of Powerful Owls. Flying foxes are important prey in some areas; birds comprise about 10-50% of the diet depending on the availability of preferred mammals. As most prey species require hollows and a shrub layer, these are important habitat components for the owl. Pairs of Powerful Owls demonstrate high fidelity to a large territory, the size of which varies with habitat quality and thus prey densities. In good habitats a mere 400 can support a pair; where hollow trees and prey have been depleted the owls need up to 4000 ha.		

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
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							Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter, but is slightly earlier in north-eastern NSW (late summer - mid autumn). Clutches consist of two dull white eggs and incubation lasts approximately 38 days. Identifiable all year.		
<i>Pandion cristatus</i> Eastern Osprey	V,P,3	M	Dual Ecosystem Foraging only Species Breeding	None Presence of stick-nests in living or dead trees (>15m) or artificial structures within 100m of a floodplain for nesting	April - Nov	Habitat assessment to detect stick nests in trees > 15 m or artificial structures within 100 m of a floodplain for nesting. Area search < 1 ha = 20 minutes	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	PMST	Low Not recorded during surveys, no suitable nesting habitat (i.e. large stick nests) and limited foraging habitat.
<i>Pachyptila turtur subantarctica</i> Fairy Prion (southern)		V	N/A	None	N/A	N/A	The fairy prion (southern) breeds on Macquarie Island and a number of other subantarctic islands outside of	PMST	Low This species does not nest/breed on the mainland and

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							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. The other subspecies (<i>P. t. turtur</i>) breeds on New Zealand offshore islands in Bass Strait and the Falkland Islands. That subspecies has a population of several million pairs. Threats to the fairy prion (southern) include is the accidental introduction of rats or other vertebrate predators to Macquarie Island.		there is no suitable foraging habitat on the subject site.
<i>Petroica boodang</i> Scarlet Robin	V,P		Ecosystem	None	N/A	No survey comments. Unit of measure: Area	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree	1 BioNet	Low No suitable habitat as the subject site does not contain eucalypt forest.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. In autumn and winter, the Scarlet Robin joins mixed flocks of other small insectivorous birds which forage through dry forests and woodlands.		
<i>Pycnoptilus floccosus</i> Pilotbird		V	N/A	N/A			Pilotbirds are endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria. Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne. Habitat critical to the survival of the Pilotbird includes: • wet sclerophyll forests in temperate zones in moist gullies with dense undergrowth (Higgins & Peter 2002), and • dry sclerophyll forests and woodlands occupying dry slopes and ridges (Higgins & Peter 2002).	PMST	Low Not suitable habitat as there are no wet or dry sclerophyll forest in the subject site.
<i>Stagonopleura guttata</i> Diamond Firetail	V,P		Ecosystem	None	N/A	No survey comments. Unit of measure: Area	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands.	1 BioNet PMST	Low Not suitable habitat as there are no associated vegetation

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
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							Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Usually encountered in flocks of between 5 to 40 birds, occasionally more. Groups separate into small colonies to breed, between August and January. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting. Appears to be sedentary, though some populations move locally, especially those in the south. Has been recorded in some towns and near farm houses.		assemblages in the subject site.
<i>Thalassarche cauta steadi</i> White-capped Albatross	P	V	EEC Marine	None	N/A	No survey comment	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	PMST	Low This species does not breed on the mainland and there is no

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
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							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.		foraging habitat in the subject site.
<i>Thinornis cucullatus</i> <i>cucullatus</i> Eastern Hooded Dotterel	CE	V	Dual Ecosystem Species	None None	Sept-Mar	Two survey seasons are required, the first to detect if the site provides breeding habitat and the second to detect winter roosting habitat.	The Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). In south-west Western Australia the Hooded Plover is not restricted to the coast, and can also live and breed around inland salt lakes. The range of the Hooded Plover has declined in eastern Australia since European settlement. Southern coastal Queensland and northern NSW were probably once part of the range of the Hooded Plover, but the species has not been recorded there since the	3 BioNet PMST	Low No suitable habitat as there is no sandy wave zone in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							1920s. In the late 1920s and early 1930s the species was recorded from Port Stephens but are now considered locally extinct. It has not been seen in the Sydney area since the 1940s. Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh. Hooded Plovers forage in sand at all levels of the zone of wave-wash during low and mid-tide or among seaweed at high-tide, and occasionally in dune blowouts after rain. At night they favour the upper		

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
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							zones of beaches for roosting. When on rocks they forage in crevices in the wave-wash or spray zone, avoiding elevated rocky areas and boulder fields. In coastal lagoons they forage in damp or dry substrates and in shallow water, depending on the season and water levels. Hooded Plovers are seen singly, in pairs, family groups or small flocks, with 16 birds at Cudmirrah Beach being the largest group recorded in NSW in recent years. During winter, very few birds are seen in pairs. 3 The Hooded Plover diet consists mainly of marine worms, molluscs, crustaceans, insects, water plants and seeds. In eastern Australia, Hooded Plovers usually breed from August to March on sandy ocean beaches strewn with beachcast seaweed, in a narrow strip between the high-water mark and the base of the fore-dunes. They often nest within 6 m of the fore-dune, mostly within 5 m of the high-water mark, but occasionally among or behind dunes. The nest is a scrape in the sand near debris, making it vulnerable to predators and beach disturbance. Both parents incubate 2-3 eggs for a period of 28 days and share the care of the young. Hooded		

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							Plovers display high nest site fidelity and nest solitarily. On mainland Australia, nests may be 2-5 km apart. Hatching success is low, being reported at around 27% of eggs laid and only 0.1 young fledge per pair. However, in the last few years recovery efforts to reduce predation and other threats in conjunction with a monitoring program has revealed an increasing breeding success. Surveys conducted over the past 15 years to determine the total population in NSW have made a maximum count of 64 adults. The estimated population for all of Australia is approximately 5000 birds.		
<i>Tyto novaehollandiae</i> Masked Owl	V,P		Dual Ecosystem Species	None Hollow bearing trees - Living or dead trees with hollows greater than 20cm diameter	May - Aug	Habitat assessment to detect suitable hollow bearing trees >20 cm diameter. Look for signs of breeding (a) presence of male and female OR (b) calling to each other (duetting) OR (c) find nest Minimum 2 nights stagwatching/call playback	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Identifiable all year.	1 BioNet	Low No suitable breeding habitat (hollow bearing trees) and no associated vegetation assemblages in the subject site.
<i>Mammal</i>									
<i>Cercartetus nanus</i> Eastern Pygmy-possum	V,P		Species	None	Oct - March	Species is very difficult to detect, especially via spotlighting.	Found in a broad range of habitats from rainforest through sclerophyll (including	3 BioNet	Low No suitable habitat as there

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
						Baited camera traps (minimum 14 nights)	Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (<i>Pseudocheirus peregrinus</i>) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Young can be born whenever food sources are available, however most births occur between late spring and early autumn. Agile climbers, but can be caught on the ground in traps, pitfalls or postholes; generally nocturnal. Frequently spends time in torpor especially in winter, with body curled, ears folded		are no associated vegetation assemblages in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							and internal temperature close to the surroundings.		
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	V,P	E	Ecosystem	None	All year	Baited camera traps (minimum 14 nights) Cage trapping should be limited to Dec to Oct. Post breeding months (Sept to Nov) where females have dependent young should be avoided.	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. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. Such sites may be visited by multiple individuals and can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals. A generalist predator with a preference for medium-sized (500g-5kg) mammals. Consumes a variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits, reptiles and insects. Also eats carrion and takes domestic fowl. Females occupy home ranges	PMST	Low No suitable habitat as there are no associated vegetation assemblages in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							up to about 750 hectares and males up to 3500 hectares. Are known to traverse their home ranges along densely vegetated creeklines. Average litter size is five; both sexes mature at about one year of age. Life expectancy in the wild is about 3-4 years.		
<i>Isoodon obesulus obesulus</i> Southern Brown Bandicoot (eastern)	E1,P	E	Species	Requires dense ground cover in a variety of habitats.	All year	Late summer/autumn is the best time to survey, when juveniles are recruited into the population. Unit of measure: Area	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Southern Brown Bandicoots are largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruiting) fungi. Their searches for food often create distinctive conical holes in the soil. Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares.	PMST	Low No suitable habitat as there are no associated vegetation assemblages in the subject site.

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							Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. Nests may be located under Grass trees <i>Xanthorrhoea</i> spp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest. Mating occurs any time of the year, usually following heavy rain. Two or three litters of 2-4 young may be produced annually. The gestation period of 11-12 days is the shortest known of any marsupial while young remarkably become independent around 60 days after being born.		
<i>Micronomus norfolkensis</i> Eastern Coastal Free tailed Bat	V,P		Ecosystem	None	Oct-Mar	Acoustic detection (4 nights x 4 hours/night)	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	1 BioNet	Moderate foraging habitat. Possible recording of this species.
<i>Myotis Macropus</i> Southern Myotis	V		Species	Waterbodies - Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site.	Oct - March	Habitat assessment to identify habitat constraints (Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site).	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and	2 BioNet	Moderate Potential habitat under the bridge however direct inspection of the underside of the bridge did not detect this

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
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						Survey techniques: • Har trap or mist net (4 nights x 4 hours/night) • Acoustic detection (4 nights x 4 hours/night) • Roost search (30 min per structure)a	small fish by raking their feet across the water surface. In NSW females have one young each year usually in Nov or Dec. Identifiable from October to March		species. Included as a precautionary approach.
<i>Miniopterus orianae oceanensis</i> Large Bentwing-bat	V,P		Dual Ecosystem Foraging only Species Breeding	None Caves, tunnel, mine, culvert etc used for breeding Nest roost with numbers of individuals > 500 or past records	Dec - Feb	Habitat assessment for suitable roosting habitat (cave/mine/tunnel etc) One harp trap per cave/mine/tunnel (4 nights x 4 hours/night)	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the treetops. Hibernation from June to August	N/A	Moderate foraging habitat. Possible recording of this species.
<i>Petauroides volans</i> Southern Greater Glider	E	E	Species	None	All year	No survey comments. Tracks, scats and scratches And Spotlighting And Baited camera traps (minimum 14 nights)	They are locally common in wet and damp sclerophyll forest on the ranges and coastal plains from near Mossman ne Queensland to Daylesford, Victoria. The	PMST	Low No suitable habitat as there are no aligned vegetation assemblages in the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
						Or Elliot traps (max 4 nights) Unit of measure: Area	require large tree hollows for shelter.		
<i>Petaurus australis</i> Yellow-bellied Glider	V		Ecosystem	None	N/A	No survey comments. Tracks, scats and scratches And Spotlightling And Camera traps Baited camera traps (minimum 14 nights) Or Elliot traps (max 4 nights) Or Call playback Unit of measure: Area	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein. Extract sap by incising (or biting into) the trunks and branches of favoured food trees, often leaving a distinctive 'V'-shaped scar. Live in small family groups of two - six individuals and are nocturnal. Den, often in family groups, in hollows of large trees. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	5 BioNet PMST	Low No suitable habitat as there are no aligned vegetation assemblages in the subject site.
<i>Phascolarctos cinereus</i> Koala	E	E	Species	Presence of koala use trees – refer survey comments field in TBDC	All year	Presence of one koala use feed tree (Parallel field traverses: 40 metres apart in open vegetation, 20 m apart in dense vegetation) Survey techniques: Spot assessment: no rain, 3 SAT sites	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	PMST	Low No suitable habitat as there are no aligned vegetation assemblages in the subject site.

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						Spotlighting: no rain, 1 x 200 m transect, 2 nights Passive acoustic (Sep-Dec) 1 recording unit/5 ha for 7 nights.	Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees, but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery. Females breed at two years of age and produce one young per year.		
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	V,P	V	Dual Ecosystem Foraging only Species Breeding	None Breeding camps	October - Dec	Habitat assessment for breeding camps (3 days (one per month), 2 hours / day.	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January and conception occurs in April or May; a single	3 BioNet PMST	Low No suitable foraging habitat and no roost camps occur in the subject site.

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							young is born in October or Nov. Site fidelity to camps is high; some camps have been used for over a century. Can travel up to 50 km from the camp to forage; commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.		
<i>Sminthopsis leucopus</i> White-footed Dunnart	V		Species	None	Oct-Dec		The White-footed Dunnart occurs in Tasmania and along the Victorian and southern NSW coast. The Shoalhaven area is the species' northern-most limit. It has not been recorded west of the coastal escarpment with the western-most record being from Coolangubra State Forest, approximately 10 km south-east of Bombala. The White-footed Dunnart is found in a range of different habitats across its distribution, including coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. In NSW, the species seems to favour vegetation communities with an open understorey structure (contrasting with populations	3 BioNet	Low No suitable habitat as the subject site does not provide shelter for this species and no burrows were observed during surveys.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							in Victoria which apparently prefer dense shrub and ground layers). It is patchily distributed across these habitats and, where present, typically occurs at low densities. Breeding populations have been recorded in logged forest shortly after disturbance, but these usually do not persist as regeneration proceeds and a dense ground cover of vegetation establishes. Home range and movement patterns of this species vary according to sex. Adult females usually have small, discrete home ranges, approximately 80 metres in length. Adult males have overlapping home ranges, approximately 100 metres in length, but are capable of making regular exploratory movements of up to 1 km. White-footed Dunnarts appear to have only one short breeding season during their lifetime. In NSW and Victoria, mating occurs in late July and August. From August to September, up to ten young are born, each about 3 mm long. At two months, the young detach from the mothers' teats and are suckled in the nest for about a month before dispersing. The White-footed Dunnart is an opportunistic carnivore that feeds on a variety of ground-		

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							dwelling invertebrates and, occasionally, small lizards. They shelter in bark nests in hollows under standing or fallen timber, burrows in the ground, piles of logging debris, in the 'skirts' of grass trees <i>Xanthorrhoea</i> spp. and cycads <i>Macrozamia</i> spp. and rock crevices.		
<i>Vespadelus troughtoni</i> Eastern Cave Bat	V,P		Species	Caves - Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds."	Nov - Jan	Habitat assessment to determine presence of roosting habitat (i.e. cliffs, rocky areas containing caves, overhangs or crevices, mines or tunnels) within 2 km. Survey techniques within 100m of breeding habitat: • Har trap or mist net (4 nights x 4 hours/night) • Roost search • Acoustic detection (4 nights x 4 hours/night) Radio tracking/roost search	Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.	2 BioNet	Moderate foraging habitat. Possible recording of this species.
<i>Amphibians</i>									
<i>Litoria aurea</i> Green and Golden Bell Frog	E1,P	V	Species	Semi permanent/ephemeral wet areas, swamps and waterbodies - within 1 km of these habitats	Nov - March	Breeding/ non-breeding shelter habitat consists of any waterbody with emergent aquatic vegetation and without the plague minnow (<i>Gambusia holbrooki</i>), Foraging habitat and migratory habitat are areas of	Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990	PMST	Low No past records in the locality of this species on BioNet and no suitable habitat on the subject site.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
						native and non-native vegetation. Survey techniques: • Aural-visual surveys (500 m transection, 480 mins over 4 days) • Acoustic recorder 14 days Tadpole search (10 mins/50m² of surface area)	there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Habitat and ecology Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet. Males call while floating in water and females produce a raft of eggs that initially float		

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							before settling to the bottom, often amongst vegetation. Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs. Preyed upon by various wading birds and snakes.		
<i>Reptiles</i>									
<i>Chelonia mydas</i> Green Turtle	V,P	V	Species	Dunes - Elevated sand dune above watertable and high tide	Dec - April	Survey 500 m of beach/50 ha of suitable habitat (i.e. Elevated sand dunes located above the water table and high tide mark), over 4 replicate surveys. Unit of measure: Area	Ocean-dwelling species spending most of its life at sea. Carnivorous when young but as adults they feed only on marine plant material. Eggs laid in holes dug in beaches throughout their range. Scattered nesting records along the NSW coast. Identifiable: Can be opportunistic; breeding period when they leave the water to breed; when they occur in estuaries particularly during warmer months of the year	PMST	Low No suitable habitat.
<i>Dermochelys coriacea</i> Leatherback Turtle	E1,P	E	Species	Dunes - Elevated sand dune above watertable and high tide	Dec - April	This species has no terrestrial habitat that could require assessment under the BAM (Threatened reptiles – Biodiversity Assessment Method survey guide) - NB. this advice is inconsistent with the habitat constraints listed in the TBDC. Unit of measure: Area	Occurs in inshore and offshore marine waters. Rarely breeds in Australia, with the nearest regular nesting sites being the Solomon Islands and Malayan Archipelago. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW. Number of sightings in southern waters suggest species actively seeks	PMST	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							temperate feeding grounds, rather than occurring only as stray vagrants. Feed on jellyfish. Identifiable all year but lay eggs on beaches during summer.		
<i>Eretmochelys imbricata</i> Hawksbill Turtle	P	V	EEC Marine	None	N/A	No survey notes	Major nesting of Hawksbill Turtles in Australia occurs at Varanus Island and Rosemary Island in Western Australia, and in the northern Great Barrier Reef and Torres Strait, Queensland. Hawksbill Turtles spend their first five to ten years drifting on ocean currents. During this pelagic (ocean-going) phase, they are often found in association with rafts of Sargassum (a floating marine plant that is also carried by currents). Once Hawksbill Turtles reach 30 to 40 cm curved carapace length, they settle and forage in tropical tidal and sub-tidal coral and rocky reef habitat. They primarily feed on sponges and algae (Whiting 2000a). They have also been found, though less frequently, within seagrass habitats of coastal waters, as well as the deeper habitats of trawl fisheries. Hawksbill Turtles have been seen in temperate regions as far south as northern NSW.	PMST	Low No suitable habitat.
<i>Natator depressus</i> Flatback Turtle	P	V	N/A	None	N/A	No survey notes	The Flatback Turtle is found only in the tropical waters of northern Australia, Papua New Guinea and Irian Jaya and is	PMST	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							one of only two species of sea turtle without a global distribution. Nesting is confined to Australia and four genetic stocks are recognised: eastern Queensland, Torres Strait, Northern Territory and Western Australia. Post-hatchling and juvenile Flatback Turtles do not have wide dispersal phase. Adults inhabit soft bottom habitat over the continental shelf of northern Australia, extending into Papua New Guinea and Irian Jaya. Turtles feed in turbid, shallow inshore waters north of latitude 25° S in depths from less than 10 m to depths of over 40 m (Robins 1995). Nesting habitat includes sandy beaches in the tropics and subtropics.		
<i>Migratory species</i>									
<i>Ardenna pacificus</i> Wedge-tailed Shearwater	P	J	N/A	N/A	N/A	N/A	The Wedge-tailed Shearwater is a pelagic, marine bird known from tropical and subtropical waters. The Wedge-tailed Shearwater breeds on the east and west coasts of Australia and on off-shore islands. The species is common in the Indian Ocean, the Coral Sea and the Tasman Sea.	1 BioNet	Low No suitable habitat.
<i>Ardenna tenuirostris</i> Short-tailed Shearwater	P	J,K	n/a	n/a	n/a	n/a	Short-tailed Shearwater breeds on the east and west coasts of Australia and on off-shore islands. Breeds from October-April in a sparse of	4 BioNet	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							grass, leaves in burrows 0.5-2m long, usually under tussocks, typically in island colonys. Migrates from May-August to North Pacific (Pizzey, 2006).		
<i>Hydroprogne caspia</i> Caspian Tern	P		N/A	None	N/A		Breeds occurs in North America, Africa and Eurasia. Within Australia, the Caspian Tern has a widespread occurrence and can be found in both coastal and inland habitat. In NSW it is widespread east of the Great Divide, mainly in coastal regions, and also in the Riverina and Lower and Upper Western Regions, with occasional records elsewhere. The Caspian Tern is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. In offshore areas the species prefers sheltered situations, particularly near islands, and is rarely seen beyond reefs. Large numbers may shelter along the coast, behind	1 BioNet	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							coastal sand-dunes or coastal lakes during rough weather, and have been recorded inland after storms.		
<i>Limosa lapponica</i> Bar-tailed Godwit, Nunivak	P	C,J,K	N/A	None	N/A	No survey comment	The Bar-tailed Godwit has been recorded in the coastal areas of all Australian states. It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, NSW and Victoria, including the offshore islands. The Bar-tailed Godwit breeds in the north of Scandinavia, Russia and north-west Alaska. The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips.	1 BioNet PMST	Low No suitable habitat.
<i>Numenius madagascariensis</i> Eastern Curlew	P	CE,C,J,K	N/A	None	N/A	No survey comment	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.	PMST	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. It roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. The Eastern Curlew is carnivorous, mainly eating crustaceans (including crabs, shrimps and prawns), small molluscs, as well as some insects. The birds may delay breeding until three to four years of age. Within Australia, immature birds, which do not migrate, move northward in winter. Identifiable from September to March.		
<i>Aquatic</i>									
Adams Emerald Dragonfly	E						The species is only known from a few sites in the greater Sydney region.	DPI threatened species list	Low No suitable habitat.
Alpine Redspot Dragonfly	V						Distribution around Kosciuszko National Park.	DPI threatened species list	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
Australian Grayling	E						Distribution around south coast of NSW.	DPI threatened species list	Low No suitable habitat.
Bennetts Seaweed	Ex						Bennetts Seaweed has only ever been collected from two localities in Port Jackson, Sydney Harbour.	DPI threatened species list	Low No suitable habitat.
Black Rockcod	V						The Black Rockcod is found in warm temperate and subtropical parts of the south-western Pacific.	DPI threatened species list	Low No suitable habitat.
Bousfield Marsh Hopper	V						Bousfield's Marsh Hopper has only been collected from a small isolated location in mangroves at South West Rocks Creek, New South Wales. The species has an extremely limited distribution, and has not been located in other mangrove areas despite active searching.	DPI threatened species list	Low No suitable habitat.
Buchanans Fairy Shrimp	V						They are known only from Lake Buchanan in southwest Queensland, and Gidgee and Burkanoko Lakes in the north-west of NSW (approximately 130 km north-west of Bourke).	DPI threatened species list	Low No suitable habitat.
Darling River Hardyhead population in the Hunter River catchment	Ep						Distribution restricted to upper reaches of the Darling River near the Queensland and New South Wales border. A small population is also found in the Hunter catchment.	DPI threatened species list	Low No suitable habitat.
Darling River Snail	CE						The species is restricted to a few populations in irrigation pipes near Bourke, Brewarrina and Walgett.	DPI threatened species list	Low No suitable habitat.
Eastern Freshwater Cod	E						Eastern Freshwater Cod is only found in the Clarence and	DPI threatened species list	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							Richmond River catchments of northern NSW.		
Fitzroy Falls Spiny Crayfish	CE						The species is only found in Wildes Meadow Creek NSW, surviving as a remnant population, restricted to a small length of the waterway upstream from Fitzroy Falls	DPI threatened species list	Low No suitable habitat.
Flathead Galaxias	CE						However they have not been recorded and are considered locally extinct in the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers. The species is now only known from the upper Murray River near Tintaldra and wetland areas near Howlong. found in still or slow moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation.	DPI threatened species list	Low No suitable habitat.
Great Hammerhead Shark	V						The Great Hammerhead Shark has a circumglobal distribution in tropical and warm temperate seas from latitudes 40° N to 35° S, however the species has been recorded as far south as Sydney (34°).	DPI threatened species list	Low No suitable habitat.
Green Sawfish	Ex						Green Sawfish were once widely distributed in the northern Indian Ocean, around south and south-east Asia and around northern Australia and have been recorded as far south as Jervis Bay. The last	DPI threatened species list	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							confirmed sighting of the Green Sawfish in NSW was in 1972 from the Clarence River at Yamba.		
Greynurse Shark	CE						The Australian east coast population of Greynurse Sharks aggregate at, and migrate between a number of key sites along the coast of NSW and southern Queensland from Montague Island in the south to Fraser Island in the north.	DPI threatened species list	Low No suitable habitat.
Hanley's River Snail	CE						Hanley's River Snail is a freshwater snail that was once common and widespread in the Murray River catchment, including the Lachlan and Murrumbidgee Rivers. They are now virtually extinct throughout their natural range and living specimens have only been found from within irrigation pipelines in South Australia and Far South-West NSW.	DPI threatened species list	Low No suitable habitat.
Haswells caprellid	Ex						Haswells Caprellid was first described from a specimen discovered in 1882 in Port Jackson. The species has also been recorded at Port Phillip Victoria and Emu Point Western Australia although has not been recorded in Southern Australia despite targeted research for over 35 years.	DPI threatened species list	Low No suitable habitat.
Macquarie Perch	E						DPI threatened species list	Low No suitable habitat.	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
Marine Brown Alga <i>Nereia lophocladia</i>	CE						<i>Nereia lophocladia</i> has only been found in two places on the coast of Australia; Port Phillip Heads in Victoria and the northern and southern sides of Muttonbird Island at Coffs Harbour in northern New South Wales.	DPI threatened species list	Low No suitable habitat.
Marine Worm <i>Hadrachaeta aspeta</i>	Ex						The only published records of <i>Hadrachaeta aspeta</i> are from Patonga Creek (lower Hawkesbury River) and Yamba in New South Wales, and from Serpentine Creek (Brisbane) in Queensland. There have been no records in NSW for over 30 years despite targeted surveys, and the species is now considered extinct in NSW.	DPI threatened species list	Low No suitable habitat.
Marine Slug <i>Smeagol hilaris</i>	CE						<i>Smeagol hilaris</i> has only been collected from a small isolated location at Merry Beach, south of Ulladulla, New South Wales, Australia.	DPI threatened species list	Low No suitable habitat.
Murray-Darling Basin population of Eel-Tailed Catfish	Ep						Murray-Darling Basin and in the Eastern drainages NSW north of Newcastle however the proposed corridor is outside the indicative distribution mapped for this species.	DPI threatened species list	Low No suitable habitat.
Murray Crayfish	V						Murray Crayfish can be found in the Murray River upstream of Mildura, in the Murrumbidgee River and in some dams.	DPI threatened species list	Low No suitable habitat.
Murray Hardyhead	CE						Murray Hardyhead is a species of small freshwater fish, native to inland parts of south-eastern Australia. They	DPI threatened species list	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							were once widespread and abundant in the Murray and Murrumbidgee river systems in southern NSW and northern Victoria; however, they have suffered a serious population decline, and now seem to be limited to a few sites, mainly in northern Victoria. There are very few recent records of Murray Hardyhead in NSW.		
Oxleyan Pygmy Perch	E						Oxleyan Pygmy Perch are a small freshwater fish endemic to the coastal region of eastern Australia, from northern NSW to south-eastern Queensland	DPI threatened species list	Low No suitable habitat.
<i>Posidonia australis</i>	Ep						<i>Posidonia australis</i> is a species of seagrass that occurs in the southern half of Australia. It occurs in 17 estuaries along the east coast of New South Wales from Wallis Lake to Twofold Bay near the New South Wales/Victorian border. Six locations within New South Wales (Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie) have suffered significant population decline and have been listed as endangered populations.	DPI threatened species list	Low Not within the locations listed as in significant population decline and not recorded during surveys.
Scalloped Hammerhead Shark	E						The Scalloped Hammerhead Shark has a circumglobal distribution in tropical and warm temperate seas between 45°N to 34°S, but occurs more frequently at higher latitudes during the warmer months.	DPI threatened species list	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							Hammerheads may be found throughout the seas around northern Australia as far south as Sydney, NSW (34°S) and Geographe Bay WA (33°S).		
Southern Bluefin Tuna	E						Southern Bluefin Tuna are highly migratory pelagic fish. In Australian waters they range from northern NSW around southern Australia to northwestern Australia. They tend to form large surface schools in offshore waters off southern Australia at certain times of the year. Overfishing has drastically reduced its numbers.	DPI threatened species list	Low No suitable habitat.
Silver Perch	V						Silver Perch were once widespread and abundant throughout most of the Murray-Darling river system. They have now declined to low numbers or disappeared from most of their former range. Only one remaining secure and self sustaining population occurs in NSW in the central Murray River downstream of Yarrawonga weir, as well as several anabranches and tributaries	DPI threatened species list	Low No suitable habitat.
Snowy River population of River Blackfish	Ep						River Blackfish are a medium sized native fish that occur in the Snowy River catchment of the eastern (coastal) flowing drainages and the Murray-Darling basin in NSW, but these populations are genetically distinct and may in fact be separate species	DPI threatened species list	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
Southern Purple Spotted Gudgeon	E						This species occur in inland drainages of the Murray-Darling basin as well as coastal drainages of northern NSW and Queensland. The western population of the Southern Purple Spotted Gudgeon was previously widespread in the Murray, Murrumbidgee and Lachlan River systems and tributaries of the Darling but has experienced a significant decline in recent times. Southern Purple Spotted Gudgeons are now extremely rare in inland NSW, having been recorded from this area only once since 1983.	DPI threatened species list	Low No suitable habitat.
Southern Pygmy Perch	E						Southern Pygmy Perch were once widely distributed throughout the Murrumbidgee and Murray River systems, as well as coastal streams in South Australia and Victoria, north-eastern Tasmania and King and Flinders Islands in Bass Strait. There have been large-scale reductions in their range since European settlement, particularly in inland regions. Populations of Southern Pygmy Perch have recently been discovered in tributaries of the upper Lachlan and upper Murray River catchments however the proposed corridor is outside the indicative distribution mapped for this species.	DPI threatened species list	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
Stocky Galaxias	CE						The Stocky Galaxias is only known from one locality – the headwaters of Tantangara Creek, upstream of the Tantangara Reservoir, Kosciusko National Park NSW.	DPI threatened species list	Low No suitable habitat.
Sydney Hawk Dragonfly	E						The known distribution of the species includes three locations in a small area south of Sydney, from Audley to Picton. The species is also known from the Hawkesbury-Nepean, Georges River and Port Hacking drainages.	DPI threatened species list	Low No suitable habitat.
Trout Cod	E						The Trout Cod is endemic to the southern Murray-Darling river system, including the Murrumbidgee and Murray Rivers, and the Macquarie River in central NSW. The species was once widespread and abundant in these areas but has undergone dramatic declines in its distribution and abundance over the past century. The last known reproducing population of Trout Cod is confined to the Murray River below Yarrawonga downstream to Tocumwal. The proposed corridor is outside the indicative distribution mapped for this species.	DPI threatened species list	Low No suitable habitat.
Western population of Olive Perchlet	Ep						The western population of the Olive Perchlet was once widespread throughout the Murray-Darling system of South Australia, Victoria, western New South Wales and southern Queensland. This	DPI threatened species list	Low No suitable habitat.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Survey period	Survey requirement	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	State	Cth							
							population has suffered a serious decline and is now found only at a few sites in the Darling River drainage.		
White Shark	V						White Sharks are found throughout the world in temperate and subtropical oceans, with a preference for cooler waters. This distribution includes the coastal waters of NSW.	PMST DPI threatened species list	Low No suitable habitat.

P = Protected, V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory, C, J, K = Species listed as being part of the bilateral migratory bird agreements with China (CAMBA), Japan (JAMBA) and Republic of Korea (ROKAMBA)

A test of significance for five threatened species and one EEC is provided below.

1. Black Bittern *Ixobrychus flavicollis* (V)
2. Eastern Coastal Free tailed Bat *Micronomus norfolkensis* (V)
3. Southern Myotis *Myotis macropus* (V)
4. Large Bentwing-bat *Miniopterus orianae oceanensis* (V)
5. Eastern Cave Bat *Vespadelus troughtoni* (V)
6. Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Endangered Ecological Community (EEC)

These species are listed under the BC Act and were either recorded during surveys or were assumed present within the *subject site* as they have a moderate likelihood of occurrence but were not adequately surveyed. Assessments have been completed in accordance with the [Threatened Species Test of Significance Guidelines \(nsw.gov.au\)](https://www.nsw.gov.au/oeht/Threatened-Species-Test-of-Significance-Guidelines) (OEH 2018).

a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction
Black Bittern <i>Ixobrychus flavicollis</i> The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. It inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. It feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again. It is generally solitary, but occurs in pairs during the breeding season, from December to March. Like other bitterns, but unlike most herons, nesting is solitary. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks. Between three and five eggs are laid and both parents incubate and rear the young. There were no past records of this species in the locality on BioNet, however this species was sighted nearby to the subject site during surveys. The subject site is partially cleared of vegetation and while it may provide limited foraging opportunities, it does not provide suitable shelter or nesting opportunities for this species. As such the proposal is unlikely to have an adverse effect on the life cycle of the species, such that a viable local population of the species is likely to be placed at risk of extinction. Eastern Coastal Free tailed Bat <i>Micronomus norfolkensis</i> The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW where it occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. They roost mainly in tree hollows but will also roost under bark or in man-made structures. They are usually solitary but have also been recorded roosting communally. The species is most likely to be insectivorous. Eastern Coastal Free-tailed was recorded during surveys using an ultrasonic detector positioned under the bridge. The call of the Eastern Coastal Free-tailed Bat was first recorded within the <i>Subject Site</i> at 6.48 pm. This species typically roosts during the day in hollow bearing trees or sometimes in man-made structures. As the recorded call is 1.5 hours after dusk, this species is likely roosting elsewhere, and was recorded foraging near the subject site. (Note. an unknown species of microbat was observed flying near the subject site at 5.07 pm, which indicates that microbats most likely leave their roost sites at around this time during the winter months). The <i>Subject Site</i> is unlikely to be providing roosting habitat for this species and the proposed works are minor and unlikely to impact foraging opportunities for this species. As such the proposal is unlikely to have an adverse effect on the life cycle of the species, such that a viable local population of the species is likely to be placed at risk of extinction. Southern Myotis <i>Myotis macropus</i> The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. They generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, wharves, bridges and in dense foliage. They forage over streams and pools catching insects and small fish by raking their feet across the water surface. In NSW females have one young each year usually in November or December. There are two past records of this species in the locality on BioNet. Despite direct inspection of the underside of the bridge and minimal ultrasonic detection, this species was assumed to be present as surveys were conducted outside of the required survey period. As this species generally roosts in groups, it is not likely to have been missed during direct inspection so it is concluded that the bridge does not provide important roosting habitat for this species. In addition, the proposal would not impact potential foraging habitat for this species. As such the proposal is unlikely to have an adverse effect on the life cycle of the species, such that a viable local population of the species is likely to

be placed at risk of extinction. Mitigation measures are however included to ensure there are no direct impacts on this species during bridge demolition.

*Large Bentwing-bat *Miniopterus orianae oceanensis**

The Large Bentwing-bat has chocolate to reddish-brown fur on its back and slightly lighter coloured fur on its belly. It has a short snout and a high 'domed' head with short round ears. The wing membranes attach to the ankle, not to the base of the toe. The last bone of the third finger is much longer than the other finger-bones giving the "bent wing" appearance. It weighs up to 20 grams, has a head and body length of about 6 cm and a wingspan of 30 - 35 cm. Large Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. They form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. This species hunt in forested areas, catching moths and other flying insects above the tree tops. Hibernates from June to August. Large Bentwing-bat was recorded during surveys using an ultrasonic detector positioned under the bridge. The call could however be *Vespadelus regulus*, which has a similar frequency and call pattern (refer Appendix A for further discussion). As such, this is defined as a 'possible' record. The call of the Large Bentwing-bat was first recorded within the Subject Site at 6.27 pm. This species typically roosts during the day caves or sometimes in man-made structures. As the recorded call is 1.5 hours after dusk, this species is likely roosting elsewhere (such as around the rock platform where there were abundant caves) and was recorded foraging near the subject site. (Note. an unknown species of microbat was observed flying near the subject site at 5.07 pm, which indicates that microbats most likely leave their roost sites at around this time during the winter months). The Subject Site is unlikely to be providing roosting habitat for this species and the proposed works are minor and unlikely to impact foraging opportunities for this species. As such the proposal is unlikely to have an adverse effect on the life cycle of the species, such that a viable local population of the species is likely to be placed at risk of extinction.

*Eastern Cave Bat *Vespadelus troughtoni**

The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT.

Very little is known about the biology of this uncommon species. It is a cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. It is occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.

Eastern Cave Bat was recorded during surveys using an ultrasonic detector positioned under the bridge. The call could however be *Vespadelus vulturnus*, which has a similar frequency and call pattern (refer Appendix A for further discussion). As such, this is defined as a 'possible' record. The call of the Eastern Cave Bat was first recorded within the Subject Site at 6.45 pm. This species typically roosts during the day caves or sometimes in man-made structures. As the recorded call is 1.5 hours after dusk, this species is likely roosting elsewhere (such as around the rock platform where there were abundant caves) and was recorded foraging near the subject site. (Note. an unknown species of microbat was observed flying near the subject site at 5.07 pm, which indicates that microbats most likely leave their roost sites at around this time during the winter months). The Subject Site is unlikely to be providing roosting habitat for this species and the proposed works are minor and unlikely to impact foraging opportunities for this species. As such the proposal is unlikely to have an adverse effect on the life cycle of the species, such that a viable local population of the species is likely to be placed at risk of extinction.

- b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:
 - i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or
 - ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Swamp Oak Floodplain Forest

- I. The BioNet Vegetation Classification estimates that 85.68% of this PCT has been previously cleared. The proposal would result in the removal of 8 m² of Swamp Oak Floodplain Forest, which is partially isolated from other patches of native vegetation by roads and the holiday park. The proposed clearing is minor and is unlikely to place this EECs local occurrence at risk of extinction.
- II. The existing Swamp Oak Floodplain Forest is impacted by exotic invasion from edge effects from past clearing for the bridge, the road and the holiday park, in addition to transport of weeds by passing vehicles animals and foot traffic. The proposal would not significantly impact the composition of the EEC such that its local occurrence is likely to be placed as risk of extinction. Stabilising the soil following completion of works is recommended to reduce the risk of edge effects on this EEC.

- c) In relation to the habitat of a threatened species or ecological community:
 - i. The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

ii.	Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
iii.	The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.
i.	The proposal would impact an area of approximately 8 m ² of potential foraging habitat for the Black Bittern and microbats (<i>Micronomus norfolkensis</i> , <i>Miniopterus orianae oceanensis</i> and <i>V. troughtoni</i>). The proposal would result in the removal of potential roosting habitat for <i>M. macropus</i> however the replacement bridge would continue to provide roosting opportunities.
ii.	The <i>subject site</i> is located along the road and adjoining the existing bridge. As such, the proposal would not result in further fragmentation of habitat.
iii.	The <i>subject site</i> provides potential foraging habitat for these species however it does not provide important roosting, breeding or nesting habitat (except for <i>M. macropus</i>). As such, the <i>subject site</i> is considered of low importance to the long-term survival of these species in the locality.
d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).
The <i>Subject site</i> does not contain a declared area of outstanding biodiversity value	
e)	Whether the proposed development or activity is part of a key threatening process or is likely to increase the impact of a key threatening process.
The proposal is part of, or may contribute to, the following key threatening processes:	
Clearing of native vegetation The clearing of native vegetation is considered a major contributor to the loss of biodiversity. In the determination, the NSW Scientific Committee found that 'clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity'. A maximum of 8 m² would be impacted as a result of the proposal, however the clearing is relatively small in scale, located within already fragmented vegetation with evidence of disturbance and exotic invasion along an existing road.	
Conclusion	
Except for <i>M. macropus</i> , the <i>Subject Site</i> does not contain important nesting or roosting habitat for threatened species known to occur within the area, and while the proposal would result in the loss of potential foraging habitat for some threatened species, it is unlikely to have a significant impact on a local population of threatened species such that it places it at risk of extinction, nor is the proposal likely to place the local occurrence of Swamp Oak Floodplain Forest EEC at risk of extinction.	

APPENDIX C: Assessment of Significance: EPBC ACT

A Protected Matters search tool (PMST) was conducted on 26/06/2024 within a 10x10 km area centred on the *Subject Site* to determine the likely occurrence of Matters of National Environmental Significance. The results are summarized in section 4.8.

The results of the PMST were that the broader *Subject site* did not provide habitat for any listed threatened species or migratory species, but did include a small patch of the EEC Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland.

Endangered communities

Coastal Swamp Oak (Casuarina glauca) Forest

As discussed in section 4.2.2, DOE (2018) provide a condition and threshold matrix designed to determine the relative importance of each patch of Coastal Swamp Oak (*Casuarina glauca*) Forest. This matrix is centred on the size of the patch, its connection with other patches, and the proportion of native vs exotic plant species it supports. The best patches (Class A) are large in size (>5 ha) and comprise >80 % native species cover. Small patches (0.5-2 ha) with <20 % exotic species cover, medium patches (2-5 ha) or small contiguous patches with <50 % exotic species cover, and large patches (>5 ha) with <80 % exotic species cover are the minimum allowable condition (Class C) recognised as forming part of the Coastal Swamp Oak (*Casuarina glauca*) Forest. Small patches (<0.5 ha) do not form part of this EEC at the Commonwealth level, irrespective of exotic species extent.

PCT 4049 within the *Subject Site* only covers 8 m² however it is part of a larger patch of this EEC which covers an area between 2-5 ha. As there is a moderate cover of exotic species in this patch (>50%), it is defined as Class C. Class C is less likely to have the highest diversity, intact structure and ecological function.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- reduce the extent of an ecological community

The proposal would result in the reduction of this EEC by 8 m².

- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

The proposal would not result in further fragmentation as the subject site is on the southern boundary of the existing fragmented EEC.

- adversely affect habitat critical to the survival of an ecological community

The habitat most critical to the survival of the ecological community are those patches that are of a reasonable size and in the best condition (i.e. Categories A and B). These represent those parts of the ecological community closest to the benchmark or reference state of the ecological community; they are the patches that retain the highest diversity and most intact structure and ecological function. The proposal would impact a small portion of Class C EEC and is therefore unlikely to affect the amount of habitat critical to the survival of this EEC.

- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

The proposal requires minimal clearing and the new bridge would be on a similar footprint as the existing bridge. Excavation works relatively shallow and are unlikely to impact groundwater or hydrology.

- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The proposal requires clearing of regrowth vegetation only and is unlikely to result a change in species composition

- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
 - assisting invasive species, that are harmful to the listed ecological community, to become established, or
 - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

This EEC already has been impacted by exotic species both within and outside of the *Subject Site*. The proposal may result in further opportunity for exotics to establish in the EEC through edge effects.

The proposal does not require the extensive use of herbicides or other chemicals or pollutants that would impact this EEC.

- interfere with the recovery of an ecological community

A recovery plan is not available for this ecological community.

In summary, the proposal would directly impact 8 m² of Class C Coastal Swamp Oak (*C. glauca*) Forest EEC, but would not modify abiotic factors, alter the hydrological regime of the EEC or adversely affect habitat critical to the survival of this EEC and the proposal is unlikely to further fragmentation.