

Ecological Assessment

Proposed Lake Ainsworth Foreshore Improvement Works

A Report to Ballina Shire Council
November 2017



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1 INTRODUCTION

1.1 Background

Blackwood Ecological Services have been engaged by Ballina Shire Council (BSC) to complete a Flora and Fauna Assessment for proposed foreshore improvement works at Lake Ainsworth, Pacific Parade, Lennox Head, NSW. The Flora and Fauna Assessment report is to be assessed under Part V of the Environmental Planning and Assessment Act 1979 (the EP&A Act).

BSC received a Part V approval under the EP&A Act in November 2016 for part of the works (the approval did not include works associated with the Southern Road and Foreshore Area). Environmental assessments completed as part of this Part V approval, including a Review of Environmental Factors (REF), were reviewed as part of this assessment. Given the high public profile of the site and degree of public interest, Council have decided to complete further assessment in order to address concerns raised by the community.

The works are on Crown Land for which the Council is the trust manager. The area is also subject to the Lake Ainsworth Management Plan (2002).

1.2 Subject site

The Subject site refers to the area directly affected by the proposal. The Subject site for this study consists of:

- the eastern road (west of fenced dune vegetation) area up to the Sport and Recreation Facility entrance.
- the intersection of Pacific Parade, eastern road and southern road.
- Camp Drewe Road as far as the beach access point north of the lake.
- foreshore areas of Lake Ainsworth where stabilisation/restoration works and the boardwalk are proposed.

FIGURE 1 shows the location of the Subject site.

1.3 Study area

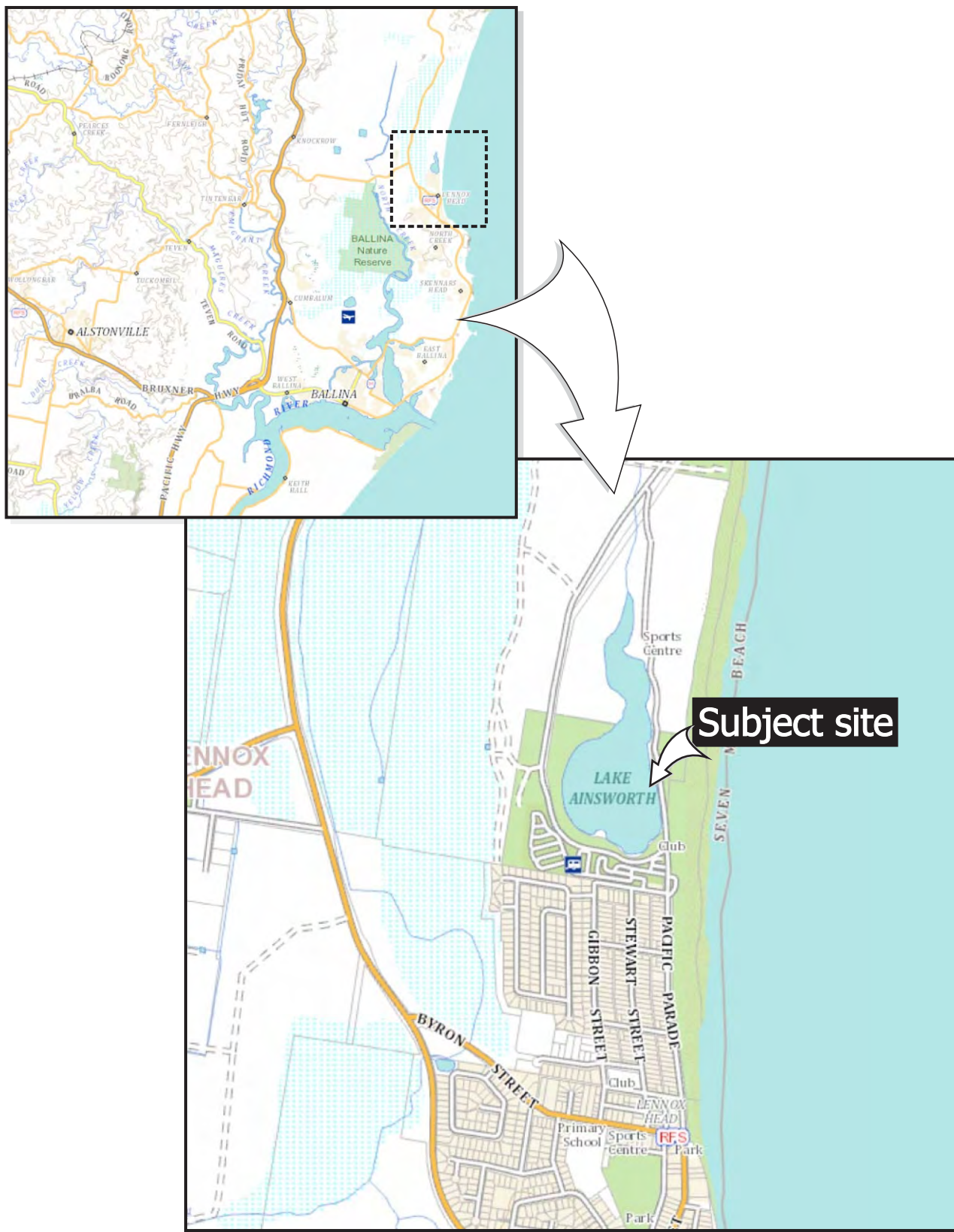
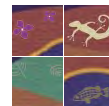
The Study area refers to the Subject site together with any additional areas which are likely to be affected by the proposal, either directly or indirectly. The Study area includes surrounding areas of vegetation, dunes, parkland and Lake Ainsworth itself.

1.4 Proposed development

The proposed works involve improvements along the eastern and-south eastern foreshore of Lake Ainsworth and adjacent recreational spaces. The proposed works are described in detail below:

Eastern Road Rehabilitation

The eastern road rehabilitation involves profiling the existing road pavement and removing concrete footpaths and kerb and gutter. The Eastern Road is currently a bitumen seal roadway approximately 7-8m wide with a turn head approximately 300m north of the surf club building. The roadway will be closed to public vehicles and the road way will be replaced with a 3.0m wide concrete footpath which will provide a wearing surface for pedestrians and emergency vehicles. The surrounding landscaping of the eastern road rehabilitation will be an extension of the existing passive recreational area comprising of seating, turfed areas, tree planting and embellishment of existing riparian vegetation. Disturbance will be restricted to a footprint contained within the limits of existing clearings which are currently grass, bitumen or hardstand surfaces. The works extend to the north gate of the Sport and Recreation Centre, east to the shoreline of Lake Ainsworth,



west to the existing dune vegetation delineated by timber fence lines and south to the intersection between Pacific Parade and the southern road.

Intersection

The intersection works involve profiling the existing road pavement and removing concrete footpaths and kerb and gutter. Pedestrian crossing points are incorporated into the intersection design.

It should be noted that the intersection works are described above to provide context of the road closure works, however are permissible works, without development consent, under the State Environmental Planning Policy (Infrastructure SEPP) 2007.

Bank Stabilisation

Sections of the Lake Ainsworth shore have experienced degradation and eroded banks predominantly from foot traffic of people using the Lake for recreational purposes. The proposed works include undertaking measures to manage foot traffic accessing the lake and protect the banks against ongoing erosion. The access points along the eastern shore are proposed to be stabilised with log revetment (or equivalent depending on availability of natural timber) which will form a natural hard edge to retain the bank where vegetation cannot be used to stabilise the banks. The log revetment will be backfilled with clean sand where banks have retreated by erosion to reinstate the original alignment of the banks. This treatment will need to periodically pull sand that retreats into the lake back up to the toe of the log revetment by mechanical excavation.

Southern Road and Foreshore Area

These works involve reconstruction of the existing road way and formalising the adjoining car parking bays between Pacific Parade and Camp Drewe Road. These works are located along the overbank area of public reserve along the southern shore of Lake Ainsworth and include bank stabilisation, improvement of the open spaces for passive recreation and potential pedestrian linkages between existing isolated open spaces.

Boardwalk

Three short sections of boardwalk are proposed to be located within clumps of lakeside paperbark forest on the southern bank of the lake. The purpose is to allow for pedestrian access round the southern bank without requiring visitors to use the roadway. Boardwalks are to be located so as to avoid loss of established paperbark trees and will be constructed of composite mesh to minimise impacts on groundcover and aquatic vegetation.

Detailed plans of the foreshore works are provided in **APPENDIX A**.

1.5 Literature review

The following reports and plans were reviewed as part of this assessment.

1.5.1 Lennox Head (Coastal) Vegetation Management Plan (Blackwood Ecological Services 2017)

This vegetation management plan covers coastal areas of vegetation from Sharpes Creek in the south to the Ballina/Byron council boundary in the north. The plan has been completed to consolidate several previous management plans undertaken by Envite and provide an updated description of site vegetation and weed distribution to account for the significant restoration works which have been undertaken. The plan provides detailed mapping of vegetation communities and

endangered ecological communities across the project site. Vegetation management recommendations outlined for the Lake Ainsworth area have been taken into consideration as part of this assessment and mitigation measures detailed in this report are consistent with these recommendations.

1.5.2 Lake Ainsworth Vegetation Management Plan (Envite and WetlandCare Australia 2007)

This VMP covers the area around Lake Ainsworth and is bound to the west by a fire-trail amongst the extensive heathland, dune vegetation to the east, the Sport and Recreation Camp to the north and the Caravan Park to the south. The plan outlines a series of guidelines relating to the protection and enhancement of both terrestrial and aquatic vegetation within this area. The western side of Lake Ainsworth is noted to be in good condition with minimal weed presence, while other areas around the lake are subject to extensive recreational usage which has resulted in heavily modified vegetation. Management of the aquatic vegetation within the lake is addressed including the mechanical removal of Yellow waterlily and Salvinia as well as the planting of several semi-aquatic species in shallow areas (<1.5m) around the western side of the lake.

1.5.3 Lake Ainsworth Management Plan (Geolink & BSC 2002)

This plan provides a framework for the effective management of Lake Ainsworth with the overall objective of achieving an integrated, balanced, responsible and ecologically sustainable use of the area in the future. The plan identifies a number of key issues and management actions in relation to ecology which are of relevance to this assessment including:

- rehabilitate coastal dunes to provide a buffer for the lake;
- control the spread of water primrose and other aquatic weeds;
- rehabilitate and restore areas infested with terrestrial weeds;
- target introduced fauna species for the eradication;
- enhance current riparian flora management strategies and ensure revegetation works utilise species that are tolerant to infrequent but potentially prolonged periods of inundation; and
- continue aeration practices to reduce incidence of algal blooms and investigate other strategies to improve water quality such as sediment capping, biomanipulation, sediment removal etc.

The proposed foreshore improvement works will further address a number of additional management actions identified in the plan which relate to water quality, traffic management, erosion and sediment management and recreation:

- installation of grassed filter swales to treat runoff from road/parking areas;
- reduce traffic numbers along the eastern road and foreshore erosion associated with carparking;
- improve safety of visitors to the lake (including addressing conflict with pedestrians and traffic, frequent crossing of eastern road from picnic facilities/parking areas to lake foreshore);
- provide designated pedestrian access paths and walking tracks, reduce erosion in vegetated areas;
- upgrade existing BBQ and picnic facilities;
- enhance riparian vegetation to reduce erosion and sedimentation; and
- reduce runoff from sealed roads.

2 FLORA

2.1 Introduction

This section discusses the methods used in the vegetation assessment and presents the results of the assessment. Relevant databases and reports were reviewed to identify records of locally occurring Threatened and Rare plant species, populations and communities. Surveys of site vegetation were undertaken on the 2nd May and 9th of August 2017.

The objectives of the site assessment were:

- To identify vegetation communities and flora species present in the area subject to the proposed works.
- To complete targeted searches for significant flora species known from the locality and considered possible occurrences based on an assessment of site habitats.
- To identify potential impacts including vegetation removal and trimming likely as a result of the proposed works.
- To identify areas of high ecological value.

2.2 Database searches

2.2.1 NPWS Database search

A search of the NPWS Database revealed records of 20 Threatened flora species within 10km of the Subject site. These species are shown in **TABLE 1**.

TABLE 1
NPWS DATABASE RECORDS OF THREATENED FLORA
SPECIES WITHIN 10 KM OF THE SUBJECT SITE

Botanical name	Common name	NSW Status
<i>Acronychia littoralis</i>	Scented Acronychia	E1
<i>Archidendron hendersonii</i>	White Lace Flower	V
<i>Arthraxon hispidus</i>	Hairy Jointgrass	V
<i>Cryptocarya foetida</i>	Stinking Cryptocarya	V
<i>Davidsonia jerseyana</i>	Davidson's Plum	E1
<i>Davidsonia johnsonii</i>	Smooth Davidson's Plum	E1
<i>Diploglottis campbellii</i>	Small-leaved Tamarind	E1
<i>Diuris</i> sp. aff. <i>chrysantha</i>	Byron Bay Diuris	E1
<i>Endiandra muelleri</i> subsp. <i>bracteata</i>	Green-leaved Rose Walnut	E1
<i>Fontainea oraria</i>	Coastal Fontainea	E4A
<i>Gossia fragrantissima</i>	Sweet Myrtle	E1
<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V
<i>Niemeyera whitei</i>	Rusty Plum, Plum Boxwood	V
<i>Ochrosia moorei</i>	Southern Ochrosia	E1
<i>Owenia cepiodora</i>	Onion Cedar	V
<i>Pterostylis nigricans</i>	Dark Greenhood	V
<i>Senna acclinis</i>	Rainforest Cassia	E1
<i>Syzygium hodgekinsoniae</i>	Red Lilly Pilly	V
<i>Syzygium moorei</i>	Durobby	V
<i>Tinospora tinosporoides</i>	Arrow-head Vine	V

KEY

E1	Endangered
E4A	Critically endangered
V	Vulnerable

2.2.2 Commonwealth EPBC Act (1999) Database search

A search of the Commonwealth EPBC Act (1999) Database revealed potential suitable habitat for a number of Threatened flora species within 5km of the Subject site. These species are shown in **TABLE 2**. The Commonwealth EPBC Act Protected Matters Report is included in full in **APPENDIX B**.

TABLE 2
COMMONWEALTH EPBC ACT (1999) DATABASE SEARCH RESULTS
THREATENED FLORA SPECIES WITH POTENTIAL HABITAT
WITHIN 5 KM RADIUS OF THE SUBJECT SITE

Botanical name	Common Name	Status
<i>Acronychia littoralis</i>	Scented acronychia	E
<i>Allocasuarina defungens</i>	Dwarf heath casuarina	E
<i>Arthraxon hispidus</i>	Hairy Jointgrass	V
<i>Baloghia marmorata</i>	Jointed baloghia	V
<i>Bulbophyllum globuliforme</i>	Miniature Moss-orchid	V
<i>Cryptocarya foetida</i>	Stinking cryptocarya	V
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	V
<i>Davidsonia jerseyana</i>	Davidson's Plum	E
<i>Davidsonia johnsonii</i>	Smooth Davidson's plum	E
<i>Diploglottis campbellii</i>	Small-leaved tamarind	E
<i>Floydia praealta</i>	Ball Nut	V
<i>Fontainea oraria</i>	Coastal fontainea	E
<i>Gossia fragrantissima</i>	Sweet Myrtle	E
<i>Macadamia integrifolia</i>	Macadamia Nut	V
<i>Macadamia tetraphylla</i>	Rough-shelled bush nut	V
<i>Owenia cepiodora</i>	Onionwood	V
<i>Phaius australis</i>	Lesser swamp orchid	E
<i>Randia moorei</i>	Spiny Gardenia	E
<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly	V
<i>Syzygium moorei</i>	Durobby	V
<i>Thesium australe</i>	Austral toadflax	V
EECs		
<i>Littoral Rainforest and Coastal Vine</i>		
<i>Thickets of Eastern Australia</i>		CE
<i>Lowland Rainforest of Subtropical</i>		
<i>Australia</i>		CE

KEY

CE	Critically Endangered
E	Endangered
V	Vulnerable

2.3 Site assessment

2.3.1 Flora species recorded

A total of 67 flora species were recorded during the surveys including 19 (28% of the total) exotic species. A full list of all species recorded is provided in **APPENDIX C**.

2.3.2 Vegetation communities

Five vegetation communities were identified within the Subject site. These vegetation communities are shown in **TABLE 3**. The location and extent of these vegetation communities on the Subject site is shown in **FIGURE 2**. Vegetation communities are described in detail below.

TABLE 3

VEGETATION COMMUNITIES WITHIN THE SUBJECT SITE

Vegetation Community	
1	Swamp sclerophyll woodland/forest (Broad-leaved paperbark dominant)
2	Coast banksia woodland to open forest
3	Dry sclerophyll woodland (Wallum banksia dominant)
4	Aquatic vegetation
5	Maintained lawn with scattered Pandanus/Coast banksia/Norfolk pine/Paperbark

2.3.2.1 Community 1 Swamp sclerophyll woodland/forest (Swamp paperbark dominant)

Description and Location

This community includes areas dominated by Broad-leaved paperbark and occurs around the perimeter of Lake Ainsworth within areas subject to inundation during heavy rainfall events. The community occurs in various degrees of condition and integrity. Within the Subject site this community occurs within areas subject to high pedestrian traffic and recreation use. Broad-leaved paperbark typically occurs as individual trees amongst grassland, in unfenced patches fringing the lake or in fenced vegetation areas. Unfenced patches of paperbark along the edge of Lake Ainsworth typically have limited groundcover and highly exposed root systems due to pedestrian traffic. Fenced areas comprise Broad-leaved paperbark with occasional Swamp oak and Tuckeroo, Coast wattle understorey and groundlayer dominated by Creeping wheat grass. Sporadic weeds noted within fenced areas along the eastern and southern shores include Coastal morning glory, Blue billy goat, Siratro, Alexander palm, exotic Pennywort and exotic grasses.

More intact examples of this community occur along the western shore of Lake Ainsworth and extend to the north within low lying areas. These areas are typically in good condition with a continuous paperbark canopy and Blechnum and rushes common in the understorey.

Conservation Status

Vegetation in this community is consistent with the description of the EEC *Swamp sclerophyll forest on coastal floodplains* which is listed under the TSC Act 1995 for the North Coast bioregion. Individual paperbark trees located amongst grassland/informal parking areas are included in this EEC, although a highly degraded/modified form of the EEC. High quality areas of this EEC occur around the perimeter of the lake and to the north along the drainage channel. In addition, vegetation surrounding the lake serves as an important buffer for the lake, filtering runoff and thus improving the water quality of the lake.



VEGETATION COMMUNITIES

- 1. Swamp sclerophyll woodland/forest (Broad-leaved paperbark)
- 2. Coast banksia woodland/open forest
- 3. Dry sclerophyll woodland (Wallum banksia/mixed species)
- 4. Aquatic vegetation
- 5. Maintained lawn with scattered trees
- Mixed coastal forest
- Tuckeroo dominated patches
- Regenerating littoral rainforest



Scale (metres) 0 50 100 150 200



PLATE 1
Patches of
Swamp
sclerophyll
forest fringe
the lake edge.



PLATE 2
Broad-leaved
paperbark
trees subject
to ongoing
pruning for
powerline
clearance.

2.3.2.2 Community 2 Coast banksia woodland to open forest

Description and Location

This community includes areas of woodland/forest dominated by Coast banksia and occurs on the foredune and backdune east of the Subject site. Foredune areas of this community typically have a wind sheared profile, while protected areas on the backdune comprise an open forest structure. Coast banksia dominates the canopy with occasional Pandanus and Horsetail oak along the foredune and Tuckeroo along the backdune. The mid-storey is generally open with patches of

Coastal wattle in exposed areas. Low patches of ferns occur in the protected interdune corridor while Flax lily dominates the ground layer of the dune crest and backdune. Additionally, there is prevalent natural regeneration of native littoral rainforest trees occurring within this community including Beach alectryon, Tuckeroo, Three-veined laurel and Beach acronychia.

Extensive works have been undertaken throughout the dunes in this area by landcare groups and weeds are generally confined to the groundlayer. Sporadic weeds noted include Ground asparagus, Coastal morning glory, Bitou bush, Turkey rhubarb, exotic grasses and annuals.

Conservation Status

Due to the dominance of Coast banksia in the canopy, this community type does not meet the definition of the EEC *Littoral rainforest* which is listed under the TSC Act. However, given time and continued restoration some areas of this community are likely to develop into Littoral rainforest. This community is of high conservation value.



PLATE 3

Areas of Coast Banksia forest on the hind dune with regenerating littoral rainforest species.

2.3.2.3 Community 3 Dry sclerophyll woodland (Wallum banksia dominant)

Description and Location

This community describes vegetation located on the western side of Lake Ainsworth, up to Camp Drewe Road. Vegetation in this area comprises dry sclerophyll woodland dominated by Wallum banksia with Coast banksia, Tuckeroo, Duboisia, Blueberry ash and groves of Pink bloodwood. Vegetation is in good condition with exotics generally restricted to the edge of Camp Drewe Rd and along walking tracks. Exotic species noted along Camp Drewe Road include Cocos palm, Lantana, Siratro, Coastal morning glory and exotic grasses.

Conservation Status

Vegetation within this area is of high quality with limited exotic weed presence and diverse structural integrity. This vegetation is not consistent with any EEC descriptions listed under the TSC or EPBC Acts.



PLATE 4
Wallum
banksia
dominant
vegetation
along Camp
Drewe
Road.

2.3.2.4 Community 4 Aquatic vegetation

Description and Location

Aquatic vegetation is generally limited within the immediate vicinity of the Subject site due to frequent recreation and usage of this area by swimmers/watercraft. Aquatic species which may occur and are common in surrounding parts of the lake subject to less disturbance include Native reed, Cumbungi, Jointed twig-rush, Grey rush, Salvinia, Azolla, Mexican waterlily, Snowflake, *Persicaria* spp., Swamp hibiscus, Water ribbon and Water primrose. Lennox Head Landcare has been active with controlling the aquatic weed Water hyacinth throughout Lake Ainsworth.

Conservation Status

Lake Ainsworth is one of the few freshwater lowland dune lakes in northern NSW. Aquatic vegetation fringing the lake provides important fauna habitat.



PLATE 5
Fringing
aquatic
vegetation
along the
southern
shore.

2.3.2.5 Community 5 Maintained lawn with scattered Pandanus/Coast banksia/Norfolk pine

Description and Location

This community describes areas of maintained grassland which are regularly mown by Council and are typically utilised for recreation. It occurs around the eastern and southern edge of the lake. Trees occur singly or in clumps and consist mainly of Broad-leaved paperbark, Coast banksia, Tuckeroo, Pandanus and Norfolk Pine.

Conservation Status

Vegetation within this community type is highly modified and has limited conservation status.



PLATE 6
Recreational
areas of
grassland with
scattered trees.

2.3.3 Endangered and Threatened Ecological Communities

Vegetation communities on the Subject site were compared with descriptions of vegetation communities listed as Endangered Ecological Communities under the Threatened Species Conservation Act (1995) and Threatened Ecological Communities under the EPBC Act (1999).

Areas of Community 1 meet the description of the EEC *Swamp sclerophyll forest on coastal floodplains* which is listed under the TSC Act 1995 for the North Coast bioregion. High quality areas of this EEC occur around the perimeter of the lake and to the north along the drainage channel. These areas have an intact canopy dominated by Broad-leaved paperbark and a native understorey typically dominated by ferns and rushes. Moderate value areas of this EEC also occur along the eastern and southern shores in unfenced areas and typically contain an intact canopy of paperbark but limited understorey due to pedestrian traffic and erosion. Scattered paperbark trees within grassland and carparking areas are also included in this EEC but are considered to be a highly degraded form. These areas have little to no natural regeneration occurring and no structured vegetation surrounding the paperbark trees.

Given time and continued restoration some areas of Community 2, particularly on the hind dune, are likely to develop into Littoral rainforest which is listed as an EEC under the TSC Act and a TEC under the EPBC Act. However, at this stage areas of Community 2 adjacent to the proposed works are dominated by a Coast banksia canopy and are not considered to constitute this EEC. Dune vegetation east of the Sport and Recreation Camp (outside the scope of this project) is considered to constitute Littoral rainforest EEC due to the greater abundance and diversity of littoral species in the canopy.

2.3.4 Significant species

No Threatened (TSC Act 1995, Commonwealth EPBC Act 1999) or ROTAP flora species were recorded during the site surveys.

2.3.5 Noxious weeds

A number of noxious weeds listed for the Ballina Shire LGA have been recorded within the Study area and may occur within the Subject site at times. These include:

- Ground asparagus – Class 4
- Bitou bush – Class 4
- Groundsel bush - Class 3
- Lantana – Class 4
- Salvinia – Class 4
- Water hyacinth – Class 4

3 FAUNA

3.1 Introduction

This section discusses the methods used in the fauna assessment and presents the results of the assessment. Relevant databases and reports were reviewed to identify records of locally occurring Threatened fauna species, populations and communities.

The fauna assessment consisted of:

- A review of relevant databases and literature.
- An assessment of site fauna habitats.

Site habitats were assessed in terms of their value for native fauna species. A site assessment was undertaken on the 2nd May 2017 to assess the extent of proposed works and complete a detailed survey of site habitats. The assessment focused on identifying habitat features associated with Threatened species known from the locality. Particular attention was paid to habitat features such as:

- The presence of mature trees with hollows, fissures and/or other suitable roosting/nesting places.
- Presence of hollow logs/debris and areas of dense leaf litter.
- The presence of Grey-headed Flying Fox camps
- The presence of preferred Koala food tree species.
- The presence of preferred Glossy black cockatoo feed trees.
- Condition, flow and water quality of drainage lines and bodies of water.
- Areas of dense vegetation.
- Presence of fruiting flora species and blossoming flora species, particularly winter-flowering species.
- Vegetation connectivity and proximity to neighbouring areas of vegetation.
- Presence of caves, hollow trees and/or man-made structures suitable as microchiropteran bat roost sites.
- Potential nest sites for shorebirds and other coastal birds.

3.2 Database searches

3.2.1 NPWS Database search

A search of the NPWS Database revealed records of 33 Threatened fauna species (excluding marine species) within 10km of the Subject site. These species are shown in **TABLE 4**.

TABLE 4
NPWS DATABASE RECORDS OF THREATENED FAUNA
SPECIES WITHIN 10 KM OF THE SUBJECT SITE

Scientific name	Common name	NSW Status
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1
<i>Carterornis leucotis</i>	White-eared Monarch	V
<i>Circus assimilis</i>	Spotted Harrier	V
<i>Crinia tinnula</i>	Wallum Froglet	V
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V

Scientific name	Common name	NSW Status
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1
<i>Grus rubicunda</i>	Brolga	V
<i>Gygis alba</i>	White Tern	V
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V
<i>Haematopus longirostris</i>	Pied Oystercatcher	E1
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V
<i>Irediparra gallinacea</i>	Comb-crested Jacana	V
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1
<i>Litoria olongburensis</i>	Olongburra Frog	V
<i>Miniopterus australis</i>	Little Bentwing-bat	V
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V
<i>Myotis macropus</i>	Southern Myotis	V
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat	V
<i>Pandion cristatus</i>	Eastern Osprey	V
<i>Pezoporus wallicus wallicus</i>	Eastern Ground Parrot	V
<i>Phascolarctos cinereus</i>	Koala	V
<i>Planigale maculata</i>	Common Planigale	V
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V
<i>Sternula albifrons</i>	Little Tern	E1
<i>Syconycteris australis</i>	Common Blossom-bat	V
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail	E1
<i>Tyto longimembris</i>	Eastern Grass Owl	V
<i>Tyto novaehollandiae</i>	Masked Owl	V

KEY

E1 Endangered

V Vulnerable

3.2.2 Commonwealth EPBC Act (1999) Database search

A search of the Commonwealth EPBC Act (1999) Database revealed potential suitable habitat for a number of Threatened fauna species within 5km of the Subject site. These species are shown in **TABLE 5**.

The Commonwealth EPBC Act Protected Matters Report is included in full in **APPENDIX B**.

TABLE 5
COMMONWEALTH EPBC ACT (1999) DATABASE RESULTS
THREATENED FAUNA SPECIES WITH POTENTIAL HABITAT
WITHIN 5KM OF THE SUBJECT SITE

Common Name	Scientific name	Status
Invertebrates		
Mitchell's Rainforest snail	<i>Thersites mitchellae</i>	CE
Birds		
Coxen's Fig-Parrot	<i>Cyclopsitta diophthalma coxeni</i>	E
Swift Parrot	<i>Lathamus discolor</i>	CE
Regent Honeyeater	<i>Xanthomyza phrygia</i>	CE
Australasian bittern	<i>Botaurus poiciloptilus</i>	E
Red Goshawk	<i>Erythrorhynchus radiatus</i>	V
White-bellied Storm-Petrel	<i>Fregetta grallaria grallaria</i>	V
Southern Giant-Petrel	<i>Macronectes giganteus</i>	E
Northern Giant-Petrel	<i>Macronectes halli</i>	V
Kermadec Petrel (western)	<i>Pterodroma neglecta neglecta</i>	V
Campbell Albatross	<i>Thalassarche melanophrys impavida</i>	V
Australian Painted Snipe	<i>Rostratula australis</i>	E
Red knot	<i>Calidris canutus</i>	E
Curlew sandpiper	<i>Calidris ferruginea</i>	CE
Great knot	<i>Calidris tenuirostris</i>	CE
Greater Sand Plover	<i>Charadrius leschenaultii</i>	V
Lesser Sand Plover	<i>Charadrius mongolus</i>	E
Antipodean Albatross	<i>Diomedea antipodensis</i>	V
Gibson's Albatross	<i>Diomedea antipodensis gibsoni</i>	V
Southern Royal Albatross	<i>Diomedea epomophora</i>	V
Wandering Albatross	<i>Diomedea exulans</i>	V
Bar-tailed Godwit	<i>Limosa lapponica baueri</i>	V
Northern Siberian Bar-tailed Godwit	<i>Limosa lapponica menzhieri</i>	CE
Eastern curlew	<i>Numenius madagascariensis</i>	CE
Fairy Prion	<i>Pachyptila turtur subantarctica</i>	V
Sooty Albatross	<i>Phoebastria fusca</i>	V
Gould's Petrel	<i>Pterodroma leucoptera leucoptera</i>	E
Shy Albatross	<i>Thalassarche cauta cauta</i>	V
White-capped Albatross	<i>Thalassarche cauta stadi</i>	V
Chatham Albatross	<i>Thalassarche eremita</i>	E
Black-browed Albatross	<i>Thalassarche melanophrys</i>	V
Salvin's Albatross	<i>Thalassarche salvini</i>	V
Black-breasted Button-quail	<i>Turnix melanogaster</i>	V
Mammals		
Large-eared Pied Bat	<i>Chalinolobus dryeri</i>	V
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	E
Koala (combined populations of Qld, NSW & ACT)	<i>Phascolarctos cinereus</i>	V
Long-nosed Potoroo (SE mainland)	<i>Potorous tridactylus tridactylus</i>	V
New Holland mouse	<i>Pseudomys novaehollandiae</i>	V
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	V
Water mouse	<i>Xeromys myoides</i>	V
Greater Glider	<i>Petauroides volans</i>	V
Amphibians		

Common Name	Scientific name	Status
Wallum Sedge Frog	<i>Litoria olongburensis</i>	V
Fish		
Black Rockcod	<i>Epinephelus daemeli</i>	V
Insects		
Pink Underwing Moth	<i>Phyllodes imperialis smithersi</i>	E

KEY

CE	Critically endangered
E	Endangered
V	Vulnerable

3.3 Fauna assessment

3.3.1 Introduction

This section discusses fauna habitat types within the Subject site. It includes a discussion of the ecological significance of these habitats including the potential for threatened and significant fauna species to occur in the Study area.

3.3.2 Previous studies of Lake Ainsworth fauna

3.3.2.1 Lake Ainsworth Management Plan (Geolink 2002)

The Lake Ainsworth Management Plan (Geolink 2002) outlines a number of fauna studies which have been undertaken at Lake Ainsworth over the years. Aquatic fauna previously recorded within the lake include firetailed gudgeons, freshwater catfish, bass and mosquito fish. Two species of freshwater turtle/tortoise have been recorded including saw-shelled turtle and eastern long-necked tortoise. Opportunistic or incidental fauna records from the Sport and Recreation Centre environs collected by Phil Buckland (staff member) include nine frog species, 21 lizards and snakes, eight mammals including the threatened Common planigale and 115 species of birds.

3.3.2.2 Lake Ainsworth Sport and Recreation Centre – Multipurpose Sports Development (Geolink 2017)

Recent fauna surveys undertaken by Geolink in March 2017, as part of a development application within the Sport and Recreation Centre, recorded one threatened fauna species, the Little Bentwing-bat. Anabat results also indicated the potential presence of up to three other threatened microbat species, Eastern Freetail-bat, Eastern Long-eared Bat and Southern Myotis. In addition, one migratory species listed under the EPBC Act was recorded, Rainbow Bee-eater. This species is common in coastal landscapes within the area.

3.3.3 Koala studies

The Ballina Koala Habitat Study (Biolink 2013) identifies three primary Koala feed tree species in the Ballina LGA, Forest red gum, Tallowwood and Swamp mahogany. The Ballina Koala Habitat Study did not record any active Koala sites in the Lennox Head locality, with the closest known population being at Tintenbar, approximately 5 km south-west of the site.

The Draft Ballina Shire Comprehensive Koala Plan of Management (Ballina Shire Council 2015) does not map the site as primary or secondary Koala habitat and the study area is not mapped as being within a designated Koala Management Precinct and does not lie within the Ballina Shire Koala Planning Area.

3.3.4 Terrestrial fauna habitats

3.3.4.1 Amphibians

Lake Ainsworth and areas of low-lying heathy forest to the north and west provide quality habitat for many frog species. North of Lake Ainsworth, low lying wallum habitats provide high quality habitat for amphibians, particularly the acid frogs including the Threatened Wallum froglet (*Crinia tinnula*) and Wallum sedgefrog (*Litoria olongburensis*). Of the nine species previously recorded within the Sport and Recreation environs the exotic Cane toad was noted as being the most common.

3.3.4.2 Reptiles

Forested sandy dune systems east of Lake Ainsworth represent good quality habitat for reptiles, although fragmentation, past clearing and disturbance and roadkill are likely to be factors in limiting reptile diversity, with species highly sensitive to disturbance unlikely to occur. Extensive tracts of heathland and forest north and west of Lake Ainsworth provide high quality reptile habitat. Threatened reptile species are unlikely to occur, with likely common species including the Eastern water dragon, Eastern blue-tongued lizard, Land mullet, Robust ctenotus, Yellow-faced whip snake, Carpet python, Green tree snake, Red-bellied black snake, Brown snake, Small-eyed snake, Burton's legless lizard, Lace monitor, Bandy bandy, *Ramphotyphlops nigrescens* (blind snake) and various smaller skinks. Freshwater turtles may occasionally occur in terrestrial habitats.

3.3.4.3 Birds

The juxtaposition of habitat types within a relatively small area can be expected to contribute toward a high diversity of bird species over the course of the seasons. Birds known from the Study area or considered likely to occur include coastal and oceanic birds (e.g. Oystercatchers, cormorants, shorebirds, terns and gulls), raptors (Osprey, Brahminy kite, Whistling kite), grassbirds (e.g. wrens, finches, Golden-headed cisticola) wetland birds (ducks, grebes, Purple swamphen) and birds typical of closed forest habitats (e.g. monarchs, Varied triller, shrike-thrushes).

Birds requiring large tree hollows for nesting are unlikely to breed in the Study area. Additional nomadic and migratory species would be expected to occur at other times of the year, including shorebird species. The high levels of disturbance and limited extent of the dune system are likely to be limiting factors reducing the suitability of the area as potential nest sites for oystercatchers, Little tern and other beach-nesting birds.

The extensive area of heathland and paperbark habitats north of Lake Ainsworth are of high value to birds, especially nectarivorous species such as honeyeaters. The Threatened Ground parrot and Eastern grass owl may occur within these vegetation types.

3.3.4.4 Mammals

Habitat fragmentation and disturbance history is likely to limit mammal diversity as well, with mammals found in larger tracts of coastal vegetation, such as the Sugar glider and Eastern chestnut mouse, unlikely to occur south of Lake Ainsworth, with areas of heathland to the north providing potential habitat. Mammals relying on larger tree hollows are unlikely to breed in the area.

The threatened Common planigale may occur in forested habitats north and west of Lake Ainsworth (Geolink 2002). Mammal species considered likely to occur in or near to the Study area include the Bush rat, Black rat, Echidna, antechinus and Brushtail possum.

Additional mammal species considered likely to occur include the Mountain brushtail possum and Ringtail possum. Roadkill along The Coast Road is also likely to be a factor limiting mammal populations in the study area.

Paperbark forest provides suitable foraging habitat for a number of threatened microbats. Small cracks and hollows also provide suitable roosting habitat for certain species of microbats.

3.3.5 Aquatic fauna habitats

Studies of aquatic vertebrate fauna and invertebrates have indicated that Lake Ainsworth supports a moderate diversity of species, including common freshwater fish species and two species of freshwater turtle/tortoise (Geolink 2002). Lake Ainsworth is fed by heathland and paperbark areas to the north and west. In these habitats, pools within low lying swales expand during rainfall events and the low pH wallum waters provide habitat for suitably adapted aquatic invertebrates, fish and other species.

3.3.6 Wildlife corridors and habitat connectivity

Movement opportunities for fauna through the Study area are limited to the south and east as a result of the ocean and urban development. Vegetation along the dune system provides a partially intact north-south wildlife corridor although the lack of vegetation along much of the Lennox Head beachfront restricts movement for all but the more mobile fauna groups. Extensive areas of vegetation occur north and west of the lake and a partially intact corridor extends south-west to the Ballina Nature Reserve. The Coast Road represents the major obstacle through this largely vegetated landscape.

3.3.7 Significant species

No Threatened (TSC Act 1995, EPBC Act 1999) fauna species were recorded during the site survey.

3.3.8 Potential occurrence of Threatened fauna

APPENDIX D lists the threatened fauna species known from the locality and considers the likelihood of these species occurring on the site. This Table includes species from the NPWS and EPBC databases as well as several other species known from other sources. Some of these species, particularly birds and bats, may be occasional or regular visitors to the site depending on seasonal migrations, availability of forage resources and other factors. Based upon the assessment, a 7-part test (TSC Act) and Assessment of Significance (EPBC Act) has been undertaken for:

- Common blossom bat
- Eastern (common) bent-wing bat
- Eastern free-tailed bat
- Eastern long-eared bat
- Greater broad-nosed bat
- Grey-headed flying fox
- Little bent-wing bat
- Southern myotis

4 POTENTIAL IMPACTS AND AMELIORATION MEASURES

4.1 Introduction

This section discusses potential impacts associated with the proposed works. The proposed works involve:

- Establish site with necessary exclusion fencing and traffic to comply with Ballina Shire Council safe work methods.
- Install erosion and sediment controls.
- Undertake controlled vegetation removal.
- Profile redundant pavement and demolish redundant concrete structures.
- Lay and compact sub-base materials.
- Pour concrete kerbing, pathways and handicapped parking bays.
- Lay and compact pavements and wearing surfaces and hard landscaping.
- Install log revetments and replenish eroded areas with clean sand.
- Construct boardwalk along southern shore.
- Revegetation of disturbed areas.
- Installation of seating, linemarking and signage.
- Undertake ongoing maintenance of rehabilitation areas/ landscaping.
- Construction of pedestrian boardwalks through vegetation patches on the southern side of the lake.

Note, the list above provides a general list of construction activities and may not be undertaken in the order listed. For example, bank stabilisation works and construction of the boardwalk may be undertaken separately from the road rehabilitation works.

4.2 Potential ecological impacts

4.2.1 *Flora*

The various activities associated with the foreshore improvement and road rehabilitation works have the potential to result in some impacts on site vegetation. These are detailed in this section.

4.2.1.1 Direct removal of vegetation

The proposed works will require the removal of one small Tuckeroo and one small Swamp she-oak on the eastern side of the lake. The removal of these trees is required so that the new pathway can be aligned further to the east than the existing roadway. The small Tuckeroo and Swamp she-oak are of minimal ecological value given their immaturity, isolated location and position under the powerlines.

Details regarding these trees are provided below in **TABLE 6**. Photographs of each tree are provided in **APPENDIX E**.

TABLE 6
TREES PROPOSED FOR REMOVAL AS A RESULT OF THE PATHWAY CONSTRUCTION

Tree No.	Species	DBH(cm)	Notes
1	Tuckeroo	4/2.5	located directly under powerline
2	Swamp she-oak	10	located directly under powerline

Locating the proposed pathway further east of the existing road will allow for the widening of existing areas of riparian vegetation and an additional area of 300 square metres will be available for regeneration of fully structured vegetation communities along the lake banks (BSC 2016). Offset requirements for the removal of these trees are discussed further in Section 4.

The existing fence located along the western edge of dune vegetation is to be retained and no vegetation removal east of this fence will be required. In addition, no riparian vegetation would be removed as a result of bank stabilisation works.

Construction of the boardwalk along three sections of the southern lake shore will require the removal of some small trees and understorey vegetation. The exact locations of boardwalks have been designed so as to minimise any vegetation removal required. No mature trees would be removed and the boardwalk is to be constructed of composite mesh to minimise impacts on groundcover and aquatic vegetation.

TABLE 7 provides details on vegetation removal associated with the construction of boardwalk sections along the southern lake shore. Vegetation removal has been calculated based on a 2m wide clearance corridor for construction. Photos of each boardwalk section are included in **APPENDIX E**.

TABLE 7
VEGETATION IMPACTS ASSOCIATED WITH SOUTHERN BOARDWALK SECTIONS

Boardwalk section	Vegetation clearance
A (Eastern section)	No tree removal required. Boardwalk located to avoid mature trunks of Broad-leaved paperbark within this patch. Vegetation removal consists of removal of Lomandra, several small Cheese tree saplings and Coast wattle shrubs and trimming of low and prostrate limbs of Broad-leaved paperbark
B (Central section)	No large tree removal required. Boardwalk located to avoid mature trunks of Broad-leaved paperbark within this patch. Boardwalk will pass through section of regrowth and embellishment plantings to about 3m high with removal of 3 Macaranga, 3 Three-veined cryptocarya, 2 Guioa and 1 Tuckeroo. All trees are less than 10cm dbh in girth.
C (Western section)	No large tree removal required. Boardwalk located to avoid mature trunks of Broad-leaved paperbark and Swamp mahogany within this patch. Boardwalk will pass through section of regrowth and embellishment plantings to about 4m high with removal of 4 Macaranga, 5 Three-veined cryptocarya, 1 Beach acronychia, 6 Coast wattle, 1 Yellow kamala and 5 Tuckeroo. All trees are less than 10cm dbh in girth. Some Lantana, Parsonsia vine and Climbing guinea flower also to be removed.

In addition, some Coastal rosemary and other landscaping located in fenced vegetated areas on the northern side of the existing toilets (adjacent to surf club) would be removed. Existing Coast banksia and Pandanus located in this area are to be retained.

4.2.1.2 Indirect physical effects on vegetation adjacent to the works area

There is some potential for areas adjacent to the work zone to be indirectly affected through damage to root systems and/or accidental damage from machinery. No stockpiling of spoil or other materials will be required, with excavated material for removal to be loaded directly onto trucks and transported off site and imported material to be delivered in place. There is some potential for aquatic/riparian vegetation within low-lying areas to be affected by sedimentation from loss of soils from adjacent disturbed areas, alteration to hydrological conditions and other factors. Sedimentation may occur from ground disturbance during construction and/or the importation of fill. Sedimentation has the potential to impact on the immediate environments as well as aquatic habitats by changing drainage patterns, smothering of aquatic vegetation and increased turbidity.

There is some potential that an increase in traffic along Camp Drewe Road may result in some increase in dust generation which could have potential impacts on adjacent vegetation. Vegetation along this road is in good condition and is not apparently adversely affected by current dust generation, although there is evidence of dust on the leaves of roadside plants. The density of the vegetation is also likely to preclude dust impacts beyond the edge. The Lennox Head (Coastal) VMP (Blackwood ES 2017) provides the following management recommendation regarding this issue:

It may be worth leaving (existing) non-invasive exotics along the Eastern edge of Camp Drewe Road to buffer core areas of vegetation. Maintenance along the inside edge will be required periodically to ensure weeds do not encroach into these areas. Consider embellishment plantings where vegetation is sparse to bolster this buffer zone and deter informal access.

4.2.1.3 Creation of edge effects and introduction of weed species and/or contaminants to the Study area

Works will not fragment or isolate any areas of native vegetation. Exotic species are present throughout most community types to varying degrees, primarily herbaceous annuals and grasses and visitation to the site is very high. The movement of machinery and site personnel would be restricted to previously disturbed areas and is unlikely to increase the likelihood of exotic weeds becoming established. The proposed works would result in the long-term improvement of site vegetation through the rehabilitation and expansion of riparian vegetation. Reducing access points along the eastern shore will allow for restoration plantings to connect existing patches of riparian vegetation and reduce existing fragmentation. Ongoing maintenance and weed control works are proposed within rehabilitation areas to ensure the long-term success of revegetation works.

No storage of fuel, material or chemicals will be required on site for the works. The receiving environment is already subject to direct road runoff, but concentrated input of contaminants from construction activities has some potential to result in further degradation if not appropriately intercepted and managed with erosion and sediment controls. The Engineering Services Report discusses proposed erosion and sediment controls.

4.2.1.4 Impacts on significant flora/communities

No threatened flora species were recorded within the Subject site at the time of the site survey. Construction activities would be restricted to previously disturbed areas and the removal of ten trees, none of which are listed as threatened. Specific amelioration measures would be implemented to ensure adjacent areas of riparian and dune vegetation are not impacted.

Vegetation dominated by Broad-leaved paperbark comprises the EEC Swamp Sclerophyll Forest and primarily occurs around the foreshore of the lake. No Broad-leaved paperbark trees will be removed. An assessment of significance for this EEC has been undertaken as part of this assessment (refer to Section 5).

4.2.2 Fauna

4.2.2.1 Direct impacts on fauna

Native fauna are highly unlikely to be killed or injured as a result of tree removal activities or other construction works. Some microbats may roost in hollows or under loose bark on paperbark trees to be retained. Assessments of significance have been undertaken for several microbat species (refer to Section 5).

There is potential for some increase in traffic along Camp Drewe Road once the eastern road is closed, primarily vehicles and coaches accessing the Sport & Recreation Centre and dog walkers accessing the off leash section of Seven Mile Beach. There is some potential that increased traffic may lead to an increase in road kill along this section of road. It is anticipated that the majority of traffic accessing the Sport and Recreation Centre would be during daylight hours and likewise for dog walkers accessing Seven Mile Beach. As such this increase in daytime traffic along Camp Drewe Road is unlikely to affect the majority of local wildlife species that are active after dark.

Freshwater turtles known from Lake Ainsworth may occasionally cross Camp Drewe Road, including to access inundated areas within heathland and Swamp sclerophyll forest to the west and may occasionally be struck by vehicles. This is highly unlikely to impact these turtles on a population scale.

Specific amelioration measures, including appropriate signage, are outlined in Section 4.3 below to minimise any potential impacts.

4.2.2.2 Loss of fauna habitat

There would be a minor short-term loss of fauna habitat as a result of tree removal required. The removal of vegetation represents a negligible loss of fauna habitat values given the extent of high quality habitat in the immediate vicinity.

There would be a long-term gain in fauna habitat values as a result of proposed rehabilitation works including the expansion and improvement of riparian vegetation through compensatory plantings and weed control works. The removal of vehicles from the eastern road will further enhance opportunities for fauna movement between dune vegetation and the lake.

4.2.2.3 Indirect impacts to aquatic habitats

Any potential impacts to aquatic habitats will be minimal and restricted to potential sedimentation or contamination by spills etc. Bank stabilisation works will be restricted to previously disturbed areas where erosion problems require remediation. The natural soil which will be exposed is sand which has a very low runoff potential. The proposed works will reduce the amount of runoff along the eastern shore by removing the road and positioning the path further east. Bioretention swales are also proposed to capture runoff from the path.

No chemicals or fuel will be stored on site. Specific erosion and sedimentation controls would be implemented throughout the duration of the works and until disturbed areas are rehabilitated. These are discussed further in Section 4.3.

4.2.2.4 Degradation/disturbance to neighbouring areas of habitat

Areas of fauna habitat adjacent to the works area may be affected by accidental damage, sedimentation, introduction of weeds and other indirect effects. Habitats along the lakes edge would not be further fragmented or isolated as a result of the works. Existing access points to the lake would be formalised to minimise erosion in these areas. Two smaller gaps in the existing riparian vegetation (at Ch160 and Ch240) would be regenerated and fenced to discourage informal access at these locations.

Closure of the eastern road will mean that dog owners wishing to utilise the dog exercise area along Seven Mile Beach will be required to leash their dogs and walk along the beach or path until they reach the off-leash area. This may result in an increase in dogs along Seven Mile Beach south of the off-leash area. Leashed dogs are already permitted along this section of beach which is subject to a high degree of disturbance from beach goers. This section of beach is likely to be utilised by common disturbance-adapted species and an increase in leashed dogs along this stretch is unlikely to affect local fauna utilising the area.

4.2.2.5 Impacts on corridor values

The proposed works are unlikely to have any significant adverse impact on fauna movement opportunities and would not sever any important wildlife corridors. Proposed rehabilitation works and closure of the eastern road will serve to improve movement opportunities for fauna between dune and lake environs.

4.2.2.6 Disturbance from construction noise, vibration and activity

The Study area is typically subject to a high degree of disturbance from cars, lake users and other visitors. Disturbance from construction noise and activity will result in a minor short term localised increase in disturbance. In the long-term, closure of the eastern road will reduce disturbance by vehicles and improve the quality of fauna habitats in this area.

4.3 Amelioration Measures

Based on the assessment of potential impacts, a number of mitigation measures are proposed to manage ecological impacts associated with the proposed works. These are discussed below:

Vegetation management

- Trees to be removed or trimmed as a result of the proposed development should be clearly marked prior to construction. Trimming to be undertaken in accordance with the Australian Standard “Pruning of Amenity Trees”.
- High Value vegetation to be retained, including areas of riparian and dune vegetation, is to have parawebbing placed around it during construction to avoid accidental disturbance where it occurs close to the proposed works. No vehicles or stockpiles are to be placed within the drip line of trees within these areas.
- Best practice weed management practices should be in place to prevent transfer of weed seeds and vegetative materials, including washdown of vehicles entering or leaving the worksite.
- Vegetation removed from the construction area should be taken to an appropriate green waste facility or mulched and used in rehabilitation works.

- Ongoing weed control and rehabilitation works should be undertaken in consultation with Lennox Head Landcare.

Fauna Management

- All reasonable practical steps shall be undertaken to reduce noise and disturbance from the site.
- Appropriate signage should be installed along Camp Drewe Road to inform road users they are travelling through an area utilised by native wildlife. Speed limit signage should also be clearly installed.
- Ongoing monitoring of dogs should continue to ensure dogs are kept on a leash outside the designated off-leash zone.

Management of soils and disturbed areas

- Erosion and sediment control measures would be implemented (in accordance with the Landcoms Managing Urban Stormwater; Soils and Construction Guidelines) and maintained to prevent sediment moving off-site and sediment laden water entering any watercourse.
- Bank stabilisation works are to use a floating boom in the lake encompassing the limit of disturbance for the installation of the log revetment.
- Works are to be staged to limit the length of bank stabilising works to short sections in order to reduce the exposed area and habitat disruption.
- Imported material should be sourced from areas which are weed seed, acid sulphate soils, and chemical and contaminant free.

Management of water quality

- No fuel or chemicals is to be stored onsite.
- A spill response kit is to be available at all times in the area of works
- No materials or machinery are to be stored within areas of riparian or aquatic vegetation and all stockpiles are to have silt fencing around them.

4.4 Proposed offset works

The Ballina Shire Development Control Plan (2012) notes that where development is unable to be sited, designed and managed to avoid potential adverse impacts on natural areas (as identified on the Natural Areas and Habitat Map), a proposal to remove habitat may be considered. Council typically applies a compensatory planting ratio of 3:1, with a higher rate of compensatory planting required in some circumstances.

The Subject site occurs within land mapped as Natural Habitat (Map ID DCP2012_NH_001_080_20140806). The loss of the two trees east of the Lake and some vegetation within southern boardwalk sections should be compensated for by the planting of 93 native species typical of Swamp Sclerophyll Forest (i.e. a ratio of 3:1).

Compensatory plantings should be planted into the area allocated for riparian rehabilitation. It is understood that an additional 300 metres square would be made available for riparian regeneration as a result of the proposed works (BSC 2016). Consultation with Lennox Head Landcare should be undertaken as part of the revegetation works. All planting and weed control works should be undertaken by suitably qualified Council environmental officers, bush regenerators and/or landcare groups guided by a qualified supervisor.



Current plans for the proposed works also include the planting of 56 trees within newly established grassland areas.

5 STATUTORY AND PLANNING ASSESSMENT

5.1 Introduction

This section includes assessments of the impacts of the Proposed development with regard to:

- Section 5A of the Environment Protection & Assessment Act (1979) (7 part tests).
- the Commonwealth Environment Protection and Biodiversity Conservation Act (1999).
- State Environmental Planning Policies (SEPP) No. 44 – Koala Habitat Protection, No. 14 (Coastal wetlands), No. 26 (Littoral rainforests) and SEPP No. 71 – Coastal Protection.
- Fisheries Management Act 1994 (FM Act).

5.2 Section 5A Assessment of Significance

Section 5A of the NSW Environmental Planning and Assessment Act (1979) requires a number of factors to be taken into account in determining the significance of impact of a development on threatened species, populations or ecological communities, or their habitats. The seven factors to be taken into account under the Assessment of Significance are known as the Seven Part Test.

Assessments of Significance are provided in **APPENDIX F** and have been completed for the following species/communities:

- Common blossom bat
- Eastern (common) bent-wing bat
- Eastern free-tailed bat
- Eastern long-eared bat
- Greater broad-nosed bat
- Grey-headed flying fox
- Large-eared pied bat
- Little bent-wing bat
- Southern myotis
- Swamp Sclerophyll Forest EEC.

Based upon the Assessments of Significance and with the adoption of the amelioration measures discussed in this report, the proposed development is unlikely to result in a significant impact on any Threatened (TSC Act 1995) species, population or ecological community. A Species Impact Statement is not required.

5.3 Commonwealth EPBC Act (1999)

5.3.1 Introduction

Under the environmental assessment provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance are subject to a rigorous assessment and approval process. An action includes a project, development, undertaking, activity, or series of activities. An action will require approval from the Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

The Act identifies seven matters of national environmental significance:

- World Heritage properties
- National heritage places
- Wetlands of international importance (Ramsar wetlands)
- Threatened species and ecological communities

- Migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining)

The EPBC Act Policy Statement 1.1 Significant Impact Guidelines (DEH 2006) outline an assessment process, including detailed criteria, to assist in deciding whether or not referral to the Minister is required. These guidelines replace the EPBC Act Administrative Guidelines of July 2000.

An assessment following the guidelines and definitions set out in the EPBC Act Policy Statement 1.1 is provided in **APPENDIX E**.

Based upon this assessment and with the implementation of the amelioration measures discussed in this report, the proposed development is unlikely to result in a significant impact on any matters of National Environmental Significance (NES) as listed under the EPBC Act 1999.

5.4 SEPP 14 Coastal Wetlands

The Subject site does not occur within or directly adjacent to any areas of SEPP 14 Coastal Wetland. The nearest SEPP 14 Coastal Wetland occurs on the western side of the North Lennox Head Heath trail (north-south oriented trail west of Camp Drewe Road). The proposed development will not have any impact on this area.

5.5 SEPP 26 Littoral Rainforests

The Subject site does not occur within or adjacent to any areas of SEPP 26 Littoral Rainforests. Small patches of Littoral rainforest vegetation in the Study area have not been mapped under SEPP 26. The closest mapped SEPP26 area occurs at Boulder Beach, south of Lennox Head. The proposed development will not have any impact on this area.

5.6 SEPP 44 Koala Habitat Protection

The SEPP 44 Koala Habitat Protection Policy aims to “encourage the proper conservation and management of area of natural vegetation that provide habitat for Koalas, to ensure permanent free-living populations over their present range and to reverse the current trend of population decline.”

SEPP 44 consists of a series of questions to provide a basis for the assessment of lands as potential and/or core Koala habitat.

1. Does the policy apply?

Does the subject land occur in an LGA identified in Schedule 1?

The Subject site occurs in the Ballina LGA, which is listed under Schedule 1.

Is the landholding to which the DA applies greater than 1 hectare in area?

Yes.

2. Is the land potential Koala habitat?

Does the site contain areas of native vegetation where the trees of types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component?

No. One Swamp mahogany tree was recorded within an area of open grassland along the southern side of the lake, opposite the caravan park and outside of the extent of proposed works. Potential Koala habitat does not occur within the Subject site.

3. *Is there core Koala habitat on the subject land?*

The site does not support core Koala habitat.

4. *Is there a requirement for the preparation of a Plan of Management for identified core Koala habitat?*

No.

5.7 SEPP 71 – Coastal Protection

This SEPP controls development occurring within the coastal zone which includes land within 1km of the coast, 1km landward around any bay, estuary, coastal lake or lagoon as well as 1km along either bank of a coastal river. The proposal site is located within this area. Conditions of the SEPP typically apply to property developments along the coast and require that the following be taken into account as part of their assessment:

- retaining public access to and along the coastal foreshore for pedestrians;
- providing opportunities for new public access on the foreshore;
- any detrimental impact that development may have on the amenity of the coastal foreshore, including overshadowing and significant loss of views from a public place;
- the scenic qualities of the NSW coast;
- measures to conserve threatened animals, plants and fish;
- protecting existing wildlife corridors; and
- the likely impact of coastal processes and coastal hazards on development.

All applicable points above, relevant to ecological impacts, have been taken into account including the impact of the proposal on threatened species and wildlife corridors. The proposed works are for the purposes of improving ecological values of the area, stabilising the foreshore of the lake, improving water quality as well as recreational areas and open spaces.

5.8 Fisheries Management Act

The FM Act requires an assessment of significance when there may be potential to impact on any species, populations and communities listed in the FM Act. Based on the habitat at the site and records within the locality, it is unlikely that the Proposal would impact on any species, populations or communities; as such an assessment of significance is not required.

6 SUMMARY AND CONCLUSIONS

Blackwood Ecological Services have been engaged by Ballina Shire Council (BSC) to complete a Flora and Fauna Assessment for proposed foreshore improvement works at Lake Ainsworth, Pacific Parade, Lennox Head, NSW. The Flora and Fauna Assessment report is to be assessed under Part V of the Environmental Planning and Assessment Act 1979 (the EP&A Act). The works are on Crown Land for which the Council is the trust manager. The area is also subject to the Lake Ainsworth Management Plan (2002).

The proposed works involve improvements along the eastern and-south eastern foreshore of Lake Ainsworth and adjacent recreational spaces. The eastern road rehabilitation involves profiling the existing road pavement and removing concrete footpaths and kerb and gutter. The roadway will be closed to public vehicles and the road way will be replaced with a concrete footpath which will provide a wearing surface for pedestrians and emergency vehicles. The surrounding landscaping of the eastern road rehabilitation will be an extension of the existing passive recreational area comprising of seating, turfed areas, tree planting and embellishment of existing riparian vegetation. The proposed works also include undertaking measures to manage foot traffic accessing the lake and protect the banks against ongoing erosion. Three short sections of boardwalk are proposed to be located within clumps of lakeside paperbark forest on the southern bank of the lake. The purpose is to allow for pedestrian access round the southern bank without requiring visitors to use the roadway. Boardwalks are to be located so as to avoid loss of established paperbark trees and will be constructed of composite mesh to minimise impacts on groundcover and aquatic vegetation.

Surveys of site vegetation were undertaken on the 2nd May and 9th of August 2017. A total of 67 flora species were recorded during the surveys including 19 (28% of the total) exotic species. Five vegetation communities were identified within the Subject site. Areas of Broad-leaved paperbark forest generally meet the description of the EEC *Swamp sclerophyll forest on coastal floodplains* which is listed under the TSC Act 1995 for the North Coast bioregion. High quality areas of this EEC occur around the perimeter of the lake and to the north along the drainage channel. These areas have an intact canopy dominated by Broad-leaved paperbark and a native understorey typically dominated by ferns and rushes. Moderate value areas of this EEC also occur along the eastern and southern shores in unfenced areas and typically contain an intact canopy of paperbark but limited understorey due to pedestrian traffic and erosion. Scattered paperbark trees within grassland and carparking areas are also included in this EEC but are considered to be a highly degraded form. These areas have little to no natural regeneration occurring and no structured vegetation surrounding the paperbark trees.

No Threatened (TSC Act 1995, Commonwealth EPBC Act 1999) or ROTAP flora species were recorded during the site surveys.

The Lake Ainsworth area provides a variety of fauna habitat types, including aquatic habitats, swamp sclerophyll forest, developing littoral rainforest and areas of Coast banksia. Movement opportunities for fauna through the Study area are limited to the south and east as a result of the ocean and urban development. Vegetation along the dune system provides a partially intact north-south wildlife corridor although the lack of vegetation along much of the Lennox Head beachfront restricts movement for all but the more mobile fauna groups. Extensive areas of vegetation occur north and west of the lake and a partially intact corridor extends south-west to the Ballina Nature Reserve.

The various activities associated with the foreshore improvement and road rehabilitation works have the potential to result in some impacts on site vegetation. The proposed works will require the removal of one small Tuckeroo and one small Swamp she-oak on the eastern side of the lake. The removal of these trees is required so that the new pathway can be aligned further to the east than the existing roadway. Locating the proposed pathway further east of the existing road will allow for the widening of existing areas of riparian vegetation and an additional area of 300 square metres will be available for regeneration of fully structured vegetation communities along the lake banks (BSC 2016). Construction of the boardwalk along three sections of the southern lake shore will require the removal of some small trees and understorey vegetation. The exact locations of boardwalks have been designed so as to minimise any vegetation removal required. No mature trees would be removed and the boardwalk is to be constructed of composite mesh to minimise impacts on groundcover and aquatic vegetation.

There is potential for some increase in traffic along Camp Drewe Road once the eastern road is closed, primarily vehicles and coaches accessing the Sport & Recreation Centre and dog walkers accessing the off leash section of Seven Mile Beach. There is some potential that increased traffic may lead to an increase in road kill along this section of road. It is anticipated that the majority of traffic accessing the Sport and Recreation Centre would be during daylight hours and likewise for dog walkers accessing Seven Mile Beach. As such this increase in daytime traffic along Camp Drewe Road is unlikely to affect the majority of local wildlife species that are active after dark.

Freshwater turtles known from Lake Ainsworth may occasionally cross Camp Drewe Road, including to access inundated areas within heathland and Swamp sclerophyll forest to the west and may occasionally be struck by vehicles. This is highly unlikely to impact these turtles on a population scale.

There would be a long-term gain in fauna habitat values as a result of proposed rehabilitation works including the expansion and improvement of riparian vegetation through compensatory plantings and weed control works. The removal of vehicles from the eastern road will further enhance opportunities for fauna movement between dune vegetation and the lake. The Ballina Shire Development Control Plan (2012) notes that where development is unable to be sited, designed and managed to avoid potential adverse impacts on natural areas, a proposal to remove habitat may be considered. The loss of the two trees east of the Lake and some vegetation within southern boardwalk sections should be compensated for by the planting of 93 native species typical of Swamp Sclerophyll Forest (i.e. a ratio of 3:1).

The Subject site does not occur within or adjacent to any areas of SEPP 14 Coastal wetlands or SEPP 26 Littoral Rainforests and the proposed development will not have any impact on any of these areas in the locality.

Assessments of significance (7 part tests) were completed for a number of species of Threatened fauna recorded on the site or considered possible occurrences on the site over time. The proposed development is unlikely to result in a significant impact on any Threatened (TSC Act 1995) species, population or ecological community. A Species Impact Statement is not required. The proposed development is unlikely to result in a significant impact on any matters of National Environmental Significance as defined under the Commonwealth EPBC Act 1999.

7 REFERENCES

- Ballina Shire Council (2016) Review of Environmental Factors (REF 2016/003) Lake Ainsworth Foreshore Improvement Works Lennox Head NSW.
- Ballina Shire Council (2017) Draft Engineering Services Report. Lake Ainsworth Foreshore Improvement Works Lennox Head NSW.
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- Higgins, P.J. (Ed.) (1999) **Handbook of Australian, New Zealand and Antarctic Birds**. Oxford University Press, Melbourne.
- Morand, D.T (1994). *Soil landscapes of the Lismore-Ballina 1:100 000 Sheet* Report, Soil Conservation Service of NSW, Sydney.
- Office of Environment and Heritage (2017). **Threatened species, populations and ecological communities**. <http://www.environment.nsw.gov.au/threatenedspecies/index.htm>
- NPWS (2002) Threatened Species of the Upper North Coast of NSW – Flora. NPWS Northern Directorate, Coffs Harbour.
- Sheringham and Westaway (1995). **Significant vascular plants of northern NSW**. A report to the NSW NPWS and Northern Region Audit Council.



APPENDIX A

DESIGN PLANS



FORESHORE IMPROVEMENT WORKS LAKE AINSWORTH, LENNOX HEAD

DRAWING No: LHR30.061

NOVEMBER 2017

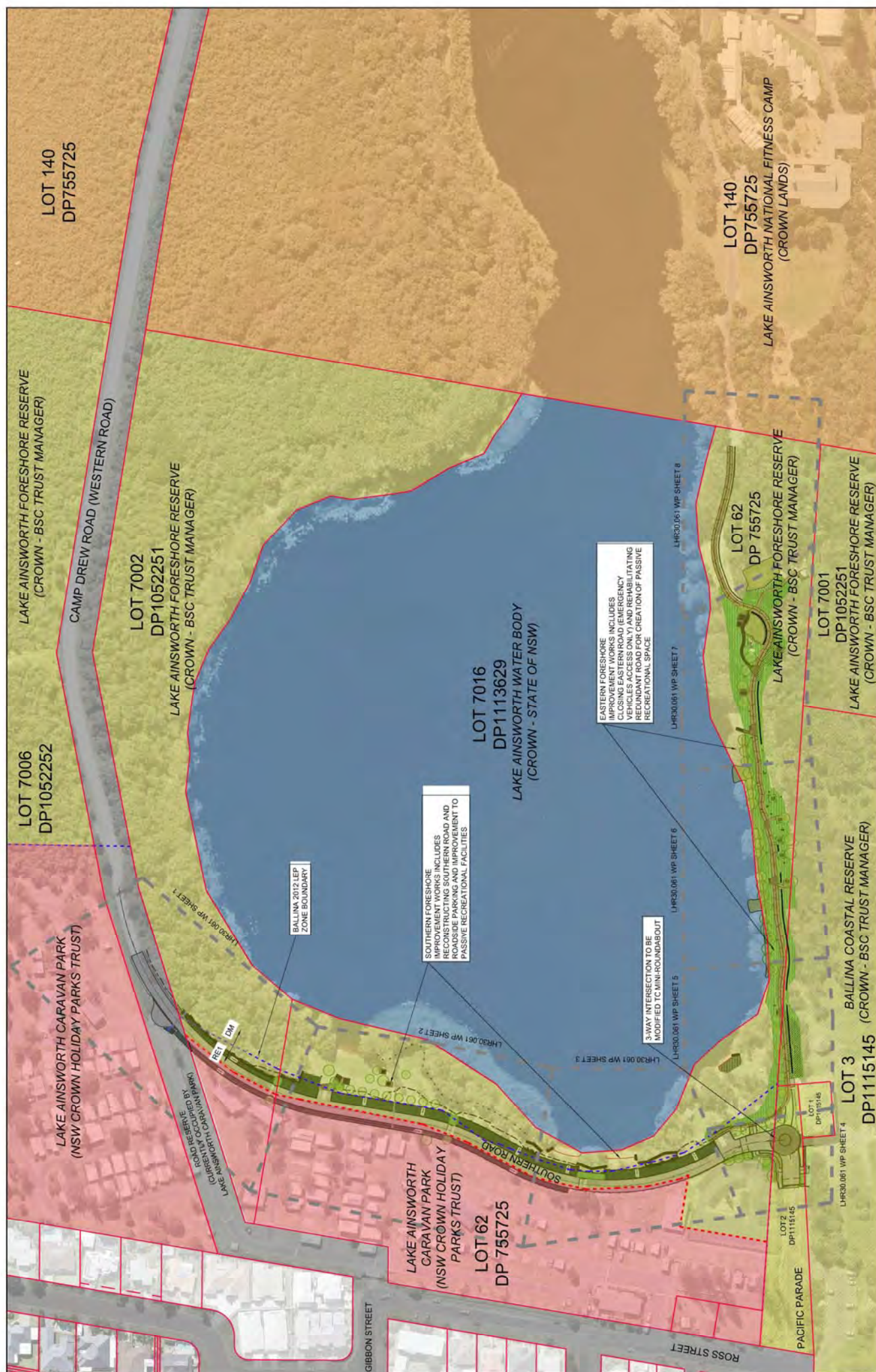
GENERAL WORKS DRAWINGS

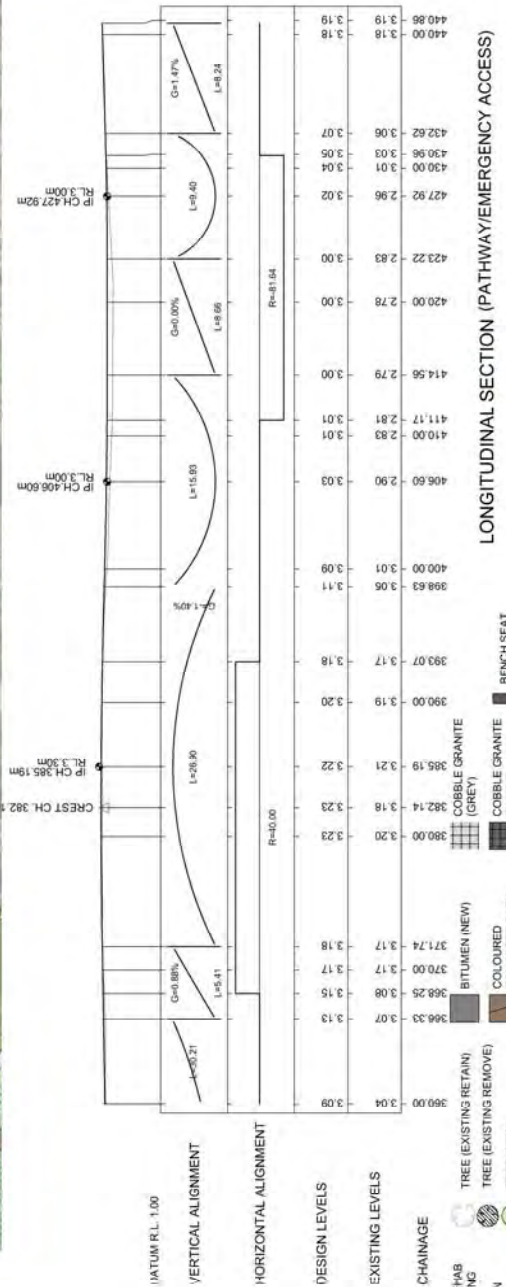
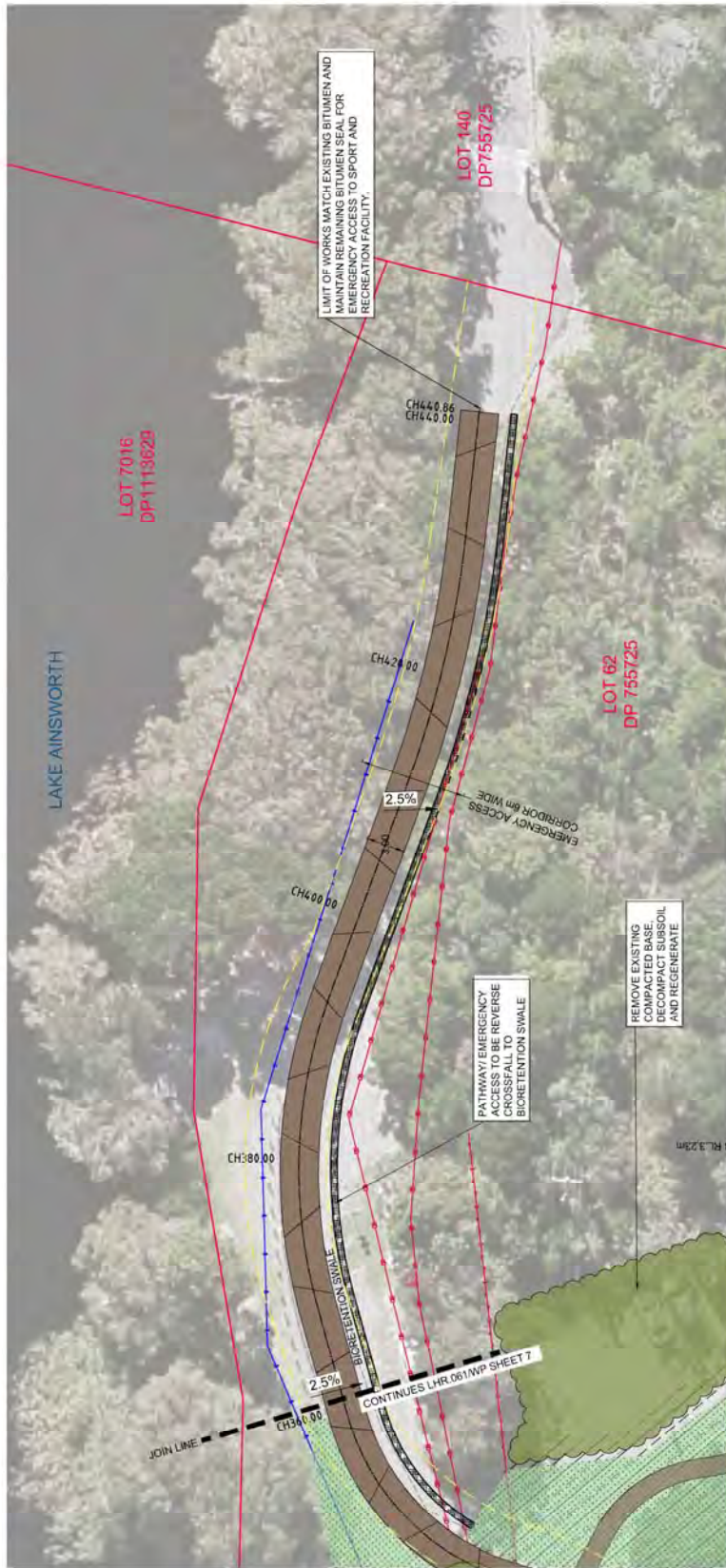
DRAWING REGISTER

DRAWING	SHEET	ISSUE	DATE	TITLE
LHR30.061/OP	1 OF 1	B	3/11/2017	OVERALL PLAN
LHR30.061/WP	1 OF 8	B	3/11/2017	SOUTHERN FORESHORE GENERAL WORKS PLAN (CH0 TO CH105)
LHR30.061/WP	2 OF 8	B	3/11/2017	SOUTHERN FORESHORE GENERAL WORKS PLAN (CH105 TO CH255)
LHR30.061/WP	3 OF 8	B	3/11/2017	SOUTHERN FORESHORE GENERAL WORKS PLAN (CH255 TO CH380)
LHR30.061/WP	4 OF 8	B	3/11/2017	INTERSECTION GENERAL WORKS PLAN
LHR30.061/WP	5 OF 8	B	3/11/2017	EASTERN FORESHORE GENERAL WORKS PLAN AND LONGITUDINAL SECTION (CH0 TO CH120)
LHR30.061/WP	6 OF 8	B	3/11/2017	EASTERN FORESHORE GENERAL WORKS PLAN AND LONGITUDINAL SECTION (CH120 TO CH240)
LHR30.061/WP	7 OF 8	B	3/11/2017	EASTERN FORESHORE GENERAL WORKS PLAN AND LONGITUDINAL SECTION (CH240 TO CH360)
LHR30.061/WP	8 OF 8	B	3/11/2017	EASTERN FORESHORE GENERAL WORKS PLAN AND LONGITUDINAL SECTION (CH360 TO CH440)
LHR30.061/LS	1 OF 2	B	3/11/2017	SOUTHERN ROAD ALIGNMENT PLAN AND LONGITUDINAL SECTION (CH0 TO CH300)
LHR30.061/LS	2 OF 2	B	3/11/2017	SOUTHERN ROAD ALIGNMENT PLAN AND LONGITUDINAL SECTION (CH300 TO CH380)
LHR30.061/DT	1 OF 1	B	3/11/2017	LOG RETENTION AND BEACH ACCESS RAMP TYPICAL DETAIL

LOCALITY PLAN



[illegible]



LEGEND

- LANDSCAPING - TURF
- RIPIARIAN VEGETATION
- REHABILITATION AREA
- PAVEMENT REHAB AND REGRADING
- BIOTRETION
- TELSTRA FIBRE OPTIC CABLE
- TELSTRA COUPLER
- UNDER GROUND ELECTRICITY
- OVER HEAD ELECTRICITY
- SEWER (GRAVITY)
- SEWER RISING MAIN (EXISTING)
- STORMWATER PIPE (EX)
- STORMWATER PIPE (NEW)
- FENCE (EXISTING)
- EXISTING EDGE OF BITUMEN
- STOP VALVE
- HYDRANT
- TELSTRA PIT
- POWER POLE
- STAY POLE
- STINGIN
- SSMPM
- WATER MAIN (NEW)
- WATER MAIN (EXISTING)
- FK 4.95 FINISHED SURFACE RL
- EMERGENCY ACCESS
- FK - FLUSH KERB
- K&G - KERB AND GUTTER
- DISH - DISH DRAIN
- FK - TOP OF KERB
- P3 FINISHED SURFACE

LONGITUDINAL SECTION (PATHWAY/EMERGENCY ACCESS)

Station	Design Level (m)	Existing Level (m)
440.00	3.18	3.18
430.00	3.01	3.01
420.00	2.78	2.78
410.00	2.83	2.83
400.00	3.01	3.01
390.00	3.17	3.17
380.00	3.20	3.20
370.00	3.17	3.17
360.00	3.07	3.07
350.00	3.21	3.21
340.00	3.18	3.18
330.00	3.23	3.23
320.00	3.20	3.20
310.00	3.17	3.17
300.00	3.13	3.13
290.00	3.09	3.09
280.00	3.15	3.15
270.00	3.17	3.17
260.00	3.17	3.17
250.00	3.17	3.17
240.00	3.17	3.17
230.00	3.17	3.17
220.00	3.17	3.17
210.00	3.17	3.17
200.00	3.17	3.17
190.00	3.17	3.17
180.00	3.17	3.17
170.00	3.17	3.17
160.00	3.17	3.17
150.00	3.17	3.17
140.00	3.17	3.17
130.00	3.17	3.17
120.00	3.17	3.17
110.00	3.17	3.17
100.00	3.17	3.17
90.00	3.17	3.17
80.00	3.17	3.17
70.00	3.17	3.17
60.00	3.17	3.17
50.00	3.17	3.17
40.00	3.17	3.17
30.00	3.17	3.17
20.00	3.17	3.17
10.00	3.17	3.17
0.00	3.17	3.17

Amendments

No.	Date	By	Change
1	3/11/17	PJB	ISSUED FOR PART A ASSESSMENT
2	27/10/17	PJB	DRAFT FOR REVIEW

Scale

1:200 [H]
1:100 [V]

ballina shire council

LAKE AINSWORTH FORESHORE WORKS
EASTERN FORESHORE GENERAL WORKS
PLAN AND LONGSECTION (CH360 TO CH440)

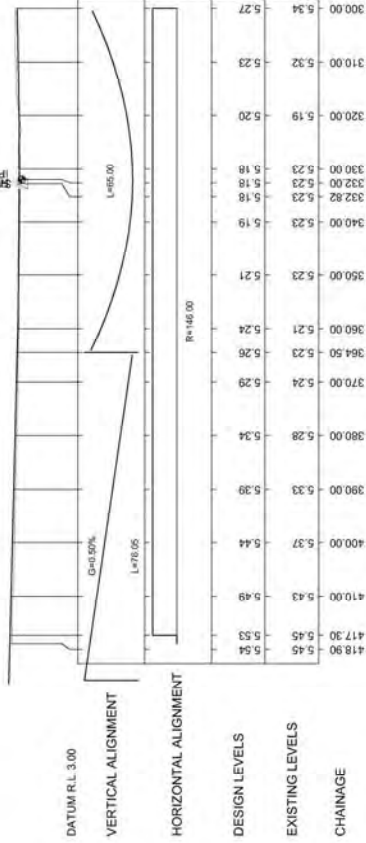
DESIGNED PJB
DRAWN PJB
CHECKED PJB
APPROVED PJB

DATE JULY 2017
F.B. L.B.
DATUM AHD
DRAWING LHR 30_061 LAKE A FORESHORE DA.dwg




















































































































































































































































































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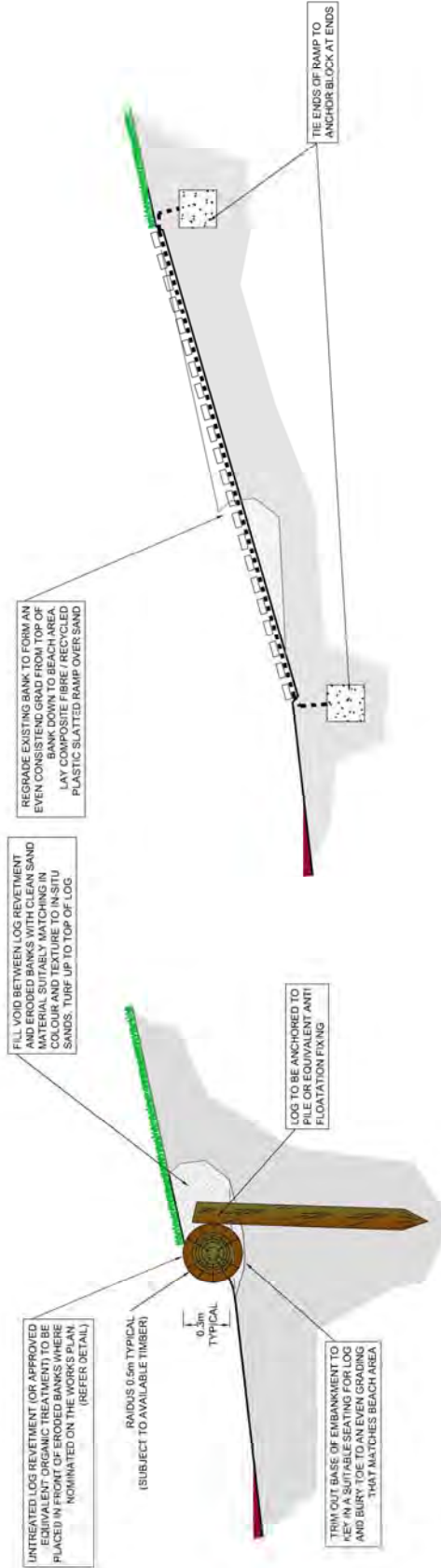
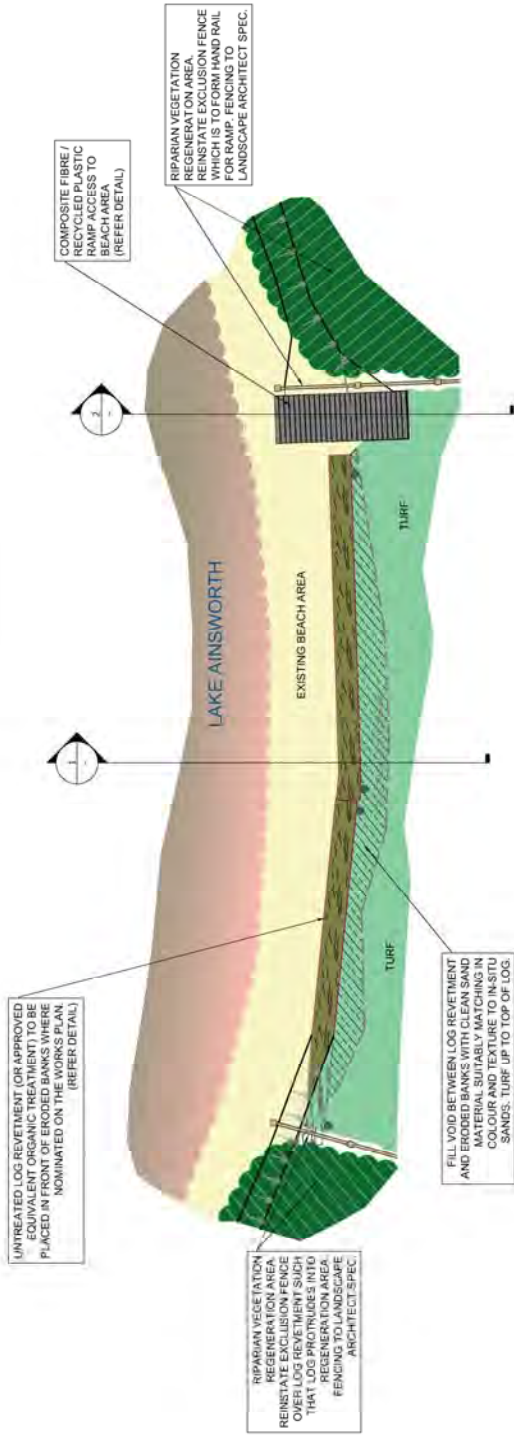
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SHEET 8 OF 8



LONGITUDINAL SECTION

	LEGEND									
	 NEW FIBRE OPTIC CABLE									
	 TELSTRA CABLE									
	 UNDER GROUND ELECTRICITY									
	 OVER HEAD ELECTRICITY									
	 SEWER BISING MAIN (EXISTING)									
	 STORMWATER PIPE (EX)									
	 WATER (EX)									
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 BOUNDARY										
 STORMWATER PIPE (NEW)										
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 BOLLARD LINE (EXISTING)										
 BOUNDARY										
 STORMWATER PIPE (NEW)										
 LANDSCAPE FENCE										



SLATTED RAMP DETAIL



LOG REVETMENT DETAIL

	BALLINA SHIRE COUNCIL			
	SURVEY	BSC	DESIGNED	PJB
	DATE	JULY 2017	DRAWN	PJB
	F.B.	L.B.	CHECKED	
	LAKE AINSWORTH FORESHORE WORKS LOG REVETMENT AND BEACH ACCESS RAMP TYPICAL DETAILS			
	DATUM	AHD	APPROVED	
	DRAWING	LHR 30_061 LAKE A FORESHORE DA.dwg		
SHEET 1 OF 1				Scale
				NOT TO SCALE
				Plan No. LHR30.061/DT
				A1



APPENDIX B

EPBC PROTECTED MATTERS DATABASE SEARCH RESULTS



EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 24/04/17 19:12:04

[Summary](#)

[Details](#)

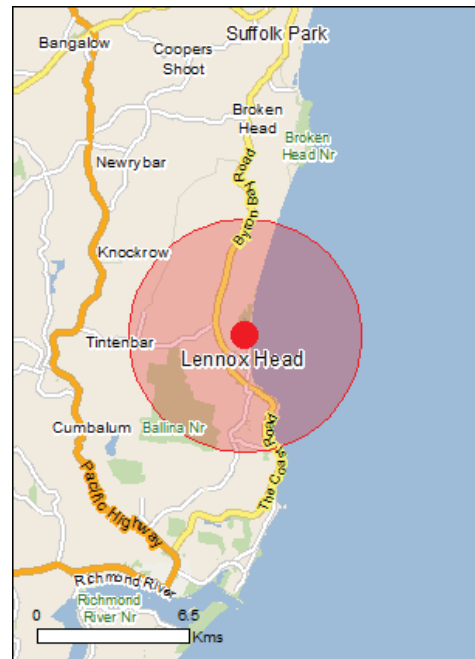
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	76
Listed Migratory Species:	72

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	110
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	38
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [\[Resource Information \]](#)

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

Name	Status	Type of Presence
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Erythroriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Litoria olongburensis Wallum Sedge Frog [1821]	Vulnerable	Species or species habitat known to occur within area
Insects		
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Status	Type of Presence
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Other		
Thersites mitchellae Mitchell's Rainforest Snail [66774]	Critically Endangered	Species or species habitat known to occur within area
Plants		
Acronychia littoralis Scented Acronychia [8582]	Endangered	Species or species habitat likely to occur within area
Allocasuarina defungens Dwarf Heath Casuarina [21924]	Endangered	Species or species habitat likely to occur within area
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat known to occur within area
Baloghia marmorata Marbled Baloghia, Jointed Baloghia [8463]	Vulnerable	Species or species habitat likely to occur within area
Bulbophyllum globuliforme Miniature Moss-orchid, Hoop Pine Orchid [6649]	Vulnerable	Species or species habitat may occur within area
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Davidsonia jerseyana Davidson's Plum [67219]	Endangered	Species or species habitat may occur within area
Davidsonia johnsonii Smooth Davidsonia, Smooth Davidson's Plum, Small-leaved Davidson's Plum [67178]	Endangered	Species or species habitat likely to occur within area
Diploglottis campbellii Small-leaved Tamarind [21484]	Endangered	Species or species habitat likely to occur within area
Floydia praealta Ball Nut, Possum Nut, Big Nut, Beefwood [15762]	Vulnerable	Species or species habitat likely to occur within area
Fontainea oraria Coastal Fontainea [24038]	Endangered	Species or species habitat likely to occur within area
Gossia fragrantissima Sweet Myrtle, Small-leaved Myrtle [78867]	Endangered	Species or species habitat likely to occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat may occur within area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat known to occur within area
Owenia cepiodora Onionwood, Bog Onion, Onion Cedar [11344]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
Phaius australis		within area
Lesser Swamp-orchid [5872]	Endangered	Species or species habitat likely to occur within area
Randia moorei		
Spiny Gardenia [10577]	Endangered	Species or species habitat likely to occur within area
Syzygium hodgkinsoniae		
Smooth-bark Rose Apple, Red Lilly Pilly [3539]	Vulnerable	Species or species habitat likely to occur within area
Syzygium moorei		
Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple [12284]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area

Reptiles

Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Sharks

Carcharias taurus (east coast population)		
Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat may occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Species or species

Name	Threatened	Type of Presence
Diomedea exulans Wandering Albatross [89223]	Vulnerable	habitat may occur within area Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding known to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur

Name	Threatened	Type of Presence
Arenaria interpres Ruddy Turnstone [872]		within area Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris subminuta Long-toed Stint [861]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]		Foraging, feeding or related behaviour known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]		Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]		Foraging, feeding or related behaviour known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Limicola falcinellus Broad-billed Sandpiper [842]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour known to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Foraging, feeding or related behaviour known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Pluvialis squatarola Grey Plover [865]		Foraging, feeding or related behaviour known to occur within area
Tringa glareola Wood Sandpiper [829]		Foraging, feeding or related behaviour known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Foraging, feeding or related behaviour known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land		[Resource Information]
The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.		
Name		
Commonwealth Land - Australian Telecommunications Commission		
Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris subminuta Long-toed Stint [861]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Foraging, feeding or related behaviour known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Foraging, feeding or related behaviour known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour known to occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Foraging, feeding or related behaviour known to occur within area
Himantopus himantopus Black-winged Stilt [870]		Foraging, feeding or related behaviour known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour known to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Foraging, feeding or related behaviour known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or

Name	Threatened	Type of Presence
Pluvialis squatarola Grey Plover [865]		related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa glareola Wood Sandpiper [829]		Foraging, feeding or related behaviour known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Foraging, feeding or related behaviour known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish		Species or species

Name	Threatened	Type of Presence
[66199]		habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus kelloggi Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Microphis manadensis Manado Pipefish, Manado River Pipefish [66258]		Species or species habitat may occur within area
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Reptiles		
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans	[Resource Information]
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Name	Status	Type of Presence
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Mammals

Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
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Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
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Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
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Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
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Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
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Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
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Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
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Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
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Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
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Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
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Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
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Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
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Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
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Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Ballina	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-28.78485 153.59247

Acknowledgements

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

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

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

Please feel free to provide feedback via the [Contact Us](#) page.



APPENDIX C

FLORA SPECIES LIST

Lake Ainsworth Foreshore Improvement Works Flora species list

Notes:

* Introduced species

Noxious weeds declared for the Ballina Shire Council control area under the *Noxious Weeds Act 1993* are indicated with a 'C' followed by their control class:

- (3) Regionally controlled weeds
- (4) Locally controlled weeds
- (5) Restricted plants

Where uncertainty exists due to the unavailability of reproductive material, the taxon is preceded by a question mark, or plants are identified to genus level only. Botanical nomenclature follows G.J. Harden (ed) (1990-2002) *Flora of New South Wales*, UNSW Press, except where recent changes have occurred.

Family	Botanical Name	Common Name
Ferns and Fern Allies		
Blechnaceae	<i>Blechnum indicum</i>	Swamp water fern
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken fern
Salviniaceae	<i>Azolla</i> sp.	Azolla
	<i>Salvinia molesta</i> *	Salvinia
Gymnosperms		
Araucariaceae	<i>Araucaria heterophylla</i> *	Norfolk pine
Monocotyledons		
Arecaceae	<i>Archontophoenix cunninghamiana</i>	Bangalow palm
	<i>Livistona australis</i>	Cabbage palm
Asparagaceae	<i>Asparagus aethiopicus</i> *	Ground asparagus fern
Commelinaceae	<i>Commelina benghalensis</i> *	Hairy commelina
	<i>Commelina cyanea</i>	Native commelina
Cyperaceae	<i>Cyperus</i> sp.	
	<i>Gabnia</i> sp.	
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed matrush
Pandanaceae	<i>Pandanus tectorius</i> var. <i>australiannus</i>	Screw Pine
Phormiaceae	<i>Dianella caerulea</i>	Flax lily
Poaceae	<i>Chloris gayana</i> *	Rhodes grass
	<i>Cynodon dactylon</i>	Couch grass
	<i>Imperata cylindrica</i>	Blady grass
	<i>Ischaemum triticeum</i>	Creeping wheat grass
	<i>Paspalum dilatatum</i> *	Paspalum
	<i>Phragmites australis</i>	Common reed
Smilacaceae	<i>Smilax australis</i>	Austral sarsparilla
Typhaceae	<i>Typha</i> sp.	Cumbungi
Dicotyledons		
Apiaceae	<i>Centella asiatica</i>	Centella
	<i>Hydrocotyle bonariensis</i> *	
Araliaceae	<i>Schefflera actinophylla</i> *	Umbrella tree
Asclepiadaceae	<i>Marsdenia lloydii</i>	Corky marsdenia
Asteraceae	<i>Ageratum houstonianum</i> *	Blue billygoat weed
	<i>Hypochoeris radicata</i> *	Cats ear

Family	Botanical Name	Common Name
	<i>Taraxacum officinale</i> *	Dandelion
Casuarinaceae	<i>Casuarina glauca</i>	Swamp oak
Convolvulaceae	<i>Ipomoea cairica</i> *	Coastal morning glory
Dilleniaceae	<i>Hibbertia scandens</i>	Climbing guinea flower
Elaeocarpaceae	<i>Elaeocarpus reticulatus</i>	Blueberry ash
Euphorbiaceae	<i>Macaranga tanarius</i>	Macaranga
Fabaceae	<i>Macroptilium atropurpureum</i> *	Siratro
Lauraceae	<i>Cryptocarya triplinervis</i> var. <i>triplinervis</i>	Three-veined Cryptocarya
Luzuriagaceae	<i>Geitonoplesium cymosum</i>	Scrambling lily
Malvaceae	<i>Hibiscus diversifolius</i>	Swamp hibiscus
	<i>Hibiscus tiliaceus</i>	Cottonwood
Menispermaceae	<i>Stephania japonica</i> var. <i>discolor</i>	Snake vine
Mimosaceae	<i>Acacia longifolia</i> subsp. <i>sophorae</i>	Coastal wattle
Moraceae	<i>Ficus fraseri</i>	Sandpaper fig
	<i>Ficus obliqua</i>	Small-leaved fig
Musaceae	<i>Musa paradisica</i> *	Banana
Myrsinaceae	<i>Myrsine variabilis</i>	Muttonwood
Myrtaceae	<i>Callistemon salignus</i>	Willow bottlebrush
	<i>Corymbia intermedia</i>	Pink bloodwood
	<i>Eucalyptus robusta</i>	Swamp mahogany
	<i>Gossia</i> sp.*	Crepe myrtle
	<i>Melaleuca quinquinervia</i>	Broad-leaved Paperbark
	<i>Syzygium luehmannii</i>	Riberry
	<i>Syzygium oleosum</i>	Blue lilly pilly
Nymphaeaceae	<i>Nymphaea mexicana</i> *	Yellow waterlily
Onagraceae	<i>Ludwigia peploides</i>	Water primrose
Oxalidaceae	<i>Oxalis debilis</i> var. <i>corymbosa</i> *	Pink oxalis
Phyllanthaceae	<i>Glochidion sumatranum</i>	Umbrella cheese tree
Polygonaceae	<i>Persicaria</i> sp.	Smartweed
Primulaceae	<i>Ardisia elliptica</i> *	Shoebuttan ardisia
Proteaceae	<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast banksia
	<i>Macadamia integrifolia</i>	Queensland nut
Rutaceae	<i>Acronychia imperforata</i>	Beach acronychia
Sapindaceae	<i>Alectryon coriaceous</i>	Beach alectryon
	<i>Cupaniopsis anacardioides</i>	Tuckeroo
	<i>Guioa semiglauc</i>	Guioa
Solanaceae	<i>Duboisia myoporoides</i>	Duboisia
Verbenaceae	<i>Lantana camara</i> *	Lantana



APPENDIX D

LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA



TABLE D1
LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES*

Species	Notes	Likelihood of occurrence on site	Potential to be impacted
Amphibians			
Green and Golden bell frog	The species is associated with semi-permanent or permanent water including marshes, dams and stream-sides as well as disturbed sites such as disused industrial sites, brick pits, mines, recently cleared bushland or council tips. There are no recent records of this species in the Study area.	One record of this species from the lake in 1977.	Low
Wallum froglet	The Wallum froglet is found in Wallum habitats such as Paperbark swamps and coastal heath as well as adjacent grassland and drains with low pH waters.	Species known to occur in heathland west of lake near The Coast Road.	Low
Wallum sedge frog	The Wallum sedge frog occurs in permanent or semi-permanent ponds and pools in Wallum habitats such as Paperbark swamps and coastal heath.	Species known to occur in heathland west of lake near The Coast Road.	Low
Forest and woodland birds			
Black-breasted Button-quail	The ground-dwelling Black-breasted Button-quail inhabits subtropical rainforest, other moist forest, dry rainforest (vine thicket) and grassy edges, with a closed canopy and deep litter layer. It is restricted to coastal south-east Queensland (north to Fraser Island), and the Border Ranges and Big Scrub areas of extreme north-east NSW.	Unlikely. Species has not been recorded within 10km of the site and suitable habitat is not present within the Subject site.	Low
Coxen's Fig parrot	This very rare species occurs in the canopy of rainforests, including dry rainforest and cool subtropical rainforest.	Unlikely. Species has not been recorded within 10km of the site.	Low
Dusky Woodswallow	The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests	Unlikely, suitable habitat is not present within the Subject site.	Low

Species		Notes	Likelihood of occurrence on site	Potential to be impacted
Eastern ground parrot		The Ground Parrot occurs in high rainfall coastal and near coastal low heathlands and sedgeland, generally below one metre in height and very dense (up to 90% projected foliage cover). These habitats provide a high abundance and diversity of food, adequate cover and suitable roosting and nesting opportunities for the Ground Parrot, which spends most of its time on or near the ground. The species is found in small numbers on the north coast (Broadwater, Bundjalung, Yuraygir NPs).	Unlikely, given the lack of foliage cover within the site and high level of pedestrian/vehicle traffic.	Low
Grass owl		Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains.	Unlikely, given the urbanised nature of the study area and lack of suitable habitat.	Low
Grey-crowned Babbler (eastern subspecies)		Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains.	Unlikely, suitable habitat is not present within the Study area.	Low
Masked owl		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. 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.	Unlikely, given the urbanised nature of the study area and lack of suitable roosting/foraging habitat.	Low
Red Goshawk		Red Goshawks inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	Unlikely. Species has not been recorded within 10km of the site.	Low, no suitable habitat would be impacted.
Regent honeyeater		The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. In NSW the distribution is very patchy and mainly confined to the two main breeding areas (at Capertee Valley and the Bundarra-Barraba region) and surrounding fragmented woodlands. In some years non-breeding flocks converge on flowering coastal woodlands and forests where they prefer Swamp mahogany and Spotted gum forests.	Unlikely. Species has not been recorded within 10km of the site.	Low

Species		Notes	Likelihood of occurrence on site	Potential to be impacted
Rose-crowned fruit-dove		The Rose-crowned fruit dove prefers tall tropical and subtropical evergreen or semi-deciduous rainforest, especially with a dense regrowth of vines.	Unlikely, given the urbanised nature of the study area and lack of suitable foraging habitat.	Low
Spotted harrier		Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.	Possible occurrence foraging throughout Study area.	Low, no suitable habitat would be impacted.
Swift parrot		This migratory species is very rarely recorded in the locality.	Unlikely. Species has not been recorded within 10km of the site.	Low
White-eared monarch		This species occurs in rainforest, particularly the edges of subtropical rainforest and contiguous wet sclerophyll forest. It is also occasionally found in mangrove swamps or streamside vegetation in Eucalypt woodland.	Unlikely, given the urbanised nature of the study area and lack of suitable habitat.	Low
Oceanic and coastal birds				
Little tern		These birds occur on open beaches, estuarine mudflats and sandflats and/or rocky shore habitats.	Possible, species may occur occasionally along Seven Mile Beach.	Low, no suitable habitat would be impacted.
Pied oystercatcher			Possible	Low, no suitable habitat would be impacted.
Osprey		Ospreys forage in coastal rivers and streams. They prefer to nest closer to coastal waterbodies.	Possible	Low, no suitable habitat would be impacted.
White-bellied Sea-Eagle	Sea-	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest (including rainforest) and even urban areas	Possible	Low, no suitable habitat would be impacted.
Wetland birds				
Australasian bittern		The Australasian bittern generally prefers freshwater habitats although it may also use dense saltmarsh vegetation in estuaries and flooded grasslands.	Low. This species would be unlikely to occur in areas near to the proposed works.	Low.

Species		Notes	Likelihood of occurrence on site	Potential to be impacted
Australian Snipe	Painted	This species prefers the fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Unlikely	Low
Black-necked stork		The Black-necked stork is an occasional visitor to the area uses grassland and wetland habitats in the locality during periods of inundation.	Low. This species would be unlikely to occur in areas near to the proposed works.	Low
Brolga		Found in shallow swamps, dry grassland or ploughed paddocks and desert claypans.	Low. This species would be unlikely to occur in areas near to the proposed works.	Low
Comb-crested jacana		Found in dams, still or slow-flowing wetlands and other waterbodies with floating waterlilies or other floating or dense fringing vegetation.	Low. This species would be unlikely to occur in areas near to the proposed works.	Low
Terrestrial mammals				
Common planigale		This species occupies a wide range of habitats including rainforest, sclerophyll forest, grasslands, marshlands, rocky areas and even some suburban areas. Species has been recorded within rainforest plantings at Lennox Head and was previously recorded within the Sport and Rec grounds.	Low. Subject site is located on an urbanised edge and is highly disturbed.	Low
Greater Glider		The Greater Glider is largely restricted to eucalypt forests and woodlands with a diversity of eucalypt species.	Unlikely	Low
Koala		No Koala food trees are located within the Subject site.	Unlikely, given the urbanised nature of the site and lack of food trees.	Low
Long-nosed potoroo		This species occurs in coastal heathland habitats at several locations along the Far North Coast.	Unlikely. Species has not been recorded within 10km of the site.	Low
New Holland Mouse		Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. Species has not been recorded within 10km of the Subject site.	Unlikely. Species has not been recorded within 10km of the site.	Low
Spotted-tail quoll		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. Quolls are rarely recorded in the locality.	Unlikely. Subject site is located on an urbanised edge and is highly disturbed.	Low

Species		Notes	Likelihood of occurrence on site	Potential to be impacted
Water mouse		It is found in coastal wetlands such as lagoons, swamps and sedged lakes close to fore dunes. It forages amongst the mangroves at night when the tide is low, and when the tide rises it returns to the adjacent sedgeland for shelter.	Unlikely. This species was not recorded on the NSW Wildlife Atlas search and is not known from the locality.	Low
Bats				
Common blossom bat		Common Blossom-bats often roost in littoral rainforest and feed on nectar and pollen from flowers in adjacent heathland and paperbark swamps.	Possible	Possible
Eastern bentwing bat	(common)	This species generally occupies caves and tunnels during the day and, at night, forages for small insects beneath the canopy of well timbered habitats.	Possible	Possible
Eastern bat	free-tailed	This bat occurs in dry sclerophyll forest and woodland east of the Great Dividing Range.	Possible. This species was potentially recorded by Geolink recently in the Sport and Rec Centre.	Possible
Eastern bat	long-eared	This species typically roosts in old growth trees with hollows. It may occasionally roost in dense forested vegetation and dead rainforest foliage. The Study area may be used for foraging or roosting by this species.	Possible. This species was potentially recorded by Geolink recently in the Sport and Rec Centre.	Possible
Greater broad-nosed bat		This species forages over a range of habitats, including rainforest and moist forests.	Possible	Possible
Grey-headed fox	flying	This species occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. Urban gardens and cultivated fruit crops also provide habitat for this species.	Possible	Possible
Large-eared pied bat		This species is found in well-timbered areas containing gullies. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin, frequenting low to mid-elevation dry open forest and woodland close to these features.	Unlikely. This species was not recorded on the Atlas of NSW Wildlife and the site contains no roost sites and only marginal forage habitat.	Low



Species	Notes	Likelihood of occurrence on site	Potential to be impacted
Little bent-wing bat	This species generally roosts in caves and tunnels during the day and forages for insects beneath the canopy of forested habitats at night.	Possible. This species was recently recorded by Geolink within the Sport and Rec Centre.	Possible
Southern myotis	This species forages over fresh and saline waterbodies and roosts in caves, tree hollows, culverts, tunnels and other man-made structures.	Possible. This species was potentially recorded by Geolink recently in the Sport and Rec Centre.	Possible
Invertebrates			
Mitchell's rainforest snail	This snail is restricted to remnant areas of lowland subtropical rainforest and swamp sclerophyll forest with a rainforest understorey on alluvial soils with a basaltic influence on the coastal plain between the Richmond and Tweed Rivers. It is known from the Suffolk Park area but the site does not provide any suitable habitat.	Unlikely, suitable habitat is not present within the Subject site.	Low
Insects			
Pink Underwing Moth	The Southern Pink Underwing Moth is found in subtropical rainforest below about 600 m elevation. Potential breeding habitat is restricted to areas where the caterpillar's food plant, a native rainforest vine, <i>Carronia multisepalea</i> , occurs in subtropical rainforest.	Unlikely	Low

* Species restricted to marine environments have not been included in this assessment as no impacts will occur to marine habitats due to the nature of the proposed works.



APPENDIX E

PHOTOGRAPHS OF TREES TO BE REMOVED



Tree No 1 Tucker



Tree No 2 Swamp oak



Boardwalk Section A
(Eastern section)



Boardwalk Section B
(Central section)



Boardwalk Section C
(Western section)



APPENDIX F

ASSESSMENTS OF SIGNIFICANCE

Section 5A Assessments of Significance

7 PART TESTS

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Common blossom bat

Common Blossom-bats often roost in littoral rainforest and feed on flowers in adjacent heathland and paperbark swamps. They roost individually in foliage of the sub-canopy, changing roost sites daily, and return to favoured feeding sites on consecutive nights.

Threats to the Common blossom bat include:

- Clearing of coastal habitat for urban development or sandmining.
- Weeds, such as Bitou Bush, that suppress the regeneration of key food trees, such as Coastal Banksia.

Recovery actions for the Common blossom bat include:

- Control of serious coastal weed species such as Bitou Bush.
- Protect areas of littoral rainforest, coastal heath and paperbark swamp.
- Plant Common Blossom-bat feed trees such as local species of banksia, bottlebrush and paperbark.
- Initiate and support rainforest and heath regeneration projects.

Source: Office of Environment and Heritage 2017

Breeding and sheltering sites for the Common blossom bat occur within subtropical and littoral rainforest (Environment Australia 1999). The Common blossom bat forages in a diverse range of nectar producing plant communities year round and forages occasionally on rainforest fruits. The Common blossom bat requires a diverse array of nectivorous plant communities close to roost sites. Common blossom bats occur along the coastal strip in the region. This species may occur on the site at times, particularly during peak fruiting and flowering times of site vegetation.

There will be negligible loss of foraging habitat for this species. Overall, the project will result in a long-term gain in foraging habitat through the compensatory planting proposed. No roosting habitat for this species would be affected by the proposed works.

Eastern bentwing bat

Caves are the primary roosting habitat for the Eastern (or Common) bent-wing bat, but they also use derelict mines, storm-water tunnels, buildings and other man-made structures. These bats form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes.

At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops.

Threats to the Eastern bent-wing bat include:

- Damage to or disturbance of roosting caves, particularly during winter or breeding.
- Loss of foraging habitat.
- Application of pesticides in or adjacent to foraging areas.

- Predation by feral cats and foxes.

Recovery actions for the Eastern bent-wing bat include:

- Control foxes and feral cats around roosting sites, particularly maternity caves.
- Retain native vegetation around roost sites, particularly within 300 m of maternity caves.
- Minimise the use of pesticides in foraging areas.
- Protect roosting sites from damage or disturbance.

Source: Office of Environment and Heritage 2017

This species may occur on the site at times, particularly during peak fruiting and flowering times of site vegetation. There will be negligible loss of foraging habitat for this species. Overall, the project will result in a long-term gain in foraging habitat through the compensatory planting proposed. No roosting habitat for this species would be affected by the proposed works.

Eastern freetail bat

The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. It occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range, roosting mainly in tree hollows but also under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.

Threats to the Eastern Freetail-bat include:

- Loss of hollow-bearing trees.
- Loss of foraging habitat.
- Application of pesticides in or adjacent to foraging areas.

Recovery actions for the Eastern Freetail-bat include:

- Retain hollow-bearing trees and provide for hollow tree recruitment.
- Retain foraging habitat.
- Minimise the use of pesticides in foraging areas.

Source: Office of Environment and Heritage 2017

This species may occur on the site at times, particularly during peak fruiting and flowering times of site vegetation. There will be negligible loss of foraging habitat for this species. Overall, the project will result in a long-term gain in foraging and roosting habitat through the compensatory planting proposed.

Eastern long-eared bat

This bat occurs in lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent areas of moist eucalypt forest. Coastal rainforest and patches of coastal scrub are particularly favoured. It roosts in hollows in trees and also in the hanging foliage of palms, in dense clumps of foliage amongst rainforest trees and under bark..

Threats to the Eastern long-eared bat include:

- Clearing, fragmentation and isolation of lowland subtropical rainforest, wet and swamp eucalypt forest and coastal scrub, particularly forest and scrub close to the coast, for agricultural, residential and other development.
- Loss of hollow-bearing trees and stands of palms and rainforest trees used for roosting and maternity sites.
- Invasion of habitat by weeds, particularly by Bitou Bush on the coast.
- Use of pesticides.

Recovery actions for the Eastern long-eared bat include:

- Protect hollow-bearing trees and patches of rainforest and other dense vegetation.
- Reduce the use of pesticides and consider alternatives where available.
- Assist with removal of weeds, particularly with Bitou Bush control in coastal areas.
- Protect known and potential habitat, particularly low elevation rainforest and coastal scrub from clearing, fragmentation and isolation.
- Reconnect and rehabilitate patches of known and potential habitat.

Source: Office of Environment and Heritage 2017

This species may occur on the site at times, particularly during peak fruiting and flowering times of site vegetation. There will be negligible loss of foraging habitat for this species. Overall, the project will result in a long-term gain in foraging and roosting habitat through the compensatory planting proposed.

Greater broad-nosed bat

The Greater Broad-nosed Bat utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. It forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest best suits the direct flight of this species as it searches for beetles and other large, slow-flying insects.

Threats to the Greater Broad-nosed Bat include:

- Disturbance to roosting and summer breeding sites.
- Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions.
- Loss of hollow-bearing trees.
- Pesticides and herbicides may reduce the availability of insects, or result in the accumulation of toxic residues in individuals' fat stores.
- Changes to water regimes are likely to impact food resources, as is the use of pesticides and herbicides near waterways.

Recovery actions for the Greater Broad-nosed Bat include:

- Raise landowners' awareness of the presence of this species, and provide information on how their management actions will affect the species' survival.
- Actively encourage the conservation of the riparian vegetation and water quality of streams and rivers.
- DEC should be consulted when planning development/s to minimise impact/s on populations.
- Conduct searches for the species in suitable habitat in proposed development areas.
- Retain stands of native vegetation, especially those with hollow-bearing trees (including dead trees), and retain other structures containing bats.
- Retain a buffer of vegetation around roost sites in vegetated areas.
- Protect hollow-bearing trees for breeding sites, including those on farmland; younger mature trees should also be retained to provide replacements for the older trees as they die and fall over.
- Reduce the use of pesticides in the environment and enter known sites of this species and its potential habitat onto maps used for planned poison spraying activities.
- Encourage regeneration and replanting of local flora species to maintain bat foraging habitat.
- Assess the site's importance to the species' survival, including linkages provided between

This species may occur on the site at times, particularly during peak fruiting and flowering times of site vegetation. There will be negligible loss of foraging habitat for this species. Overall, the project will result in a long-term gain in foraging and roosting habitat through the compensatory planting proposed.

Grey-headed flying-fox

Grey-headed flying-foxes 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, birth and the rearing of young. Site fidelity to camps is high with some camps being used for over a century. These bats travel up to 50 km to forage, feeding on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. They also forage in cultivated gardens and fruit crops and can inflict severe crop damage.

Threats to the Grey-headed flying-fox include:

- Loss of foraging habitat.
- Disturbance of roosting sites.
- Unregulated shooting.
- Electrocution on powerlines.

Recovery actions for the Grey-headed flying-fox include:

- Protect roost sites, particularly avoid disturbance September through November.
- Identify and protect key foraging areas.
- Manage and enforce licensed shooting.
- Investigate and promote alternative non-lethal crop protection mechanisms.
- Identify powerline blackspots and implement measures to reduce deaths.

Source: Office of Environment and Heritage 2017

This species may occur on the site at times, particularly during peak fruiting and flowering times of site vegetation. There will be negligible loss of foraging habitat for this species. Overall, the project will result in a long-term gain in foraging habitat through the compensatory planting proposed.

Little bentwing bat

The Little bentwing bat prefers moist eucalypt forest, rainforest or dense coastal banksia scrub. It roosts in caves, tunnels and sometimes tree hollows during the day, and at night forages for small insects beneath the canopy of densely vegetated habitats. The Little bentwing bat often shares roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters.

Threats to the Little bent-wing bat include:

- Disturbance of colonies, especially in nursery or hibernating caves may be catastrophic.
- Destruction of caves that provide seasonal or potential roosting sites.
- Changes to habitat, especially surrounding maternity caves.
- Use of pesticides.

Recovery actions for the Little bent-wing bat include:

- Retain stands of native vegetation.
- Reduce use of pesticides.
- Protect known roosting and nursery sites and surrounding forest.
- Check with OEHL before undertaking recreational caving activities.

Source: Office of Environment and Heritage 2017

This species may occur on the site at times, particularly during peak fruiting and flowering times of site vegetation. There will be negligible loss of foraging habitat for this species. No roosting habitat for this species would be affected by the proposed works.

Southern myotis

The Southern myotis generally roosts in groups of 10 - 15 close to water. It has been found roosting in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. This bat forages over streams and pools, catching insects and small fish by raking their feet across the water surface.

Threats to the Southern myotis include:

- Reduction in stream water quality affecting food resources
- Loss or disturbance of roosting sites.
- Clearing adjacent to foraging areas.
- Application of pesticides in or adjacent to foraging areas.

Recovery actions for the Southern myotis include:

- Retain native vegetation along streams and rivers and around other waterbodies.
- Minimise the use of pesticides adjacent to foraging areas.
- Protect roosts from damage or disturbance.

Source: Office of Environment and Heritage 2017

Foraging habitat for this species would not be affected by the proposed works. There will be negligible loss of foraging habitat for this species. Overall, the project will result in a long-term gain in roosting habitat through the compensatory planting proposed.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

There are no listed endangered populations in the Study area.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(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,

A number of listed Endangered Ecological Communities occur in the North Coast bioregion, including:

- Byron Bay Dwarf Graminoid Clay Heath Community
- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and SE Corner bioregions

- Freshwater wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner bioregions
- Littoral rainforest in the NSW North Coast, Sydney Basin and SE Corner bioregions
- Lowland Rainforest in the NSW North Coast and Sydney Basin bioregions
- Lowland Rainforest on Floodplain in the NSW North Coast bioregion
- Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, SE Corner, SE Highlands and Australian Alps bioregions
- Subtropical Coastal Floodplain Forest of the NSW North Coast bioregion
- Swamp oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner bioregions
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner bioregions
- *Themeda* grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and SE Corner bioregions
- Coastal Cypress Pine Forest in the NSW North Coast Bioregion

One EEC is considered to occur in the Subject site, *Swamp sclerophyll forest on coastal floodplains*. No mature or juvenile paperbark trees will require removal as part of the proposed works. The proposed works will result in the long-term expansion of this EEC through the compensatory planting and expansion/restoration of riparian vegetation around Lake Ainsworth which comprises this EEC.

(d) in relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

Impacts to vegetation will be minor and short term and will not result in the longer term modification, fragmentation or isolation of any areas of habitat. There would be a long-term gain in vegetation cover and condition which would improve the habitat values for those species and EEC considered in this assessment.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Recommended and declared areas of critical habitat are listed on the Critical Habitat Register. The North Coast bioregion contains one area of declared Critical Habitat. Stott's Island (in the Tweed River) has been declared as critical habitat for the Mitchell's Rainforest Snail.

There are no areas of critical habitat in the Study area.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A number of priority actions have been set out for the species and EEC considered in this assessment. The proposed development is not inconsistent with these priority actions.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A “threatening process” means a process that threatens, or may have the capability to threaten, the survival or evolutionary development of a species, population or ecological community. Key Threatening Processes have been listed in Schedule 3 of the TSC Act (1995).

A number of Key threatening processes have been listed on the schedules of the TSC Act (1995).

- Alteration of habitat following subsidence due to longwall mining
- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands
- Anthropogenic climate change
- Bushrock removal
- Clearing of native vegetation
- Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)
- Competition and habitat degradation by feral goats (*Capra hircus*)
- Competition from feral honey bees (*Apis mellifera*)
- Death or injury to marine species following capture in shark control programs on ocean beaches
- Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments
- Forest Eucalypt dieback associated with over-abundant psyllids and bell miners
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition
- Herbivory and environmental degradation caused by feral deer
- Importation of red imported fire ants (*Solenopsis invicta*)
- Infection by psittacine circoviral (beak and feather) disease affecting endangered psittacine species and populations
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis
- Infection of native plants by *Phytophthora cinnamomi*
- Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
- Introduction of the large earth bumblebee (*Bombus terrestris*)
- Invasion and establishment of exotic vines and scramblers
- Invasion and establishment of Scotch broom (*Cytisus scoparius*)
- Invasion and establishment of the cane toad (*Bufo marinus*)
- Invasion of native plant communities by African Olive *Olea europaea* L. subsp. *cuspidata*
- Invasion, establishment and spread of *Lantana camara*
- Invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush and boneseed)
- Invasion of native plant communities by exotic perennial grasses
- Invasion of the yellow crazy ant (*Anoplolepis gracilipes* (Fr. Smith)) into NSW
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
- Loss of hollow-bearing trees
- Loss or degradation (or both) of sites used for hill-topping by butterflies
- Predation and hybridisation of feral dogs (*Canis lupus familiaris*)
- Predation by the European red fox (*Vulpes vulpes*)
- Predation by the feral cat (*Felis catus*)
- Predation by *Gambusia holbrooki* Girard, 1859 (plague minnow or mosquito fish)
- Predation by the ship rat (*Rattus rattus*) on Lord Howe Island
- Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)

- Removal of dead wood and dead trees

The proposed works will make a negligible contribution toward the clearing of native vegetation and human-caused climate change. This contribution would be negated through the proposed compensatory planting and riparian restoration works.

Conclusion

With the adoption of the amelioration measures discussed in this report, the proposed development is unlikely to result in a significant impact on any Threatened (TSC Act 1995) species, population or ecological community. A Species Impact Statement is not required.

EPBC ASSESSMENT OF SIGNIFICANCE

The following assessment follows the guidelines and definitions set out in the EPBC Act Policy Statement 1.1.

Assessment of proposed action

Are there any matters of national environmental significance located in the area of the proposed action?

Threatened species and ecological communities.

The EPBC Protected Matters Report generated for the Subject site shows a number of Threatened species as possible occurrences within 5km of the Subject site. Of the Threatened fauna species included in the Protected Matters Report, the Vulnerable Grey-headed flying-fox is the only species considered a possible occurrence in the area subject to the proposed works.

Migratory species

The EPBC Protected Matters Report generated for the Subject site shows a number of Migratory species as possible occurrences within 5km of the Subject site. Several of these species, including the White-bellied sea eagle, White-throated needle-tail and Rainbow bee-eater, may occur in the Study area at times.

Ramsar Wetlands of International Significance

There are no Wetlands of International Significance within 5km of the Subject site.

Commonwealth marine areas

Generally, the Commonwealth marine area stretches from three miles to two hundred nautical miles from the coast. The Proposed development will not affect any Commonwealth marine areas.

World Heritage properties

The EPBC Protected Matters Report generated for the Subject site shows no World Heritage properties within 5km of the Subject site.

National heritage places

The EPBC Protected Matters Report generated for the Subject site shows no National Heritage places within 5km of the Subject site.

Considering the proposed action at its broadest scope, is there potential for impacts on matters of national environmental significance?

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

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

No critically endangered or endangered species were recorded or considered likely to occur.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species, or
- reduce the area of occupancy of an important population, or
- fragment an existing important population into two or more populations, or
- adversely affect habitat critical to the survival of a species, or
- disrupt the breeding cycle of an important population, or
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

An important population is one that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

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

The Grey-headed flying –fox may occur on the site at times, particularly during peak fruiting and flowering times of site vegetation. Overall, the project will result in a long-term gain in foraging habitat through the compensatory planting proposed.

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

- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
- adversely affect habitat critical to the survival of an ecological community
- 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
- 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
- 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
- interfere with the recovery of an ecological community.

No Threatened Ecological Community (TEC) types occur in the Study area.

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

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of *important habitat* of the migratory species;
- result in an invasive species that is harmful to the migratory species becoming established in an area of *important habitat* of the migratory species; or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an *ecologically significant proportion* of the population of the species.

An area of important habitat is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an *ecologically significant proportion* of the population of the species; and/or
- habitat that is of critical importance to the species at particular life-cycle stages; and/or
- habitat utilised by a migratory species which is at the limit of the species range; and/or
- habitat within an area where the species is declining.

The Study area may be used at times by a range of migratory species. The Subject site does not represent an area of important habitat for any migratory species and will not seriously disrupt the lifecycle of an ecologically significant proportion of any migratory species.

Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance?

Amelioration measures have been recommended to reduce overall site impacts and potential impacts on areas of retained habitat.

Are any impacts of the proposed action on matters of national environmental significance likely to be significant impacts?

No.

Conclusion

Based upon this assessment and with the implementation of the amelioration measures discussed in this report, the proposed development is unlikely to result in a significant impact on any matters of National Environmental Significance (NES) as listed under the EPBC Act 1999 and referral to the Minister is not required.