

Hallidays Point Biodiversity Study and Local Conservation Action Plan

**A guide for growth and conservation in the
Hallidays Point area**

MidCoast Council

19 May 2025

Final for public exhibition



Report No. 21161RP2

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Glossary

Term / Abbreviation	Definition
BAM	Biodiversity Assessment Method
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BC Regulation	NSW <i>Biodiversity Conservation Regulation 2019</i>
BDAR	Biodiversity Development Assessment Report
Biodiversity corridors	Avenues of land that allow or provide a pathway for animals to travel from one patch of habitat (node) to another. Generally, they contain connected areas of vegetation / habitat but sometimes past land uses have fragmented or reduced areas of land that are important for connectivity.
BioNet	NSW BioNet Atlas database
Biosecurity Act	NSW <i>Biosecurity Act 2015</i>
BOS	Biodiversity Offsets Scheme
BSS	Biodiversity Stewardship Site
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically Endangered Ecological Community
CM Act	NSW <i>Coastal Management Act 2016</i>
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DCP	<i>Greater Taree Development Control Plan 2010</i>
DPE	Department of Planning and Environment
EEC	Endangered Ecological Community
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	NSW <i>Fisheries Management Act 1994</i>
GDEs	Groundwater Dependent Ecosystems
GIS	Geographic Information System
GPS	Global Positioning System
GTCC CKPoM	Greater Taree City Council Draft Comprehensive Koala Plan of Management 2002
ha	Hectares
Habitat nodes	Core patches of vegetation which play an important or key role in providing habitat for populations of native flora and fauna species. This includes habitat that provides for refuges. Nodes are connected by corridors
LEC	NSW Land and Environment Court
LEP	<i>Greater Taree Local Environment Plan 2010</i>
LGA	MidCoast Local Government Area
LLSA	NSW <i>Local Land Services Act 2016</i>
Locality	The area within a 5-kilometre radius around the project area. The project area is shown in Figure 1
MNES	Matters of National Environmental Significance
NPWS	National Parks and Wildlife Service
NRAR	Natural Resources Access Regulator
NSW	New South Wales

Term / Abbreviation	Definition
PCT	Plant Community Type
Project area	The area subject to this Plan. It is shown in Figure 1
SAII	Serious and Irreversible Impact
SEPP 44	<i>State Environmental Planning Policy No. 44 – Koala Habitat Protection (repealed)</i>
SEPP	<i>State Environmental Planning Policy</i>
TEC	Threatened Ecological Community
VEC	Vulnerable Ecological Community
WM Act	<i>NSW Water Management Act 2000</i>

1. Introduction

1.1. Introduction

The coastal locality of Hallidays Point, NSW is experiencing high development pressure and population growth, with an associated demand to provide new urban release areas and additional infrastructure and services, including new and upgraded roads.

The locality also contains important biodiversity assets. These features have conservation importance and they contribute to the amenity and liveability of the area.

There has been a history of development and biodiversity planning in the locality. However, there is not an overarching strategic framework to plan for growth, to conserve biodiversity and to balance outcomes. Up to date information and biodiversity analysis is required to inform future growth and conservation in the Hallidays Point area in the short, medium, and long term.

This Biodiversity Study and Local Conservation Action Plan for Hallidays Point has been prepared by Cumberland Ecology on behalf of MidCoast Council. It:

- Describes the existing biodiversity of the locality;
- Discusses biodiversity trends and pressures; and
- Outlines a range of actions to deliver important biodiversity outcomes.

1.2. Location and Description of the Locality

The Hallidays Point project area is about 4,644 hectares in size and is within the MidCoast Council Local Government Area (LGA). It includes the area between Darawank National Park in the south, The Lakes Way in the west, Khappinghat National Park in the north and the Pacific Ocean in the east. This is referred to as the '*project area*' and is shown in **Figure 1**. The '*locality*' is an area 5-kilometres outside the extent of the project area.

The project area is within the traditional lands of the Biripi People. It is near the southern boundary of these lands (and near the northern boundary of the lands of the neighbouring Worimi People). The Aboriginal significance of the project area has been discussed in references, which have identified the presence of culturally important places, sites (carved trees, middens, etc) and local story-places. For example, a former bora ring was located "*on the ridge south of Black Head*" (GTCC, 1983). The nearby Saltwater National Park is a listed Aboriginal Place and continues to be a place of cultural and spiritual significance, coastal camping and a ceremonial site for Aboriginal people.

The land tenure across the project area is mainly private freehold land, with some areas of MidCoast Council owned land, Crown Land, and National Park reserves (being portions of the Khappinghat National Park and Darawank National Park in the north and south, respectively). The locality includes the coastal villages of Black Head, Red Head, Diamond Beach and Tallwoods, as well as part of the localities of Corrigan and Rainbow Flat.



Figure 1. The Hallidays Point project area

The project area includes parts of the catchments of the Darawank Creek/ Frogalla Swamp wetland, Black Head lagoon and Khappinghat Creek estuary (Saltwater lagoon). Black Head lagoon and the Khappinghat Creek estuary are intermittent closed or open lake or lagoons (ICOLLs). The Darawank Creek/ Frogalla Swamp Wetland is a tributary of the Wallis Lake estuary and has been the focus of substantial acid sulfate soil remediation / water quality improvement. Black Head lagoon and the Khappinghat Creek estuary have had recent episodes of sub-optimal water quality conditions because of catchment inputs (MidCoast Council 2021; [https://www.environment.nsw.gov.au/topics/water/estuaries/estuaries-of-nsw/black-head-lagoon#:~:text=water%20clarity%20graded%20poor%20\(D\)\).](https://www.environment.nsw.gov.au/topics/water/estuaries/estuaries-of-nsw/black-head-lagoon#:~:text=water%20clarity%20graded%20poor%20(D)).)

The landscapes / habitats of the project area are characterised by coastal beaches and dunes in the east and gently undulating low coastal ranges in the west, with areas of floodplains and estuarine wetlands also present. The elevation ranges from sea-level to approximately 100-metres above-sea-level (ASL).

Native vegetation is diverse and includes dry and wet sclerophyll forests, rainforests, coastal sands forests, heaths, shrublands, swamp forests and wetlands. This report describes the vegetation types of the project area.

Bushfire Planning Australia (2023) has compiled a Strategic Bushfire Study and has analysed the patterns of bushfire in the project area. The project area was impacted by a major fire during the 2019 Black Summer bushfires. Areas of native vegetation and wildlife habitat were burnt; some at moderate to high intensity. High

intensity fire is the most ecologically destructive form of bushfire. A plan of the extent of the 2019 bushfires in the project area is provided as **Figure 2**.

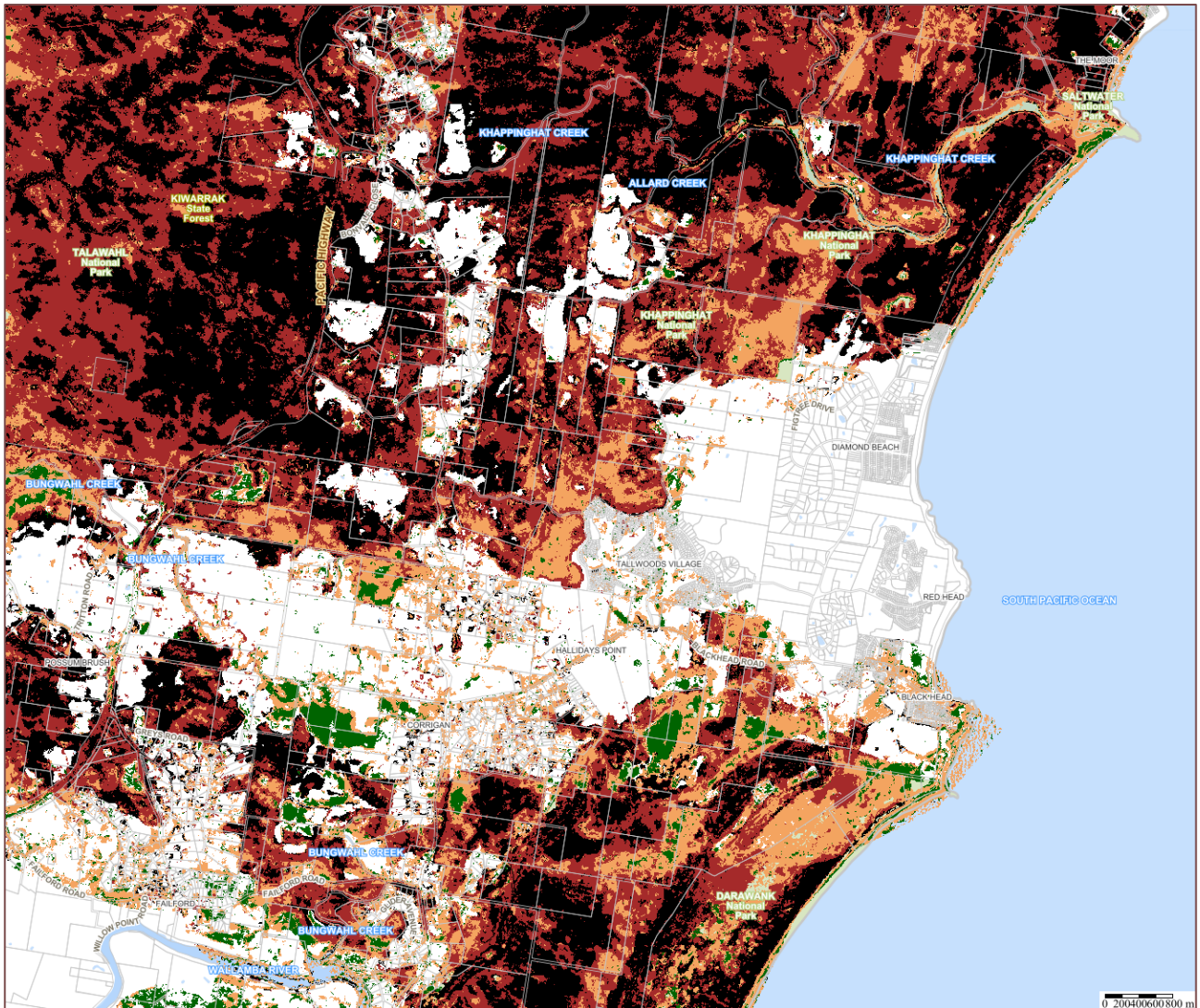


Figure 2. The extent of the 2019 bushfires in the Hallidays Point project area.

Historically, some areas of land were cleared for general farming (dairying, beef cattle). Some of these farms and farmlets, as well as some of the residual forested areas, have been progressively converted to residential development, particularly along the coastal areas, and in Tallwoods. Within these areas, small commercial centres have been established in Black Head and Diamond Beach. Outside the residential areas, land uses include lifestyle bush blocks, low-intensity grazing, private equine facilities, a golf course, private native forestry, large-lot residential estates, tourism developments and domestic wastewater management (Hallidays Point wastewater treatment plant and its perimeter lands). Historically, the area supported minor hard rock quarrying and some mineral sands mining.

The natural features contribute to the liveability and aesthetic appeal of the project area. The Hallidays Point / Red Head Environmental Study in 1983 noted that *"the exceptional natural beauty of the Study Area is perhaps*

its most popular asset. It is therefore essential that it be preserved as much as possible for the enjoyment of both residents and visitors" (GTCC, 1983). The 1983 study advocated for the protection of native vegetation on ridgelines.

Despite a long history of land use and development, there are tracts of native vegetation in both public and private ownership. These areas support a range of threatened species and contain several threatened ecological communities (TECs).

1.3. Conservation Planning Framework

The preparation of a Local Conservation Action Plan is an important reference for guiding future growth and conservation in the Hallidays Point area in the short, medium, and long term.

The project area has been identified as a priority for a Local Conservation Action Plan as its extensive forested lands include areas of threatened ecological communities, provide habitat for threatened species and provide important ecosystem services functions. Settlement pressures that drive unbalanced or inappropriate development is a threat to the ecological condition and function of the project area.

A variety of strategic biodiversity planning processes have been undertaken across the project area. This includes the *Hallidays Point Flora and Fauna Management Study* prepared by EcoPro in 1997. In 1997, the *Hallidays Point Flora and Fauna Management Study* recognised that "*Hallidays Point is continuing to experience significant urban and rural/residential growth pressures. Transition from a rural coastal environment, with extensive areas of natural vegetation, to a more urbanised environment has caused loss of natural vegetation and fragmentation of significant habitats. Community concerns were expressed regarding land use decisions being made without the benefit of data on flora and fauna and an appreciation of the cumulative impacts of development. Concern over further loss or fragmentation of habitat likely to result in a loss of fauna in the area, especially threatened species.*"

There is presently no adopted strategic plan for biodiversity conservation that serves as a guide for local development planning. This Study will be a reference document for future growth and conservation in Hallidays Point in the short, medium, and long term.

Preparing a Local Conservation Action Plan involves the following steps:

- Compile vegetation mapping (**Chapter 3**);
- Review all available knowledge (**Chapter 4**);
- Identify and map all public and private conserved areas and understand patterns of approved development (**Chapter 5** and **Chapter 6**);
- Undertake field surveys for priority / focus species (**Chapter 7**); and
- Plan for (and then implement) Conservation Actions (**Chapter 9**), including:
 - Collect information on biodiversity values and assets;

- Understand biodiversity condition, viability and threats;
- Identify priority biodiversity assets;
- Set biodiversity goals and targets;
- Develop strategies;
- Take actions; and
- Monitor / measure outcomes.

1.4. Objectives

In delivering a Hallidays Point Biodiversity Study and Local Conservation Action Plan, MidCoast Council seeks to:

- Protect values and features of importance for the liveability and amenity of local communities, including (but not limited to) natural spaces, buffers, nature recreation areas and habitats for plants and wildlife;
- Conserve and, where required, restore important biodiversity values;
- Assist in the delivery of an effective reserve and open space system;
- Provide for wildlife corridors and connecting landscapes; and
- Recognise and protect culturally important natural landscapes (in concert with Traditional Owners).

1.5. Structure of this Plan

The chapters of this report are set out as follows:

Chapter 1: Introduction – provides background and the objectives of the project;

Chapter 2: Biodiversity Legislation – provides an overview of Local, State and Commonwealth legislation that may be relevant to biodiversity planning;

Chapter 3: Vegetation of Hallidays Point – includes the methodology used to map the vegetation of the Hallidays Point project area and describes the vegetation communities recorded;

Chapter 4: Threatened Species Records – provides an analysis of the existing BioNet Atlas database results and other threatened species records relevant to the project area;

Chapter 5: Areas of Existing Conservation – details the areas and conservation mechanisms of land currently reserved for conservation within the project area;

Chapter 6: Areas of Development – details areas currently developed, or approved / zoned to be developed, within the project area;

Chapter 7: Wildlife Surveys – details the wildlife survey methodology employed as part of the preparation of this Biodiversity Study and Local Conservation Action Plan and the results obtained;

Chapter 8: Catchment and Riparian Health – details the waterbodies and riparian corridors occurring within the project area and their protection strategies; and

Chapter 9: Local Conservation Action Plan – presents the findings, visions and goals, and the framework for implementing long term conservation measures and guiding future growth.

2. Biodiversity Legislation

2.1. Legislation

2.1.1. Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth Government's role in environmental assessment, biodiversity conservation and the management of protected areas of national significance.

The EPBC Act is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and provides protection for listed Matters of National Environmental Significance (MNES) including:

- Listed threatened species, ecological communities and migratory species; and
- Nationally significant areas (e.g. World Heritage properties, Ramsar wetlands of international significance).

Under the EPBC Act, any action (which includes a development, project, or activity) that may have a significant impact on MNES must be referred to the Commonwealth Minister for a determination as to whether that action is controlled. Controlled actions require Commonwealth approval.

There are no nationally protected areas within the project area.

Several EPBC Act listed threatened ecological communities and species (e.g. littoral rainforest and the koala, etc) occur within the project area. These require consideration in all future development and rezoning proposals.

2.1.2. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the overarching planning legislation in NSW. This Act provides for the creation of planning instruments that guides land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, communities, habitat, and processes that are listed under the *NSW Biodiversity Conservation Act 2016* (BC Act) and *Fisheries Management Act 1994* (FM Act).

The EP&A Act establishes the threatened species and environmental assessment considerations within the Part 4 development application assessment process and the Part 5 environmental impact assessment process for local authorities.

2.1.3. Biodiversity Conservation Act 2016

Under the NSW Land Management and Biodiversity Conservation reform, the NSW Parliament passed the following two Acts in November 2016:

- *Biodiversity Conservation Act 2016* (BC Act), which replaced the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and parts of the *National Parks and Wildlife Act 1974*; and
- *Local Land Services Amendment Act 2016* (LLSA Act), which replaced the *Native Vegetation Act 2003* and the *Native Vegetation Regulation 2005*.

These reforms commenced on 25 August 2017 and require development and conservation projects that meet certain thresholds to be assessed under the Biodiversity Offsets Scheme (BOS). Assessment under the BOS requires an assessment using the Biodiversity Assessment Methodology (BAM) by an accredited assessor and the preparation of a Biodiversity Development Assessment Report (BDAR), Biodiversity Certification Assessment Report (BCAR) or Biodiversity Stewardship Site Assessment Report (BSSAR), depending on the nature of the project being assessed.

The BOS is intended to measure the biodiversity loss of development proposals and the gains in biodiversity value achieved at offset sites.

The BAM establishes an avoid - mitigate – offset hierarchy for development, which means that avoiding impacts on biodiversity values is paramount and must be clearly demonstrated in development applications. Offset measures are to be applied to residual impacts only after biodiversity impacts have been firstly avoided and then mitigated.

The BOS applies to local development (assessed under Part 4 of the EP&A Act) where the project exceeds any one of the BOS thresholds according to s7.1 of the NSW *Biodiversity Conservation Regulation 2019* (BC Regulation). Likewise, it applies to all State Significant projects unless the Secretary of the Department of Planning and Environment and the Chief Executive of DPE determine that the project is not likely to have a significant impact.

Establishment of a Biodiversity Stewardship Site (BSS) by way of a Biodiversity Stewardship Agreement (BSA) is also assessed under the BAM. A BSA is a legal agreement between the owner of land and the Minister administering the BC Act to establish a site for the purpose of generating biodiversity credits (i.e. to establish an offset site). A BSA identifies the land to which the agreement applies and the BSA is registered on the title of the land in perpetuity.

The BC Act also provides a framework for private land conservation in NSW, principally through conservation agreements and biodiversity stewardship sites administered by the NSW Biodiversity Conservation Trust.

The BC Act was subject to an independent review in 2023. The review found the current legislative regime was not meeting its objectives (which include the conservation of biodiversity at regional and State scales) and was unlikely ever to do so without significant reform. The Review Panel acknowledged that under the current trajectory of biodiversity loss, half of the threatened species in the State would become extinct within the next 100 years. The Review Panel found that the Biodiversity Offset Scheme required a clear ‘nature positive’ objective in alignment with the Global Biodiversity Framework and that the scheme should be simplified and more broadly and consistently applicable to development and land clearing. Improved transparency and accountability measures were also recommended.

2.1.4. Local Land Services Act 2013

The *Local Land Services Act 2013* regulates the management of native vegetation on rural properties. Administration of this Act is the responsibility of Hunter Local Land Services. Clearing of native vegetation on rural zoned land requires consent, unless it is undertaken in accordance with applying exemptions, codes or

allowances. Assessment and approval pathways for clearing native vegetation on rural land depends on the purpose, nature, location and extent of the clearing.

If a development approval is required for clearing native vegetation, then that clearing cannot be undertaken as an allowance under the LLS Act but must be considered as part of a development application.

If a development approval is not required, the proposed activity is on rural zoned land (under the local council's Local Environment Plan) and the activity is related to routine agricultural activities (for an agricultural purpose), then certain clearing may be undertaken as an allowable activity. Rural land in the context of native vegetation management is defined as land zoned as RU1, RU2, RU3, RU4 and RU6. RU5 and C zoned land is not considered as rural land.

Advice on the application of the LLS Act is provided by Hunter Local Land Services, the Native Vegetation Panel and / or Council.

Private native forestry (PNF) is referred to as the management of native vegetation on private land for sustainable logging and timber production. Harvesting timber for the purposes of PNF requires approval through a private native forestry plan (PNF Plan), which seeks to ensure that ecologically sustainable forest management is implemented, and measures are put in place to mitigate impacts on plants, animals, soil and water. A PNF Plan is an approval under the LLS Act to carry out private native forestry operations in accordance with the minimum operating standards set out in the relevant PNF Code of Practice. PNF Codes of Practice require landholders to complete a forest operation plan before commencing operations. The plan describes the proposed forestry operations. Anyone carrying out forestry activities must comply with the PNF Plan, the relevant PNF Code and the forest operation plan. PNF is regulated by Hunter Local Land Services, with the Environment Protection Authority being responsible for monitoring and compliance.

2.1.5. National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* governs areas of national parks, historic sites, state conservation areas, regional parks, nature reserves, karst conservation reserves and certain Aboriginal areas throughout NSW. Within the project area, this Act applies to Khappinghat National Park and Darawank Nature Reserve.

The objectives of the *National Parks and Wildlife Act 1974* are provided below.

- *the conservation of nature, including, but not limited to, the conservation of:*
 - habitat, ecosystems and ecosystem processes;
 - biological diversity at the community, species and genetic levels;
 - landforms of significance, including geological features and processes; and
 - landscapes and natural features of significance including wilderness and wild rivers.
- *the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to:*
 - places, objects and features of significance to Aboriginal people;

- places of social value to the people of New South Wales; and
- places of historic, architectural or scientific significance.
- *fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation; and*
- *providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation.*

National Parks and Nature Reserves are managed through the preparation and implementation of specific reserve Plans of Management under this Act.

2.1.6. Greater Taree Local Environmental Plan 2010

Local Environmental Plans (LEPs) guide planning decisions for local government areas. They do this through zoning and development controls, which provide a framework for the way land can be used. LEPs are the main planning tool to shape the future of communities and ensure local development is done appropriately. The *Greater Taree Local Environmental Plan 2010* (LEP) makes environmental planning provisions for land in the Manning Region. The LEP defines the land zoning within the locality and the associated objectives of those zones. The aims of the plan are:

(aa) to protect and promote the use and development of land for arts and cultural activity, including music and other performance arts;

(a) to promote and encourage the ecologically sustainable development of Greater Taree City;

(b) to encourage the proper management, development and conservation of natural and human made resources (including natural areas, forests, coastal areas, water, groundwater dependent ecosystems, agricultural land, extractive resources, towns, villages, and cultural amenities) for the purpose of promoting the social and economic welfare of the community, protecting ecological and cultural heritage and achieving a better environment;

(c) to promote and co-ordinate the orderly and economic use and development of land, and to minimise conflict between adjacent land uses;

(d) to facilitate the provision and co-ordination of community services and facilities;

(e) to encourage the protection of the environment, including the protection and conservation of native animals and plants, threatened species and endangered ecological communities and their habitats;

(f) to minimise the exposure of development to natural hazards and natural risks;

(g) to seek the provision of adequate and appropriate infrastructure to meet the needs of future development; and

(h) to encourage a strong, growing and diversified economy that promotes local self-reliance, and recognises and strengthens the local community and its social capital in ways that safeguard the quality of life of future generations.

The current zoning plan for the project area from the Greater Taree Local Environmental Plan 2010 is provided in **Figure 3**.

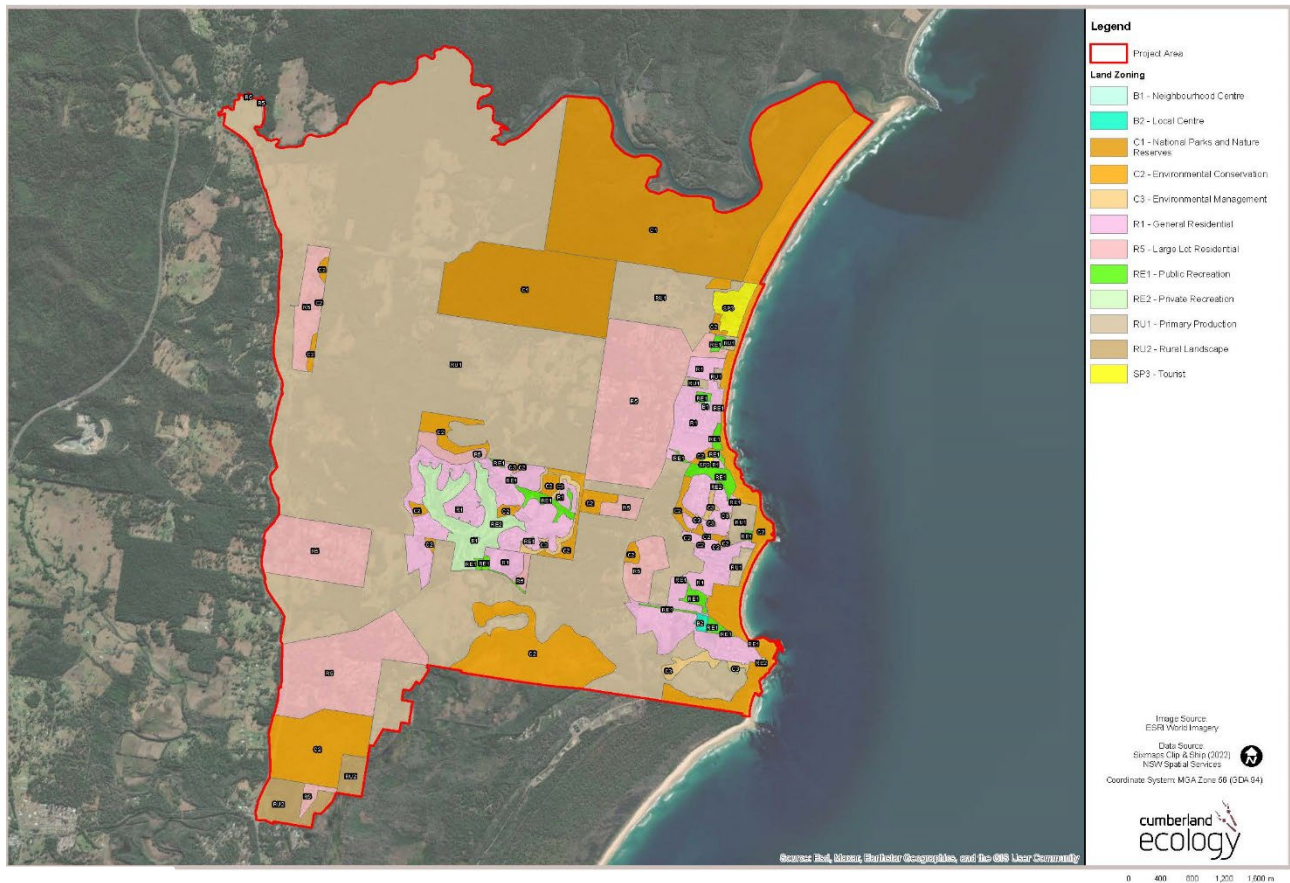


Figure 3. Land zoning.

The Greater Taree Local Environmental Plan 2010 is to be replaced by a new MidCoast Local Environmental Plan in 2025.

2.1.7. Greater Taree Development Control Plan 2010

Development Control Plans (DCPs) establish design standards on developments. The *Greater Taree Development Control Plan 2010* (DCP) purpose is to:

- *Expand upon the aims, objectives and other provisions of the Greater Taree LEP;*
- *Provide detailed planning and design objectives and performance criteria to guide the built form, environmental and social amenity standards and requirements for development within Greater Taree City Council; and*
- *Provide area specific development controls within local area plans.*

The key aims of the DCP are to:

- *Achieve a high architectural standard of development that is sympathetic with the environment;*
- *Achieve a high level of environmental and social performance for all development;*
- *Provide a framework of considerations against which development proposals can be consistently measured.*

All future local development (unless exempt or complying development) within the project area is assessed in accordance with the aims and objectives outlined in both the Greater Taree LEP 2010 and the Greater Taree DCP 2010. Part D of the DCP stipulates the environmental requirements to be accounted for, including:

- Coastline management;
- Environmental buffers;
- Earthworks, erosion and sedimentation; and
- Vegetation management.

The Greater Taree Development Control Plan 2010 facilitates the MidCoast Vegetation Management Policy (which is discussed in **Section 2.1.9** below).

2.1.8. State Environmental Planning Policy (Resilience and Hazards) 2021

State Environmental Planning Policy (Resilience and Hazards) 2021 (SEPP Resilience and Hazards) commenced on 1 March 2022 and consolidates and repeals the provisions of three separate SEPPs:

- SEPP (Coastal Management) 2018;
- SEPP 33 – Hazardous and Offensive Development; and
- SEPP 55 – Remediation of Land.

The new SEPP Resilience and Hazards retained many of the existing provision of these three SEPPs, with Chapter 2 identifying the provisions previously included within the SEPP (Coastal Management) 2018. Chapter 2 aligns with the objectives of the *Coastal Management Act 2016* (CM Act) and applies to land within the coastal zone that falls under one of the four coastal management areas:

- Coastal Environment Area;
- Coastal Use Area;
- Coastal Wetlands and Littoral Rainforests Area; and
- Coastal Vulnerability Area.

Each Coastal Management Area has differentiated objectives under the CM Act, which respond to their social and environmental values and key threats. The objectives for each management area are to be achieved using both strategic and site-specific approaches.

The development controls applicable to the coastal management areas are identified in Part 2.2 of the SEPP, and generally identify that development may only occur in these areas subject to development consent where the consent authority is satisfied that sufficient measures have been, or will be, taken to protect, and where possible enhance, the biophysical, hydrological, coastal processes, cultural and built environment heritage, and ecological integrity of the area.

The locality includes areas of land that fall within several of these coastal management areas; with the applicable mapping shown in **Figure 4**.



Figure 4. Areas mapped under the SEPP (Biodiversity and Conservation) 2021 and SEPP (Resilience and Hazards) 2021.

2.1.8.1. Coastal Environment Area

The Coastal Environment Area applies to Khappinghat Creek and its buffer area, the entirety of the project area coastline, and area around Blackhead Reserve, as shown in **Figure 4**.

The management objectives for the Coastal Environment Area are:

- *To protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes, and coastal lagoons; and enhance natural character, scenic value, biological diversity, and ecosystem integrity;*

- *To reduce threats to, and improve the resilience of, coastal waters, estuaries, coastal lakes, and coastal lagoons, including in response to climate change;*
- *To maintain and improve water quality and estuary health;*
- *To support the social and cultural values of coastal waters, estuaries, coastal lakes, and coastal lagoons;*
- *To maintain the presence of beaches, dunes, and the natural features of foreshores, taking into account the beach system;*
- *To maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands, and rock platforms.*

2.1.8.2. Coastal Use Area

The Coastal Use Area applies to Khappinghat Creek and its buffer area, the entirety of the project area coastline, and area around Blackhead Reserve, as shown in **Figure 4**.

The management objectives for the Coastal Use Area are:

- *To protect and enhance the scenic, social and cultural values of the coast by ensuring that:*
 - *the type, bulk, scale, and size of development is appropriate for the location and natural scenic quality of the coast;*
 - *adverse impacts on cultural and built environment heritage are avoided or mitigated;*
 - *urban design, including water sensitive urban design, is supported, and incorporated into development activities;*
 - *adequate public open space is provided, including for recreational activities and associated infrastructure; and*
 - *the use of the surf zone is considered.*
- *To accommodate both urbanised and natural stretches of coastline.*

2.1.8.3. Coastal Wetlands and Littoral Rainforest Area

The Coastal Wetlands and Coastal Wetlands Proximity Area occurs around Khappinghat Creek in the north of the project area and around Darawank Nature Reserve in the south, as shown in **Figure 4**.

The Littoral Rainforest and Littoral Rainforest Proximity Area occurs along the coastline in the south-eastern portion of the project area, from approximately Diamond Beach in the north right through to the southern boundary of the project area south of Blackhead Beach, as shown in **Figure 4**.

The management objectives for the Coastal Wetlands and Littoral Rainforests Area are:

- *To protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity;*

- *To promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests;*
- *To improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration;*
- *To support the social and cultural values of coastal wetlands and littoral rainforest; and*
- *To promote the objectives of State policies and programs for wetlands or littoral rainforest management.*

2.1.8.4. Coastal Vulnerability Area

Although provisions for the Coastal Vulnerability Area are set out in Division 2 of the SEPP (Resilience and Hazards), it is noted that no Coastal Vulnerability Area Map was adopted as part of that SEPP and therefore this category does not currently apply to any land.

2.1.9. State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

The SEPP (Vegetation in Non-Rural Areas) 2017 facilitates the MidCoast Vegetation Management Policy through the Greater Taree DCP 2010. Part D4 of the Greater Taree DCP facilitates the implementation of the MidCoast Vegetation Management Policy, to achieve the aims of the SEPP.

The SEPP policy aims are:

- *To protect the biodiversity values of trees and other vegetation in non-rural areas of the State; and*
- *To preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation.*

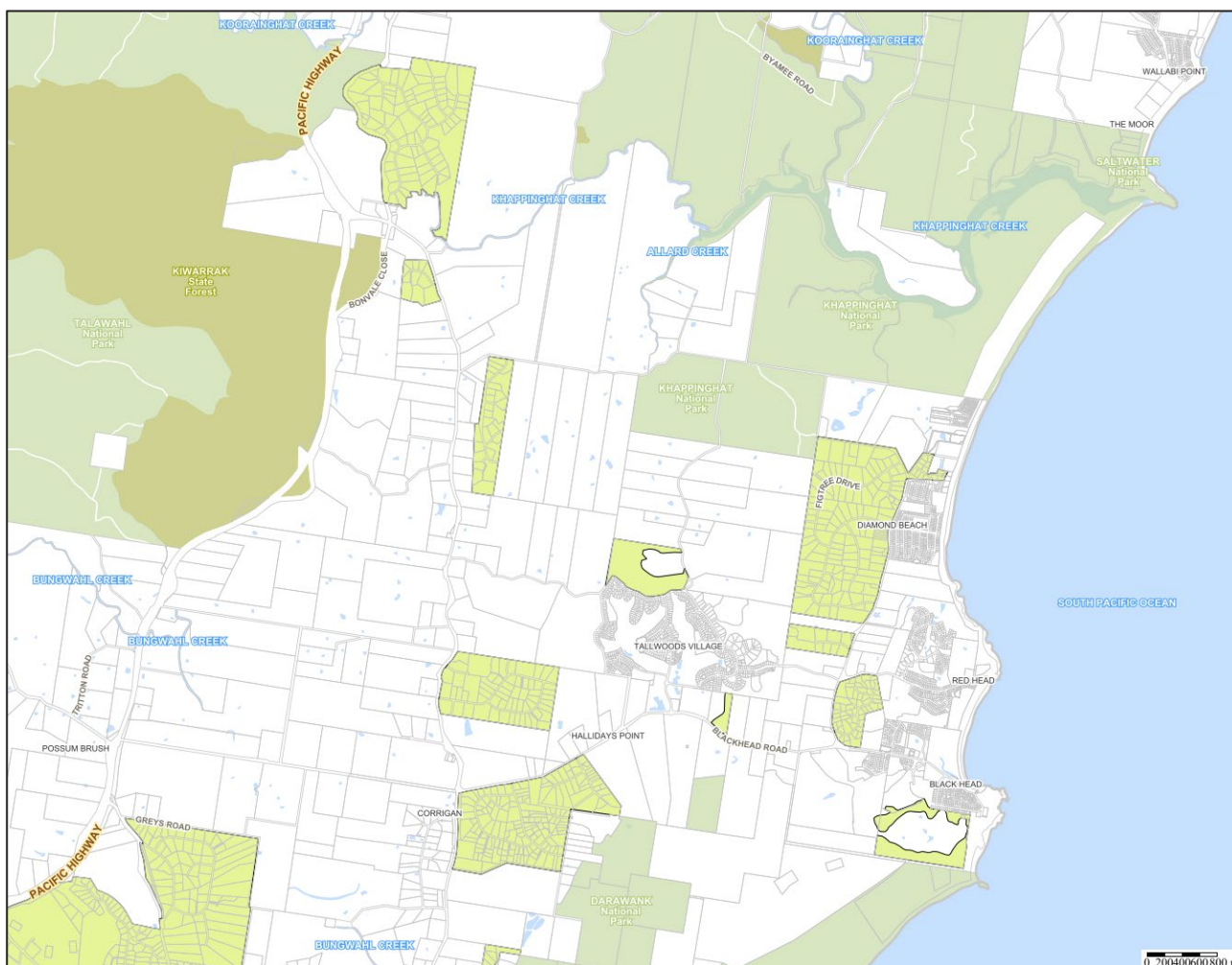
The Vegetation Management Policy provides a trigger for assessment of tree and vegetation removal applications.

The removal of trees is regulated via the Vegetation Management Policy across several areas within Hallidays Point. A plan of the location of Vegetation Management Policy areas is provided below in **Plate 1**, and it includes:

- C3 zoned land south of Black Head village;
- Rural residential land in Homestead estate (including Pacific View Drive and Woodlands Drive and adjoining roads);
- Rural residential land in Federation Drive and associated roads;
- Rural residential estate in Idlewoods Drive;
- C3 zoned land that is part of Lot 4 DP242332 Blackhead Road;
- Rural residential land in Headland Drive and adjoining roads;
- Rural residential land in Belgraiv Close;
- Land on Lot 131 DP753146 Tallwood Drive;

- Rural residential land in Panorama Drive, Figtree Drive, Vincent Close, The Dell, Majestic Place and parts of Diamond Beach Road, Old Soldiers Road, Edgewater Drive and Dune Springs Close; and
- Rural residential land in Treeview Drive and adjoining roads.

Plate 1 Areas covered by the MidCoast Council Vegetation Management Policy (light-green shading)



2.1.10. Water Management Act 2000

Under the *Water Management Act 2000* (WM Act), waterfront land includes the bed and bank of any river, lake or estuary.

The Natural Resources Access Regulator (NRAR) administers the WM Act and is required to assess the impact of any proposed development or activity to ensure that no more than minimal harm will be done to waterfront land. A controlled activity approval is required to authorise the carrying out of a proposed development or activity on waterfront land.

The WM Act also includes objects and principles aimed specifically at protecting and restoring ground water-dependent ecosystems and riparian zones of watercourses. There are many areas of waterfront land, including

mapped watercourses and estuary foreshores, across the project area. These are discussed further in **Chapter 8**.

The document “*Controlled activities – guidelines for riparian corridors on waterfront land*” establishes the widths of required vegetated riparian zones. These widths vary according to the Strahler stream order of watercourses. Vegetated riparian zones are measured from the top of the highest bank on both sides of the watercourse and comprise the following:

- 1st order stream: 10 metres vegetated riparian zone (total riparian corridor 20-metres plus channel width);
- 2nd order stream: 20 metres vegetated riparian zone (total riparian corridor 40-metres plus channel width);
- 3rd order stream: 30 metres vegetated riparian zone (total riparian corridor 60-metres plus channel width); and
- 4th order stream: 40 metres vegetated riparian zone (total riparian corridor 80-metres plus channel width).

The overarching objective of the controlled activities provisions of the WM Act is to establish and preserve the integrity of riparian corridors. Ideally, the environmental functions of riparian corridors should be maintained or rehabilitated in developments and activities by applying the following principles:

- *Identify whether there is a watercourse present and determine its order in accordance with the Strahler System;*
- *Define the riparian corridor / vegetated riparian zone on a map in accordance with the guidelines if a watercourse is present;*
- *Maintain or rehabilitate a riparian corridor / vegetated riparian zone with fully structured native vegetation;*
- *Minimise disturbance and harm to the riparian corridor / vegetated riparian zone;*
- *Minimise the number of creek crossings and provide perimeter road separating development from the riparian corridor / vegetated riparian zone;*
- *Locate services and infrastructure outside of the riparian corridor / vegetated riparian zone; and*
- *Treat stormwater run-off before discharging into the riparian corridor / vegetated riparian zone.*

A range of defined works and activities on waterfront land and in riparian corridors is permitted so long as they cause minimal harm.

2.1.11. Fisheries Management Act 1994

Threatened species legislation in NSW currently consists of the *Fisheries Management Act 1994* (FM Act), and the BC Act. The FM Act protects threatened fish species and marine vegetation and identifies threatening processes. It is administered by the Department of Primary Industries – Fisheries (DPI - Fisheries).

The FM Act has the objective to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. This Act includes measures to conserve fish stocks and key fish habitats, to

conserve threatened species, populations and ecological communities of fish and marine vegetation, and to promote ecologically sustainable development, including the conservation of biological diversity.

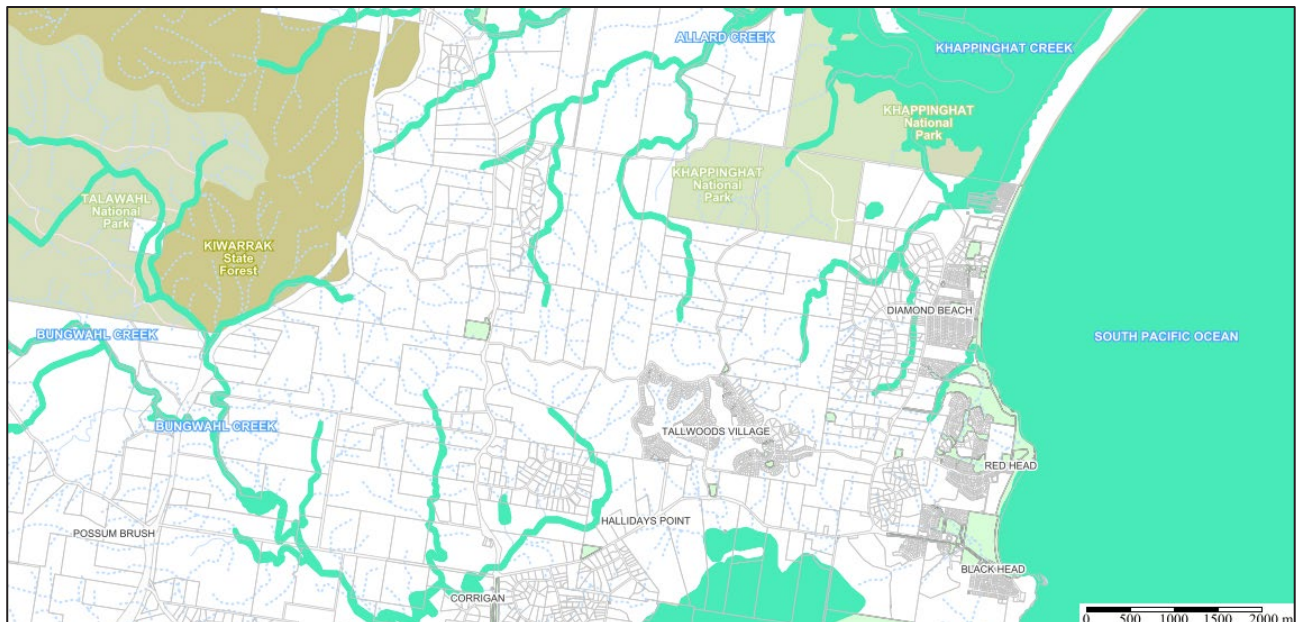
The FM Act incorporates integrated development provisions of the EP&A Act 1979, in which DPI is an approval body for development and activities that requires a permit under the FM Act, and which includes:

- An aquaculture permit (cultivating fish or marine vegetation for commercial purposes);
- A permit to carry out dredging or reclamation activities;
- A permit to harm marine vegetation; or
- A permit to obstruct the free passage of fish.

One of the objectives of the FM Act is to '*conserve key fish habitats*'. To help achieve this objective, DPI Fisheries has identified 'Key Fish Habitats', which are considered as those aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally, and the survival and recovery of threatened aquatic species. Key Fish Habitat is defined to include all marine and estuarine habitats up to the highest astronomical tide level (that reached by 'king' tides) and most permanent and semipermanent freshwater habitats including rivers, creeks, lakes, lagoons, billabongs, weir pools and impoundments up to the top of the bank.

There are mapped areas of key fish habitat within the project area. This is shown on **Plate 2** below:

Plate 2 Areas mapped as Key Fish Habitat under the Fisheries Management Act 1994 (green shading)



Mapped key fish habitats are protected under the *Policy and Guidelines for Fish Habitat Conservation and Management* (2013), which outlines policies and guidelines aimed at maintaining and enhancing fish habitat

for the benefit of native fish species, including threatened species, in marine, estuarine and freshwater environments.

The policy and guidelines assist developers, government and non-government organisations to ensure compliance with legislation, policies and guidelines as they relate to fish habitat conservation and management. It can be used to inform land use and natural resource management planning, development planning and assessment processes. It is also a valuable tool to improve awareness and understanding of the importance of fish habitats and how impacts can be mitigated, managed or offset. DPI take the policy and guidelines into account when assessing and either approving or refusing proposals for developments or other activities affecting fish habitats.

2.1.12. Biosecurity Act 2015

Under the *Biosecurity Act 2015*, weeds, pathogens and diseases and feral pest animals are required to be controlled by all persons under a “*General Biosecurity Duty*”. The General Biosecurity Duty means that all public and private land owners or managers and all other people who deal with biosecurity matters must use the most appropriate approach to prevent, eliminate, or minimise the negative impact (biosecurity risk) of weeds and pests (DPI 2017). The power for enforcement of penalties relating to state priority weeds compliance is with Local Control Authorities (i.e. Local Governments) and those relating to prohibited matters (state priority pests – American corn snakes, etc) is with the Department of Primary Industries. Recently, a State priority weed outbreak was detected near the Hallidays Point project area, relating to Plume Poppy (*Bocconia frutescens*). This outbreak is being controlled.

2.2. Policies and Documents

2.2.1. Greater Taree City Council Draft Comprehensive Koala Plan of Management

The Greater Taree City Council Draft Comprehensive Koala Plan of Management (GTCC CKPoM) was prepared for the former Greater Taree LGA in accordance with the (now repealed) *State Environmental Planning Policy No. 44 - Koala Habitat Protection* (SEPP 44). The GTCC CKPoM sought to conserve Koalas by identifying and protecting existing habitat and incorporating Koala conservation into local government planning processes.

The principal objectives were to:

- *Evaluate and rank Koala habitat throughout the Greater Taree LGA;*
- *Identify priority conservation areas and strategies to protect Koala habitat;*
- *Identify the principal threats that adversely impact on Koalas and Koala habitat within the Greater Taree LGA;*
- *Provide for the long-term survival of Koala populations within the Greater Taree LGA by devising conservation strategies to effectively address threats impacting on Koalas and Koala habitat;*
- *Provide for the restoration of degraded Koala habitat areas;*
- *Promote a balanced approach to Koala conservation and development;*

- *Ensure that adequate detail is provided with Development Applications and Rezoning Proposals in order to assess, minimise and effectively ameliorate likely impacts on Koala habitat;*
- *Provide guidelines and development standards to protect Koala habitat;*
- *Provide for effective public awareness and education programs concerning Koala conservation issues;*
- *Identify potential funding sources for implementation of the GTCC CKPoM;*
- *Facilitate targeted Koala conservation and management-oriented research projects within the Greater Taree LGA; and*
- *Provide for the effective implementation and monitoring of the GTCC CKPoM.*

The GTCC CKPoM identified areas as Primary Koala Habitat, Secondary A Koala Habitat, Secondary B Koala Habitat, Secondary C Koala Habitat and Tertiary Koala Habitat (Habitat Buffers and Habitat Linking Areas) and sought to provide guidance for assessing koala habitat and potential development considerations; as discussed further in **Chapter 4**. While Council at the time resolved not to adopt the GTCC CKPoM following exhibition, the information it contains remains useful.

2.2.2. MidCoast Community Strategic Plan: MidCoast 2030 – Shared Vision, Shared Responsibility

The MidCoast Community Strategic Plan 'MidCoast 2030 – Shared Vision, Shared Responsibility' is a document produced by MidCoast Council that reflects the community's vision for the MidCoast region and identifies the long-term objectives and strategies to achieve that vision. The plan was adopted by MidCoast Council in 2018 following extensive community consultation. Key elements of the plan include:

- Overarching vision for the region developed with the community; and
- Definition of core values, objectives and strategies to achieve community goals.

2.2.3. Hunter Regional Plan 2041

The Hunter Regional Plan 2041 was prepared to guide the NSW Government's land use planning priorities and decisions over the next 20 years, by providing an overarching framework for land use plans, development proposals and infrastructure funding decisions. Priorities for each council area are set out in the Local Government Narratives.

There are nine main objectives identified within the plan and each include several directions. Of relevance to biodiversity conservation is Objective 6 – *Conserve heritage, landscapes, environmentally sensitive areas, waterways and drinking water catchments.*

As part of this objective, any Planning Proposals or local strategic planning statements must demonstrate the following using the 'avoid, minimise, offset hierarchy':

1. *Areas of high environmental value are protected to contribute to a sustainable region;*
2. *The biodiversity network is sustainably managed and provide social, environmental, health, cultural and economic benefits;*
3. *Development outcomes maintain or improve the environmental value or viability of the biodiversity network;*
4. *Connection with Country is at the core of designing and planning new projects and places;*
5. *Aboriginal cultural heritage is recognised and celebrated as living and dynamic and not dealt with statically through harm prevention and protection alone;*
6. *Items, areas, objects and places of heritage significance are conserved;*
7. *Water management uses innovative approaches in urban, rural and natural areas to enhance and protect the health of waterways, wetlands, coast and bays; and*
8. *Water quality in drinking water catchments is protected.*

2.2.4. NSW Groundwater Dependent Ecosystem Policy

The State Groundwater Dependent Ecosystems (GDEs) policy is specifically designed to protect ecosystems which rely on groundwater for survival so that, wherever possible, the ecological processes and biodiversity of the GDEs are maintained or restored. Some GDEs such as *Melaleuca* dominated wetlands, saltmarsh and mangroves occur within the locality.

2.3. Summary of the Implications of Biodiversity Legislation

Within NSW, a suite of legislation provides for the consideration and management of biodiversity.

This chapter provides an overview of relevant legislation and how it relates to biodiversity within the Hallidays Point locality.

In **Table 1** below, a summary is provided of the key implications of legislation and policies as it relates to biodiversity conservation in the Hallidays Point project area.

Table 1 Summary of key implications of biodiversity legislation relating to Hallidays Point

Key Implications of Biodiversity Legislation
Environment Protection and Biodiversity Conservation Act 1999 • <i>Developments or activities in the Hallidays Point project area that may have a negative impact on nationally listed threatened ecological communities, threatened species, or their habitats, need to identify the type, nature and significance of these impacts.</i> • <i>Developments or activities must not cause a significant impact on nationally listed threatened ecological communities or species without the (controlled activity) approval of the Commonwealth Environment Minister.</i>

Key Implications of Biodiversity Legislation

Environmental Planning and Assessment Act 1979

- *Developments, activities and planning proposals need to consider the impacts on threatened ecological communities and threatened species, native plants and animals and the natural environment.*

Biodiversity Conservation Act 2016

- *Developments and activities need to be assessed in accordance with the Biodiversity Assessment Method and need to demonstrate adherence to the avoid – mitigate – offset hierarchy.*
- *Developments that are proposed within areas of mapped biodiversity value or which exceed the biodiversity offset scheme area threshold need to be assessed by an accredited assessor via a Biodiversity Development Assessment Report.*
- *Developments that require offsets can secure them through the retirement of credits at a biodiversity stewardship site or by payment into the NSW biodiversity credit fund.*
- *Landholders can establish biodiversity stewardship or conservation agreements on their land, which permanently conserve the land and provide funding mechanisms for long-term conservation management.*

Local Land Services Act 2013

- *Native vegetation on rural land is protected. Clearing of native vegetation on rural land may be undertaken for routine agricultural purposes if that clearing is a form of allowable activity or if an approval is provided by the Native Vegetation Panel.*
- *Private native forestry is regulated. Approval is required by Hunter Local Land Services for private native forestry activities. Logging activities must be in accordance with the approved plan, the applying PNF Code and a forest management plan.*

National Parks and Wildlife Act 1974

- *The conservation and management of National Parks and Nature Reserves is regulated by this Act. The Act provides for the preparation of reserve plans of management.*
- *This Act regulates the management framework for Khappinghat National Park and Darawank National Park.*

Greater Taree Local Environmental Plan 2010

- *The LEP guides development and how land can be used through the framework of land zoning, land use tables and zone objectives. The land zoning in the LEP should reflect a current or desired character and use of land. Areas of environmental or biodiversity importance should be reflected in the zoning scheme as C - Conservation lands.*
- *The LEP establishes developments and activities that are permitted without consent, permitted only with consent or prohibited in each land zone.*
- *Amendments to the LEP via gazetted rezonings should guide orderly, strategic development and conservation outcomes.*

Greater Taree Development Control Plan 2010

- *The DCP establishes design standards on developments, including environmental considerations.*

SEPP (Resilience and Hazards) 2021

- *This SEPP maps, regulates development within, and guides the protection of areas of Coastal Wetlands and land in proximity to Coastal Wetlands.*
- *This SEPP maps, regulates development within, and guides the protection of areas of Littoral Rainforests and land in proximity to Littoral Rainforests.*
- *This SEPP maps, regulates development within and guides the management of areas of the Coastal Environment.*
- *Mapped Coastal Wetlands and Littoral Rainforests are highly constrained to development or clearing through the controls within this SEPP.*

SEPP (Vegetation in Non-Rural Areas) 2017

- *The Vegetation Management Policy applies to certain mapped areas within the Hallidays Point project area. Trees and other native vegetation can only be removed from these mapped areas with approval from Council or via the application of exemptions or permitted activities set out within the Vegetation Management Policy.*

Key Implications of Biodiversity Legislation

Water Management Act 2000

- Provides for the protection, management and restoration of watercourses and riparian areas within developments and activities.

Fisheries Management Act 1994

- Developments and activities need to evaluate and assess the type, nature and significance of the impact on threatened fish species, protected habitats (such as mangroves) and mapped key fish habitats.
- This Act provides an integrated development approval process for developments and activities such as dredging and reclamation, obstruction of fish passage and harm to marine vegetation.

Biosecurity Act 2015

- Establishes a general biosecurity duty on all landholders to control feral pests and weeds.
 - Provides powers of inspection, direction and enforcement of landowners with state priority weeds or prohibited matters.
-

3. Vegetation of Hallidays Point

3.1. Introduction

This chapter summarises the methodology used to map and describe native vegetation and provides a map of the locations of different native plant communities within the Hallidays Point project area. Here the plant communities are referred to as “*plant community types*” (“PCTs”). These are distinguishable types of vegetation that have been formally described and included in the NSW BioNet Vegetation Classification database.

Within the BioNet Vegetation Classification database, each PCT is assigned a number code, given a formal name based on the plant species that dominate it, and a description for that PCT is provided.

PCT descriptions include detailed lists of the plant species that occur in the community, descriptions of habitats and areas where the communities are found, and information about the conservation status of the PCT.

The Commonwealth and NSW each have a system of classification of plant communities that are threatened ecological communities (TECs). These are not the same as PCTs. PCTs are the simplest units of vegetation. A TEC is a larger entity that may consist of one or more PCTs. The Commonwealth and NSW TECs are typically similar, but not identical.

This chapter summarises the PCTs and TECs that occur across the locality.

3.2. Vegetation Surveys

3.2.1. Desktop Assessment

A contemporary, accurate vegetation community map for the project area is an important element of the Local Conservation Action Plan. The new mapping collated for this Strategy updates previously held mapping and data and informs an understanding of the biodiversity values of the project area. Pre-existing mapping of the vegetation community types by Eco Logical Australia (ELA 2020) and CRAFTI Lower North East Vegetation Map (2010) omitted some areas of native vegetation and were based on high level mapping classification schemes. More detailed, fine scale mapping of native vegetation types was needed for strategic planning and biodiversity conservation.

Vegetation community mapping was undertaken through a combination of revised aerial photograph interpretation and targeted field surveys. The existing vegetation mapping prepared by CRAFTI Lower North East Vegetation Map (2010) and Eco Logical Australia (ELA 2020) was overlaid on the best available aerial photographs from ESRI World Imagery and Sixmaps (2022) to refine line-work, define and attribute non-vegetation and artificial types and identify gaps and errors in the existing mapping.

Vegetation from different parts of the project area were sampled using flora plots. Flora plot locations were pre-determined based on the available desktop information and were positioned throughout the locality with consideration of accessibility and spatial representativeness.

3.2.2. Vegetation Mapping

Vegetation mapping surveys were conducted throughout the locality between 14 – 17 June 2022 and 20 – 24 June 2022 to ground-truth the vegetation community boundaries and to fill in existing gaps within the mapping to produce a complete vegetation map for the Hallidays Point project area. The boundaries of vegetation

communities at each survey location, within areas able to be accessed throughout the locality, or where vegetation community boundaries are visible from the roadside, were recorded with a Global Positioning System (GPS) unit to allow for the subsequent creation of accurate vegetation maps using Geographic Information Systems (GIS). Vegetation was classified using the MidCoast Council classification system provided in the document *Vegetation Community Types of the MidCoast Council Area ('MidCoast Council Vegetation Report')* and each community was identified for its closest fit to NSW PCTs.

Targeted searches were undertaken during the field surveys for threatened flora species, particularly those recorded from the database analysis and considered to have potential to occur. Any threatened flora species observed during the field surveys was recorded and the location plotted using a GPS.

The flora survey included the surveying of detailed floristic plots to compile lists of plant species present at each survey location, and random meander surveys were undertaken to collect additional species composition information where required. Field surveys utilised both full floristic plots as well as rapid assessment sites.

3.2.3. Plot-based Vegetation Survey

The vegetation survey was plot-based and used the Biodiversity Assessment Method (BAM) procedure. A plot-based vegetation survey was undertaken within the project area by Cumberland Ecology on the 24 June 2022 and between 2 – 5 August 2022.

A total of 25 flora plots were undertaken and the following data was collected within each of the plots:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 m x 20 m floristic plot;
- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 m x 20 m (or 10 m x 40 m) floristic plot; and
- Cover of 'High Threat Exotic' (as defined under BAM) weed species within a 20 m x 20 m (or 10 m x 40 m) floristic plot.

The location of plots sought to capture the environmental variation of the vegetation communities identified within the locality. The location of the flora plots is shown in **Figure 5**. Plot numbers are non-sequential due to a total of 33 survey sites being initially identified to be the subject flora and fauna surveys; however, site access was withdrawn on several sites, or they were determined to be unsuitable for surveys following an initial site inspection.



Figure 5. Flora plot locations

3.2.4. Random Meander Surveys

Random meander surveys were undertaken within the project area to detect additional flora species not recorded during plot-based sampling. If any threatened flora species were identified, the locations were recorded using a hand-held GPS. A flora list of all species recorded within the locality is provided in **Appendix A**.

3.3. Soil Information

The Australian Soil Classification and Great Soil Groups map covers the project area. It identifies that:

- Hydrosols and podsols generally occur in conjunction with the beach dunes and coastal parts to the north of Diamond Beach;
- Behind the hydrosols in the north there are kurosols and yellow podzolic soils (less fertile), with some dermasols and humic gleys and acid peats mapped around the Khappinghat Creek;
- South of Diamond Beach, the coastal area comprises a mix of kurosols and brown podzolic soils, kurosols (natric) and acid peats, and a small area of hydrosols and siliceous sands; and
- Behind the coastal area to the south is a large patch of dermosols and yellow podzolic soils (more fertile) that covers Tallwoods and areas further west.

3.4. IBRA Regions and Subregions

The project area is within the NSW North Coast Region and the Karuah Manning IBRA Subregion under the Interim Biogeographic Regionalisation for Australia (IBRA).

The Karuah Manning IBRA Subregion is characterised by coastal barrier sands, estuarine plains and alluvial deposits. Much of the land within this IBRA Subregion has been previously cleared to support agriculture and residential development; however, there are persisting wetlands, coastal sand heaths, and woodlands (DECCW, 2009).

3.5. Mitchell Landscapes

The project area is dominated by the Port Macquarie Coastal Ramp Mitchell Landscape. An area around Khappinghat National Park and Khappinghat Creek in the north includes the Manning – Macleay Coastal Alluvial Plains Mitchell Landscape, and the coastal dunes north of Diamond Beach and south of Blackhead Beach are mapped as the Manning – Macleay Barriers and Beaches Mitchell Landscape (OEH, 2016).

3.6. Vegetation Communities

The vegetation surveys and analysis identified that a total of 35 vegetation communities occur within the project area. This includes 31 native vegetation communities and four non-native communities. The total area of the project area is 4,644 ha, of which 3,017 ha is native vegetation, representing 65% of the total project area. The remaining 35% of the project area comprises cleared and urban lands that includes cleared farming paddocks, residential land and infrastructure occupied zones.

A total of 25 PCTs held within the BioNet Vegetation Classification database were identified within the project area, of which 11 align with TECs listed under the BC Act or EPBC Act. **Table 2** provides a summary of the MidCoast Council vegetation communities identified within the locality, including their likely associated PCTs and TECs. Overall vegetation mapping of the locality is provided in **Figure 6**, with the maps broken down into six higher definition versions in **Figures 6a – Figure 6f**.

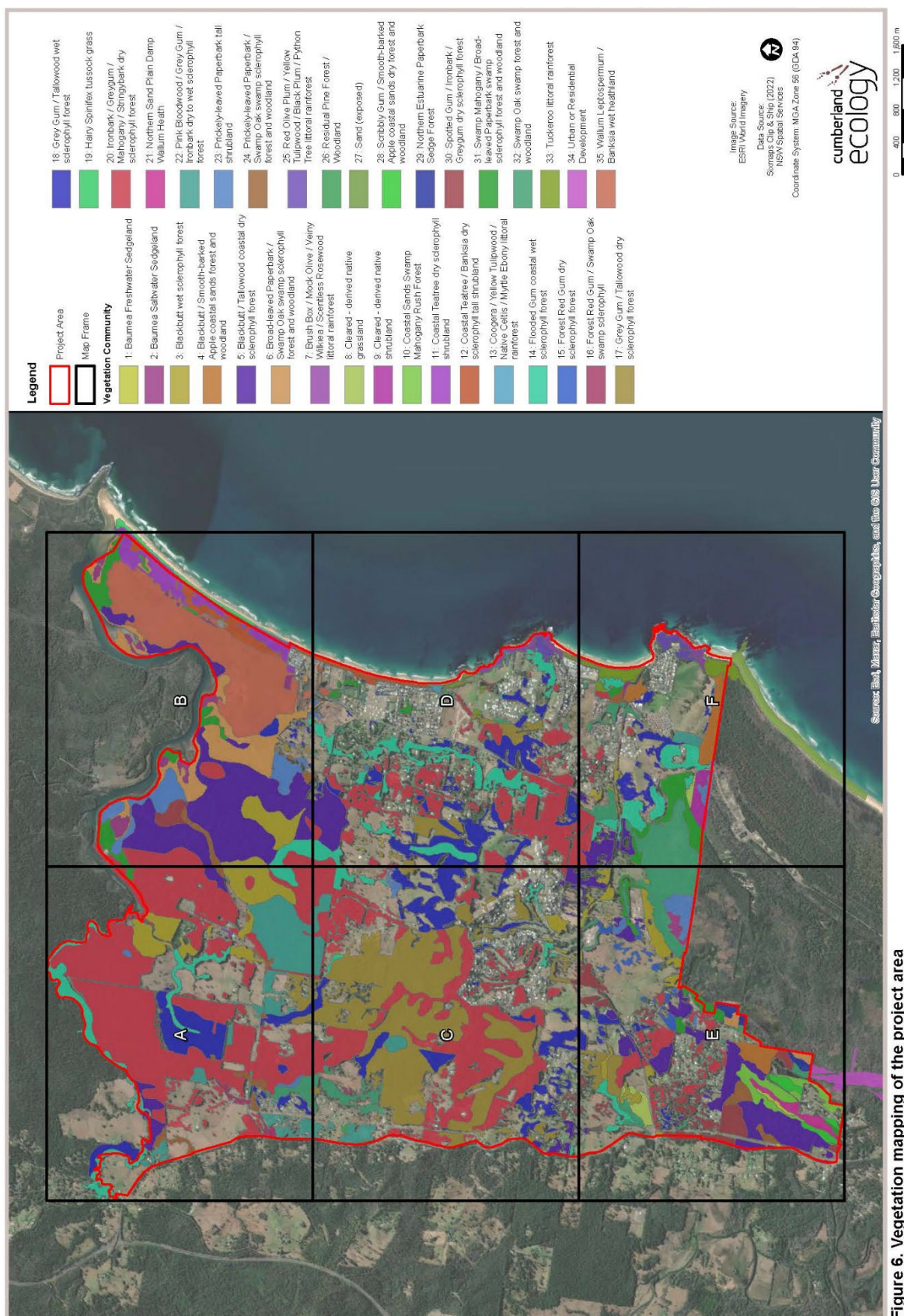


Figure 6. Vegetation mapping of the project area

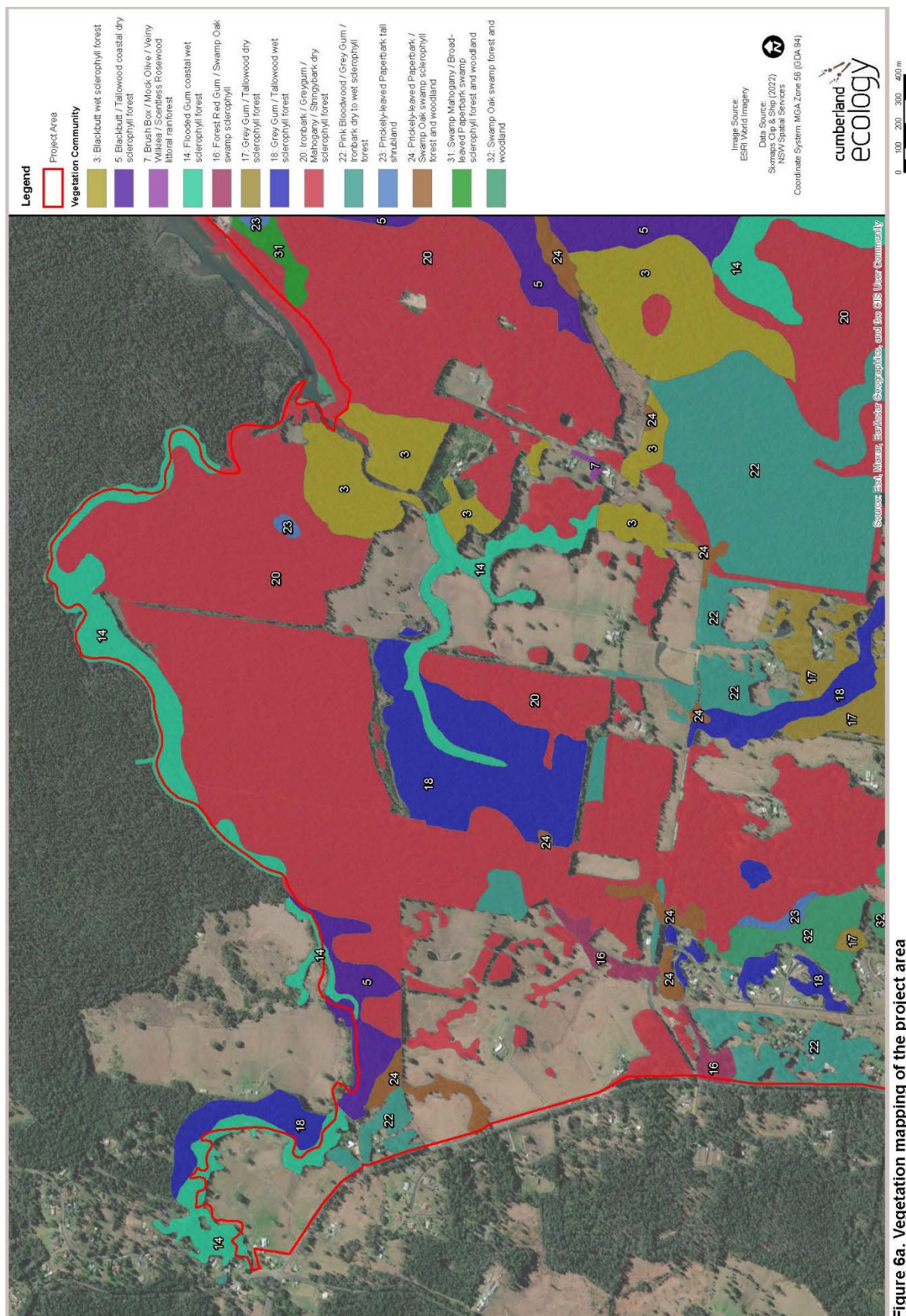


Figure 6a. Vegetation mapping of the project area

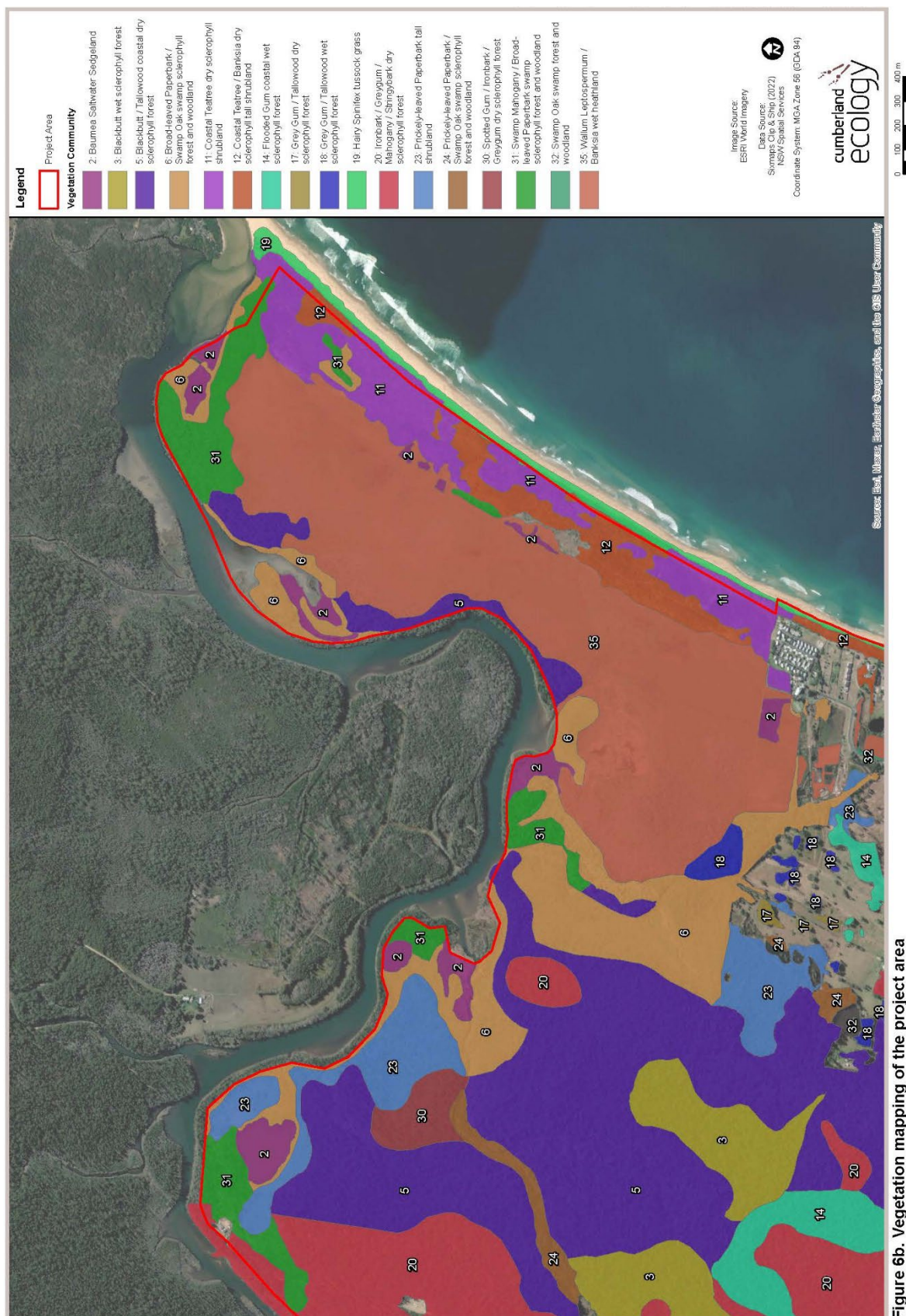


Figure 6b. Vegetation mapping of the project area

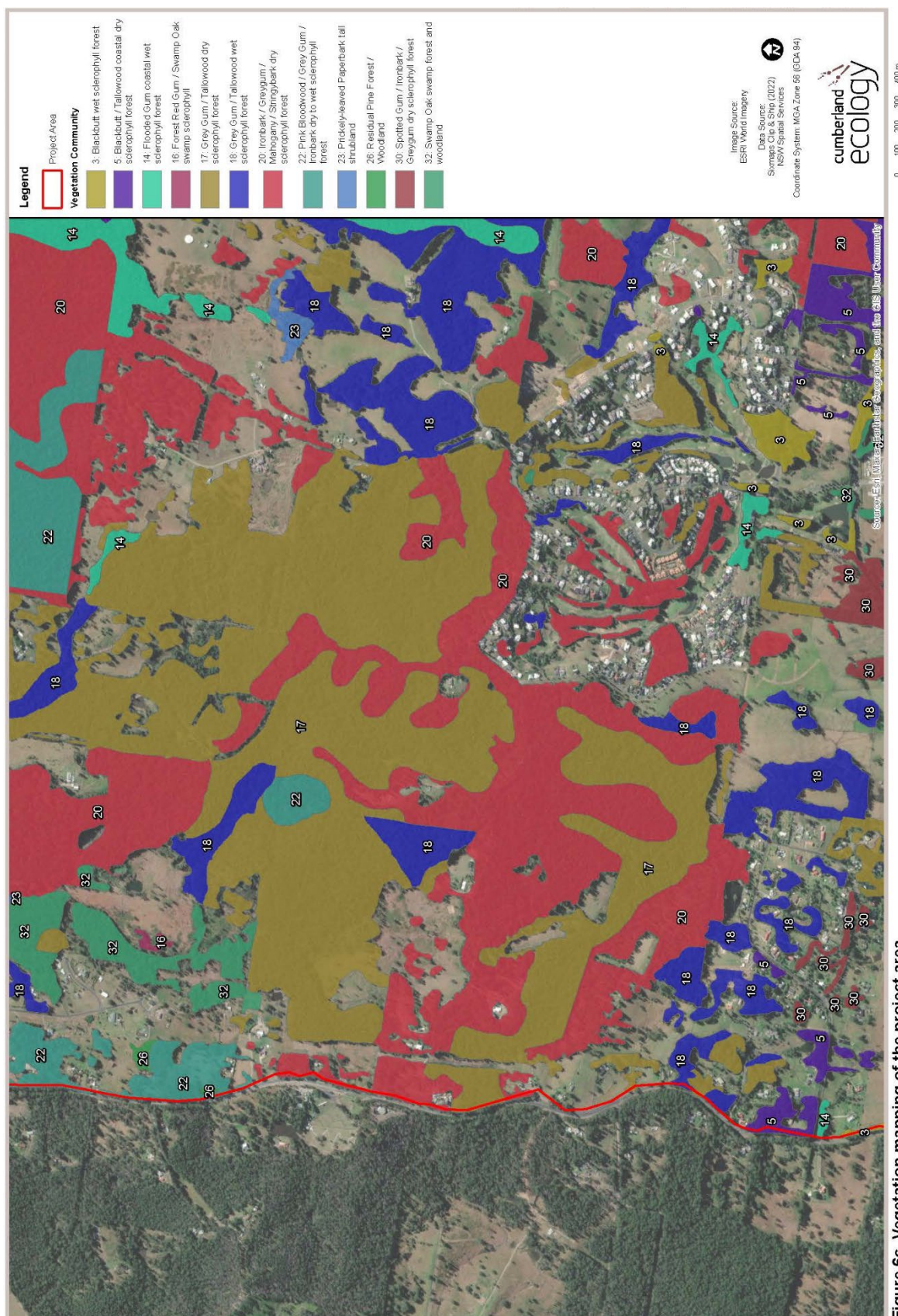


Figure 6c. Vegetation mapping of the project area



Figure 6d. Vegetation mapping of the project area

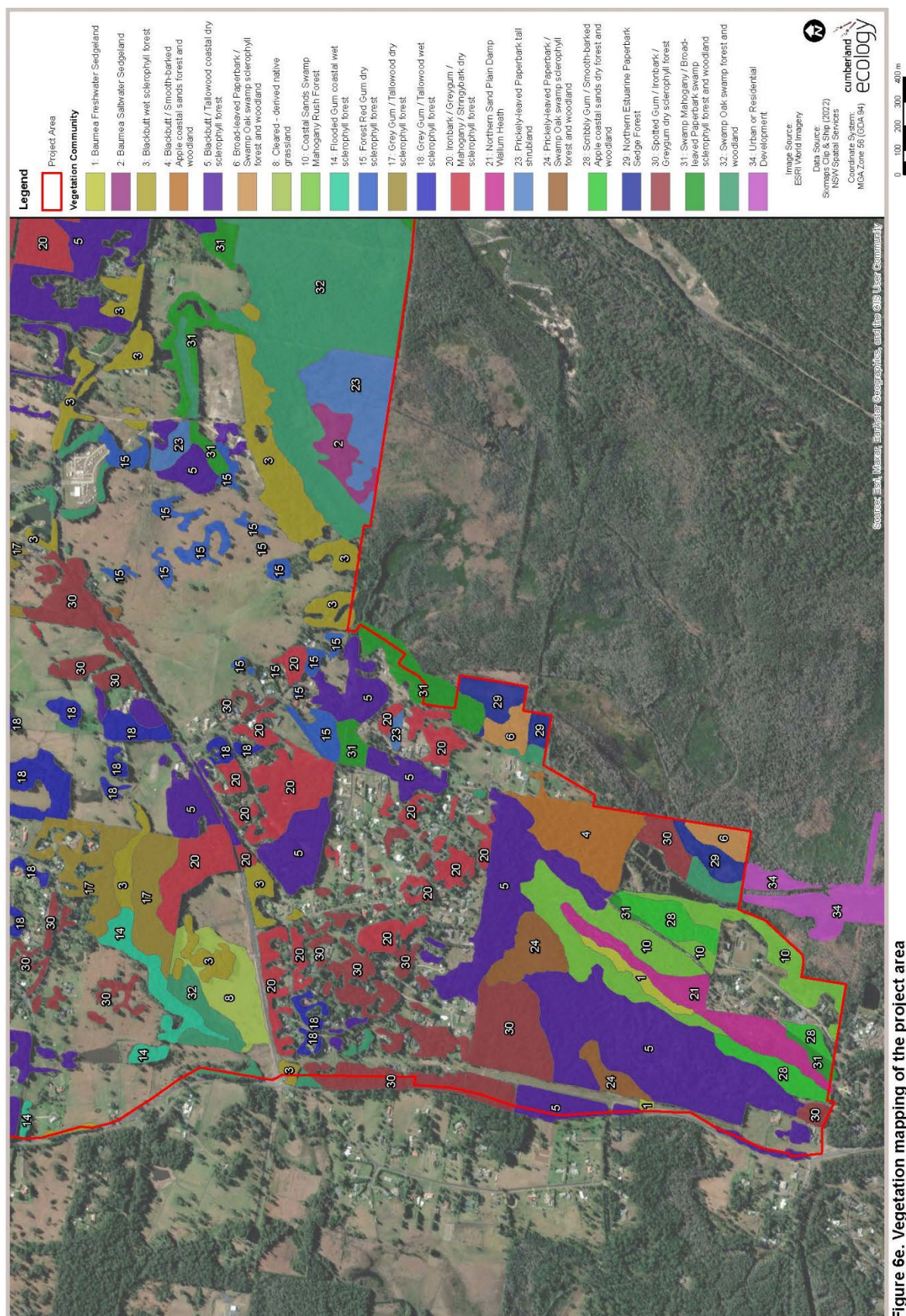


Figure 6e. Vegetation mapping of the project area



Figure 6f. Vegetation mapping of the project area

Table 2 Vegetation communities recorded within the project area

Vegetation Community	Area (ha)	PCT Number	PCT Name	BC Act Associated TECs	EPBC Act Associated TECs
1. Baumea Freshwater Sedgeland	2.27	3959	Coastal Sands <i>Baumea articulata</i> Sedgeland	EEC: Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	-
2. Baumea Saltwater Sedgeland	23.40	4103	<i>Sporobolus virginicus</i> Saltmarsh	EEC: Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	VEC: Subtropical and Temperate Coastal Saltmarsh
3. Blackbutt wet sclerophyll forest	126.89	3248	Northern Blackbutt-Turpentine Shrub Forest	-	-
4. Blackbutt/ Smooth-barked Apple coastal sands forest and woodland	31.70	3544	Coastal Sands Apple-Blackbutt Forest	-	-
5. Blackbutt/ Tallowwood coastal dry sclerophyll forest	322.71	3250	Northern Foothills Blackbutt Grassy Forest	-	-
6. Broad-leaved Paperbark/ Swamp Oak swamp sclerophyll forest and woodland	79.43	4004	Northern <i>Melaleuca quinquenervia</i> Swamp Forest	EEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	

Vegetation Community	Area (ha)	PCT Number	PCT Name	BC Act Associated TECs	EPBC Act Associated TECs
7. Brush Box / Mock Olive / Veiny Wilkiea / Scentless Rosewood littoral rainforest	11.48	3127	Mid North Headland Brush Box Littoral Rainforest	EEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CEEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
8. Cleared – derived native grassland	9.88	-	-	-	-
9. Cleared – derived native shrubland	10.09	4004	Northern <i>Melaleuca quinquenervia</i> Swamp Forest	EEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	
10. Coastal Sands Swamp Mahogany Rush Forest	22.87	3986	Coastal Sands Swamp Mahogany Rush Forest	EEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	
11. Coastal Teatree dry sclerophyll shrubland	37.74	3788	Coastal Foredune Wattle Scrub	-	-
12. Coastal Teatree/ Banksia dry sclerophyll tall shrubland	30.19	3788	Coastal Foredune Wattle Scrub	-	-

Vegetation Community	Area (ha)	PCT Number	PCT Name	BC Act Associated TECs	EPBC Act Associated TECs
13. Coogera / Yellow Tulipwood / Native Celtis / Myrtle Ebony littoral rainforest	2.59	4114	Lower North Sands Littoral Rainforest	EEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CEEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
14. Flooded Gum coastal wet sclerophyll forest	181.11	3174	Northern Turpentine-Brush Box Wet Forest	-	-
15. Forest Red Gum dry sclerophyll forest	13.17	3445	Lower North Coastal Hills Red Gum Grassy Forest	-	-
16. Forest Red Gum/ Swamp Oak swamp sclerophyll	6.00	4020	Coastal Creekflat Layered Grass-Sedge Swamp Forest	EEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	
17. Grey Gum/ Tallowwood dry sclerophyll forest	330.14	3252	Northern Hinterland Grey Gum-Mahogany Grassy Forest	-	-
18. Grey Gum/ Tallowwood wet sclerophyll forest	252.96	3160	Lower North Turpentine-Tallowwood-Grey Gum Forest	-	-
19. Hairy Spinifex tussock grass	13.06	3410	Spinifex Strandline Grassland	-	-
20. Ironbark/ Grey Gum/ Mahogany/ Stringybark dry sclerophyll forest	821.15	3249	Northern Bloodwood-Ironbark Moist Grassy Forest	-	-

Vegetation Community	Area (ha)	PCT Number	PCT Name	BC Act Associated TECs	EPBC Act Associated TECs
21. Northern Sand Plain Damp Wallum Heath	10.33	3803	Northern Sandplain Damp Wallum Heath	-	-
22. Pink Bloodwood/ Grey Gum/ Ironbark dry to wet sclerophyll forest	115.73	3249	Northern Bloodwood-Ironbark Moist Grassy Forest	-	-
23. Prickly-leaved Paperbark tall shrubland	61.05	3436	Hunter Coast Sandy Creekflat Low Paperbark Scrub	-	-
24. Prickly-leaved Paperbark/ Swamp Oak swamp sclerophyll forest and woodland	29.04	4048	Northern Swamp Oak-Paperbark Forest	EEC: Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC: Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community
25. Red Olive Plum / Yellow Tulipwood / Black Plum / Python Tree littoral rainforest	11.57	3131	Myall-Wallis Lakes Littoral Rainforest	EEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CEEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
26. Residual Pine Forest / Woodland	0.90	-	-	-	-
27. Sand (exposed)	25.63	-	-	-	-
28. Scribbly Gum/ Smooth-barked Apple coastal sands dry forest and woodland	9.26	3549	Lower North Sandplain Heathy Forest	-	-

Vegetation Community	Area (ha)	PCT Number	PCT Name	BC Act Associated TECs	EPBC Act Associated TECs
29. Northern Estuarine Paperbark Sedge Forest	7.34	4000	Northern Estuarine Paperbark Sedge Forest	EEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	
30. Spotted Gum/ Ironbark/ Grey Gum dry sclerophyll forest	57.78	3244	Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	-	-
31. Swamp Mahogany/ Broad-leaved Paperbark swamp sclerophyll forest and woodland	78.82	4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest	EEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	-
32. Swamp Oak swamp forest and woodland	129.25	4048	Northern Swamp Oak-Paperbark Forest	EEC: Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC: Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community

Vegetation Community	Area (ha)	PCT Number	PCT Name	BC Act Associated TECs	EPBC Act Associated TECs
33. Tuckeroo littoral rainforest	22.54	3132	Northern Sands Tuckeroo-Banksia Forest	EEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CEEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
34. Urban or Residential Development	24.19	-	-	-	-
35. Wallum Leptospermum/ Banksia wet heathland	165.59	3803 / 3913	Northern Sandplain Damp Wallum Heath / Northern Sandplain Heath	-	-
Total	3,077.85				

Key: VEC= Vulnerable Ecological Community, EEC= Endangered Ecological Community, CEEC= Critically Endangered Ecological Community

3.6.1. Vegetation Community Descriptions

A brief description of each vegetation community occurring within the project area is provided below. Not all vegetation communities within the project area were able to be subject to detailed plot-based floristic survey or have full flora species lists prepared. The below descriptions are based on the information able to be recorded during random meander and vegetation mapping surveys, combined with information garnered from the MidCoast Council Vegetation Report and the PCT data held within the BioNet Vegetation Classification database.

i. Baumea Freshwater Sedgeland

Vegetation Formation: Freshwater Wetlands

Vegetation Class: Coastal Freshwater Lagoons

Associated PCT: 3959 - Coastal Sands *Baumea articulata* Sedgeland

BC Act TEC: Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

EPBC Act TEC: None

Baumea Freshwater Sedgeland occupies approximately 2.27 ha within the project area and occurs as an isolated patch to the east of The Lakes Way near Darawank Nature Reserve. The vegetation community generally occurs as a mid-high tall closed sedgeland on level, swampy land with standing fresh water.

Within this vegetation community and PCT the dominant species is *Baumea articulata* (Jointed Twig-rush), with occurrences of additional species such as *Eleocharis sphacelata* (Tall Spike Rush), *Baumea teretifolia*, *Baloskion tetraphyllum*, and *Triglochin procera* (Water Ribbons). Emergent *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Callistemon pachyphyllus* (Wallum Bottlebrush) may also be present.

This PCT is associated with the Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions TEC.

ii. Baumea Saltwater Sedgeland

Vegetation Formation: Saline Wetlands

Vegetation Class: Saltmarshes

Associated PCT: 4103 - *Sporobolus virginicus* Saltmarsh

BC Act TEC: Coastal saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner bioregions

EPBC Act TEC: Subtropical and Temperate Coastal Saltmarsh

Baumea Saltwater Sedgeland occupies approximately 23.40 ha within the project area and occurs behind the coastal dunes to the north along Diamond Beach leading up to Saltwater Beach. The vegetation community generally occurs as a mid-high tall closed sedgeland on supratidal flats associated with estuaries.

Within this vegetation community and PCT the dominant species are *Sporobolus virginicus* and *Baumea juncea*, with occurrences of additional species such as *Juncus kraussii subsp. australiensis* (Sea Rush) and *Juncus usitatus*. Emergent *Melaleuca ericifolia* (Swamp Paperbark) and *Melaleuca linariifolia* (Flax-leaved Paperbark) may also be present.

iii. Blackbutt Wet Sclerophyll Forest

Vegetation Formation: Wet Sclerophyll Forests (grassy sub-formation)

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests

Associated PCT: 3248 - Northern Blackbutt-Turpentine Shrub Forest

BC Act TEC: None

EPBC Act TEC: None

Blackbutt wet sclerophyll forest occupies approximately 126.89 ha within the project area in patches in the north within and around Khappinghat National Park and in scattered patches in the south along Blackhead Road. The vegetation community generally occurs as a very tall open to closed forest on south-west facing hillslopes and in gullies.

Within this vegetation community and PCT the dominant canopy species is *Eucalyptus pilularis* (Blackbutt), with the sub-dominants *Eucalyptus microcorys* (Tallowwood), *Lophostemon confertus* (Brush Box), *Allocasuarina torulosa* (Forest Oak) and *Syncarpia glomulifera* (Turpentine). The dominant shrub species include *Breynia oblongifolia* (Coffee Bush). The ground layer comprises predominantly *Imperata cylindrica*, *Lomandra longifolia* (Spiny-headed Mat-rush) and *Entolasia stricta* (Wiry Panic), with frequent *Dianella caerulea* (Blue Flax-lily), *Calochlaena dubia* (Rainbow Fern), and *Hibbertia scandens* (Climbing Guinea Flower). Vines include *Cissus hypoglauca* (Giant Water Vine) and *Smilax australis* (Lawyer Vine).

iv. Blackbutt / Smooth-barked Apple Coastal Sands Forest and Woodland

Vegetation Formation: Dry Sclerophyll Forests (shrubby sub-formation)

Vegetation Class: Coastal Dune Dry Sclerophyll Forests

Associated PCT: 3544 – Coastal Sands Apple-Blackbutt Forest

BC Act TEC: None

EPBC Act TEC: None

Blackbutt / Smooth-barked Apple coastal sands forest and woodland occupies approximately 31.70 ha within the project area and in the southeast behind the coastal littoral rainforest at Back Beach. The vegetation community generally occurs as a mid-high to tall open to closed forest on coastal sand plains.

Within this vegetation community and PCT the dominant canopy species is *Angophora costata* (Smooth-barked Apple), *Eucalyptus pilularis* (Blackbutt), *Banksia serrata* (Old-man Banksia) and *Corymbia gummifera* (Red Bloodwood). The dominant shrub species include *Monotoca elliptica* (Tree Broom-heath), *Acacia ulicifolia*

(Prickly Moses), *Acacia suaveolens* (Sweet Wattle) and *Hibbertia linearis*. The ground layer comprises predominantly *Imperata cylindrica*, *Lomandra longifolia* (Spiny-headed Mat-rush) and *Themeda triandra*, with frequent *Dianella caerulea* (Blue Flax-lily) and *Pomax umbellata*. Other ground layer type species include *Hardenbergia violacea* (False Sarsaparilla), *Billardiera scandens* (Hairy Apple Berry), and the vine *Pandorea pandorana* (Wonga Wonga Vine).

v. Blackbutt / Tallowwood Coastal Dry Sclerophyll Forest

Vegetation Formation: Wet Sclerophyll Forests (grassy sub-formation)

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests

Associated PCT: 3250 - Northern Foothills Blackbutt Grassy Forest

BC Act TEC: None

EPBC Act TEC: None

Blackbutt / Tallowwood coastal dry sclerophyll forest occupies approximately 322.71 ha within the project area, appearing in large patches in the north within and around Khappinghat National Park and in scattered patches in the south along Blackhead Road and Darawank Nature Reserve. The vegetation community generally occurs as a tall to very tall open to closed forest on sheltered mid-slopes.

Within this vegetation community and PCT the dominant canopy species is *Eucalyptus pilularis* (Blackbutt) and *Eucalyptus microcorys* (Tallowwood), with subdominant species including *Corymbia maculata* (Spotted Gum), *Eucalyptus propinqua* (Small-fruited Grey Gum), *Corymbia intermedia* (Pink Bloodwood) and *Allocasuarina torulosa* (Forest Oak). The dominant shrub species include *Breynia oblongifolia* (Coffee Bush), *Polyscias sambucifolia*, *Hibbertia aspera* (Rough Guinea Flower), and *Dodonaea triquetra* (Large-leaf Hop-bush). The ground layer comprises predominantly *Imperata cylindrica*, *Lomandra longifolia* (Spiny-headed Mat-rush) and *Entolasia stricta* (Wiry Panic), with frequent *Dianella caerulea* (Blue Flax-lily), *Lobelia purpurascens* (Whiteroot) and the fern *Pteridium esculentum* (Bracken). Other ground layer type species include *Billardiera scandens* (Hairy Apple Berry), *Hibbertia scandens* (Climbing Guinea Flower), and *Glycine clandestina* (Twining Glycine).

vi. Broad-leaved Paperbark / Swamp Oak Swamp Sclerophyll Forest and Woodland

Vegetation Formation: Forested Wetlands

Vegetation Class: Coastal Swamp Forests

Associated PCT: 4004 - Northern *Melaleuca quinquenervia* Swamp Forest

BC Act TEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: None

Broad-leaved Paperbark / Swamp Oak swamp sclerophyll forest and woodland occupies approximately 79.43 ha within the project area, appearing in patches in the northeast of Khappinghat National Park near

Khappinghat Creek, and in the southwest near Darawank Nature Reserve. The vegetation community generally occurs as a mid-high to tall open woodland to closed forest on flats associated with estuaries.

Within this vegetation community and PCT the dominant canopy species is *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Casuarina glauca* (Swamp Oak). The ground layer comprises predominantly *Baumea juncea*, *Telmatoblechnum indicum* (Swamp Water Fern), *Eriochloa procera* (Spring Grass), *Gahnia clarkei* (Tall Saw-sedge), and *Zoysia macrantha* (Prickly Couch).

vii. Brush Box / Mock Olive / Veiny Wilkiea / Scentless Rosewood Littoral Rainforest

Vegetation Formation: Rainforests

Vegetation Class: Littoral Rainforests

Associated PCT: 3127 - Mid North Headland Brush Box Littoral Rainforest

BC Act TEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia

Brush Box / Mock Olive / Veiny Wilkiea / Scentless Rosewood littoral rainforest occupies approximately 11.48 ha within the project area, appearing in patches along the coastal headlands at Back Beach and Red Head. The vegetation community generally occurs as a low to tall closed forest from 3-15 metres high.

Within this vegetation community and PCT the dominant canopy species is *Lophostemon confertus* (Brush Box), with subdominant canopy and shrub species including *Notelaea longifolia* (Mock Olive), *Wilkiea huegeliana* (Veiny Wilkiea), and *Synoum glandulosum* (Scentless Rosewood) and *Cupaniopsis anacardioides* (Tuckeroo), *Eupomatia laurina* (Bolwarra) and *Acmena smithii* (Lilly Pilly).

The ground layer comprises predominantly *Doodia aspera* (Rasp Fern), *Blechnum neohollandicum*, *Gymnostachys anceps* (Settlers Twine), *Pseuderanthemum variabile* (Pastel Flower), *Tripladenia cunninghamii* (Tripladenia), *Oplismenus imbecillis*, *Gahnia aspera* (Rough Saw-sedge) and *Gahnia melanocarpa* (Black Fruit Saw-sedge). Vines are common and include *Cissus antarctica* (Kangaroo Vine) and *Smilax australis* (Lawyer Vine).

viii. Cleared – Derived Native Grassland

Vegetation Formation: None

Vegetation Class: None

Associated PCT: None

BC Act TEC: None

EPBC Act TEC: None

Cleared – derived native grassland occupies approximately 9.88 ha within the project area, appearing in patches within previously cleared paddocks in the southwest around Blackhead Road. It is likely there are much larger areas of this vegetation community occurring throughout the farm paddocks in the project area that have not yet been mapped. These derived native grasslands could also be aligned with numerous PCTs, though this would require determination at a site-specific scale.

Within this vegetation community the dominant ground layer comprises predominantly *Themeda triandra*, *Entolasia stricta* (Wiry Panic), *Pratia purpurascens* (Whiteroot) and *Poa labillardieri* (Tussock). Exotic and pasture sown grass species are abundant throughout.

ix. Cleared – Derived Native Shrubland

Vegetation Formation: Forested Wetlands

Vegetation Class: Coastal Swamp Forests

Associated PCT: 4004 - Northern Melaleuca quinquenervia Swamp Forest

BC Act TEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: None

Cleared – derived native shrubland occupies approximately 10.09 ha within the project area, appearing in a large patch within previously cleared paddocks near the Hallidays Point wastewater treatment plant in the south. The vegetation community generally occurs as a low regenerating shrubland.

Within this vegetation community and PCT the dominant canopy species are *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Casuarina glauca* (Swamp Oak), with some *Banksia integrifolia* (Coast Banksia). The ground layer comprises predominantly *Lomandra longifolia* (Spiny-headed Mat-rush), *Gahnia clarkei* (Tall Saw-sedge) and *Parsonsia straminea* (Common Silkpod).

x. Coastal Sands Swamp Mahogany Rush Forest

Vegetation Formation: Forested Wetlands

Vegetation Class: Coastal Swamp Forests

Associated PCT: 3986 - Coastal Sands Swamp Mahogany Rush Forest

BC Act TEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: None

Coastal Sands Swamp Mahogany Rush Forest occupies approximately 22.87 ha within the project area, appearing in a large patch in the southwest of the subject land near The Lakes Way. The vegetation community generally occurs as a low to tall swampy sclerophyll open forest with a dense groundcover of rushes and sedges on low-lying sandy alluviums.

Within this vegetation community and PCT the dominant canopy species are *Melaleuca quinquenervia* (Broad-leaved Paperbark) and *Eucalyptus robusta* (Swamp Mahogany), with occasional *Angophora costata* (Smooth-barked Apple). The shrub layer includes *Melaleuca linariifolia* (Flax-leaved Paperbark), *Leucopogon lanceolatus*, and *Elaeocarpus reticulatus* (Blueberry Ash). The ground layer comprises predominantly *Gahnia clarkei* (Tall Saw-sedge), *Baloskion tetraphyllum*, *Entolasia stricta* (Wiry Panic), *Imperata cylindrica* (Blady Grass) and *Hemarthria uncinata* (Matgrass), with the fern *Telmatoblechnum indicum* (Swamp Water Fern).

xi. Coastal Teatree Dry Sclerophyll Shrubland

Vegetation Formation: Heathlands

Vegetation Class: Coastal Headland Heaths

Associated PCT: 3788 – Coastal Foredune Wattle Scrub

BC Act TEC: None

EPBC Act TEC: None

Coastal Teatree dry sclerophyll shrubland occupies approximately 37.74 ha within the project area, appearing on the coastal foredunes to the north along Red Head Beach leading up to Saltwater Beach. The vegetation community generally occurs as a tall closed shrubland on the siliceous sands of the foredunes.

Within this vegetation community and PCT the dominant species is *Leptospermum laevigatum* (Coast Teatree), with *Banksia serrata* (Old-man Banksia) and *Banksia integrifolia* (Coast Banksia) being subdominant and occurring at a density <30% of the canopy cover. The shrub layer is abundant in *Acacia longifolia* and the ground layer includes *Spinifex sericeus* (Hairy Spinifex), *Lomandra longifolia* (Spiny-headed Mat-rush), *Pteridium esculentum* (Bracken), *Dianella caerulea* (Blue Flax-lily) and *Hibbertia scandens* (Climbing Guinea Flower).

xii. Coastal Teatree / Banksia Dry Sclerophyll Tall Shrubland

Vegetation Formation: Heathlands

Vegetation Class: Coastal Headland Heaths

Associated PCT: 3788 – Coastal Foredune Wattle Scrub

BC Act TEC: None

EPBC Act TEC: None

Coastal Teatree / Banksia dry sclerophyll tall shrubland occupies approximately 30.19 ha within the project area, appearing on the coastal foredunes to the north along Red Head Beach leading up to Saltwater Beach. The vegetation community generally occurs as a tall closed shrubland on the siliceous sands of the foredunes.

Within this vegetation community and PCT the dominant species is *Leptospermum laevigatum* (Coast Teatree), *Banksia serrata* (Old-man Banksia), and *Banksia integrifolia* (Coast Banksia): with the latter two being present at a density >30% of the canopy cover. The shrub layer is abundant in *Acacia longifolia* and the ground layer

includes *Spinifex sericeus* (Hairy Spinifex), *Lomandra longifolia* (Spiny-headed Mat-rush), *Pteridium esculentum* (Bracken), *Dianella caerulea* (Blue Flax-lily) and *Hibbertia scandens* (Climbing Guinea Flower).

xiii. Coogera / Yellow Tulipwood / Native Celtis / Myrtle Ebony Littoral Rainforest

Vegetation Formation: Rainforests

Vegetation Class: Littoral Rainforests

Associated PCT: 4114 – Lower North Sands Littoral Rainforest

BC Act TEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia

Coogera / Yellow Tulipwood / Native Celtis / Myrtle Ebony littoral rainforest occupies approximately 2.59 ha within the project area, appearing in patches along the coast behind Shelly Beach and at the southern end of Diamond Beach. The vegetation community generally occurs as a low to tall closed forest from 1-22 metres high.

Within this vegetation community and PCT the dominant canopy species are *Arytera divaricata* (Coogera), *Drypetes deplanchei* (Yellow Tulip), *Celtis paniculata* (Native Celtis), *Diospyros pentamera* (Myrtle Ebony), *Planchonella australis* (Black Apple), *Scolopia braunii* (Flintwood), *Cupaniopsis anacardioides* (Tuckeroo) and *Alphitonia excelsa* (Red Ash). The shrub layer includes *Notelaea longifolia* (Mock Olive), *Wilkiea huegeliana* (Veiny Wilkiea), and *Eupomatia laurina* (Bolwarra) and the sparse understorey includes *Oplismenus imbecillis* (Creeping Beard Grass), *Gymnostachys anceps* (Settlers Twine), *Pellaea falcata* (Sickle Fern), *Tripladenia cunninghamii* (Tripladenia) and *Doodia aspera* (Rasp Fern). Vines are common and include *Cissus antarctica* (Kangaroo Vine) and *Smilax australis* (Lawyer Vine).

xiv. Flooded Gum coastal Wet Sclerophyll Forest

Vegetation Formation: Wet Sclerophyll Forests (shrubby sub-formation)

Vegetation Class: North Coast Wet Sclerophyll Forests

Associated PCT: 3174 - Northern Turpentine-Brush Box Wet Forest

BC Act TEC: None

EPBC Act TEC: None

Flooded Gum coastal wet sclerophyll forest occupies approximately 181.11 ha within the project area, appearing interspersed amongst dry sclerophyll forest in the east and in numerous scattered patches throughout. The vegetation community generally occurs as a very tall open to closed forest on sheltered hillslopes and in gullies.

Within this vegetation community and PCT the dominant canopy species is *Eucalyptus grandis* (Flooded Gum), with the sub-dominants *Eucalyptus microcorys* (Tallowwood), *Lophostemon confertus* (Brush Box), *Allocasuarina*

torulosa (Forest Oak) and *Syncarpia glomulifera* (Turpentine). The dominant shrub species include *Acacia binervata* (Two-veined Hickory), *Glochidion ferdinandi* (Cheese Tree), *Melaleuca linariifolia* (Flax-leaved Paperbark), *Pittosporum undulatum* (Sweet Pittosporum), *Rhodamnia rubescens* (Scrub Turpentine), *Notelaea longifolia* (Large Mock-olive), and *Breynia oblongifolia* (Coffee Bush). The ground layer comprises predominantly *Blechnum neohollandicum*, *Hypolepsis muelleri* (Harsh Ground Fern), *Lomandra longifolia* (Spiny-headed Mat-rush), *Oplismenus imbecillis*, and *Entolasia stricta* (Wiry Panic).

xv. Forest Red Gum Dry Sclerophyll Forest

Vegetation Formation: Dry Sclerophyll Forests (shrub/grass sub-formation)

Vegetation Class: Hunter-Macleay Dry Sclerophyll Forests

Associated PCT: 3445 - Lower North Coastal Hills Red Gum Grassy Forest

BC Act TEC: None

EPBC Act TEC: None

Forest Red Gum dry sclerophyll forest occupies approximately 13.17 ha within the project area, appearing to around Blackhead Road to the south and west of the caravan park and in a small area within the residential development along Diamond Beach. The vegetation community generally occurs as a mid-high to tall open woodland to closed forest on north to north-easterly aspects of hillslopes.

Within this vegetation community and PCT the dominant canopy species is *Eucalyptus tereticornis* (Forest Red Gum) with the sub-dominants *Notelaea longifolia*, *Eucalyptus microcorys* (Tallowwood) and *Eucalyptus pilularis* (Blackbutt). The dominant shrub species include *Acacia maidenii* (Maiden's Wattle) and *Trema tomentosa* var. *aspera*.

The ground layer comprises predominantly *Imperata cylindrica* (Blady Grass), *Lomandra longifolia* (Spiny-headed Mat-rush), *Themeda triandra*, *Poa labillardieri* (Tussock) *Oplismenus imbecillis*, and *Entolasia marginata* (Bordered Panic).

xvi. Forest Red Gum / Swamp Oak Swamp Sclerophyll

Vegetation Formation: Forested Wetlands

Vegetation Class: Coastal Floodplain Wetlands

Associated PCT: 4020 - Coastal Creekflat Layered Grass-Sedge Swamp Forest

BC Act TEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: None

Forest Red Gum / Swamp Oak swamp sclerophyll occupies approximately 6.00 ha within the project area, appearing in a few small patches around the central west and north west near The Lakes Way, where it adjoins

other swamp oak forests and wet sclerophyll forests. The vegetation community generally occurs as a tall, mid-dense sclerophyll forest on lower slopes and flats.

Within this vegetation community and PCT the dominant canopy species is *Eucalyptus tereticornis* (Forest Red Gum), with the sub-dominant being *Casuarina glauca* (Swamp Oak) and occasionally *Eucalyptus robusta* (Swamp Mahogany). The dominant shrub species include *Melaleuca linariifolia* (Flax-leaved Paperbark), *Callistemon salignus* (Willow Bottlebrush), and *Acacia longifolia*.

The ground layer comprises predominantly *Imperata cylindrica* (Blady Grass), *Lomandra longifolia* (Spiny-headed Mat-rush), *Oplismenus imbecillis*, *Entolasia marginata* (Bordered Panic), *Dichondra repens* (Kidney Weed), and *Microlaena stipoides* var. *stipoides* (Weeping Grass).

xvii. Grey Gum / Tallowwood Dry Sclerophyll Forest

Vegetation Formation: Wet Sclerophyll Forests (grassy sub-formation)

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests

Associated PCT: 3252 - Northern Hinterland Grey Gum-Mahogany Grassy Forest

BC Act TEC: None

EPBC Act TEC: None

Grey Gum / Tallowwood dry sclerophyll forest occupies approximately 330.14 ha within the project area, appearing in large patches in the west amongst ironbark dry sclerophyll forest, with a few scattered occurrences in the east. The vegetation community generally occurs as a very tall open to closed forest, typically occurring on south facing rocky hillslopes and lower footslopes.

Within this vegetation community and PCT the dominant canopy species are *Eucalyptus propinqua* (Small-fruited Grey Gum) and *Eucalyptus microcorys* (Tallowwood), with subdominant species including *Corymbia maculata* (Spotted Gum), *Corymbia gummifera* (Red Bloodwood), and *Eucalyptus siderophloia* (Grey Ironbark). The dominant shrub species include *Breynia oblongifolia* (Coffee Bush), *Ozothamnus diosmifolius* (White Dogwood), and *Polyscias sambucifolia*. The ground layer comprises predominantly *Aristida vagans* (Threeawn Speargrass), *Microlaena stipoides* var. *stipoides* (Weeping Grass), *Imperata cylindrica*, *Lomandra longifolia* (Spiny-headed Mat-rush), *Themeda triandra* and *Entolasia stricta* (Wiry Panic), with frequent *Dianella caerulea* (Blue Flax-lily) and the fern *Pteridium esculentum* (Bracken). Other ground layer type species include *Hardenbergia violacea* (False Sarsaparilla) and *Hibbertia scandens* (Climbing Guinea Flower).

xviii. Grey Gum / Tallowwood Wet Sclerophyll Forest

Vegetation Formation: Wet Sclerophyll Forests (shrubby sub-formation)

Vegetation Class: North Coast Wet Sclerophyll Forests

Associated PCT: 3160 - Lower North Turpentine-Tallowwood-Grey Gum Forest

BC Act TEC: None

EPBC Act TEC: None

Grey Gum / Tallowwood wet sclerophyll forest occupies approximately 252.96 ha within the project area, appearing in large patches in the west amongst other wet and dry sclerophyll forest, with a few scattered occurrences in the east. The vegetation community generally occurs as a very tall open to closed forest, typically on sheltered gullies and slopes.

Within this vegetation community and PCT the dominant canopy species are *Eucalyptus propinqua* (Small-fruited Grey Gum) and *Eucalyptus microcorys* (Tallowwood), with subdominant species including *Syncarpia glomulifera* (Turpentine), *Corymbia maculata* (Spotted Gum), *Corymbia gummifera* (Red Bloodwood), and *Eucalyptus siderophloia* (Grey Ironbark). The dominant understorey species include *Allocasuarina littoralis* (Black She-Oak), *Melaleuca linariifolia* (Flax-leaved Paperbark), *Synoum glandulosum subsp. glandulosum* (Scentless Rosewood), *Myrsine variabilis*, and *Glochidion ferdinandi* (Cheese Tree). The ground layer comprises predominantly *Carex appressa* (Tall Sedge), *Lomandra longifolia* (Spiny-headed Mat-rush), *Gymnostachys anceps* (Settler's Twine), *Gahnia clarkei* (Tall Saw-sedge), *Microlaena stipoides var. stipoides* (Weeping Grass), *Oplismenus imbecillis*, and *Pseuderanthemum variabile* (Pastel Flower). Vines are common, including species such as *Eustrephus latifolius* (Wombat Berry), *Pandorea pandorana subsp. pandorana* (Wonga Wonga Vine), *Cissus antarctica* (Water Vine), and *Smilax australis* (Lawyer Vine).

xix. Hairy Spinifex Tussock Grass

Vegetation Formation: Grasslands

Vegetation Class: Maritime Grasslands

Associated PCT: 3410 - Spinifex Strandline Grassland

BC Act TEC: None

EPBC Act TEC: None

Hairy Spinifex tussock grass occupies approximately 13.06 ha within the project area, appearing on the coastal foredunes to the north along Red Head Beach leading up to Saltwater Beach. The vegetation community generally occurs as a low to mid-high, sparse to closed tussock grassland.

Within this vegetation community and PCT the dominant species is *Spinifex sericeus* (Hairy Spinifex). Other co-occurring minor associate ground layer species include *Carpobrotus glaucescens* (Pigface) and *Zoysia macrantha*. In transitional areas towards dunes, occasional clumps of *Acacia longifolia subsp. sophorae* (Coastal Wattle) appear.

xx. Ironbark / Grey Gum / Mahogany / Stringybark Dry Sclerophyll Forest

Vegetation Formation: Wet Sclerophyll Forests (grassy sub-formation)

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests

Associated PCT: 3249 - Northern Bloodwood-Ironbark Moist Grassy Forest

BC Act TEC: None

EPBC Act TEC: None

Ironbark / Grey Gum / Mahogany / Stringybark dry sclerophyll forest occupies approximately 821.15 ha within the project area, appearing in large patches in the central and west amongst other wet and dry sclerophyll forests. The vegetation community generally occurs as a very tall open to closed forest, typically occurring on south facing rocky hillslopes and lower footslopes.

Within this vegetation community and PCT the dominant canopy species are *Eucalyptus siderophloia* (Grey Ironbark), *Eucalyptus propinqua* (Small-fruited Grey Gum), *Corymbia intermedia* (Pink Bloodwood), and *Eucalyptus carnea* (Thick-leaved Mahogany), with subdominant species including *Angophora costata* (Smooth-barked Apple), *Eucalyptus globoidea* (White Stringybark) and *Eucalyptus microcorys* (Tallowwood). The dominant understorey and shrub species include *Notelea longifolia* (Large Mock-olive), *Acacia ulicifolia* (Prickly Moses), and *Dodonaea triquetra* (Large-leaf Hop-bush). The ground layer comprises predominantly *Eragrostis leptostachya* (Paddock Lovegrass), *Microlaena stipoides* var. *stipoides* (Weeping Grass), *Imperata cylindrica*, *Lomandra longifolia* (Spiny-headed Mat-rush), and *Themeda triandra*. Other ground layer type species include *Lobelia purpurascens* (Whiteroot), *Vernonia cinerea*, and *Glycine clandestina* (Twining Glycine).

xxi. Northern Sand Plain Damp Wallum Heath

Vegetation Formation: Heathlands

Vegetation Class: Wallum Sand Heaths

Associated PCT: 3803 – Northern Sand Plain Damp Wallum Heath

BC Act TEC: None

EPBC Act TEC: None

Northern Sand Plain Damp Wallum Heath occupies approximately 10.33 ha within the project area, appearing in a large patch to the east of The Lakes Way near Darawank Nature Reserve in the south west. The vegetation community generally occurs as a tall to very tall heathland with a ground layer of sedges and grasses on damp soils associated with large sand plains.

Within this vegetation community and PCT the dominant species is *Banksia aemula* (Wallum Banksia), with *Banksia serrata* (Old-man Banksia), *Banksia integrifolia* (Coast Banksia) and *Eucalyptus robusta* (Swamp Mahogany) being subdominant. The shrub layer is abundant in *Leptospermum polygalifolium* (Tantoon) and *Melaleuca nodosa*, and the ground layer includes *Cassytha glabella*, *Xanthorrhoea glauca*, *Schoenus brevifolius*, and *Pteridium esculentum* (Bracken).

xxii. Pink Bloodwood / Grey Gum / Ironbark Dry to Wet Sclerophyll Forest

Vegetation Formation: Wet Sclerophyll Forests (grassy sub-formation)

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests

Associated PCT: 3249 - Northern Bloodwood-Ironbark Moist Grassy Forest

BC Act TEC: None

EPBC Act TEC: None

Pink Bloodwood / Grey Gum / Ironbark dry to wet sclerophyll forest occupies approximately 115.73 ha within the project area, appearing in large patches in the central west amongst other wet and dry sclerophyll forests. The vegetation community generally occurs as a tall open to closed forest, typically occurring on wet low hills.

Within this vegetation community and PCT the dominant canopy species are *Corymbia intermedia* (Pink Bloodwood), *Eucalyptus propinqua* (Small-fruited Grey Gum), and *Eucalyptus siderophloia* (Grey Ironbark), with subdominant species including *Eucalyptus carnea* (Thick-leaved Mahogany), *Eucalyptus globoidea* (White Stringybark) and *Eucalyptus microcorys* (Tallowwood). The dominant understorey and shrub species include *Allocasuarina torulosa* (Forest Oak), *Breynia oblongifolia* (Coffee Bush), and *Ozothamnus diosmifolius* (White Dogwood). The ground layer comprises predominantly *Entolasia stricta* (Wiry Panic), *Imperata cylindrica*, *Lomandra longifolia* (Spiny-headed Mat-rush), *Themeda triandra* and *Microlaena stipoides* var. *stipoides* (Weeping Grass). Other ground layer type species include *Pteridium esculentum* (Bracken), *Cheilanthes sieberi* (Rock Fern), *Lobelia purpurascens* (Whiteroot) and *Dianella caerulea* (Blue Flax-lily).

xxiii. Prickly-leaved Paperbark Tall Shrubland

Vegetation Formation: Dry Sclerophyll Forests (shrub/grass sub-formation)

Vegetation Class: Hunter-Macleay Dry Sclerophyll Forests

Associated PCT: 3436 - Hunter Coast Sandy Creekflat Low Paperbark Scrub

BC Act TEC: None

EPBC Act TEC: None

Prickly-leaved Paperbark tall shrubland occupies approximately 61.05 ha within the project area, appearing in significant patches bordering Khappinghat Creek in the north east and in smaller scattered patches throughout. The vegetation community generally occurs as a tall closed shrubland to low closed forest on poorly drained low-lying sandy soils and creekflats.

Within this vegetation community and PCT the dominant species is *Melaleuca nodosa*, with *Callistemon salignus* (Willow Bottlebrush) and *Melaleuca linariifolia* (Flax-leaved Paperbark) being subdominant. The shrub and ground layer includes *Acacia longifolia*, *Entolasia stricta* (Wiry Panic), *Brunoniella australis* (Blue Trumpet), *Microlaena stipoides* var. *stipoides* (Weeping Grass), *Imperata cylindrica*, *Dichondra repens* (Kidney Weed), *Schoenus brevifolius*, *Gahnia clarkei* (Tall Saw-sedge) and *Baumea juncea*.

xxiv. Prickly-leaved Paperbark / Swamp Oak Swamp Sclerophyll Forest and Woodland

Vegetation Formation: Forested Wetlands

Vegetation Class: Coastal Floodplain Wetlands

Associated PCT: 4048 - Northern Swamp Oak-Paperbark Forest

BC Act TEC: Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community

Prickly-leaved Paperbark / Swamp Oak swamp sclerophyll forest and woodland occupies approximately 29.04 ha within the project area, appearing in scattered patches throughout, often found along the creek lines and depressions between dry sclerophyll forests. The vegetation community generally occurs as a mid-high to very tall open woodland to closed forest on flats and associated with estuaries.

Within this vegetation community and PCT the dominant species is *Casuarina glauca* (Swamp Oak) and *Melaleuca styphelioides* (Prickly-leaved Tea Tree), although other *Melaleuca* species may be common. Understorey species include *Carex appressa* (Tall Sedge), *Juncus kraussii* (Sea Rush), *Baumea juncea*, *Pteridium esculentum* (Bracken), *Hypolepsis muelleri* (Harsh Ground Fern), and *Gahnia clarkei* (Tall Saw-sedge). The twiner, *Parsonsia straminea* (Common Silkpod) is common in this community.

xxv. Red Olive Plum / Yellow Tulipwood / Black Plum / Python Tree Littoral Rainforest

Vegetation Formation: Rainforests

Vegetation Class: Littoral Rainforests

Associated PCT: 3131 – Myall-Wallis Lakes Littoral Rainforest

BC Act TEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia

Red Olive Plum / Yellow Tulipwood / Black Plum / Python Tree littoral rainforest occupies approximately 11.57 ha within the project area, appearing in a large patch at the headlands either end of Black Head Beach. The vegetation community generally occurs as a dwarf to tall closed forest from 2-16 metres high on headlands and steep coastal hills.

Within this vegetation community and PCT the dominant canopy species are *Backhousia sciadophora* (Shatterwood), *Elaeodendron australe* (Red Olive Plum), *Diospyros australis* (Black Plum), and *Drypetes deplanchei* (Yellow Tulip), with other subdominant species including *Planchonella australis* (Black Apple), and *Gossia bidwillii* (Python Tree). The understorey and shrub species include *Pittosporum multiflorum* (Orange Thorn), *Wilkiea huegeliana* (Veiny Wilkiea), *Pseuderanthemum variabile* (Pastel Flower), *Gymnostachys anceps* (Settlers Twine), and *Oplismenus imbecillis* (Creeping Beard Grass). *Platynerium bifurcatum* (Elkhorn Fern) is usually an abundant epiphyte and the dominant vine is *Cissus antarctica* (Kangaroo Vine).

xxvi. Residual Pine Forest / Woodland

Vegetation Formation: None

Vegetation Class: None

Associated PCT: None

BC Act TEC: None

EPBC Act TEC: None

Residual Pine Forest / Woodland occupies approximately 0.90 ha within the project area, appearing in a patch in the central west along The Lakes Way. The vegetation community generally occurs mid-high to very tall open to closed forest.

Within this vegetation community the dominant species is planted *Pinus elliottii* (Slash Pine) and *Pinus radiata* (Radiata Pine). The understorey often comprises predominantly exotic species, though may include scattered natives such as *Leptospermum polygalifolium subsp. polygalifolium*, *Monotoca elliptica* (Tree Broom-heath) and *Lomandra longifolia* (Spiny-headed Mat-rush).

xxvii. Sand (exposed)

Vegetation Formation: None

Vegetation Class: None

Associated PCT: None

BC Act TEC: None

EPBC Act TEC: None

Sand (exposed) occupies approximately 25.63 ha within the project area, appearing along the coastline in the east. Vegetation is generally lacking in this community and it does not include any greater than 10% vegetation cover.

Where vegetation does occur, it is primarily *Spinifex sericeus* (Hairy Spinifex), *Carpobrotus glaucescens* (Pigface) and *Zoysia macrantha*.

xxviii. Scribbly Gum / Smooth-barked Apple Coastal Sands Dry Forest and Woodland

Vegetation Formation: Dry Sclerophyll Forests (shrubby sub-formation)

Vegetation Class: Coastal Dune Dry Sclerophyll Forests

Associated PCT: 3549 - Lower North Sandplain Heathy Forest

BC Act TEC: None

EPBC Act TEC: None

Scribbly Gum / Smooth-barked Apple coastal sands dry forest and woodland occupies approximately 9.26 ha within the project area, appearing in two patches in the south west along The Lakes Way, near Darawank Nature Reserve. The vegetation community generally occurs as a mid-high to tall woodland to open forest on sandy low rises and dune sheets.

Within this vegetation community and PCT the dominant canopy species are *Angophora costata* (Smooth-barked Apple) and *Eucalyptus signata* (Scribbly Gum), with *Corymbia intermedia* (Pink Bloodwood) or *Corymbia gummifera* (Red Bloodwood) being sub-dominant. The shrub layer often includes *Banksia oblongifolia* (Fern-

leaved *Banksia*), *Acacia ulicifolia* (Prickly Moses), *Persoonia levis* (Broad-leaved Geebung), *Hakea teretifolia* subsp. *teretifolia* (Needlebush), *Melaleuca nodosa*, and *Epacris microphylla* var. *microphylla* (Coral Heath). The ground layer comprises predominantly *Pteridium esculentum* (Bracken), *Lomandra longifolia* (Spiny-headed Mat-rush), *Baumea articulata* (Jointed Twig-rush) and *Baloskion tetraphyllum*.

xxix. Northern Estuarine Paperbark Sedge Forest

Vegetation Formation: Forested Wetlands

Vegetation Class: Coastal Swamp Forests

Associated PCT: 4000 - Northern Estuarine Paperbark Sedge Forest

BC Act TEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: None

Northern Estuarine Paperbark Sedge forest occupies approximately 7.34 ha within the project area, appearing in two patches in the south west of the project area and to the east of The Lakes Way, near Darawank Nature Reserve. The vegetation community generally occurs as a low to tall mid-dense to dense forest on estuarine flats, coastal lake fringes and littoral depressions.

Within this vegetation community and PCT the dominant species is *Melaleuca quinquenervia* (Broad-leaved Paperbark), with *Casuarina glauca* (Swamp Oak) as a subdominant species. The understorey is predominantly *Baumea juncea*, with other less frequently occurring species including *Phragmites australis* (Common Reed), *Baumea articulata* (Jointed Twig-rush), *Schoenus brevifolius*, and *Gahnia clarkei* (Tall Saw-sedge).

xxx. Spotted Gum / Ironbark / Grey Gum Dry Sclerophyll Forest

Vegetation Formation: Wet Sclerophyll Forests (grassy sub-formation)

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests

Associated PCT: 3244 - Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest

BC Act TEC: None

EPBC Act TEC: None

Spotted Gum / Ironbark / Grey Gum dry sclerophyll forest occupies approximately 57.78 ha within the project area, appearing in several patches in the central and south west along Black Head Road and The Lakes Way, particularly around Woodlands Drive. The vegetation community generally occurs as a mid-high to very tall open forest, typically on lower slopes and rises on low hills.

Within this vegetation community and PCT the dominant canopy species are *Corymbia maculata* (Spotted Gum), *Eucalyptus siderophloia* (Grey Ironbark), and *Eucalyptus propinqua* (Small-fruited Grey Gum), with subdominant species including *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus microcorys* (Tallowwood), and *Syncarpia glomulifera* (Turpentine). The dominant understorey and shrub species include *Persoonia linearis*

(Narrow-leaved Geebung), *Breynia oblongifolia* (Coffee Bush), *Cheilanthes sieberi* (Rock Fern), *Imperata cylindrica*, *Lomandra longifolia* (Spiny-headed Mat-rush), *Entolasia stricta* (Wiry Panic), and *Themeda triandra*.

xxxi. Swamp Mahogany / Broad-leaved Paperbark Swamp Sclerophyll Forest and Woodland

Vegetation Formation: Forested Wetlands

Vegetation Class: Coastal Swamp Forests

Associated PCT: 4006 - Northern Paperbark-Swamp Mahogany Saw-sedge Forest

BC Act TEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: None

Swamp Mahogany / Broad-leaved Paperbark swamp sclerophyll forest and woodland occupies approximately 78.82 ha within the project area, appearing in patches in the far north and far south nearby wetlands and estuaries and with scattered patches around the residential areas of Diamond Beach. The vegetation community generally occurs as a low to tall open woodland to closed forest on broad swamp areas near sea level where peaty soils are formed over sand.

Within this vegetation community and PCT the dominant species are *Eucalyptus robusta* (Swamp Mahogany) and *Melaleuca quinquenervia* (Broad-leaved Paperbark), with *Casuarina glauca* (Swamp Oak) as a subdominant species. The understorey and shrub species include *Baumea articulata* (Jointed Twig-rush), *Baumea juncea*, *Hemarthria uncinata* (Matgrass), *Lomandra longifolia* (Spiny-headed Mat-rush), *Entolasia marginata* (Bordered Panic), *Baloskion tetraphyllum*, and *Gahnia clarkei* (Tall Saw-sedge). The twiner *Parsonsia straminea* (Common Silkpod) is frequently recorded.

xxxii. Swamp Oak Swamp Forest and Woodland

Vegetation Formation: Forested Wetlands

Vegetation Class: Coastal Floodplain Wetlands

Associated PCT: 4048 - Northern Swamp Oak-Paperbark Forest

BC Act TEC: Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community

Swamp Oak swamp forest and woodland occupies approximately 129.25 ha within the project area, appearing in larger swathes in the west towards The Lakes Way and in the south around the Hallidays Point wastewater treatment plant perimeter lands, with minor scattered occurrences in the east. The vegetation community generally occurs as a mid-high to tall open woodland to closed forest in muddy estuarine sediments on flats.

Within this vegetation community and PCT the dominant species is *Casuarina glauca* (Swamp Oak), with and *Melaleuca styphelioides* (Prickly-leaved Tea Tree) as a subdominant species. Understorey species include *Gahnia clarkei* (Tall Saw-sedge), *Oplismenus aemulus*, *Baumea juncea*, *Viola banksia*, *Sporobolus virginicus*, and *Juncus kraussii* (Sea Rush). The twiner, *Parsonsia straminea* (Common Silkpod) is common in this community.

xxxiii. Tuckeroo Littoral Rainforest

Vegetation Formation: Rainforests

Vegetation Class: Littoral Rainforests

Associated PCT: 3132 - Northern Sands Tuckeroo-Banksia Forest

BC Act TEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

EPBC Act TEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia

Tuckeroo littoral rainforest occupies approximately 22.54 ha within the project area, appearing in coastal areas along Back Beach, Black Head Beach and north of Shelly Beach. The vegetation community generally occurs as a dwarf to tall closed forest from 1-18 metres high on foredunes behind sandy beaches, beach ridges and sandplains.

Within this vegetation community and PCT the dominant canopy species is *Cupaniopsis anacardioides* (Tuckeroo), with *Banksia integrifolia* (Coast Banksia) being subdominant. Other canopy species may include *Drypetes deplanchei* (Yellow Tulip), *Notelea longifolia* (Mock Olive) and *Planchonella australis* (Black Apple). The understorey and shrub species include *Wilkiea huegeliana* (Veiny Wilkiea), *Oplismenus imbecillis* (Creeping Beard Grass), *Lomandra longifolia* (Spiny-headed Mat-rush), *Pellaea falcata* (Sickle Fern) and *Dianella caerulea* (Blue-flax Lily). Dominant vines include *Smilax australis* (Lawyer Vine) and *Cissus antarctica* (Kangaroo Vine).

xxxiv. Urban or Residential Development

Vegetation Formation: None

Vegetation Class: None

Associated PCT: None

BC Act TEC: None

EPBC Act TEC: None

Urban or Residential Development occupies approximately 24.19 ha within the project area, though much larger areas are present and have not yet been mapped. The only vegetation occurring within this community is restricted to planted gardens surrounding dwellings and infrastructure. These do not form part of a native vegetation community.

xxxv. Wallum Leptospermum / Banksia Wet Heathland

Vegetation Formation: Heathlands / Freshwater Wetlands

Vegetation Class: Wallum Sand Heaths / Coastal Heath Swamps

Associated PCT: 3803 – Northern Sand Plain Damp Wallum Heath / 3913 – Northern Sandplain Wet Heath

BC Act TEC: None

EPBC Act TEC: None

Wallum *Leptospermum* / *Banksia* wet heathland occupies approximately 165.59 ha within the project area, appearing in a large patch appearing behind the coastal dunes to the north along Red Head Beach leading up to Saltwater Beach. The vegetation community generally occurs as a mid-high to tall closed heathland in humus and peaty podzol soils of dune swales.

Within this vegetation community and PCT the dominant species is *Banksia aemula* (Wallum Banksia) and *Banksia oblongifolia* (Old-man Banksia), with emergent *Eucalyptus robusta* (Swamp Mahogany) and occasional *Melaleuca* species present. The shrub and ground layer includes *Leptospermum liversidgei* (Olive Tea-tree), *Leptocarpus tenax*, *Schoenus brevifolius*, and *Entolasia stricta* (Wiry Panic).

3.7. Threatened Ecological Communities

Five TECs listed under the BC Act and three TECs listed under the EPBC Act occur within the project area. The total area of BC Act listed TECs is 434 ha and the total area of the EPBC Act listed TECs is 230 ha; assuming all areas of the vegetation communities recorded conform to the TEC listings. The determination of vegetation community conformance with each TEC listed would require assessment at a site-specific scale to accurately ascertain whether the criterion for listing is met. **Table 3** provides the areas of each TEC recorded within the project area and the associated PCTs. The BC Act listed TECs are shown in **Figure 7** and the EPBC Act listed TECs are shown in **Figure 8**.

Table 3 Threatened ecological communities recorded within the locality

BC Act TEC	EPBC Act TEC	Associated PCTs	Area
EEC: Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	VEC: Subtropical and Temperate Coastal Saltmarsh	4103	23.40
EEC: Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	-	3959	2.27
EEC: Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	-	3986, 4000, 4004, 4006, 4020	204.55

BC Act TEC	EPBC Act TEC	Associated PCTs	Area
EEC: Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CEEC: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	3127, 3131, 3132, 4114	48.18
EEC: Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	EEC: Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community	4048	158.29
Total Area of BC Act Listed TECs			436.69
Total Area of EPBC Act Listed TECs			229.87

Key: VEC= Vulnerable Ecological Community, EEC= Endangered Ecological Community, CEEC= Critically Endangered Ecological Community

There is a possibility that, depending on the landscape position, some sclerophyll forest types might conform to the BC listed TEC Sub-tropical coastal floodplain forest of the NSW North Coast Bioregion. This EEC:

- Occupies central or marginal parts of floodplains and sandy flats, including Pleistocene back-barrier flats; habitats where flooding is periodic and soils are rich in silt and sand, sometimes humic, and show little influence of saline ground water;
- Is associated with clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains;
- It generally occurs below 50 m but may occur on localised river flats up to 250 m elevation;
- May form mosaics with other floodplain forest communities and treeless wetlands, and often fringe treeless floodplain lagoons or wetlands with semi-permanent standing water;
- It has a tall open tree layer of eucalypts, angophoras, melaleucas and bloodwoods, with, the most widespread and abundant dominant trees being *Eucalyptus tereticornis* (forest red gum), *E. siderophloia* (grey ironbark) and *Corymbia intermedia* (pink bloodwood); and
- The local presence of this TEC requires site specific floristic and geomorphological description and analysis.

3.7.1. Coastal Saltmarsh

Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions (Coastal Saltmarsh) is listed as an EEC under the BC Act. Coastal Saltmarsh is also listed as the VEC Subtropical and Temperate Coastal Saltmarsh under the EPBC Act. Coastal Saltmarsh occurs in the subtropical and temperate climate zones of Australia (DoEE, 2013) at the intertidal zone on the shores of estuaries and lagoons including when they are intermittently closed (NSW Scientific Committee, 2011). Flora species characteristic of this community includes *Baumea juncea*, *Juncus kraussii*, *Sarcocornia quinqueflora*, *Sporobolus virginicus*, *Samolus repens*, *Triglochin striata*, and *Zoysia macrantha*.

Coastal Saltmarsh provides significant habitat for migratory wading birds, fish, macropods that may graze between tides and for an array of marine and terrestrial invertebrate fauna.

Saltmarsh communities are threatened worldwide by a range of factors including infilling for road and residential use, modified tidal flow, weed invasion, damage by domestic and feral animals, human disturbance (including 4WD damage), altered fire regimes and climate change (NSW Scientific Committee, 2011).

Within the project area, this community occurs along Khappinghat Creek in the north-east and as a small patch in Blackhead Flora Reserve. This community is largely protected within Khappinghat NP and the Blackhead Flora Reserve Council natural area reserve, with some unprotected occurrences on private land north of Old Soldiers Road.

3.7.2. Freshwater Wetland on Coastal Floodplain

Freshwater Wetland on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions is listed as an EEC under the BC Act. It is not listed under the EPBC Act. This type is associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. It typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. These wetlands generally occur below 20 m elevation on level areas.

They are dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime. Those that lack standing water most of the time are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metre tall and dominated by amphibious plants. Where they are subject to regular inundation and drying the vegetation may include large emergent sedges over 1 metre tall, such as *Baumea articulata*, *Eleocharis equisetina* and *Lepironia articulata*, as well as emergent or floating herbs. As standing water becomes deeper or more permanent, amphibious and emergent plants become less abundant, while floating and submerged aquatic herbs become more abundant.

These wetlands provide significant habitat for wading birds, fish, amphibians and an array of aquatic and terrestrial invertebrate fauna.

Coastal floodplain wetlands, including this type, have been heavily modified for agriculture and development across NSW, mostly by hydrological alterations (draining and filling) and clearing.

Within the project area, this community occurs in one location of 2.27-hectares as an isolated patch to the east of The Lakes Way, near Darawank Nature Reserve. This occurrence is on private, freehold land in the Wards Road area.

3.7.3. Swamp Sclerophyll Forest

Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Swamp Sclerophyll Forest) is listed as an EEC under the BC Act. Swamp Sclerophyll Forest occurs in association with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. The structure of the community is typically

open forest and the flora species characteristic of this community include *Eucalyptus robusta*, *Eucalyptus botryoides*, *Glochidion ferdinandi*, *Dodonaea triquetra*, *Melaleuca quinquenervia*, *Melaleuca linariifolia*, *Allocasuarina littoralis*, *Oplismenus aemulus*, *Pteridium esculentum*, *Parsonsia straminea*, *Lomandra longifolia*, *Baumea juncea*, *Carex appressa*, and *Dianella caerulea*.

Swamp Sclerophyll Forest provides significant habitat for flying foxes, microchiropteran bats, gliders, woodland birds including the Regent Honeyeater (*Xanthomyza phrygia*) and Swift Parrot (*Lathamus discolor*), the Eastern Osprey (*Pandion haliaetus*), and the Wallum Froglet (*Crinia tinnula*).

Swamp Sclerophyll Forests are threatened by land clearing for agricultural and residential purposes, fragmentation and degradation, flood mitigation and drainage works, weed invasion, overgrazing, trampling by domestic livestock, activation of 'acid sulfate soils', removal of dead wood and rubbish dumping (NSW Scientific Committee, 2011).

Within the project area, this community occurs in large patches in the north-east within Khappinghat National Park and on private land where it flanks Khappinghat Creek. It occurs on private lands as scattered occurrences in the eastern residential areas of Diamond Beach and larger patches in the Wards Road area. There is a patch within the Council's Blackhead Flora Reserve and the perimeter lands of the Hallidays Point wastewater treatment plant. There are larger patches in Darawank NP to the south.

3.7.4. Littoral Rainforest

Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Littoral Rainforest) is listed as an EEC under the BC Act. Littoral Rainforest is also listed as the CEEC Littoral Rainforest and Coastal Vine Thickets of Eastern Australia under the EPBC Act. Littoral Rainforest occurs on sand dunes and on soils derived from underlying rocks along the coastline (NSW Threatened Species Scientific Committee, 2012). Flora species characteristic of this community include *Cissus antarctica*, *Cupaniopsis anacardioides*, *Diospyros pentamera*, *Ficus coronata*, *Ficus rubiginosa*, *Glochidion ferdinandi*, *Guioa semiglaucula*, *Pandorea pandorana*, *Pittosporum multiflorum*, *Rhodamnia rubescens*, *Smilax australis*, and *Wilkiea huegeliana*.

Littoral Rainforest provides significant habitat for a diversity of threatened flora species such as *Rhodamnia rubescens*, *Syzygium paniculatum*, *Macadamia tetraphylla* and *Cynanchum elegans*. Threatened fauna species are similarly abundant, and include numerous fruit doves, the Sooty Owl (*Tyto tenebricosa*), microchiropteran bats, and flying foxes.

Littoral Rainforests are threatened by land clearing, loss of structural integrity from wind and salt damage due to edge effects of such clearing, weed infestation, soil disturbance, 4WD tracks, recreational activities, feral animal activity, and loss of connectivity reducing genetic exchange between patches (NSW Threatened Species Scientific Committee, 2012).

Within the project area, this community occurs on areas of coastal dunes and on headlands. There is a large patch on Blackhead headland / Blackhead back beach, within Crown Land, adjoining private land and the north-eastern part of Darawank NP. A contiguous occurrence extends from the coastal parts of Blackhead Flora Reserve north to south Diamond Beach. It is reduced to a very narrow band along Red Head Beach, and this strip appears vulnerable to coastal recession associated with sea level rise. The occurrences in Red Head

Reserve are large, intact (and thanks to the efforts of Coastcare volunteers) well-managed. The occurrences at Diamond Beach are relatively narrow and linear, but there are initiatives for re-creation of new littoral rainforests in some areas here.

3.7.5. Swamp Oak Floodplain Forest

Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Swamp Oak Floodplain Forest) is listed as an EEC under the BC Act. Swamp Oak Floodplain Forest is also listed as the EEC Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community under the EPBC Act. Swamp Oak Floodplain Forest occurs in association with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains (NSW Scientific Committee, 2011). Flora species characteristic of this community include *Casuarina glauca*, *Melaleuca ericifolia*, *Melaleuca quinquenervia*, *Lophostemon suaveolens*, *Glochidion ferdinandi*, *Alternanthera denticulata*, *Baumea juncea*, *Blechnum indicum*, *Entolasia marginata*, *Hypolepsis muelleri*, *Juncus usitatus*, and *Lomandra longifolia*.

Swamp Oak Floodplain Forest provides habitat for the Glossy Black-Cockatoo (*Calyptrorhynchus lathami lathami*), the Squirrel Glider (*Petaurus norfolcensis*) and several frog species.

Swamp Oak Floodplain Forest is threatened by extensive clearing for agriculture, flood mitigation and drainage works, landfilling and earthworks associated with urban and industrial development, pollution from urban and agricultural runoff, weed invasion, overgrazing, trampling and other soil disturbance by domestic livestock and feral animals including feral deer and feral pigs, activation of 'acid sulfate soils' and rubbish dumping (NSW Scientific Committee, 2011).

Within the project area, Swamp Oak Floodplain Forest occurs in numerous smaller patches in the north around Old Soldiers Road and in drainage-impered / low-lying areas east of Treeview Place. These are located on private lands and are not conserved. Scattered occurrences are present south of Chelmsbrook Drive, west of Blackhead Flora Reserve, north of Blackhead Road (west of Diamond Beach Road), in the Wards Road area and in the area south of Tallwoods. Again, these are mostly on private land and are not actively secured for conservation. There is a tract of Swamp Oak Floodplain Forest present within Darawank NP.

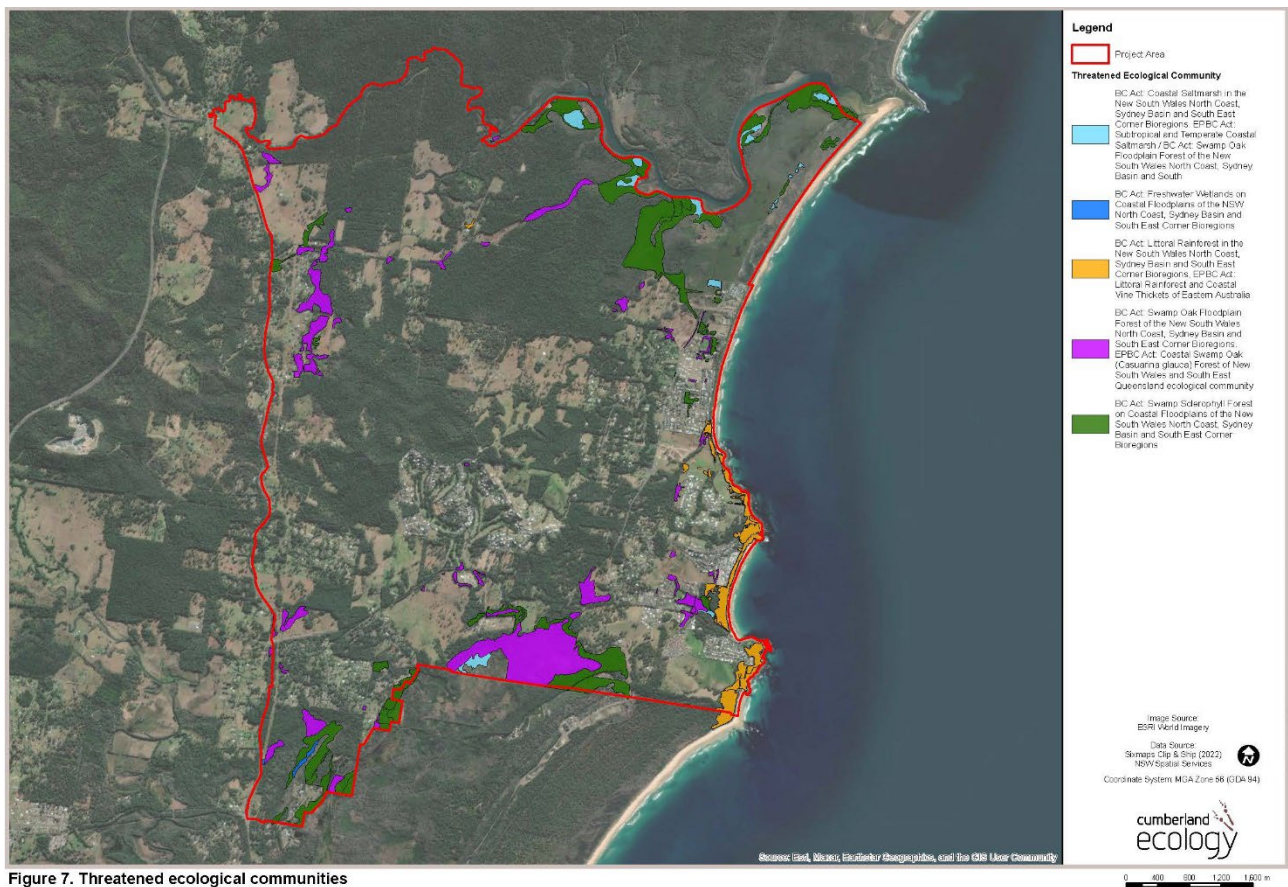


Figure 7. Threatened ecological communities

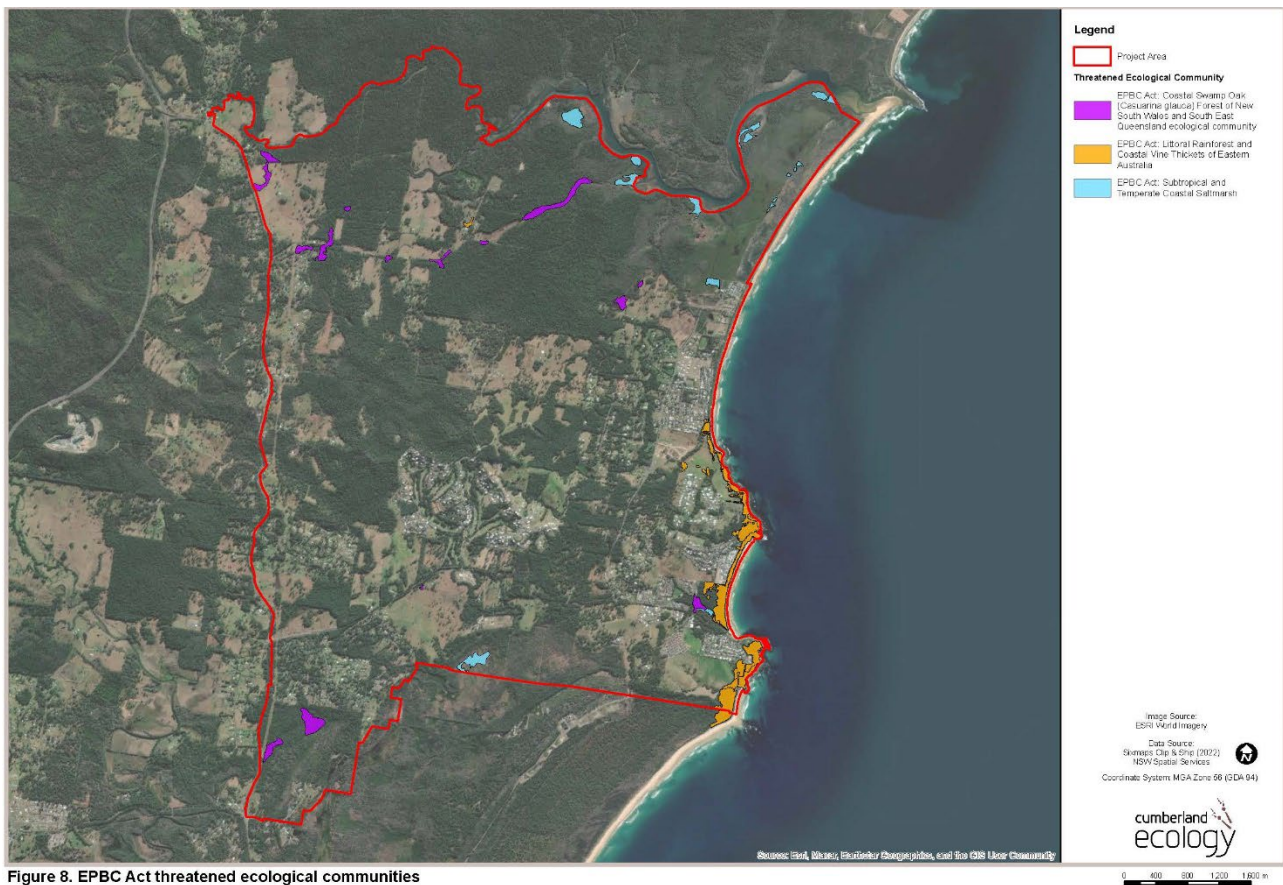


Figure 8. EPBC Act threatened ecological communities

3.8. Bushfire History

Bushfire Planning Australia has prepared a *Strategic Bushfire Study* (Bushfire Planning Australia, 2023). That Study has been prepared pursuant to *Planning for Bushfire Protection* (2019), which sets out the requirements of a Bushfire Strategic Study. A Bushfire Strategic Study incorporates the following details:

- A bushfire landscape assessment that considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape. This describes the bushfire hazards and intensities, details the recorded bushfire history, identifies potential fire runs and the difficulties that apply in accessing and suppressing bushfires in the project area; and
- A land use assessment that identifies the most appropriate locations for proposed new development / growth areas and studies the existing and the proposed road and emergency networks and frameworks.

The updated vegetation mapping for the project area in this report has been provided to the authors of the *Hallidays Point Strategic Bushfire Study* for their analysis of bushfire intensities, risks and management.

The *Strategic Bushfire Study* reflects that the preservation of natural areas and wildlife corridors for biodiversity will have implications for bushfire events and risks into the future and that provisions need to be made for the protection of current and future developments and infrastructure, via adequate setbacks and other planning and management tools.

The *Strategic Bushfire Study* has collated information on fire history data within the MidCoast region and specifically within the project area. This has included data on the main sources of ignitions of bushfires, which are listed as:

- Escapes from legal burns;
- Arson;
- Re-ignition of previous bushfire or legal burns;
- Illegal burning off; and
- Lightning (particularly in late Spring and Summer thunderstorms).

Data on bushfires that is available since 1957 has been analysed in the *Strategic Bushfire Study*. The Hallidays Point project area was significantly impacted by the 2019 Black Summer bushfires. A tree / limb falling onto a powerline near Failford Road ignited a local bushfire, which connected with the large Hillville Road, Hillville bushfire. The extent of the 2019 bushfire has been provided in **Figure 2**. Most parts of the key conservation reserves of the wider locality were burned, including in places at high fire intensity. This affected almost all parts of both Darawank National Park and Khappinghat National Park, as well as naturally vegetated areas south of Black Head Road, between Tallwoods and The Lakes Way and around Old Soldiers Road.

The impacts of the 2019 bushfires on the biodiversity of the Hallidays Point project area have not been characterised. The lack of a systematic biodiversity baseline as well as incomplete follow-up studies of enough detail precludes a comparative analysis. However, several generalised findings can be documented:

- Fire has shaped most of the local ecosystems and most of the local plants and animals have evolved to co-exist with fire. These communities and species possess life history and ecological adaptations to cope with bushfire events. The 2019 bushfires were however unprecedented in recorded history, as to their extent, their duration and their severity. Legge *et al* (2021) reported that severe fires can directly kill individuals and cause elevated mortality for months after the fire due to a lack of resources (food, water, shelter), increased sedimentation and deteriorating water quality in waterways, and heightened exposure to other threats such as introduced predators, herbivores, and disease. Fires can cause key habitat resources (e.g. large tree hollows) to be rare for decades after the event, potentially hastening declines and local extinctions for species depending on those resources. After fire, populations usually recover by dispersal from nearby unburnt areas as well as in-situ reproduction. In 2019, the extent and severity of the fires was such that mortality during and after the fire was potentially higher than usual and large areas were burnt (reducing the availability and proximity of unburnt refuges). Compounding this, many species were already declining, fragmented, or had reduced populations before the fires due to extended drought, and from ongoing threats such as habitat loss, introduced species and / or disease;
- The 2019 bushfires impacted areas of highly fire sensitive ecological communities in the Hallidays Point area including littoral rainforest and some peat-underlain wetland types. The areas of highest concern include littoral rainforests in the Black Head back beach area, as well as wetlands and wet heathlands in parts of Darawank NP and Khappinghat NP;

- The 2019 bushfire is expected to have caused koala mortalities within the Hallidays Point project area (and connected habitats). A local study of State Forest land reported 50 – 80% reduction in koala populations in areas affected by moderate to high fire intensity. A broader study by Cristescu *et al* (2021) showed that koala density was generally 24% to 71% lower in fire-affected sites compared with control sites, but, positively, koalas were mostly still present in fire-affected areas;
- Local impacts on other fauna species generally equivalent to impacts on koalas are anticipated. The 2019 bushfires are likely to have reduced populations of species of low to moderate mobility or dependence on features impacted by fire (e.g. hollows). This includes Squirrel Gliders and Brush-tailed Phascogales. Local representation of mature *Allocasuarina* is expected to be temporarily reduced, which is likely to impact on foraging habitats for the Glossy Black-cockatoo. Whilst there is an expectation of declines, there is no evidence to suggest that the 2019 bushfires have caused local extinctions of threatened species. There are sightings and records of local threatened species in the project area post 2020;
- The 2019 bushfires would have influenced the results of the flora and fauna field surveys in this study;
- The 2019 bushfires may set a benchmark of future bushfire regimes and thresholds of the expected hotter and drier conditions associated with human-induced climate change; and
- Proactive, strategic management of bushfire in the context of biodiversity conservation is required in the Hallidays Point project area, particularly as it relates to improvements in the:
 - Protection of fire-sensitive communities and species from the effects of fire;
 - Management of fire so that fire regimes are within ecological thresholds for different vegetation communities (ie. deliberate use of cool, mosaic burns);
 - Regeneration and recovery from the impacts of the 2019 bushfires;
 - Protection and conservation management of important habitat areas and corridors;
 - Recognition of the value of cultural fire management; and
 - Suppression and management of unplanned bushfire events to reduce the impacts of fire on sensitive assets within the natural environment.

4. Threatened Species Records of Hallidays Point

4.1. Introduction

The array of native vegetation within the project area supports a large variety of plant and animal species. Amongst these, there is a range of threatened species listed by the NSW BC Act and/or the Commonwealth EPBC Act. Conservation of threatened species and the habitats that support them is a key aim of this Plan.

This chapter summarises the methodology used to determine the occurrence of threatened species within the Hallidays Point project area. It also summarises the known and likely occurrences of threatened biota.

4.2. BioNet Records

The primary source of data on the recorded presence of threatened species within the project area is the BioNet Atlas (BioNet). This NSW State Government database stores flora and fauna records. Records vary in quantity and quality and are most prolific within lands that have been intensively studied. Hallidays Point is an area where considerable flora and fauna data has been collected and stored in BioNet. This is useful for conservation planning and for environmental impact assessment. This chapter presents a review of the BioNet records for the locality, which gives a valuable insight into the biodiversity of the area.

BioNet records are not perfect and should be interpreted with care. That is because records may be prolific in well-studied areas, and falsely absent from un-studied areas, though many un-studied or understudied areas lie deep within relatively inaccessible areas or privately held lands. The absence of records of a certain species on BioNet does not mean that the species is absent from that area.

The records also vary in age, with some records dating back well over 20 years. Therefore, patterns of records may not necessarily reflect patterns of current occurrence of flora and fauna.

Nevertheless, where records of flora and fauna are available, they do clearly demonstrate the presence, or recent presence of species in the locality, and the availability of likely suitable habitat. Further, the 2019 bushfires are likely to have resulted in reduced recordings of threatened species due to several factors, including threatened fauna species death and dispersal during the fires, threatened flora species being burnt or unrecognisable, and lack of survey effort during this time. Throughout the year following the fires, there was little foraging opportunity for most fauna species in the intensely burnt areas and subsequently few species would utilise the project area until vegetation regeneration had commenced.

Other data sources were accessed for the review of locally recorded threatened species. This included previously published biodiversity studies, such as biodiversity assessment reports and local biodiversity studies.

A review of existing data was undertaken for the locality, including a search of the threatened flora and fauna records held within the BioNet database. These records have been analysed to better understand local threatened flora and fauna habitat preferences and to assist the identification of biodiversity conservation priority areas and corridors.

4.3. Threatened Flora

Seven (7) threatened flora species listed under the BC Act and/or EPBC Act have been recorded within the project area, as shown in **Figure 9**.



Figure 9. BioNet threatened flora records within the project area

The occurrences of these threatened flora species are primarily towards the eastern coastal area of the locality. This higher number of records occurring in the east is consistent with the additional survey effort concentrated on these areas as part of the coastal development projects being undertaken within this area over the previous decade. Such developments generally involve biodiversity assessments that increase the likelihood of detecting threatened species.

Further, the accessibility of these eastern areas is greater than to the land occurring in the west based on the smaller lot sizes and density of road networks located there. The western area of the locality may also contain a diversity of threatened flora species; however, a lack of access and concentrated survey effort in these areas is likely reducing the number of records available through the BioNet Atlas.

The trend towards the east may also be linked to species likely to be associated with the rainforest vegetation types occurring in proximity to the coast; such as *Rhodamnia rubescens* (Scrub Turpentine) and *Senna acclinis* (Rainforest Cassia). **Table 4** lists the threatened flora species recorded within the locality, their conservation status, and whether they are listed as a Serious and Irreversible Impact (SAII) candidate species under the BAM.

Table 4 Threatened flora of the Hallidays Point project area

Scientific Name	Common Name	No. of Records*	BC Act Status	EPBC Act Status	SAIL Candidate
<i>Allocasuarina defungens</i>	Dwarf Heath Casuarina	23	E	E	No
<i>Allocasuarina thalassoscopia</i>	-	1	-	E	No
<i>Cynanchum elegans</i>	White-flowered Wax Plant	4	E	E	No
<i>Macadamia integrifolia</i>	Macadamia Nut	1	-	V	No
<i>Rhodamnia rubescens</i>	Scrub Turpentine	20	E	CE	Yes
<i>Rhodomyrtus psidioides</i>	Native Guava	15	E	-	Yes
<i>Senna acclinis</i>	Rainforest Cassia	11	E	-	No
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	1	E	V	No

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

Note: not all individual records have a marker on Figure 9 as many are clumped together in a small area and are recorded in BioNet as occurring at the same waypoint

4.3.1. *Allocasuarina defungens*

Allocasuarina defungens is a dioecious or monoecious, lignotuberous, depauperate shrub to 2m high that is part of the She-oak family and has the characteristic jointed branches rather than leaves. It has blue-green foliage, branchlets up to 12 cm in length and inconspicuous flowers. The cones are very irregular, 8 to 11 mm long, held on narrow stalks to 3-7 mm long (Royal Botanic Gardens Trust, 2015).

Allocasuarina defungens has a limited distribution that is restricted to the Nabitac sandplain, Booti Booti National Park (NP), Wallis Island, Khappinghat NP and Crowdy Bay NP; where it is found growing in dry to wet, dense (mostly low) heath on sand. Within the project area, this species was historically recorded in the north-east near Old Soldiers Road, and within Khappinghat National Park.

In the BioNet Atlas, it is listed as being associated with the following PCTs occurring within the project area:

- PCT 3803: Northern Sandplain Damp Wallum Heath; and
- PCT 4004: Northern Melaleuca quinquenervia Swamp Forest.

A recent population study by Ryan Sims and Dr Stephen Griffith has been undertaken. These authors report that "the extant Nabitac population comprises at least 18,000 individuals, but the Khappinghat extant population on present knowledge appears to consist of only one sexually immature individual. This is probably a post 2019 fire recruit. Killed, charred stumps of adult plants of this species are present and repeated uncontrolled bushfires the anticipated agent of the decline of this species at Khappinghat. A 1992 study identified the Khappinghat population as being genetically distinct from the Nabitac population. Two hundred Khappinghat *Allocasuarina defungens* seeds are held in ex situ storage, with discussions currently underway to determine the conservation outlook and required actions for the Khappinghat population."

An example image is provided in **Photograph 1** below.

Photograph 1 *Allocasuarina defungens* (photograph supplied by Ryan Sims)



4.3.2. *Allocasuarina thalassoscopica*

Allocasuarina thalassoscopica is a dioecious spreading to erect shrub 0.5 - 1.5m high that is root-suckering and has bark that is grey-brown, smooth or slightly fissured on big branches. It has ascending branchlets and the cones are cylindrical, occasionally irregular and with a sterile apex to 5 mm long, peduncles 3-14 mm long, and cone bodies 12-28mm long (Royal Botanic Gardens Trust, 2015).

Allocasuarina thalassoscopica is widespread along the North Coast as far south as Diamond Head, extending north to the Noosa Heads area of south-east Queensland, where it is found in graminoid low heath, on coastal flats or on rhyolite or granite outcrops close to the coast.

Within the project area, this species was historically recorded only once in the north-east near Old Soldiers Road within rural-residential land.

In the BioNet Atlas, it is not listed as being associated with any PCTs that occur within the project area.

4.3.3. *Cynanchum elegans*

Cynanchum elegans is a climber with paired broad-ovate to ovate leaves 1.5-5.5cm length and 15-25mm width. The flowers are few, white, tubular and up to 4mm length, 8mm width and appear between August and May. The stems of the species have corky bark in maturity and may be up to 10 m long (DEC (NSW), 2005). *Cynanchum elegans* has a broad distribution from Brunswick Heads in the north to Gerroa in the south. It is usually found on the edge of dry rainforests.

On BioNet, in the project area, the species has been recorded on the northern side of the Red Head headland and in the rural residential area near Woodlands Drive in the south-east. The Woodlands Drive record may be erroneous, as the habitat there appears atypical. This species is also known from littoral rainforest at Black Head. In 2022, MidCoast Council staff observed *Cynanchum elegans* in the Seascapes Koala Corridor at Red Head.

In the BioNet Atlas, it is listed as being associated with the following PCTs occurring within the project area:

- PCT 3131: Myall-Wallis Lakes Littoral Rainforest;
- PCT 3160: Lower North Turpentine-Tallowwood-Grey Gum Forest;
- PCT 3244: Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest;
- PCT 3132: Northern Sands Tuckeroo-Banksia Forest;
- PCT 3174: Northern Turpentine-Brush Box Wet Forest;
- PCT 3248: Northern Blackbutt-Turpentine Shrub Forest;
- PCT 3250: Northern Foothills Blackbutt Grassy Forest;
- PCT 3252: Northern Hinterland Grey Gum-Mahogany Grassy Forest;
- PCT 3544: Coastal Sands Apple-Blackbutt Forest;
- PCT 4004: Northern *Melaleuca quinquenervia* Swamp Forest; and
- PCT 4114: Lower North Sands Littoral Rainforest.

An example image is provided in **Photograph 2** below.

Photograph 2 *Cynanchum elegans* (photograph supplied by Ryan Sims)



4.3.4. *Macadamia integrifolia*

Macadamia integrifolia is a medium sized tree to 20 m in height, with simple narrow-elliptical to narrow-oblong leaves 10-15cm long. These leaves have a serrated edge as juveniles though are smooth as mature leaves. The flowers are creamy white, and the fruit is a hard brown nut encased in a green leathery outer shell (DotE, 2014).

Within the project area, the species has been recorded on the Red Head headland. *Macadamia integrifolia* has a distribution from northern NSW to south-east Queensland in remnant rainforest. This species is not naturally occurring in the Mid North Coast of NSW and the records of the species would be from planted specimens.

The species is not listed as being associated with any PCTs occurring within the project area.

4.3.5. *Rhodamnia rubescens*

Rhodamnia rubescens is a shrub or tree to 25 m in height with leaves that are ovate to elliptic, 5-10cm in length, 2-4.5cm in width, with a green upper surface and a paler lower surface that is densely hairy. The fruit is 5-8 mm in diameter and is firstly red, then turns black (NSW Scientific Committee, 2019).

Rhodamnia rubescens has a broad distribution and appears along the NSW coast northwards from Batemans Bay, where it is found in warmer rainforests and on rainforest margins. This species is highly susceptible to Myrtle Rust infection.

Within the project area, the species has been recorded in a variety of littoral rainforest and wet sclerophyll forests in the east. In 2022, MidCoast Council staff observed this species in the Seascapes Koala Corridor at Red Head. On protected land, it is known from Black Head headland reserve, Black Head Flora Reserve Seascapes koala corridor and Khappinghat NP.

In the BioNet Atlas, it is listed as being associated with the following PCTs occurring within the project area:

- PCT 3127: Mid North Headland Brush Box Littoral Rainforest;
- PCT 3131: Myall-Wallis Lakes Littoral Rainforest;
- PCT 3132: Northern Sands Tuckeroo-Banksia Forest;
- PCT 3160: Lower North Turpentine-Tallowood-Grey Gum Forest;
- PCT 3174: Northern Turpentine-Brush Box Wet Forest;
- PCT 3244: Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest;
- PCT 3248: Northern Blackbutt-Turpentine Shrub Forest;
- PCT 3249: Northern Bloodwood-Ironbark Moist Grassy Forest
- PCT 3250: Northern Foothills Blackbutt Grassy Forest;
- PCT 3252: Northern Hinterland Grey Gum-Mahogany Grassy Forest;
- PCT 3436: Hunter Coast Sandy Creekflat Low Paperbark Scrub;
- PCT 3986: Coastal Sands Swamp Mahogany Rush Forest;
- PCT 4004: Northern Melaleuca quinquenervia Swamp Forest;
- PCT 4006: Northern Paperbark-Swamp Mahogany Saw-sedge Forest;
- PCT 4048: Northern Swamp Oak-Paperbark Forest; and
- PCT 4114: Lower North Sands Littoral Rainforest.

An example image is shown in **Photograph 3** below.

Photograph 3 *Rhodamnia rubescens* (photograph supplied by Ryan Sims)



4.3.6. *Rhodomyrtus psidioides*

Rhodomyrtus psidioides is a shrub to small tree to 12 m in height with narrow-ovate, elliptic, or oblong leaves 5-25cm in length and 2.5 – 6.5cm in width. The upper surface of the leaf is glabrous and glossy while the lower surface is pale. The flowers are white or pink and 7-10mm in length and the yellow fleshy berry is 15-25mm long and 10-15 mm wide (Royal Botanic Gardens Trust, 2022).

Rhodomyrtus psidioides has a broad distribution from Broken Bay near Sydney to Maryborough in Queensland, where it is found in coastal and subcoastal areas of low elevation in association with rainforests and wet sclerophyll forests. This species is highly susceptible to Myrtle Rust infection.

Within the project area, the species has been recorded along Khappinghat Creek in the north, around the residential areas of Diamond Beach and around the coastal areas of Black Head, including Black Head Back Beach.

In the BioNet Atlas, it is listed as being associated with the following PCTs occurring within the project area:

- PCT 3127: Mid North Headland Brush Box Littoral Rainforest;
- PCT 3131: Myall-Wallis Lakes Littoral Rainforest;
- PCT 3132: Northern Sands Tuckeroo-Banksia Forest;
- PCT 3160: Lower North Turpentine-Tallowood-Grey Gum Forest;
- PCT 3174: Northern Turpentine-Brush Box Wet Forest;
- PCT 3248: Northern Blackbutt-Turpentine Shrub Forest;

- PCT 3249: Northern Bloodwood-Ironbark Moist Grassy Forest
- PCT 3250: Northern Foothills Blackbutt Grassy Forest'
- PCT 3252: Northern Hinterland Grey Gum-Mahogany Grassy Forest;
- PCT 3436: Hunter Coast Sandy Creekflat Low Paperbark Scrub;
- PCT 3544: Coastal Sands Apple-Blackbutt Forest;
- PCT 3788: Coastal Foredune Wattle Scrub;
- PCT 3986: Coastal Sands Swamp Mahogany Rush Forest;
- PCT 4000: Northern Estuarine Paperbark Sedge Forest;
- PCT 4004: Northern Melaleuca quinquenervia Swamp Forest;
- PCT 4006: Northern Paperbark-Swamp Mahogany Saw-sedge Forest;
- PCT 4020: Coastal Creekflat Layered Grass-Sedge Swamp Forest;
- PCT 4048: Northern Swamp Oak-Paperbark Forest; and
- PCT 4114: Lower North Sands Littoral Rainforest.

4.3.7. *Senna acclinis*

Senna acclinis is a shrub to 3 m in height with compound leaves to 15cm in length that have up to six pairs of oval shaped leaflets each, and with pods 12-15 cm long and 6-8 mm in width. Flowers are golden yellow, and cup shaped (DEC (NSW), 2005).

Senna acclinis has a broad distribution from the Illawarra region in the south to Queensland in the north, where it is commonly found on the margins of rainforests.

Within the project area, the species has been recorded to the east of Khappinghat NP in the north, and in multiple locations south of Black Head and along Back Beach. This includes sightings in littoral rainforest to the west of Black Head Sports Club.

In the BioNet Atlas, it is listed as being associated with the following PCTs occurring within the project area:

- PCT 3127: Mid North Headland Brush Box Littoral Rainforest;
- PCT 3131: Myall-Wallis Lakes Littoral Rainforest;
- PCT 3132: Northern Sands Tuckeroo-Banksia Forest;
- PCT 3160: Lower North Turpentine-Tallowwood-Grey Gum Forest;
- PCT 3174: Northern Turpentine-Brush Box Wet Forest;
- PCT 3248: Northern Blackbutt-Turpentine Shrub Forest; and
- PCT 4114: Lower North Sands Littoral Rainforest.

4.3.8. *Syzygium paniculatum*

Syzygium paniculatum is a shrub to small tree up to 8 m in height, with lanceolate to obovate leaves 4.5 – 10 cm in length and 1.5 – 3cm in width. The leaves have a glossy upper surface and a paler underside and the white, clustered flowers appear between November and February. The fruit is globose to ovoid, a magenta colour, and contains one seed (DPIE, 2021).

Syzygium paniculatum has a coastal distribution Conjola SF in the south to Upper Lansdowne in the north, where it is found in littoral rainforests.

In the project area, the species has been recorded in littoral rainforest at Black Head Back Beach.

In the BioNet Atlas, it is listed as being associated with the following PCTs occurring within the project area:

- PCT 3127: Mid North Headland Brush Box Littoral Rainforest;
- PCT 3250: Northern Foothills Blackbutt Grassy Forest;
- PCT 3544: Coastal Sands Apple-Blackbutt Forest;
- PCT 3788: Coastal Foredune Wattle Scrub;
- PCT 3986: Coastal Sands Swamp Mahogany Rush Forest;
- PCT 4004: Northern Melaleuca quinquenervia Swamp Forest;
- PCT 4006: Northern Paperbark-Swamp Mahogany Saw-sedge Forest;
- PCT 4020: Coastal Creekflat Layered Grass-Sedge Swamp Forest; and
- PCT 4114: Lower North Sands Littoral Rainforest.

An example image is shown in **Photograph 4** below.

Photograph 4 *Syzygium paniculatum* (photograph supplied by Ryan Sims)



4.3.9. Other Threatened Flora Species

The Hallidays Point project area contains potentially suitable habitat for several other threatened flora species, which includes, but is not restricted to the following species that have been recorded in proximity:

- *Asperula asthenes* has been recorded from swamp sclerophyll forest in the Darawakh Creek – Frogalla Swamp wetlands to the immediate south of the project area;

- *Genoplesium littorale* is a critically endangered small terrestrial orchid, which is known only from North Tuncurry, Minimbah and Booti Booti NP. It has been recorded in the vicinity of the Tuncurry Waste Management Facility to the south of the Hallidays Point project area; and
- *Lindernia alsinoides* has been identified in swamp sclerophyll forest vegetation in the Failford area, to the south-west of the Hallidays Point project area.

4.4. Threatened Fauna

Thirty-three (33) threatened fauna species listed under the BC Act and/or EPBC Act have been recorded within the project area, as shown in **Figure 10**. The occurrences of these threatened fauna species are also primarily towards the eastern coastal area of the locality, which would be consistent with the additional survey effort and accessibility of these areas as part of the coastal development over the previous decade. The western area of the locality may also contain a diversity of threatened fauna species; however, a lack of access and survey in these areas is likely limiting the availability of publicly accessible records.

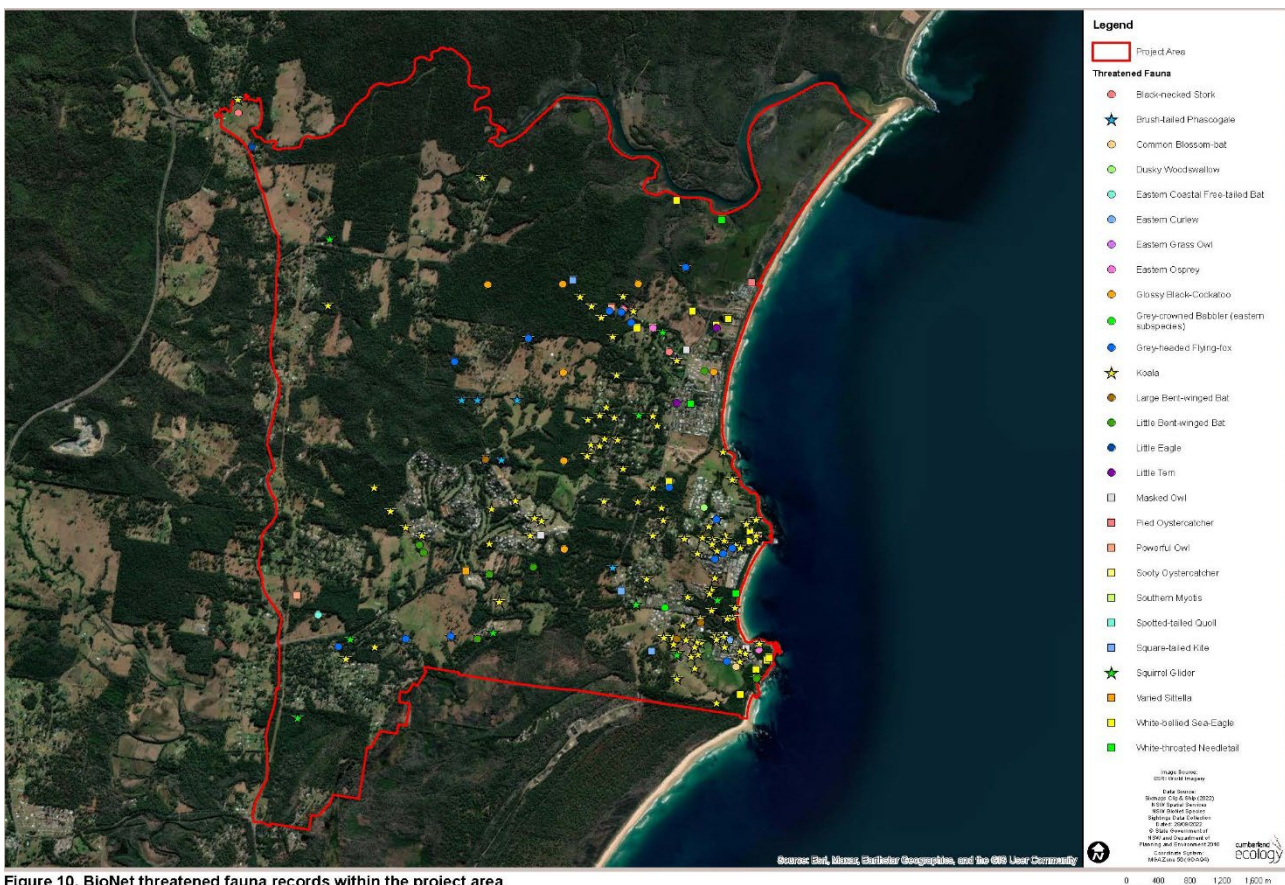


Figure 10. BioNet threatened fauna records within the project area

Table 5 lists the BioNet Atlas threatened fauna records within the project area, their conservation status, and whether they are listed as a SAIL candidate species under the BAM. Migratory and marine listed species have been excluded.

Table 5 Threatened fauna of the Hallidays Point project area

Scientific Name	Common Name	BioNet Records	BC Act Status	EPBC Act Status	SAIL Candidate
<i>Ninox connivens</i>	Barking Owl	0	V	-	No
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	5	E	-	No
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	12	V	-	No
<i>Syconycteris australis</i>	Common Blossom-bat	1	V	-	No
<i>Planigale maculata</i>	Common Planigale	0	V	-	No
<i>Artamus cyanopterus</i>	Dusky Woodswallow	4	V	-	No
<i>Micronomus norfolkensis</i>	East Coast Free-tailed Bat	6	V	-	No
<i>Numenius madagascariensis</i>	Eastern Curlew	1	-	CE	Yes
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	0	V	-	No
<i>Tyto longimembris</i>	Eastern Grass Owl	1	V	-	No
<i>Pandion cristatus</i>	Eastern Osprey	9	V	-	No
<i>Petroica phoenicea</i>	Flame Robin	1	V	-	No
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	1	V	-	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	24	V	V	No
<i>Phascolarctos cinereus</i>	Koala	224	E	E	No
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	4	V	-	Yes*
<i>Dermochelys coriacea</i>	Leatherback Turtle	1	E	E	Yes
<i>Miniopterus australis</i>	Little Bent-winged Bat	8	V	-	Yes*
<i>Hieraaetus morphnoides</i>	Little Eagle	2	V	-	No
<i>Sternula albifrons</i>	Little Tern	3	E	-	No
<i>Sternula albifrons</i>	Loggerhead Turtle	22	E	E	Yes
<i>Tyto novaehollandiae</i>	Masked Owl	5	V	-	No
<i>Haematopus longirostris</i>	Pied Oystercatcher	1	E	-	No
<i>Ninox strenua</i>	Powerful Owl	5	V	-	No
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	5	V	-	No
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	10	V	-	No
<i>Petauroides volans</i>	Southern Greater Glider	1	-	E	No
<i>Myotis macropus</i>	Southern Myotis	2	V	-	No
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	2	V	E	No
<i>Lophoictinia isura</i>	Square-tailed Kite	5	V	-	No
<i>Petaurus norfolcensis</i>	Squirrel Glider	14	V	-	No
<i>Daphoenositta chrysoptera</i>	Varied Sittella	1	V	-	No

Scientific Name	Common Name	BioNet Records	BC Act Status	EPBC Act Status	SAIL Candidate
<i>Crinia tinnula</i>	Wallum Froglet	0	V	-	No
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	25	V	-	No
<i>Hirundapus caudacutus</i>	White-throated Needletail	4	-	V	No
<i>Ptilinopus magnificus</i>	Wompoo Fruit-dove	0	V	-	No

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

*SAIL applies only to breeding habitat for these species

4.4.1. Arboreal Mammals

Species: Brush-tailed Phascogale, Greater Glider, Koala, Squirrel Glider.

The Brush-tailed Phascogale is a tree-dwelling marsupial carnivore that occurs mainly in dry sclerophyll open forest with a sparse groundcover of herbs, grasses, shrubs or leaf litter and has been recorded locally in coastal sands eucalypt forest / tall coastal sands heaths. The species also occasionally inhabits rainforest or open woodlands. It forages preferentially on rough barked trees of 25 cm DBH or greater. Brush-tailed Phascogales nest and shelter in tree hollows with an entrance size range of 2.5-4cm (EES, 2021) and critically rely on the availability of suitable habitat with adequate tree hollows. This species is susceptible to predation by foxes and cats.

The Greater Glider is a large gliding possum that occurs in eucalypt forests and woodlands from north-eastern Queensland to the Central Highlands of Victoria. It feeds on eucalypt leaves, buds, flowers and mistletoe. The species has a relatively small home range but which contains numerous (relatively large) tree hollows (OEH, 2017). It is mainly restricted to areas with relatively large intact or connected forests.

The Koala inhabits eucalypt woodlands and forests from north-east Queensland to the Eyre Peninsula in South Australia, though the species has a patchy distribution within this range. The Koala feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select a few preferred feed species. Locally preferred food trees include but are not limited to tallowwood, forest red gum, grey gum and swamp mahogany. Home range size varies with quality of habitat, ranging from less than two hectares to over one hundred hectares in size (EES, 2020).

The Squirrel Glider inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and dry to wet sclerophyll and swamp forests in coastal areas. The Squirrel Glider is widely, though sparsely, distributed in eastern Australia, from northern Queensland to western Victoria. It feeds on acacia gum, eucalypt sap, nectar, honeydew, manna, and invertebrates (OEH, 2019) and relies on tree hollows for shelter / denning.

Other than for the Greater Glider, the BioNet records for these species are scattered throughout the project area primarily in association with the wet / dry sclerophyll forests (and to a lesser degree, rainforests). There is a higher density of records in the central and eastern portions. Most of the project area provides suitable woodland and forest habitat for these species, and it is likely these species are prevalent in the western portion of the project area too.

The Greater Glider is known from the project area from one BioNet record from within dry sclerophyll forest to the north of Tallwoods village. This record was from 2001. The status of the Greater Glider in Hallidays Point is not known.

More detail of the habitat and local distribution of the Koala, Squirrel Glider and Brush-tailed Phascogale is provided in **Section 4.5**, **Section 4.6.1** and **Section 4.6.2** of this report.

4.4.2. Grey-headed Flying-fox

The Grey-headed Flying-fox is found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. The species occurs 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 (DPIE, 2021).

The BioNet records are scattered throughout the project area primarily in association with the wet / dry sclerophyll forests and rainforest vegetation communities, with an abundance of records in the central and eastern portion. This species is also observed foraging on fruit and nectar-bearing trees and shrubs in residential areas.

A small transient camp of Grey-headed Flying-fox occupied swamp forest habitats to the east of the Black Head sports field within the last 3-years, but this camp has not been regularly occupied. There are accounts of a historic Flying-fox camp at Darawank, immediately south of the project area. While there has been some roosting in this area by small numbers of flying-foxes, this camp has not been regularly occupied in recent times.

The nearest regularly occupied Grey-headed Flying-fox camps are located at Coocumbac Island NR (11 km from the project area), Karloo Street and Cocos Crescent Council Reserves at Forster (12 km) and Wingham Brush (20 km).

4.4.3. Microchiropteran Bats

Species: Common Blossom-bat, East Coast Freetail-bat, Eastern False Pipistrelle, Large Bent-winged Bat, Little Bent-winged Bat, Southern Myotis.

The Common Blossom-bat is a small nectar and pollen eating bat that is found in the coastal areas from Hawks Nest in NSW to Cape York in Queensland. The species roosts individually in littoral rainforest with dense foliage and vine thickets, and feeds in nearby heathland and paperbark swamps. The species has also been recorded in a range of other vegetation communities, such as subtropical rainforest, wet sclerophyll forest and other coastal forests (EHG, 2023).

The East Coast Freetail-bat is a small insectivorous bat found in dry sclerophyll forest, woodland, swamp forest and mangrove forests east of the Great Dividing Range from southern Queensland to southern NSW. It primarily roosts in tree hollows but will also utilise man-made structures (EES, 2022).

The Eastern False Pipistrelle is a relatively large insectivorous bat and occurs on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. The species prefers moist forested habitats.

It generally roosts in hollows in trees but has also been recorded under loose bark and in buildings. Most foraging occurs above or just below the canopy in dry to wet eucalypt forests (OEH 2019).

The Little Bent-winged Bat and Large Bent-winged Bat are small insectivorous bats that are predominantly cave (or tunnel) roosting species and forage in moist eucalypt forest, rainforest, vine thicket, wet / dry sclerophyll forests, Melaleuca swamps, dense coastal forests and banksia scrub (as well as modified areas). The Little Bent-winged Bat is found along the east coast and ranges from Cape York in Queensland to Wollongong in NSW, while the Large Bent-winged Bat is found along both the east and north-west coasts of Australia (OEH, 2019) (EES, 2021).

The Southern Myotis generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. The species forages over streams and pools catching insects and small fish by raking their feet across the water surface (DPIE, 2020).

There is only one local record of the Common Blossom-bat, within the coastal area of Khappinghat NP. The Eastern False Pipistrelle has not been recorded on the BioNet records, but calls attributed to this species were recorded on land at 303 Blackhead Road near Tallwoods (Conacher Consulting, 2020).

The BioNet records for many of the remaining species are generally scattered throughout the project area (mainly in the south and east) in association with a variety of treed vegetation community types. Most of the project area provides suitable woodland, forest, rainforest and riparian / water habitat for these species, and it is likely these species are equally prevalent in the western and northern portions of the project area.

The density and abundance of hollow-bearing trees influences roosting opportunities for the hollow dependent bats. Hollow-bearing trees can be well-represented in some parts of the project area but have been depleted from forests in other parts due to the bushfire, and / or the influence of land uses such as past clearing and forestry activities.

Cave-roosting opportunities for dependent bat species may exist in minor sea caves, large culverts and cavities in buildings. Foraging activities of the Southern Myotis would be focussed on open water in creeks, lagoons, dams and associated foreshores / riparian zones.

4.4.4. Owls

Species: Barking Owl, Eastern Grass Owl, Masked Owl, Powerful Owl.

The Barking Owl is found throughout Australia except for the central arid regions. Although still common in parts of northern Australia, the species has declined significantly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. The owls sometimes extend their home range into urban areas, hunting birds in garden trees and insects attracted to streetlights. The Barking Owl inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. It roosts in shaded portions of tree canopies, including tall mid-storey trees with dense foliage such as Acacia and Casuarina species. During nesting season, the male perches in a nearby tree overlooking the hollow entrance. It preferentially hunts small arboreal mammals such as Squirrel Gliders and Common Ringtail Possums, but when loss of tree hollows decreases

these prey populations the owl becomes more reliant on birds, invertebrates and terrestrial mammals such as rodents and rabbits. They can catch bats and moths on the wing, but typically hunt by sallying from a tall perch (EHG 2023).

The Eastern Grass Owl is found in all mainland states of Australia but is most common in northern and north-eastern Australia. It occurs in areas with tall grass including swamps, grassy plains and flood plains. The species breeds on the ground within dense grass (OEH, 2014).

The Masked Owl is found in Tasmania and most of mainland Australia except the interior, living in dry eucalypt forests and woodlands from sea level to 1100 m ASL. It roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. They are a forest owl, but often hunt along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats (OEH, 2018).

The Powerful Owl is found in eastern and south-eastern Australia and lives in forests and woodlands in the coastal, escarpment, tablelands and western slopes environments. Specific habitat requirements include eucalypt forests and woodlands on productive sites on gentle terrain; a mosaic of moist and dry types, with mesic gullies and permanent streams; the presence of leafy sub canopy trees or tall shrubs for roosting; and the presence of large old trees to provide nest hollows. Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials (EES, 2021).

Much of the project area provides suitable woodland and forest for the Masked Owl and Powerful Owl, which are likely to be equally prevalent in the eastern and western portions of the project area. Masked Owl records exist at Black Head, near Tallwoods, west of Diamond Beach, Khappinghat NP and land to the east of the end of Chelmsbrook Drive. A nest tree was reported at 303 Blackhead Road in a senescent blackbutt, but the hollow structure failed, and nesting by this species at the site was discontinued. Recently (in 2021) a Masked Owl was reported near Cooina Street at Black Head, predated a bandicoot. The Powerful Owl has been recorded also at Black Head Lagoon / Flora Reserve and near Tallwoods. The Eastern Grass Owl would be expected to occur in the far northern and southern portions of the project area, where swamps, sedgeland and wet heath vegetation types occur. There is only one BioNet record locally. The Barking Owl has been recently observed in the Tallwoods urban / residential area (Ashley Carlson, *pers. comm.*).

These owls tend to use and rely on large foraging ranges. The presence of these owls depends on suitable areas of quality habitat that support adequate prey populations. Declines in habitat availability and quality that affect the prey population have a cascading negative effect on the populations of these species. The 2019 bushfires are likely to have caused short to medium-term declines.

4.4.5. Forest Raptors

Species: Little Eagle, Square-tailed Kite.

The Little Eagle is found throughout mainland Australia and occupies habitats rich in prey within open eucalypt forest, woodland, or open woodland. Allocasuarina or acacia woodlands and riparian woodlands of interior NSW are also used. The species nests in tall living trees in remnant vegetation and preys on birds, reptiles and mammals, large insects and carrion (DPIE 2019).

The Square-tailed Kite is found along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria, where it occupies a variety of timbered habitats including dry woodlands and open forests. It is a specialist hunter preying on passerine birds, especially honeyeaters and targets predominately nestlings as well as insects in the tree canopy. It nests in tree forks or on large horizontal tree limbs located mostly along or near to watercourses (DPIE, 2019).

The Little Eagle is known from two BioNet records, but much of the forested lands are suitable habitat for this wide-ranging species. There is no knowledge of the occurrence of local nests of this species. The Square-tailed Kite has been observed in Khappinghat NP, in forested lands between Black Head and Tallwoods and over Diamond Beach village. Good quality nesting habitat is present for the Square-tailed Kite in Khappinghat NP and Darawank NP and in other large patches of remnant forest in the project area.

Both the Little Eagle and Square-tailed Kite tend to use and rely on large foraging ranges. The presence of these raptors depends on enough areas of quality habitat that support adequate prey populations. Declines in habitat availability and quality that affect the prey population can have a cascading negative effect on the populations of these species.

4.4.6. Coastal Raptors

Species: Eastern Osprey, White-bellied Sea-Eagle.

The Eastern Osprey is found in littoral and coastal habitats and terrestrial wetlands, though will travel inland along major water courses. They visit a wide range of wetland habitats including inshore waters, reefs, bays, coastal cliffs, estuaries, mangrove swamps, broad rivers, reservoirs, large lakes, and water holes. They feed on fish over clear, open water, and nest in trees or dead trees, generally within one kilometre of the ocean or other large waterbody (OEH, 2021). The Eastern Osprey nests in tall (often dead) trees, which have good visibility and are proximal to foraging grounds. They also readily nest in purpose-built nesting platforms, power-poles, large floodlights at sporting grounds, communications towers and other similar structures.

The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the seashore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied are characterised by the presence of large areas of open water and include coastal dunes, tidal flats, grassland, heathland, woodland, forest and rainforest. Nest trees are typically large emergent eucalypts with dead branches, and they feed primarily on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion (OEH, 2019). This species is very sensitive to nest disturbances during the breeding season.

The White-bellied Sea-Eagle and the Eastern Osprey are both frequently observed foraging over the near-shore marine environment and flying over the project area. Roosts and feeding perches near the ocean are also regularly used. Information on the occurrence of nests of these species in the area is currently poor.

4.4.7. Terrestrial Mammals

Species: Common Planigale, Spotted-tailed Quoll.

The Common Planigale is found in coastal north-eastern NSW, coastal east Queensland and Arnhem Land, where it inhabits rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas with surface cover. The species shelters in nests built in crevices, hollow logs, beneath bark or under rocks and prey on insects and small vertebrates (EES, 2020).

The Spotted-tailed Quoll is found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania, where it has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. The Spotted-tailed Quoll feeds on gliders, possums, small wallabies, rats, birds, bandicoots, rabbits, reptiles and insects. It also eats carrion and takes domestic fowl (EES, 2021).

The BioNet records for these species show the Spotted-tailed Quoll in the far north-west of the project area and the Common Planigale is noted as occurring in Khappinghat NP in the north and north-east of the project area. There is also a record of the Common Planigale from the Black Head Lagoon / Flora Reserve (EcoPro, 1997). Though the records for these species are few, there is suitable woodland, forest, rainforest, heathland and grassland habitat for these species throughout most of the project area.

4.4.8. Waders

Species: Black-necked Stork, Eastern Curlew.

The Black-necked Stork is widespread in coastal and subcoastal northern and eastern Australia, though they rarely occur south of Sydney and are rare in the south-west of their range. They inhabit wetlands of major coastal rivers along with minor floodplains, coastal sandplain wetlands and estuaries and dams and wet pastures in agricultural lands, where they forage in water 5-30cm deep for vertebrate and invertebrate prey. Nests are built in tall trees close to water (OEH, 2018).

The Eastern Curlew is a migratory shore bird that breeds in Russia and north-eastern China, before migrating to Australia where it is found along the coast in all states, particularly the north, east, and south-east regions including Tasmania. The species prefers sheltered coasts, especially estuaries, bays, harbours, inlets and lagoons. It roosts on sandy spits and in low saltmarsh or mangroves and feeds on crustaceans (including crabs, shrimps and prawns), small molluscs, as well as some insects (EHG, 2023).

There are five records of the Black-necked Stork on BioNet. The species has been observed north of Diamond Beach village and within parts of the Darawakh Creek / Frogalla Swamp Wetlands. The only suitable habitat for the Eastern Curlew appears to occur just outside the project area on the shores and sandy shoals of the Khappinghat Creek estuary.

4.4.9. Near-shore Marine Birds

Species: Little Tern, Pied Oystercatcher, Sooty Oystercatcher.

The Little Tern is a migratory sea bird that migrates from eastern Asia to the east and south-east Australian coasts in September to November each year. In Australia the species occurs in sheltered coastal environments, beaches, estuaries, lakes, lagoons, river mouths and deltas, where it breeds in spring and summer before migrating back to eastern Asia by May. The Little Tern preys upon small fish, crustaceans, insects, worms and molluscs by plunging in the shallow water of channels, estuaries, and beaches (OEH, 2016).

The Pied Oystercatcher is found around the entire Australian coastline where it prefers intertidal flats of inlets and bays, open beaches and sandbanks. It nests primarily on coastal or estuarine beaches and forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish (OEH, 2017).

The Sooty Oystercatcher is found around the entire Australian coast, where they favour rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. The species forages on exposed rock or coral at low tide for foods such as limpets and mussels (OEH, 2016).

The BioNet records for these species are congregated along the coastline in the project area, which is consistent with the habitat preferences of these species. The Little Tern has been recorded foraging in the near-shore marine environment and within Khappinghat Estuary. The nearest regular nesting site for Little Terns is within the Lower Manning Estuary (at Farquhar Park and at Harrington). These nesting sites are of state significance. Adults and fledged juveniles suspected to be from these nesting sites have been observed foraging at Diamond Beach, Black Head Beach and northern Nine Mile Beach locally. Pied Oystercatchers are observed on Diamond Beach, Shelley Beach and Black Head Back Beach. The Khappinghat Estuary to the north would be favoured local habitat for this species. The Sooty Oystercatcher is recorded in small numbers on mainly the rocky shores (particularly in the South Diamond Beach rock platforms) and occasionally on the local beaches.

4.4.10. Rainforest Birds

Species: Wompoo Fruit-Dove.

The Wompoo Fruit-Dove is a large rainforest pigeon that is found along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula. The species occurs in or near rainforests, low elevation moist eucalypt forests and brush box forests, where it nests in palms over water and feeds on a diverse range of tree and vine fruits (OEH, 2017).

The Wompoo Fruit-dove has been observed within Khappinghat NP.

4.4.11. Woodland and Forest Birds

Species: Dusky Woodswallow, South-eastern Glossy Black-Cockatoo, Grey-crowned Babbler (eastern subspecies), Varied Sittella, White-throated Needletail.

The Dusky Woodswallow is found in eastern, southern and south-western Australia, from coast to inland, including the western slopes of the Great Dividing Range and farther west. The Dusky Woodswallow inhabits

woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations, where it primarily eats invertebrates captured whilst hovering above the canopy or over water (OEH, 2018).

The Glossy Black-Cockatoo is found from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, where it inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m ASL in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*Allocasuarina torulosa*) or Drooping She-oak (*Allocasuarina verticillata*) occur. The species nests in very large hollows in mature to over-mature eucalypts (EES, 2021). The availability of habitat for this species is critically influenced by groves of mature *Allocasuarina* and large hollow-bearing trees.

The Grey-crowned Babbler (eastern subspecies) is found from Cape York south through Queensland, NSW, and Victoria, and formerly to the south-east of South Australia. The species inhabits open Box-Gum Woodlands on the slopes, Box-Cypress-pine and open Box Woodlands on alluvial plains, and woodlands on fertile soils in coastal regions. The species feeds on invertebrates foraged on the trunks and branches of eucalypts and other woodland trees, or on the ground by probing amongst litter and tussock grasses. Territories range from one to fifty hectares and several nests are built in shrubs and sapling eucalypts (OEH, 2017).

The Varied Sittella is found across most of mainland Australia except the treeless deserts and open grasslands. The species inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland, where they forage on arthropods in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy (EES, 2021).

The White-throated Needletail is a migratory species that breeds in south-eastern Siberia, Mongolia, the Korean Peninsula, and northern Japan, before coming to eastern Australia from October to April. The species is almost exclusively aerial, foraging from heights of less than 1 m up to more than 1000 m above the ground over most types of habitat, particularly above wooded areas including open forest and rainforest, between trees or in clearings and below the canopy (EES, 2021).

Most of the project area provides suitable woodland and forest habitat for these species, and it is likely these species are equally prevalent in the western and northern portions of the project area. The Dusky Woodswallow has been the subject of only two BioNet records, including at Seascapes in Red Head. The Grey-crowned Babbler has one record on BioNet between Black Head and Tallwoods. The presence of a local population of this relatively obvious, social and gregarious species is questionable. The Varied Sittella is the subject of one local record near Tallwoods, but it may be more widespread than the data suggests because of the suitability of much of the local habitat for this species. The White-throated Needletail is an aerial species that can occur in large flocks periodically over the project area.

The local habitats and population of the Glossy Black-Cockatoo is examined later in this report in **Section 4.6.3**.

4.4.12. Frogs

Species: Wallum Froglet.

The Wallum Froglet is found in a wide range of habitats, usually associated with acid swamps on coastal sand plains. They typically occur in sedgeland and wet heathlands. They can also be found along drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests. The species breeds in swamps with permanent water as well as shallow ephemeral pools and drainage ditches. Breeding is thought to peak in the colder months but can occur throughout the year following rain. Eggs of 1.1-1.2mm diameter are deposited in water with a pH of <6 and tadpoles take 2-6 months to develop into frogs. Wallum Froglets shelter under leaf litter, vegetation, other debris or in burrows of other species. Shelter sites are wet or very damp and often located near the water's edge. Males may call throughout the year and at any time of day, peaking following rain (OEH 2017).

This species has been recorded in the Darawakh Creek / Frogalla Swamp Wetlands and are expected to occur in wet heaths and sedgelands in Khappinghat NP.

4.4.13. Marine Turtles

Species: Loggerhead Turtle, Leatherback Turtle

The Loggerhead Turtle is a large sea turtle to 1.5 m in length. The shell is an elongated heart-shape, dark brown above and white, cream or yellowish below. The large head is dark brown on top becoming pale at the sides, with darker blotches. The species is found in tropical and temperate waters off the Australian coast. In NSW they are as far south as Jervis Bay and have been recorded nesting on beaches on the NSW north coast. Loggerhead Turtles are ocean-dwellers, foraging in deeper water for fish, jellyfish and bottom-dwelling animals. The female comes ashore to lay her eggs in a hole dug on the beach in tropical to subtropical regions during the warmer months (EHG 2024b).

The Leatherback Turtle is a very large sea turtle up to 3 m in length and has heavy paddle-shaped limbs lacking claws. Adults are dark brown or black above, sometimes with paler marbling or longitudinal rows of fine dots on the back, while hatchlings are a rich blue-black trimmed with white, and pale below. The adult shell is covered by a thick, smooth, leathery skin. There is a series of seven prominent longitudinal ridges above the shell and four ridges along the lower half of the shell. Throughout the world's tropical and temperate seas and in all coastal waters of Australia. Most sightings are in temperate waters. Large numbers of Leatherback Turtles feed in coastal waters from southern Queensland to the central coast of NSW (EHG 2024a).

Diamond Beach is known to be used for successful nesting by Loggerhead Turtles. Due to the frequency of nesting and its' southerly location, it is considered one of the most significant beaches of the east coast of NSW for this endangered species. Other local beaches may also be used for nesting. Threats to local nests include direct disturbance by vehicles and horses, as well as the impacts associated with light pollution. Only one record of the Leatherback Turtle occurs, in the south-eastern corner of the project area at Black Head Back Beach.

4.4.14. Other Threatened Fauna Species

The Hallidays Point project area contains potentially suitable habitat for several other threatened fauna species, which includes, but is not restricted to the following species that have been recorded in proximity:

- Eastern Pygmy Possum – known locally from the North Tuncurry area;
- Long-nosed Potoroo – possible evidence of the presence of this species has been observed in coastal sand forests and heaths at Khappinghat NP and at North Tuncurry (in the north and to the south of the project area), but the species has not been confirmed as present. Suitable habitat does occur;
- Greater Broad-nosed Bat – known from the wider locality in equivalent dry to wet sclerophyll forests, which includes a species record immediately to the north of the project area at Koorainghat;
- New Holland Mouse – known locally from the North Tuncurry area;
- Green Turtles – may also nest locally on beaches in the project area;
- Black Bittern – may occur within the freshwater wetlands of the wider project locality;
- Little Lorikeet – known from records in the wider area in dry forests and woodlands; and
- Superb Fruit-dove and Rose-crowned Fruit-dove – these species may utilise littoral rainforest foraging habitats.

4.5. Koalas at Hallidays Point

4.5.1. Koala Records

Koalas are a part of the Hallidays Point landscape that are richly valued by many in the community. There is a history of koala occupation and observation in the locality, with documented records of the species dating back to the early 1900's (a BioNet record from the area of Khappinghat NP – 2.5 kilometres west of the mouth of the Khappinghat Creek). Observations and records have persisted over time.

Koalas within the Hallidays Point project area are part of the Khappinghat Area of Regional Koala Significance (ARKS).

An analysis of relevant source documents has been undertaken to describe koalas and their habitats in the Hallidays Point project area. This is provided below.

4.5.1.1. Hallidays Point Habitat Study

EcoPro analysed koala records and habitat use in the 1997 Hallidays Point Habitat Study. They reported that the Koala is *“known to occur throughout the area. Sightings or other signs of this species have been recorded at Black Head, Red Head, Frogalla Swamp, Kiwarra State Forest and many areas in between. Known and likely critical habitat for this species in the area includes Swamp Forest, Dry Forest, Moist Forest and Coastal Complex. Disturbed Woodland may also be very important for this species in the local area”*.

The distribution of koala sightings and their habitat from the 1997 Hallidays Point Habitat Study is reproduced below:

Plate 3 Koala habitat map reproduced from EcoPro (1997)

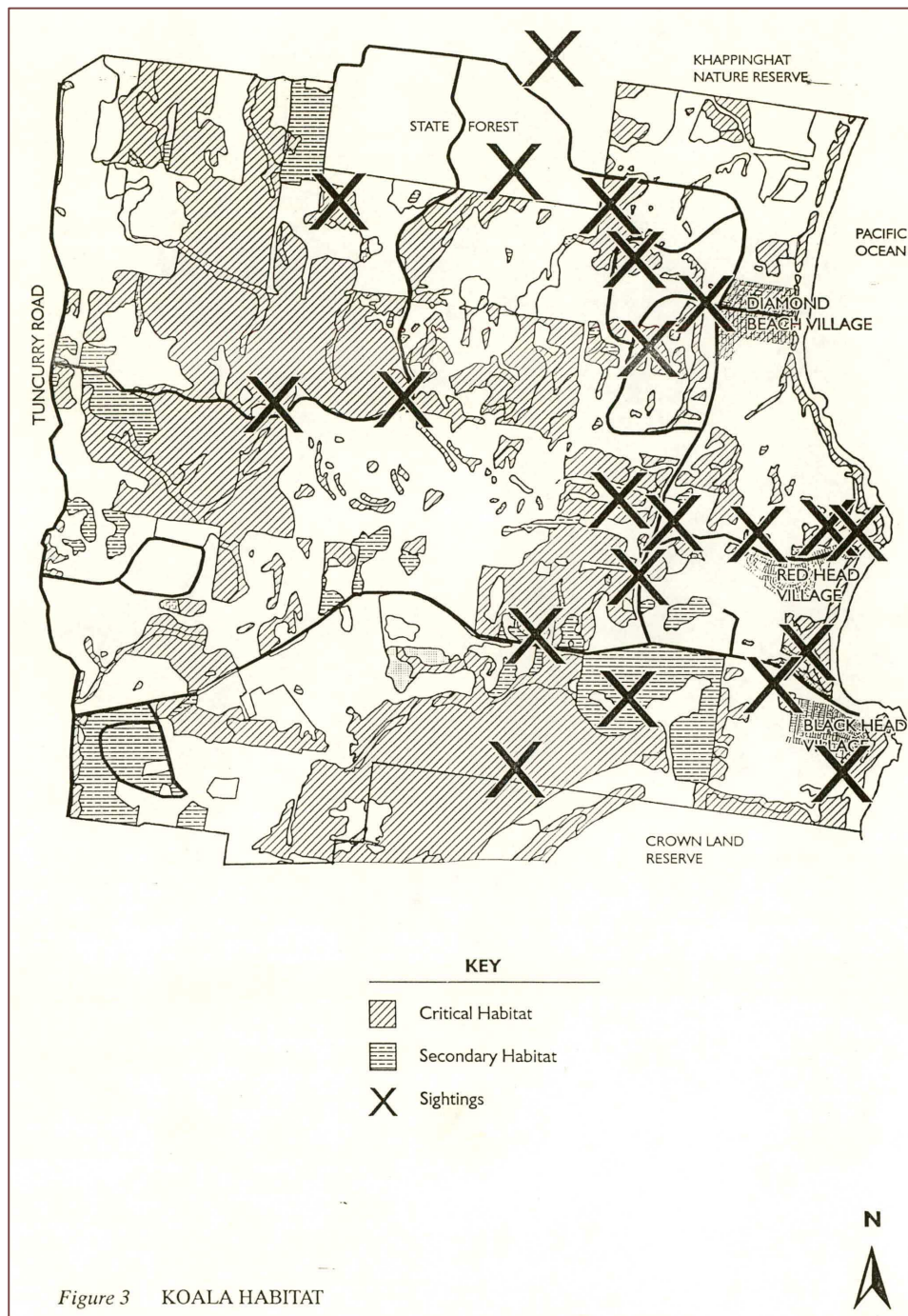


Figure 3 KOALA HABITAT

4.5.1.2. GTCC Comprehensive Koala Plan of Management

Koala habitat within the Greater Taree Region was identified by the Koala Habitat Atlas (KHA) component of the Greater Taree City Council Comprehensive Koala Plan of Management ("GTCC CKPoM"). The KHA identified and ranked habitat into categories including Primary Koala Habitat, Secondary A Koala Habitat, Secondary B Koala Habitat, and Secondary C Koala Habitat.

The KHA identified the following tree species as being preferentially utilised by Koalas in the Greater Taree Region. The species underlined are those identified as occurring within the locality by surveys conducted for this Biodiversity Study and Local Conservation Action Plan (**Chapter 9**).

Primary species: *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus microcorys* (Tallowwood), and *Eucalyptus robusta* (Swamp Mahogany).

Secondary species: *Eucalyptus propinqua* (Small-fruited Grey Gum), *Eucalyptus paniculata*/*Eucalyptus placita* (Grey Ironbarks), *Eucalyptus siderophloia* (Ironbark) and *Eucalyptus eugenioides* (Thin-leaved Stringybark).

Additional tree species considered likely to be preferred by Koalas within the Greater Taree Region include *Eucalyptus amplifolia* (Cabbage Gum), *Eucalyptus viminalis* / *Eucalyptus nobilis* (Ribbon Gums) and *Eucalyptus obliqua* (Messmate).

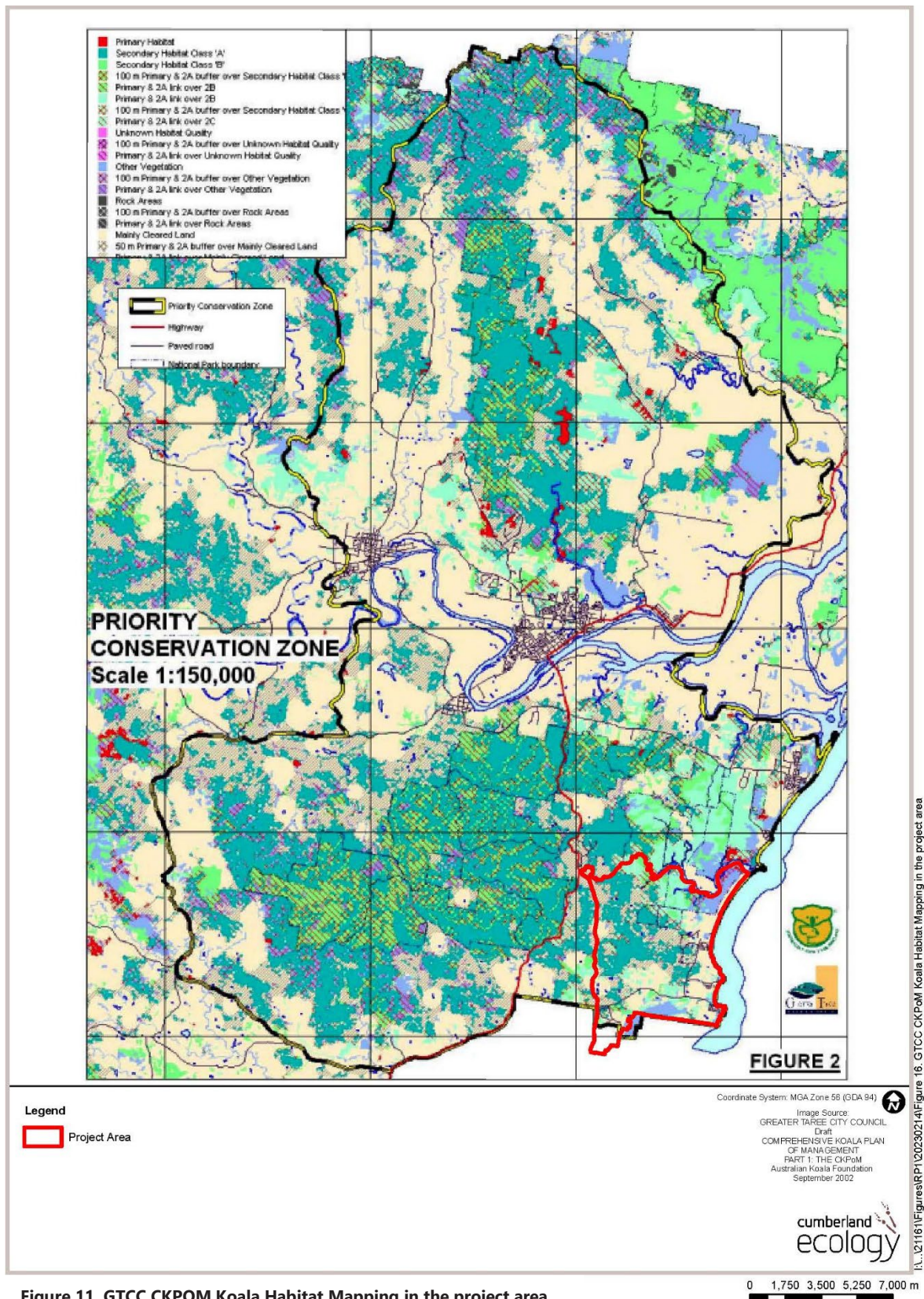
Collectively, these tree species were referred to as Preferred Koala Food Trees (PKFTs) and provided the basis for the Koala Habitat Atlas Model and associated mapping for the Greater Taree Region. Supplementary Koala Food Tree species listed included: *Eucalyptus resinifera* (Red Mahogany), *Eucalyptus seeana* (Narrow-leaved Red Gum), *Eucalyptus agglomerata* (Blue-leaved Stringybark), *Eucalyptus umbra* (Broad-leaved White Mahogany) and *Corymbia maculata* (Spotted Gum).

All three of the primary PKFT species occur within the Hallidays Point locality in a range of vegetation community types (**Chapter 3**). Several of the secondary and supplementary tree species also occur. Based on the mapping provided within the GTCC CKPoM, much of the locality comprises the following Koala Planning Classes:

- Class 2 (Secondary Habitat Class 'A' with Koala records);
- Class 3 (other Secondary Habitat Class 'A'); and
- Class 4 (Secondary Habitat Classes 'B' and 'C').

In addition, the entirety of the locality was mapped as being within the 'Priority Conservation Zone'.

The GTCC CKPoM Koala habitat mapping of the project area is provided in **Figure 11**.



Photograph 5 Koala at Diamond Beach in 2022 (photograph supplied by Andy Tychon)



4.5.1.3. Nomination of Koalas at Hallidays Point as an Endangered Population

In 2003, information was compiled by members of the Hallidays Point community in support of a nomination to list the koalas of Hallidays Point as an Endangered Population under Part 2 of Schedule 1 of the then *Threatened Species Conservation Act 1995*. Key points in that submission included:

- According to the Koala Preservation Society, the Hallidays Point koala population is “*certainly under threat*” and “*the incidence of disease is uncharacteristically high. No other area [in the Greater Taree LGA] is showing the consistent disease prevalence or severity and [this] is most likely due to loss and fragmentation of habitat*”.
- Information provided by [the late] D. K Jeffers reported that:
 - *There is data that confirms the historical presence of a breeding colony of koalas within the Hallidays Point area;*
 - *Since systematic and intensive collation of koala records in the Hallidays Point area between 1994 and 2001, there has been a 1.45% annual reduction in the frequency of koala sightings and the known koala population has declined from 9 animals to 6 animals, which is a 4.8% annual decline. There is a heavy sex bias to male animals;*
 - *Individual koala survivability appears to be poor. Only one animal was consistently recorded in repeated surveys between 1994 and 2001. The Koala Preservation Society data identified at least 8 koala deaths in 8-years; and*
 - *The koala population is in decline, is at a critical threshold and is in danger of extinction in the short term because it consists of a small population size, there is a negative population trend and the population is male-biased which affects the rate of possible recruitment.*

- According to anecdotal sources, koalas were apparently “*very numerous*” in the area from the 1940’s / 50’s through to the late 1970’s.
- Historically, koalas were commonly observed in three (3) identified areas: Frogalla Swamp, moist open forests of Black Head and Red Head and sheltered gullies in the Tallwoods area. However, clearing and development and associated increased mortality had depressed the local population. The local koala population shows a “*greater than normal*” reliance on *Eucalyptus grandis* and *Eucalyptus saligna* as preferred food tree species,
- Without protections, the submission noted that “*koalas as a culturally significant population would be displaced, ... and the genetically and ecologically distinct population would be lost*”. Protection should commence with “*the surviving bastions in the Red Head, Black Head and Tallwoods areas*”.

4.5.1.4. BioNet Records

A total of 224 BioNet records of the Koala occur within the locality (based on the BioNet Atlas database of records collected between years 1980 – 2022). An analysis of these BioNet records has been undertaken by categorising the age of the records to visualise the number and geographical location of the records appearing over time, as shown in **Figure 12**.

The resulting number of records per timespan is provided in **Table 6**.

Table 6 BioNet Atlas Koala records

Species	Age of Records	Number of Records
Koala	1980 - 1990	25
	1991 - 1995	0
	1996 - 2000	12
	2001 - 2005	43
	2006 - 2010	12
	2011 - 2015	12
	2016 - 2020	61
	2021 - 2024	59
Total		130

The spike in records in the 2000’s correlates with the Dan Lunney Community Wildlife Survey and the Hallidays Point habitat and conservation strategy development.

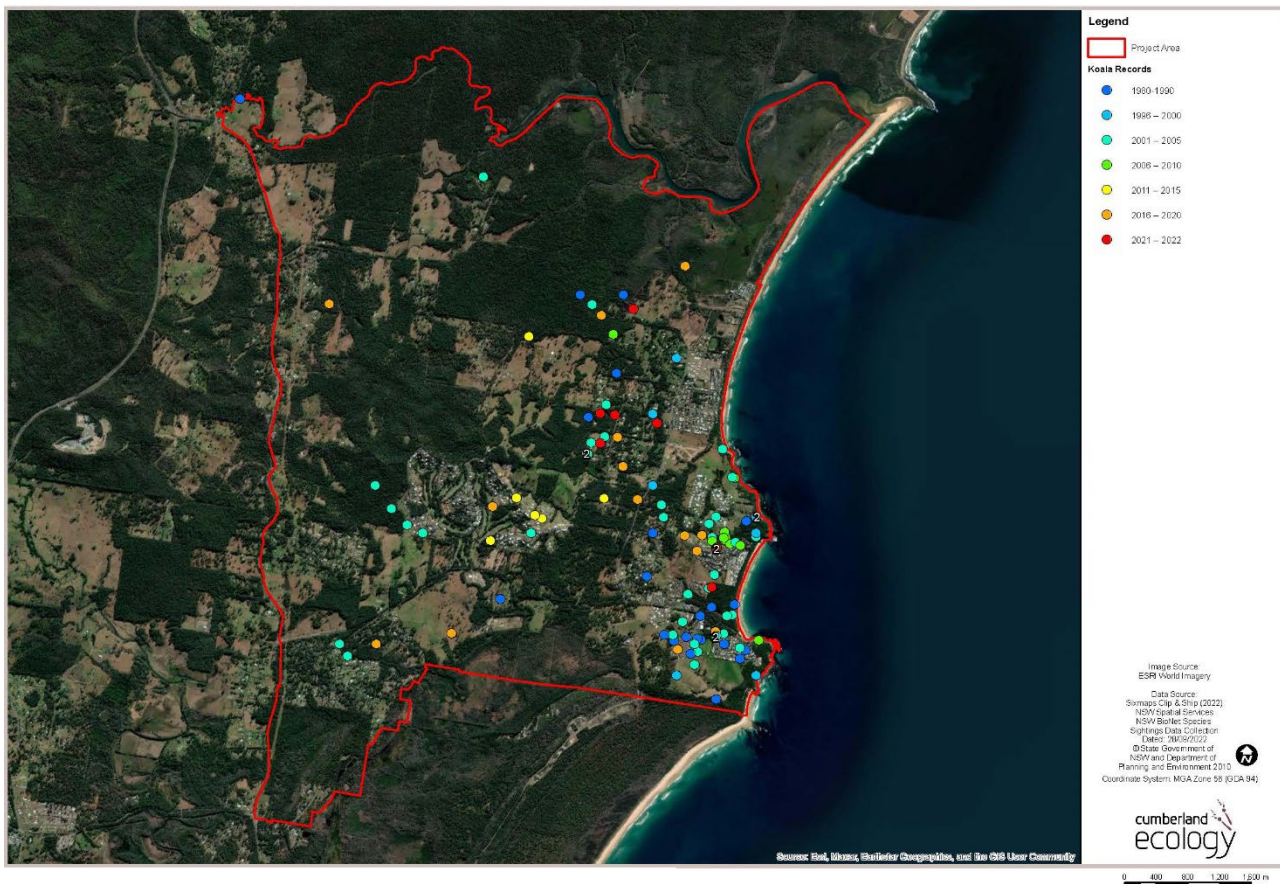


Figure 12. BioNet Koala records within the project area

In the BioNet records, koalas are most frequently recorded in woodlands, dry and wet sclerophyll forests, and rainforest vegetation community types and records are more numerous in the eastern portion of the locality. This distribution is consistent with the greater accessibility of these areas leading to koalas being more visible and likely to be sighted, along with the higher development concentrations in this area that often require targeted threatened species surveys. A shift towards records appearing in the centre of the locality is seen from approximately year 2000 onwards, which may be associated with the Tallwoods development commencing and making this area also more accessible.

Most records from years 2021 – 2022 occur towards the east, which is the area in the locality least impacted by the 2019 bushfires that burnt through most of the central and western areas. The eastern portion of the locality appears to have retained a population of koalas following the 2019 bushfires and has thereby provided an area of significant habitat value for the species. Bushfire within the project area is discussed in **Section 3.8**.

Overall, most of the BioNet Koala records occur towards the eastern portion of the locality in a variety of vegetation types; and while this may be influenced by several human and environmental factors, it is evident these areas provide suitable habitat for the Hallidays Point Koala population.

4.5.1.5. Community Sightings held by MidCoast Council

MidCoast Council has established an online community Koala Sighting Report Form that allows residents in the MidCoast Council LGA to document and submit their local Koala sightings. **Table 7** includes a list of these

community Koala sightings, from within the Hallidays Point locality dating from 2023 to 2018. **Figure 13** maps out these records.

Table 7 Community Koala sightings

Street Address	Locality	Date of Record
Panorama Drive, Diamond Beach Road	Diamond Beach	27/11/2023
Tallwoods Drive	Tallwoods	5/11/2023
Red Head Reserve, near Scarborough Circuit	Red Head	29/10/2023
Black Head Road	Hallidays Point	21/10/2023
Red Head Road	Red Head	19/10/2023
Koorainghat Trail	Koorainghat	8/10/2023
Seascape Reserve (Koala Corridor)	Red Head	7/09/2023
Old Soldiers Road	Rainbow Flat	7/09/2023
Valley View Place	Rainbow Flat	6/09/2023
Blackhead Beach Reserve, Blackhead Road	Black Head	6/09/2023
77 Diamond Beach Road	Red Head	6/09/2023
Hilltop Parkway near 17 th fairway at Tallwoods Golf Course	Tallwoods	5/09/2023
Fords Road, The Pines	Koorainghat	4/09/2023
Blackhead Road	Hallidays Point	26/08/2023
Red Head Reserve	Red Head	24/08/2023
Old Soldiers Road	Rainbow Flat	20/07/2023
Figtree Drive	Diamond Beach	24/05/2023
Tallwoods Golf Course	Tallwoods	25/04/2023
Blackhead Beach Reserve	Black Head	16/04/2023
Vincent Close	Diamond Beach	26/02/2023
Red Head Reserve	Red Head	9/02/2023
38 Red Head Road (Koala Corridor)	Red Head	3/01/2023
Near corner of Blackhead Road and The Boulevard	Tallwoods	20/12/2022
Eastern Valley Way	Tallwoods	25/11/2022
Tallwood Drive, near Hilltop Parkway	Tallwoods	28/10/2022
Vincent Close	Diamond Beach	19/09/2022
Vincent Close	Diamond Beach	10/09/2022
The Lakes Way, near Timbertops Drive	Hallidays Point	7/06/2022
Goulds Trail	Rainbow Flat	1/06/2022
Blackhead Road, near Federation Drive	Hallidays Point	18/05/2022
Gordon Avenue	Black Head	18/05/2022
Gordon Avenue	Black Head	18/05/2022
Gordon Avenue	Black Head	18/05/2022
38 Red Head Road (Koala Corridor)	Red Head	18/05/2022

Street Address	Locality	Date of Record
Seascape Drive (Koala Corridor)	Red Head	18/05/2022
Red Head Road	Red Head	18/05/2022
Blackhead Road	Black Head	18/05/2022
Vincent Close	Diamond Beach	14/05/2022
Seascapes koala corridor	Red Head	12/02/2022
Seascapes koala corridor	Red Head	4/01/2022
Seascapes koala corridor	Red Head	14/12/2021
Blackhead Road, between Tallwoods Drive and Diamond Beach Road	Black Head	31/10/2021
Figtree Drive	Diamond Beach	27/10/2021
Black Head Lagoon Flora Reserve	Black Head	13/10/2021
Tallwoods Trail	Khappinghat NP	9/10/2021
Vincent Close	Diamond Beach	7/10/2021
Seascapes koala corridor	Red Head	8/09/2021
Seascapes koala corridor	Red Head	30/08/2021
Seascapes koala corridor	Red Head	30/08/2021
Chelmsbrook Drive	Rainbow Flat	20/08/2021
Diamond Beach Road	Red Head	3/08/2021
Figtree Drive	Diamond Beach	30/07/2021
Vincent Close	Diamond Beach	25/07/2021
Seascapes koala corridor	Red Head	9/06/2021
Panorama Drive	Diamond Beach	11/03/2021
Seascapes koala corridor	Red Head	1/02/2021
Panorama Drive	Diamond Beach	20/12/2020
Coastal View Drive	Tallwoods	22/09/2020
The Lakes Way	Rainbow Flat	17/09/2020
Vincent Close	Diamond Beach	22/06/2020
Blackhead Road, between Tallwoods Drive and Diamond Beach Road	Black Head	15/03/2020
Diamond Beach Road / Diamond Drive intersection	Diamond Beach	2/02/2020
Koorainghat Close	Rainbow Flat	15/01/2020
Hallidays Shores Retirement village	Black Head	8/01/2020
Diamond Beach Road	Diamond Beach	20/12/2019
The Lakes Way	Hallidays Point	16/12/2019
Near the intersection of Black Head Road and The Lakes Way	Hallidays Point	15/12/2019
Red Head Road, near Red Head Reserve	Red Head	14/12/2019
Seascapes koala corridor	Red Head	14/12/2019
The Grove	Tallwoods	13/12/2019
Stephenson Close	Rainbow Flat	18/11/2019
Figtree Drive	Diamond Beach	15/11/2019

Street Address	Locality	Date of Record
15th tee at Tallwoods golf course	Tallwoods	12/11/2019
Seascapes koala corridor	Red Head	22/10/2019
Woodlands Drive	Hallidays Point	18/10/2019
Pacific Highway	Rainbow Flat	11/10/2019
Diamond Beach Road	Diamond Beach	1/09/2019
Hallidays Shores	Black Head	13/08/2019
Eastern Valley Way	Tallwoods	18/07/2019
Lot 21 DP753207 The Lakes Way	Darawank	8/05/2019
Intersection of Kiwarrak Drive and Stephenson Close	Rainbow Flat	24/01/2019
Red Head Road	Red Head	10/01/2019
Mid-way along Old Soldiers Road	Diamond Beach	2/12/2018
The Pulpit	Tallwoods	22/11/2018
The Knoll	Tallwoods	15/09/2018
Augusta Point	Tallwoods	10/01/2018

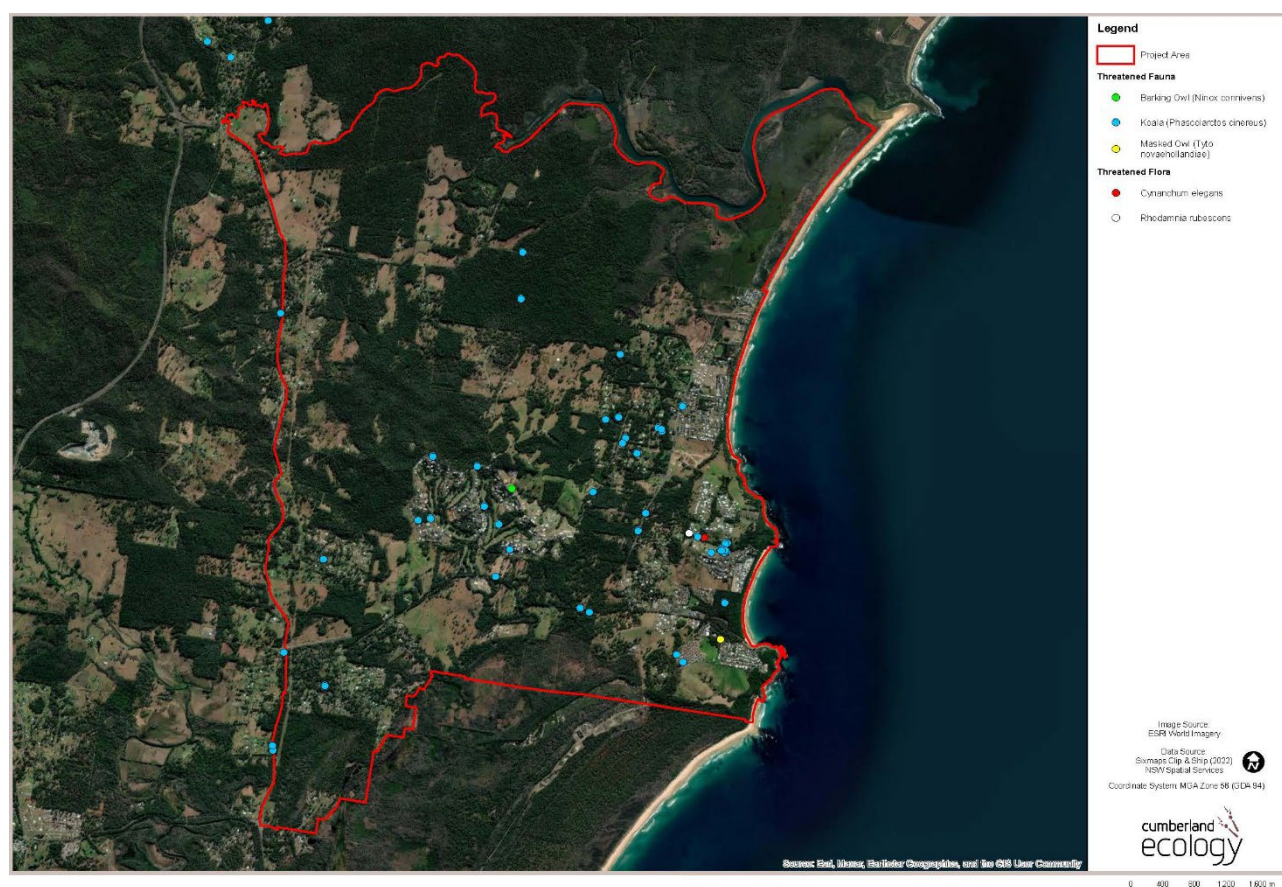


Figure 13. Community and MidCoast Council threatened species sightings

4.5.1.6. Studies of the Koala in the Khappinghat ARKS

In 2019, Biolink was engaged by MidCoast Council to investigate the distribution and abundance of koalas in the Kiwarra and Khappinghat ARKS. The study pre-dated the 2019 black summer bushfires.

The Hallidays Point project area forms about 25% of the 18,780-hectare Khappinghat ARKS (which extends from Old Bar to Darawank and west to the Pacific Highway).

Koalas in the Khappinghat ARKS have a degree of connectivity with the large Kiwarra ARKS population. Biolink (2019) considered the Khappinghat and Kiwarra ARKS as a single, large meta-population.

Key findings of Biolink (2019) were:

- According to the NSW Government, the Khappinghat ARKS has mostly moderate to high resilience, with key threats listed as fragmentation, disease, dog attack and vehicle strike, along with climate change, heat stress and wildfire;
- The available data recognised that a 4,500-hectare area extending from the Pacific Highway to Diamond Beach has a long history of koala occupation and comprises an area of **generational persistence** for koalas. Areas of generational persistence are those where there is evidence of koala records over three consecutive koala generations; thus, identifying the *"presence of longstanding historical and or contemporaneous source populations / koala hubs"*; and
- Koalas in Hallidays Point form part of the Wallabi Hub, which comprises the land enclosed by the Manning River in the north, Pacific Highway in the west and Black Head Road / Black Head in the south, and which includes parts of Kiwarra SF, Khappinghat NP. Biolink (2019) said that the Wallabi Hub comprises large areas of interconnected Secondary (Class B and C) koala habitat, with smaller areas of Primary and Secondary (Class A) koala habitat. The Hub was considered *"active"* at a high level of certainty. Biolink also mapped a koala hub at Darawank (from Tuncurry to Black Head Road) but considered that while this hub contained enough koala habitat, it had been impacted by recurrent fire over the preceding two decades and koalas there may have become *"functionally-extinct"*.

In 2022, Biolink investigated koala habitat connectivity in the Kiwarra and Khappinghat ARKS using a GAPCLoSR analyses. Biolink (2022) found, in summary:

- Parts of Khappinghat NP and surrounding rural land and an area west of Darawank National Park in the Hallidays Point project area comprise important habitat patches for koala connectivity;
- In the Hallidays Point project area, several least cost dispersal pathways for koalas were mapped, including:
 - A series of dispersal pathways in the west across The Lakes Way;
 - A dispersal pathway from Darawank NP west to Crown Land near Wards Road;
 - A north-south dispersal pathway in the west of Homestead Estate;
 - North-south dispersal pathways through Tallwoods Village and across Black Head Road, east of The Boulevard;

- A north-south dispersal pathway across Black Head Road, west of Diamond Beach Road;
- An east-west connection north of Red Head Road across Diamond Beach Road;
- North-south dispersal pathways from Belgravia Close through the Panorama Drive / Figtree Drive rural residential area (generally associated with Moor Creek) and across Old Soldiers Road and
- Dispersal pathways north of Tallwoods.

The map of dispersal pathways modelled in Biolink (2022) is provided below in **Plate 4**.

Plate 4 Modelled koala dispersal pathways in the Hallidays Point project area in Biolink (2022) - blue and orange lines



4.5.2. Updated Koala Habitat Map

An updated Koala Habitat Map has been prepared for the project area using a targeted methodology that incorporates tree species utilised within the locality.

The following steps were undertaken to determine the various koala habitat types:

- Identification of Primary and Secondary Koala Feed Trees;
- Identification of Highly Suitable Koala Habitat using PCTs;
- Classification of Highly Suitable Koala Habitat into subgroups;
- Identifying Koala Generation Persistence; and
- Identification of Core Koala Habitat.

4.5.2.1. Identification of Primary and Secondary Koala Feed Trees

Identification of the Koala Feed Trees (KFTs) within the locality was undertaken in conjunction with Council, with the suitable species from the project area and locality separated into Primary Koala Feed Trees (Class C1) and Koala Use Trees (Class C2). The KFTs and their assigned class is provided in **Table 8**.

Table 8 Primary and Secondary Koala Feed Trees

Species Scientific Name	Species Common Name	Class
<i>Eucalyptus amplifolia</i>	Cabbage Gum	C1
<i>Eucalyptus biturbinata</i>	Grey Gum	C1
<i>Eucalyptus canaliculata</i>	Large-fruited Grey Gum	C1
<i>Eucalyptus glaucina</i>	Slaty Red Gum	C1
<i>Eucalyptus globoidea</i>	White Stringybark	C1
<i>Eucalyptus grandis</i>	Flooded Gum	C1
<i>Eucalyptus largeana</i>	Craven Grey Box	C1
<i>Eucalyptus microcorys</i>	Tallowwood	C1
<i>Eucalyptus moluccana</i>	Grey Box	C1
<i>Eucalyptus propinqua</i>	Small-fruited Grey Gum	C1
<i>Eucalyptus punctata</i>	Grey Gum	C1
<i>Eucalyptus robusta</i>	Swamp Mahogany	C1
<i>Eucalyptus rudderi</i>	Rudder's Box	C1
<i>Eucalyptus saligna</i>	Sydney Blue Gum	C1
<i>Eucalyptus seeana</i>	Narrow-leaved Red Gum	C1
<i>Eucalyptus signata</i>	Scribbly Gum	C1
<i>Eucalyptus tereticornis</i>	Forest Red Gum	C1
<i>Corymbia gummifera</i>	Red Bloodwood	C2
<i>Corymbia intermedia</i>	Pink Bloodwood	C2
<i>Corymbia maculata</i>	Spotted Gum	C2
<i>Eucalyptus acmenioides</i>	White Mahogany	C2
<i>Eucalyptus carnea</i>	Thick-leaved Mahogany	C2

Species Scientific Name	Species Common Name	Class
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	C2
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark	C2
<i>Eucalyptus fibrosa</i>	Red Ironbark	C2
<i>Eucalyptus pilularis</i>	Blackbutt	C2
<i>Eucalyptus placita</i>	-	C2
<i>Eucalyptus resinifera</i>	Red Mahogany	C2
<i>Eucalyptus siderophloia</i>	Grey Ironbark	C2
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark	C2
<i>Eucalyptus umbra</i>	Broad-leaved White Mahogany	C2

4.5.2.2. Identification of Highly Suitable Koala Habitat using PCTs

This step involves the identification of the PCTs likely to support koalas based on the presence/absence of the significant KFT species identified for that region. Using the scientific description information for PCTs within the BioNet Vegetation Classification database, 'Highly Suitable Koala Habitat' can be derived based on the presence of 15% or greater cover of KFT's in each PCT. The 15% or greater cover is derived from the median cover score for species occurring within a PCT, as provided by the BioNet Vegetation Classification database.

The PCTs within the project area that met the criteria for 'Highly Suitable Koala Habitat' are provided in **Table 9**.

Table 9 Highly Suitable Koala Habitat PCTs based on 15% or greater cover of KFTs (C1 and C2)

PCT Number	PCT Name	Area (ha)
3160	Lower North Turpentine-Tallowwood-Grey Gum Forest	252.96
3174	Northern Turpentine-Brush Box Wet Forest	181.11
3244	Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	57.78
3248	Northern Blackbutt-Turpentine Shrub Forest	126.89
3249	Northern Bloodwood-Ironbark Moist Grassy Forest	936.87
3250	Northern Foothills Blackbutt Grassy Forest	322.71
3252	Northern Hinterland Grey Gum-Mahogany Grassy Forest	330.14
3436	Hunter Coast Sandy Creekflat Low Paperbark Scrub	61.05
3544	Coastal Sands Apple-Blackbutt Forest	31.70
3549	Lower North Sandplain Heathy Forest	9.26
4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest	78.82
4020	Coastal Creekflat Layered Grass-Sedge Swamp Forest	6.00
Total		2,395.30

4.5.2.3. Classification of Highly Suitable Koala Habitat into Class Subgroups

Utilising both the frequency of occurrence (frequency) and the median cover scores (cover) of KFT's as provided by the BioNet Vegetation Classification database for each PCT identified as Highly Suitable Koala Habitat, further classification of the Highly Suitable Koala Habitat into subgroups of 'Likely High Suitability Habitat', 'Likely Suitable Habitat', and 'Unlikely Habitat' was undertaken, with the details of the parameters as shown in **Table 10** below. The classification of the PCTs occurring within the project area is provided in **Table 11**.

Table 10 Koala habitat classes

Koala Habitat Classes	Frequency of Occurrence and Median Cover Scores in BioNet	Layer Class
	≥1 C1 KFT cover ≥3 and frequency ≥70%	1
Likely Highly Suitable Koala Habitat (LHSH)	≥1 C1 KFT cover ≥3 and frequency ≥50% and other C1 and C2 KFT listed	2
	≥2 C1 KFT cover ≥3 and frequency ≥20% and other C1 and C2 KFT listed	3
Likely Suitable Habitat (LSH)	≥1 C1 KFT cover ≥2 and frequency ≥20% and other C1 and C2 KFT listed	4
	≥3 C1 KFT listed (low cover and low frequency)	5
Unlikely Habitat (UL)	C1 and C2 KFT listed at low frequency	Additional site survey required

Table 11 PCT classification into koala habitat classes

PCT Number	PCT Name	Class Subgroup	Layer Class
3160	Lower North Turpentine-Tallowood-Grey Gum Forest	LHSH	1
3174	Northern Turpentine-Brush Box Wet Forest	LHSH	2
3244	Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	LHSH	3
3248	Northern Blackbutt-Turpentine Shrub Forest	LHSH	2
3249	Northern Bloodwood-Ironbark Moist Grassy Forest	LHSH	2
3250	Northern Foothills Blackbutt Grassy Forest	LHSH	1
3252	Northern Hinterland Grey Gum-Mahogany Grassy Forest	LHSH	1
3436	Hunter Coast Sandy Creekflat Low Paperbark Scrub	LSH	5
3544	Coastal Sands Apple-Blackbutt Forest	LSH	5
3549	Lower North Sandplain Heathy Forest	LHSH	2
4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest	LHSH	1
4020	Coastal Creekflat Layered Grass-Sedge Swamp Forest	LHSH	2

4.5.2.4. Identifying Koala Generation Persistence

The continued use over time of an area by a koala population is known as 'Generational Persistence' (GP). This can be determined by chronologically separating koala records within the NSW BioNet into the last 3 koala generations, each over a 6-year period. By applying a 2.5 km grid (625ha grid cells) over the study area, a spatial assessment of koala records within the present and past two koala generational periods (total of last 18 years) was undertaken to demonstrate where koala presence occurs both historically and in the last 6 years.

Areas are assumed to be occupied by a koala population where grid cells demonstrate GP based on the presence of both historical and present records.

This meant dividing the project area up into the 625-hectares grid cells and then separating the records based on age into these categories:

- 2017 – 2022;
- 2011 – 2016;
- 2005 – 2010; and
- 2004 and older.

The PCTs determined as Highly Suitable Koala Habitat and the koala records divided by age are presented in **Figure 14**.

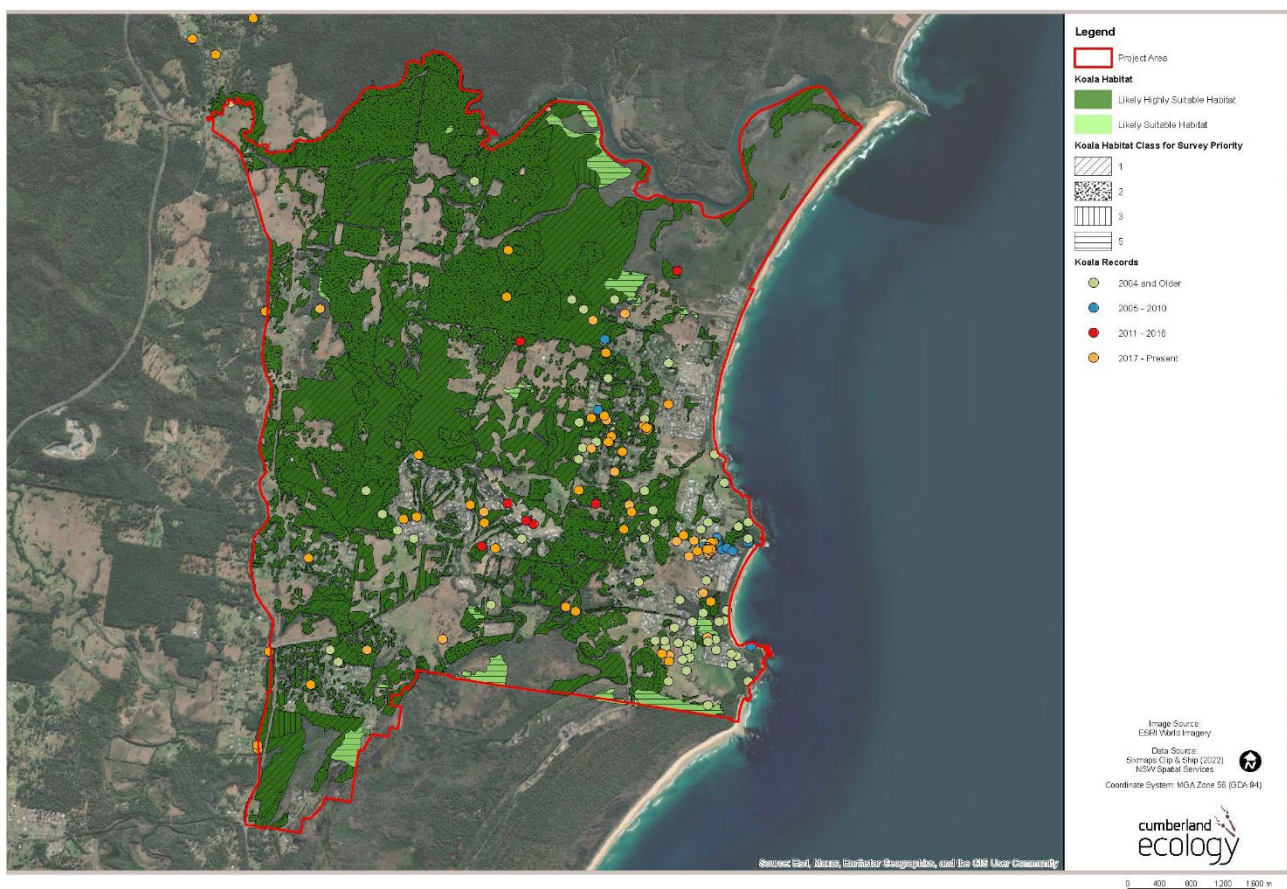


Figure 14. Koala habitat mapping in the project area (and koala records)

4.5.2.5. Identification of Core Koala Habitat

Following this process, 'Core Koala Habitat' was determined by identifying the PCTs that met the definition of 'Highly Suitable Koala Habitat' or 'Likely Suitable Koala Habitat' within those grid cells that met GP criteria. The Core Koala Habitat identified in the project area is shown in **Figure 15**.

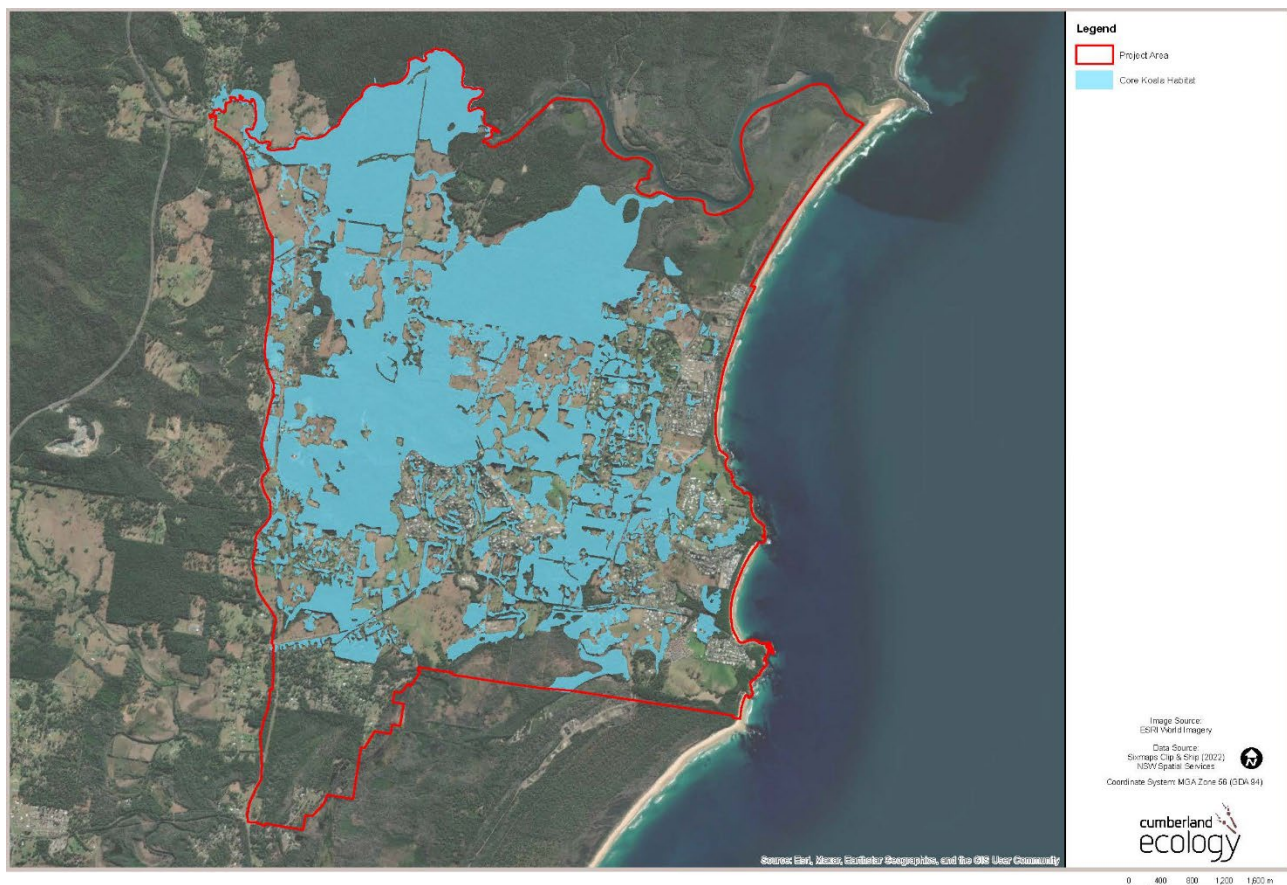


Figure 15. Core Koala Habitat

4.5.3. Synthesis of Knowledge of Koalas in Hallidays Point

The investigations of koalas in the Hallidays Point project area has determined (in summary):

- Koalas are present across the Hallidays Point project area in dry forest, wet forest, woodland, rainforest, modified and sometimes urban habitats. They do not appear to be present in estuarine wetlands, treeless freshwater wetlands, and dunal shrublands / heaths;
- Koalas are an endangered species in NSW and Australia, and the Hallidays Point locality populations are of (at least) regional significance, if not state significance. Koalas are functionally extant and there is evidence of successful breeding and stable social structures / territories. Koalas in the project area exhibit generational persistence;
- Areas of known importance for koalas based on contemporary data include:
 - A coastal south-eastern node in Black Head Flora Reserve, Red Head reserve, Red Head koala corridor;

- A dry forest node east of Tallwoods;
- A central eastern node around the Panorama Drive / Fig Tree Drive rural residential estate;
- A Tallwoods node;
- A Khappinghat NP node; and
- A Homestead Estate node.
- Areas of uncertainty, where contemporary data is limited includes:
 - The status of the population of historical value in the Frogalla Swamp area is poorly known. This area was heavily impacted by bushfire of moderate to high intensity in 2019. A drone with a thermal camera survey conducted in 2024 identified a mother and joey in this Darawank NP habitat, demonstrating that koalas remain in the area and are breeding;
 - The dry and wet forest remnant to the west and north-west of Tallwoods is expected to be a significant area of habitat based on the large patch size, connectedness and availability of preferred food tree species (such as Tallowwood and Grey Gums), but data availability on koala populations is presently limited.
- Preserving, reinstating or enhancing connections between the known and likely koala nodes is critical to long-term koala population viability and persistence. The accessibility of safe connections between koala habitat nodes has declined in recent years. As an example, traditional connections to Black Head Flora Reserve to the south-west have been reduced by recent residential development. Approved but un-built developments will further deplete habitat and connecting areas for koalas in this area.
- Local roads where koala road mortalities have been recently observed or where there have been several koalas observed in near roadside trees or observations of koalas crossing roads include:
 - The Lakes Way, from Blackhead Road to Timber Tops Drive (east – west koala movement);
 - The Lakes Way, from Old Soldiers Road to Talabah Close (east – west koala movement);
 - Blackhead Road, from The Boulevard to Diamond Beach Road (north – south koala movement); and
 - Diamond Beach Road, from Red Head Road to Panorama Drive (east – west koala movement).
 - Just outside the project area, the Pacific Highway, near the Lakes Way exit, just outside the north-west corner of the project area and Failford Road have also had several koala road mortality incidents.
- There is no data on the numbers of koalas or the density of koalas (the number of animals per hectare) within the Hallidays Point project area;
- Local extinctions of koalas have occurred in similar landscapes and contexts to that of Hallidays Point, such as the Iluka koala population. Preserving koalas will rely on proactive, deliberate conservation actions;

- Koala habitat mapping demonstrates that a large proportion of the residual native vegetation of the project area comprises likely highly-suitable or likely suitable habitat for koalas and that by analysing habitat suitability, with records, large parts of the project area comprise habitat that would meet the definition of "core habitat" for koalas;
- Koalas in the Hallidays Point area apparently exhibit a higher than typical presentation of the clinical signs of *Chlamydia* (either ocular or urogenital). This may be an indicator of the degree to which this population is experiencing stress. Measurement of cortisol levels in the blood of koalas in other locations demonstrates that key stress factors include loss of habitat, proximity of roads, presence of dogs, urbanisation and bushfire.

Reducing the stress that koalas experience in this landscape is an important element in the conservation / recovery of this species. Stress can be reduced by the creation and management of safe spaces for koalas, where threatening processes are managed and where habitat is retained and protected. Koalas in Care (Taree) Inc. is the local koala rescue and care provider;

- General threatening processes that affect koalas in the project area primarily include loss and modification of habitat, fragmentation, disease, vehicle strike, and high-intensity bushfire. The contribution of threats associated with domestic dog attack, cattle / horse attack and heat stress / climate change are not well understood. Stress (and its influence on disease prevalence) is a locally significant threat to koalas; and
- To conserve koalas in the Hallidays Point project area, there is a need to enhance and conserve koala habitat (including occupied and unoccupied suitable habitat), create new habitat and corridors for movement, manage the factors that are threatening adult survival and juvenile recruitment (cars, dogs, disease, fire, etc) and manage stress.
- Importantly, koalas are an umbrella species. The conservation of koalas in the landscape has cascading positive effects for the protection of other species and biodiversity generally.

4.6. Priority Umbrella Species

Priority umbrella species have been identified as threatened fauna species that occur within the locality and which can be adopted as surrogates to inform the wider biodiversity conservation assessment for the locality under this Local Conservation Action Plan. The Koala is a priority umbrella species and has been discussed in **Section 4.5** of this report.

The other priority umbrella species in this Plan are:

- Squirrel Glider;
- Brush-tailed Phascogale; and
- Glossy Black-Cockatoo.

The available local records for these priority umbrella species have been examined and are discussed below. These species have been considered in the conservation action planning process in **Chapter 9** of this report.

4.6.1. Squirrel Glider

A total of 12 records of the Squirrel Glider occurs within the locality based on the BioNet Atlas database of records collected between years 1980 – 2022. An analysis of these records has been undertaken by categorising the age of the records to visualise the number and geographical location of the records appearing over time, as shown in **Figure 16**. The resulting number of records per timespan is provided in **Table 12**.

Table 12 BioNet Atlas Squirrel Glider records

Species	Age of Records	Number of Records
Squirrel Glider	1980 - 1990	0
	1991 - 1995	0
	1996 - 2000	6
	2001 - 2005	2
	2006 - 2010	0
	2011 - 2015	0
	2016 - 2020	1
	2021 - 2022	3
Total		12



Figure 16. BioNet Squirrel Glider records within the project area

This species has also been observed as part of biodiversity impact assessments and opportunistic sightings, which are not lodged with BioNet.

EcoPro (1997) reported Squirrel Gliders from areas of Diamond Beach village, Khappinghat NP, Black Head Lagoon / Flora Reserve, on the edge of Frogalla Swamp and the forests between Red Head and Tallwoods.

The Squirrel Glider records are variable over time, with few records available to indicate consistent trends.

Most of the records occur within the southern portion of the project area and the species appears to occupy a variety of habitat types in the locality (including but not limited to dry sclerophyll forest vegetation in the north-west and littoral rainforest vegetation in the south-east).

For squirrel gliders to persist in a locality or sub-region, they need the following habitat elements:

- Adequately large patches of dry eucalypt forest, wet eucalypt forest, swamp sclerophyll forest and woodland habitat, with opportunities for safe dispersal and recolonization (corridors);
- The minimum habitat patch size that will be occupied by squirrel gliders is strongly influenced by habitat quality. Squirrel gliders can occupy small patches if habitat quality is high, and much larger habitat patch sizes in lower quality habitat. However, the probability of a patch being occupied by squirrel gliders decreases with remnant size. Modelling predicts that density and occurrence begins to decline when patch size falls below 100-ha depending on time since isolation, remnant shape, and distance to nearby habitat. Habitat patches of less than 4-ha are considered unsuitable for permanent occupancy;
- Owls, goannas, cats and foxes prey on squirrel gliders and predation is likely to cause periodic extinction in small patches. Cat predation is expected to be a problem near urban areas. Predation rates must be below critical thresholds for populations to thrive;
- High intensity fires should be excluded from the habitat of this species because it can cause direct mortality of individuals, cause a decreased availability of tree hollows, expose animals to predation and impact the short-term availability of food;
- High population density is only achievable in forested habitats with:
 - abundant hollow-bearing trees (at least 4 habitat trees per hectare) including hollow-bearing dead trees. Tree hollows utilised can have entrance sizes of 2.5 to 12-cm in diameter. Hollows with entrances less than 5-cm in diameter are used most frequently because gliders select these small entrances to exclude competitors and predators. Most foraging is within about 400 m of dens; and
 - abundant food trees and foraging sites, that include the availability of nectar from flowers, pollen, sugary plant insect exudates, invertebrates, sap and Acacia gum. High eucalypt diversity (nectar flow seasonal reliability), winter flowering eucalypts, high nectar producing understorey shrubs (such as banksias), over-mature or senescent trees (arthropods) and / or winter gum producing acacias are important elements of habitat. Red and Pink Bloodwood trees (*Corymbia gummifera* and *C. intermedia*) are important in providing sap.

4.6.2. Brush-tailed Phascogale

A total of 12 records of the Brush-tailed Phascogale occurs within the locality based on the BioNet Atlas records collected between years 1980 – mid 2022. An analysis of these records has been undertaken by categorising the age of the records to visualise the number and geographical location of the records appearing over time, as shown in **Figure 17**. The resulting number of records per timespan is provided in **Table 13**.

Table 13 BioNet Atlas Brush-tailed Phascogale records

Species	Age of Records	Number of Records
Brush-tailed Phascogale	1980 - 1990	0
	1991 - 1995	0
	1996 - 2000	6
	2001 - 2005	5
	2006 - 2010	0
	2011 - 2015	0
	2016 - 2020	0
	2021 - 2022	1
Total		12



Figure 17. BioNet Brush-tailed Phascogale records within the project area

This species has been observed as part of biodiversity impact assessments and opportunistic sightings. On land to the east of the end of Chelmsbrook Drive, a colony of Brush-tailed Phascogales was reported denning in a standing dead tree. This colony was discovered when the tree was felled for firewood.

The Brush-tailed Phascogale records are variable over time. Most of the records occur in the centre of the locality in areas of both wet sclerophyll forest and dry sclerophyll forest; however, one record from the south-east appears in littoral rainforest. It is noted the species has been infrequently recorded in the recent past, only one (1) record of the species appearing post 2005, with 11 of the 12 records occurring between the decade of years 1996 – 2005. A significant aggregation of the species was reported to be present in the dry forest and woodland habitats north of Tallwoods (Brett Campbell, pers. comm.).

For brush-tailed phascogales to persist in a locality or sub-region, they need the following habitat elements:

- Adequately large patches of dry eucalypt forest and woodland as well as heath with emergent trees, with opportunities for safe dispersal and recolonization (corridors);
- The minimum habitat patch size that will be occupied by brush-tailed phascogales is not well described;
- Owls, goannas, cats and foxes prey on brush-tailed phascogales and predation is likely to cause periodic extinction in small patches. As for squirrel gliders, cat predation is expected to be a problem near urban areas. Predation rates must be below critical thresholds for populations to thrive;
- High intensity fires should be excluded from the habitat of this species because it can cause mortality of individuals, cause a decreased availability of tree hollows, expose animals to predation and impact the short-term availability of food; and
- High population density is only achievable in forested habitats with:
 - abundant hollow-bearing trees (at least 4 habitat trees per hectare) including hollow-bearing dead trees. Tree hollows utilised can have entrance sizes of 2.5 to 4-cm in diameter,
 - abundant foraging sites, that include the availability of arthropods, as well as other invertebrates, nectar and sometimes small vertebrates. Large, rough-barked eucalypts (over 25cm trunk diameter) and particularly over-mature or senescent trees are particularly valuable.

4.6.3. Glossy Black-Cockatoo

A total of ten records of the Glossy Black-Cockatoo occurs within the locality based on the BioNet Atlas database of records collected between years 1980 – mid 2022. An analysis of these records has been undertaken by categorising the age of the records to visualise the number and geographical location of the records appearing over time, as shown in **Figure 18**.

The resulting number of records per timespan is provided in **Table 14**.

Species	Age of Records	Number of Records
Glossy Black-Cockatoo	1980 - 1990	0
	1991 - 1995	0
	1996 - 2000	5
	2001 - 2005	2
	2006 - 2010	0
	2011 - 2015	2
	2016 - 2020	0
	2021 - 2022	1
	Total	10

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The Glossy Black-Cockatoo records are variable over time. Most of the records occur in the centre of the locality in areas of predominantly wet sclerophyll forest; however, one record is from the eastern coastal area of Diamond Beach that includes fragments of wet sclerophyll forest and swamp oak forest currently; however, the record is from between 1996 – 2000 and historical aerial imagery available through NearMap dating back to year 2011 shows this area include a much larger tract of vegetation at that time.

For Glossy Black-Cockatoos to persist in a locality or sub-region, they need the following habitat elements:

- Very large patches of dry to wet eucalypt forest and woodland;
- High intensity fires should be excluded from the habitat of this species because it can cause a decreased availability of tree hollows, and impact the short to medium-term availability of food;
- Forested habitats with abundant fruiting *Allocasuarina torulosa* and / or *Allocasuarina littoralis*; and
- Breeding requires the availability of very large hollows in standing living and dead trees; with a foraging resource in the surrounding habitat.

5. Conservation Reserves

5.1. Public Reserves

The Hallidays Point area contains public conservation reserves, including National Parks, natural area Council reserves and Crown Land Reserves. These areas form the current foundation of biodiversity conservation in the project area. They are described below.

5.1.1. National Parks

5.1.1.1. Khappinghat National Park and Khappinghat Nature Reserve

Khappinghat NP and Khappinghat NR combined occupies 637-hectares within the northern portion of the project area and (with Saltwater NP) extends beyond the northern boundary to cover a total area of 3,547 hectares. Reservation of the National Park and Nature Reserve has occurred progressively since 1993. The reserve includes a range of ecosystems, and records of threatened flora and fauna species. It is managed under a Plan of Management (NSW Government 2019). A large portion of the reserve was transferred from State Forest in 1999 as part of the North East Regional Forest Agreement. These portions have had a history of forestry use.

The name 'Khappinghat' may be a derivation of words from the Gattang language, which refers to 'having honey' (NSW Government 2019).

Khappinghat NP is on a relatively flat coastal plain extending from the mean high tide mark on Saltwater Beach and Wallabi Beach to the low hills reaching a maximum elevation of over 100 metres above sea level east of the Pacific Highway. This topography includes a coastal headland, beach dunes and swales, the Khappinghat Creek estuary, tidal flats, stream channels, drainage depressions, valley flats and hills.

Ecosystems that dominate the higher elevation areas include dry sclerophyll forests, particularly in the southern part of the national park. Wet sclerophyll forests occur in protected gullies in the west of the park and in other sheltered, relatively free-draining sites on the coastal plain. Wet and dry forests contain a diversity of eucalypt and canopy species, including *Eucalyptus microcorys* (Tallowwood), *Eucalyptus pilularis* (Blackbutt), *Eucalyptus propinqua* (Small-fruited Grey Gum) and *Corymbia intermedia* (Pink Bloodwood).

Forested wetland vegetation communities surround Khappinghat Creek and its tributaries and include swamp sclerophyll forests dominated by Swamp Mahogany (*Eucalyptus robusta*). Mangrove woodland, rush-dominated wetlands and saltmarsh complexes occur in the national park adjacent to Khappinghat Creek. Saltmarsh areas include areas of sedges, rushes and tussock grasslands dominated by bare twig-rush (*Baumea juncea*).

The large patch size of Khappinghat NP and its diversity of ecosystems represent a key conservation area within the locality and offers significant habitat value for a range of threatened and non-threatened flora and fauna species. The Plan of Management for the reserve identifies four threatened ecological communities, three threatened plant species and 16 threatened animal species.

Khappinghat NP is also an area of considerable cultural significance. There are stone artefact scatters on the shores of Khappinghat Creek. This area has been used by Aboriginal people for thousands of years.

5.1.1.2. Darawank National Park

Darawank NP occupies approximately 29-hectares of land within the southern part of the project area. It extends beyond the southern boundary of the project area to cover a total area of 1,191-hectares. Darawank NP includes a diversity of ecosystems; particularly, high conservation value wetlands and coastal vegetation communities. The eastern portion of the reserve was formerly crown land and was gazetted as a nature reserve in March 1999. The western portion of the reserve was compiled under a Memorandum of Understanding between the former Great Lakes Council and the NSW National Parks and Wildlife Service, as part of restoring and conserving degraded coastal floodplain wetlands and repairing impacts associated with drained coastal acid sulfate soil landscapes.

Vegetation communities present include littoral rainforests and coastal heaths along the coastline and wet sclerophyll forests, dry sclerophyll forests, swamp sclerophyll forests and open freshwater wetlands / rushlands further inland.

Darawank NP and its significant wetlands protect habitat for numerous threatened shorebird species, including the Pied Oystercatcher (*Haematopus longirostris*). In addition, the reserve contains habitat for species such as the Wallum Froglet (*Crinia tinnula*), Black Bittern (*Ixobrychus flavicollis*), and Eastern Grass Owl (*Tyto longimembris*), among others.

The large patch size of Darawank NP and its' diversity of wetland and coastal ecosystems represent a second key conservation area within the locality and offers significant habitat value for a range of threatened and non-threatened flora and fauna species.

There is evidence of Aboriginal occupation by way of artefacts such as earth mounds (middens), scarred trees and ceremonial areas and it is likely that the freshwater wetlands provided a significant resource for Indigenous groups in the area.

5.1.2. Council Land and Council-managed Crown Land

Several MidCoast Council Reserves occur throughout the locality. These include reserves that provide important ecological 'stepping-stone' habitats, particularly along the eastern coastline and beyond the southern project area boundary, including:

- Seascapes koala corridor; and
- Hallidays Point wastewater treatment plant perimeter lands.

The main Council natural area reserves are listed in **Table 15** and are mapped on **Figure 19**.

Several areas of Crown Land managed by Council occur throughout the locality. These areas include reserves that provide important ecological habitats, particularly along the eastern coastline, including:

- Black Head Lagoon and Flora Reserve;
- Black Head Headland Reserve;
- Black Head Beach Reserve;

- Read Head and Shelley Beach Reserve; and
- Diamond Beach Reserve.

Council Reserves and Council-managed Crown Land comprise about 173 hectares of the project area.

5.1.3. Planning Agreements

Planning Agreements can be used to direct conservation actions. In this context, such agreements are usually established between a developer and Council. They set out commitments of a development that are used to improve environmental outcomes or offset residual impacts, and can include actions associated with habitat restoration, revegetation, conservation or dedication. MidCoast Council maintains a Register of Planning Agreements on its website.

One executed Planning Agreements delivered the acquisition of an area of native vegetation and habitat at North Tuncurry comprising 32.4-hectares and the dedication of this land to the NPWS for eventual gazettal as a National Park to offset vegetation clearing for the Edgewater Shores development at Diamond Beach.

Several Planning Agreements relating to the protection or conservation of natural areas or habitat currently apply to land within the Hallidays Point project area: These include Planning Agreements for land at:

- Tallwoods Eastern Lands (dedication, conservation, revegetation and restoration of certain environmentally sensitive land);
- 391 Diamond Beach Road (conservation and restoration of certain environmentally sensitive land); and
- 210 Diamond Beach Road (dedication, conservation, revegetation and restoration of certain environmentally sensitive land).

These Planning Agreements achieve the conservation and protection of approximately 19.5 hectares of land.

5.2. Areas of Existing Conservation

Presently, there is about 879.5 hectares of existing public and private permanently conserved land in the Hallidays Point project area. This comprises about 20% of the project area. These areas are described in the summary table below.

Table 15 Areas of existing conservation

Conservation Type	Name or Lot / DP	Area (ha)	Land Manager
Public Reserves	Darawank National Park (part)	29	NPWS
	Khappinghat National Park (part)	637	NPWS
	Hallidays Point Wastewater Treatment Plant perimeter lands	51	MCC
	Black Head Lagoon and Flora Reserve (and natural parts of Wylie Breckenridge Park)	22	MCC
	Black Head Headland and Back Beach Reserves	19	MCC
	Black Head Beach (Coastal) Reserve	9	MCC
	Oakview Drive Council Reserve	16	MCC
	Red Head (and Shelley Beach) Reserve	18	MCC
	Seascope Koala Corridor	6	MCC
	Seascope Reserves	23	MCC
	Diamond Beach (Coastal) Reserve	10	MCC
	111 Black Head Road Council Land	2	MCC
	East Tallwoods Reservoir natural area	1	MCC
	Red Head Reservoir natural area	1	MCC
	Golden Drive Reserve, Diamond Beach	1	MCC
	Diamond Beach Park natural area	1	MCC
	Anchorage Way Reserve, Diamond Beach	7	MCC
	Edgewater Drive Reserve, Diamond Beach	1	MCC
	Diamond Beach playing field natural area	1	MCC
Planning Agreements	Tallwoods Eastern Lands – C2 zoned lands	17	Private
	391 Diamond Beach Road – C2 zoned lands	0.5	Private
	210 Diamond Beach Road – C2 and RE1 zoned lands	7	Private
Private Conservation	-	0	-

Key: NPWS=National Parks and Wildlife Service, MCC=MidCoast Council

There are no areas of private conservation in the project area at the present time under permanent, on-title conservation instruments such as Biodiversity Stewardship Site Agreements or BCT Conservation Agreements.

Several landholders are part of the voluntary Land for Wildlife and Humane Society International Wildlife Land Trust program. Several current landholders have expressed an interest in applying for permanent conservation instruments over their land.

5.3. C2 - Environmental Conservation Zoned Land

Within the project area, there are areas that are currently zoned for Environmental Conservation (C2) under the Greater Taree City Local Environmental Plan (2010). This zone applies to areas that contain high ecological, scientific, cultural or aesthetic values. The objectives of the zone are to protect those natural and cultural resources and to prevent development that could destroy, damage or otherwise have an adverse effect on those values. Presently, there is about 480-hectares of land within the project area that is zoned C2 – Environmental Conservation under the Greater Taree LEP. Some of these overlap with existing conserved or reserved land.

C2-zoned areas are shown in **Figure 19**.

They provide important ‘stepping-stone’ habitats and the zoning does reflect a degree of conservation management through the regulation of land uses. However, C2 zoning typically does not facilitate active conservation. C2 zoning is the highest level of conservation zoning for privately-owned lands and regulates the range of activities and developments that are permitted, permitted only with consent or which are prohibited on the applying land.

5.4. Statement on Existing Conservation

This study has determined that existing conservation across Hallidays Point is not comprehensive, adequate or representative. It is below the scientific threshold area expected to conserve threatened species, threatened ecological communities, important natural assets and local biodiversity values (according to current scientific consensus, a minimum viable conservation percentage is often considered to be around 30% of a land area, as reflected in the Kunming-Montreal Global Biodiversity Framework). Additions to actively managed conservation land in the future are needed. It would be positive if permanently conserved areas within the project area was increased to at least 30% of the land area within the next 5-years.

In recognising the quality of the conservation system in the project area considerations are required for enhanced comprehensiveness, adequacy and representativeness. These terms are discussed below:

- *Comprehensiveness* relates to the conservation of the range of vegetation communities and habitats. Effective conservation schemes sample, to the fullest possible extent, the types of vegetation communities present in a landscape. Vegetation is often used as a surrogate for biodiversity and sampling all the vegetation communities in a locality is thought likely to sample the widest range of native plants and animals within that vegetation.
- *Adequacy* relates to conservation that maintains ecological viability and the integrity of populations, species and communities. Other than through population viability assessments for target species, there is typically no precise basis for determining *adequacy* criteria. This is explained in Commonwealth of Australia (1997): *“The general rule is that the chances of long-term survival increase with increased proportions of populations or forest ecosystems reserved and appropriately managed. The degree of risk varies with different species (or suites of species) and with the degree of modification of the contiguous native forest beyond reserves. Most estimates show that the risk of loss is highest where only a small percentage of the distribution of the community or species is reserved and adjoining unreserved forest is cleared or significantly modified.”*

Replication across the range of geographic, environmental and biotic domains must also be considered when determining the adequacy of the reserve system. Replication is essentially "insurance" against the loss of natural values due to stochastic events (such as fire) which may dramatically reset successional processes and reduce or entirely remove key habitats. Implicit in the maintenance of biodiversity is the requirement to sustain ecological processes and functions and provide for the maintenance of natural patterns of speciation and extinction... Factors operating within the surrounding landscape that are particularly relevant to determining the adequacy of the reserve system are threatening processes (e.g., land clearing and disease), and the conservation strategies adopted in forests outside those areas reserved specifically for conservation"

- *Representativeness* relates to how well the diversity of vegetation or ecological communities are sampled in the conservation system. This includes whether genetic diversity is included and preserved to guard against pressures such as in-breeding.

The existing conservation areas do not represent enough occurrences of several mapped vegetation community types, including but not limited to grey gum / tallowwood dry sclerophyll forest, grey gum / tallowwood wet sclerophyll forest, and ironbark / grey gum / mahogany / stringybark dry sclerophyll forest.

Existing conservation reserves are mapped in **Figure 19**.

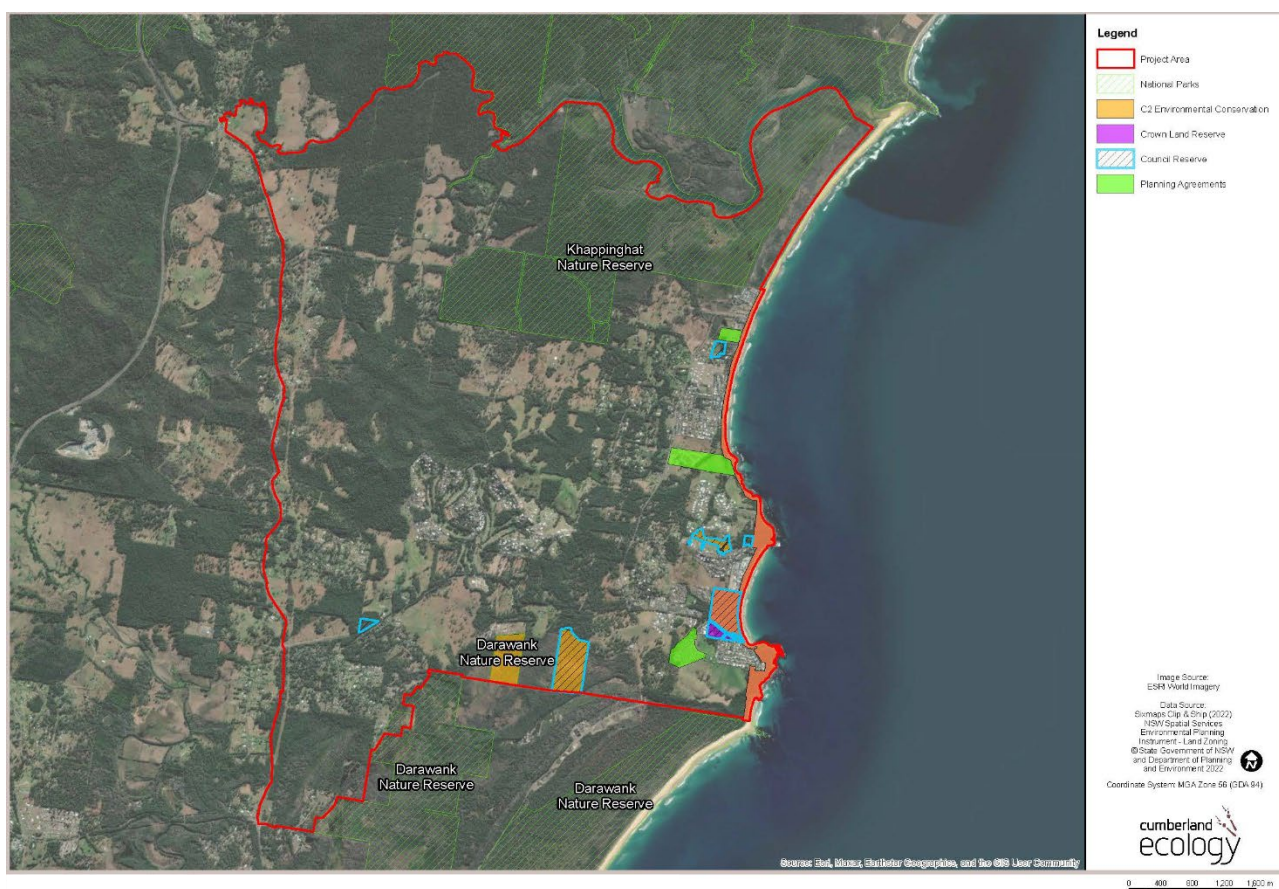


Figure 19. Areas of existing conservation

6. Areas of Development

6.1. Approved Developments

Poorly planned and / or executed development can constitute a major threat to biodiversity. Development can have direct negative impacts, through the removal of native vegetation, corridors and wildlife habitat, as well as nexused, indirect or related impacts. These secondary impacts can include edge-related impacts and disturbances (noise and light), increased populations of uncontrolled domestic dogs and cats, increased traffic representing escalated roadkill pressures, pollution, and the alteration of hydrological patterns. Future development has the potential to extend or worsen the current state of biodiversity in this project area.

Existing development approvals (but which are not yet constructed) and future urban area releases will continue to facilitate development and growth in the Hallidays Point area.

Ensuring that future growth occurs contextually within the Hallidays Point area is critical. Thoughtful growth involves respecting and reflecting the coastal character, recognising housing (and development) needs, establishing balanced growth, and integrating corridors and natural areas.

Future development can be categorised in two ways; in-fill growth or greenfield growth. These different categories require different environmental considerations.

The locations listed in **Table 16** have existing development approvals, and potential physical commencement however, no significant works have been undertaken at the time of this Strategy. Pending the development proceeding (which may require satisfaction of pre-development or pre-construction conditions, where applicable), these developments may come online. These areas are unlikely to be available for fulfilling conservation strategies in the future and may be associated with a degree of further biodiversity loss and impact.

Table 16 Existing development approvals (not yet constructed)

Address	Development Type
166 Blackhead Road, Hallidays Point	Seniors Living Development
Lot 612 DP1160096 Blackhead Road, Tallwoods	Residential Subdivision
296 Blackhead Road, Tallwoods	Mixed Use
323 Blackhead Road, Tallwoods	Residential Subdivision
361 Blackhead Road, Black Head	Seniors Living Development
245 Tallwood Drive, Tallwoods	Rural Residential Subdivision
14 Seabreeze Parade, Black Head	Residential Subdivision
21 Greenview Drive, Black Head	Residential Subdivision
214 Diamond Beach Road, Diamond Beach	Residential Subdivision

There has been local discussion in respect to so-called “zombie” developments – being loosely described as developments that have gained a historic consent and which have been commenced but not constructed. They may have obtained a consent at a time when biodiversity matters were not as well understood or regulated in

the consent process. These developments benefit from a lawful consent and precluding or rectifying these are generally impractical, unfeasible or not possible, given the costs to do so, and the NSW legislation that applies.

6.2. Development Zoned Lands

Other than existing development approvals, there is also land that is zoned for residential or large-lot residential development, but for which no development consent has been issued, and which contain native vegetation, modified native vegetation and / or important buffers or linkage habitats.

Land zoning for a development land use (such as residential zoned land) does not guarantee developmental outcomes. The land zoning permits the making of a development application for certain activities. These development applications are then subject to a merits assessment under the applying planning and environmental legislation. The outcomes of the merits assessment will define the type, nature and extent of approved development on that undeveloped but zoned land.

Zoned residential, commercial, industrial or tourist land that is not yet approved for development occurs within the Hallidays Point project area, inclusive of (but not confined to) land at:

- 52 High Street, Black Head;
- 303 Blackhead Road, Tallwoods (DA application lodged 2022 - DA2022/0665);
- Lot 25 DP 1191907 Coastal View Drive, Tallwoods (DA application lodged 2024 – DA2024/0559); and
- 70 Coastal View Drive, Tallwoods.

Figure 20 shows the areas that are currently zoned for development but not yet developed.

6.3. Urban Release Areas

Urban Release Areas (URAs) have been identified in the project area in the Hunter Regional Plan 2041. The MidCoast Urban Release Areas Report – July 2021 also identifies the URAs within the project area. Several URAs have been identified.

The existence of URAs does not guarantee a developmental outcome. They identify areas in which rezoning applications may be received. The process of rezoning applications (planning proposals) is established with the NSW and MidCoast Council planning frameworks and includes detailed evaluations of constraints and opportunities. Biodiversity is usually a major consideration and potential constraint, together with issues such as water quality / quantity management, bushfire, transport, cultural heritage, servicing, and other matters. Rezoning is an effective planning process to resolve development and conservation outcomes for landholdings and neighbourhoods. Local URAs are likely to be the subject of rezoning applications in the short (1-5 years), medium (6-10 years) and long terms (10+ years). URAs will be progressively reviewed and updated, as new information is compiled.

The adopted Urban Release Areas of the locality are shown in **Figure 20**.

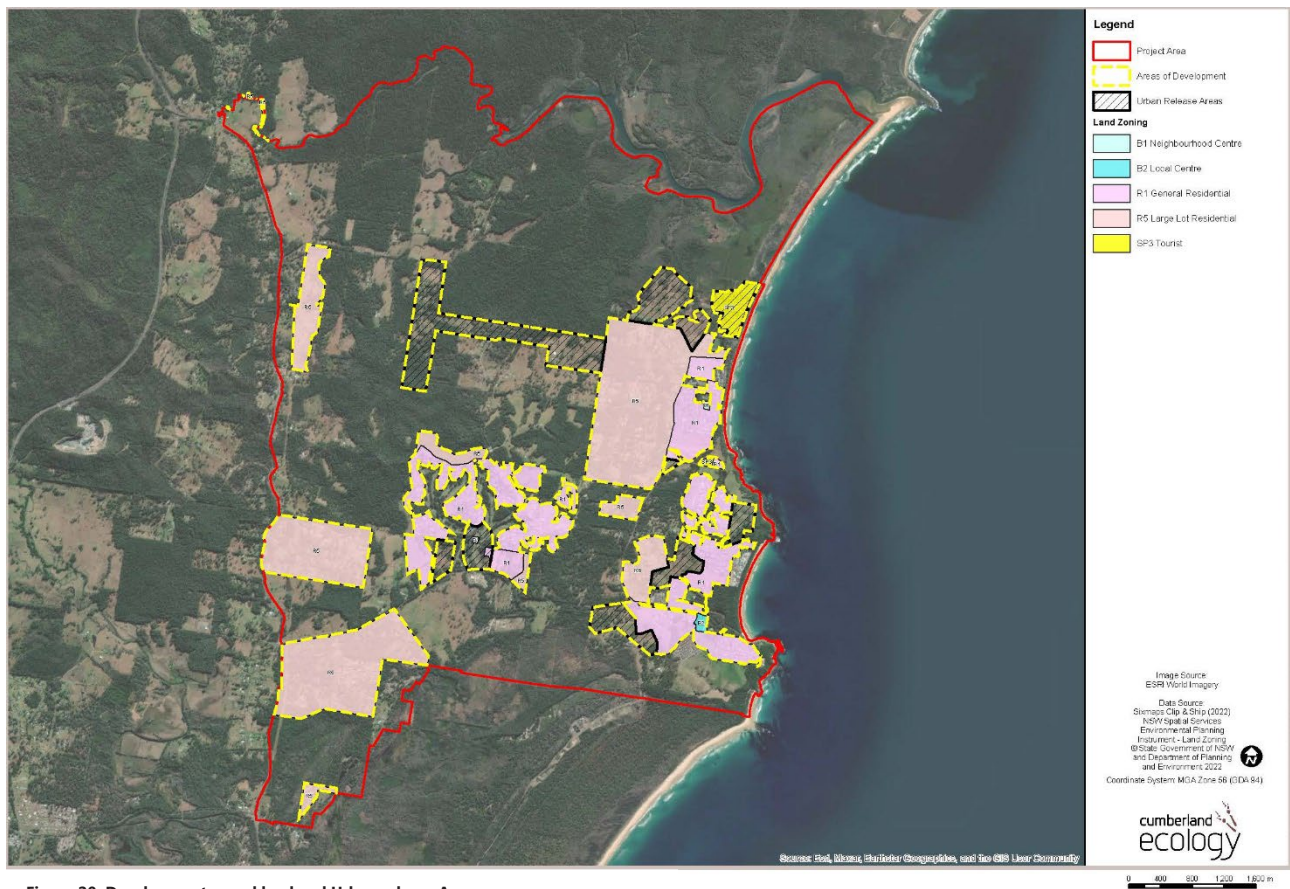


Figure 20. Development zoned land and Urban release Areas

7. Wildlife Surveys for Priority Fauna

7.1. Methodology

7.1.1. Wildlife Surveys for Priority Fauna

Wildlife surveys throughout the project area were completed in June – September 2022 targeting the priority umbrella species of the Koala, Squirrel Glider, Brush-tailed Phascogale and Glossy Black-cockatoo. A total of 25 survey sites were established throughout the project area, and MidCoast Council established a further two additional sites for placement of motion sensor cameras during the survey period (as detailed in **Section 7.1.1.1**) (**Figure 21**).

Fauna survey methodologies employed included the following:

- Motion sensor cameras to target the Squirrel Glider and Brush-tailed Phascogale;
- Koala detection dog surveys to target the Koala;
- Nocturnal spotlighting and call playback to target the Koala, Squirrel Glider and Brush-tailed Phascogale; and
- Habitat assessments to target all priority umbrella species, with a specific search for evidence of Glossy Black-Cockatoo feeding.

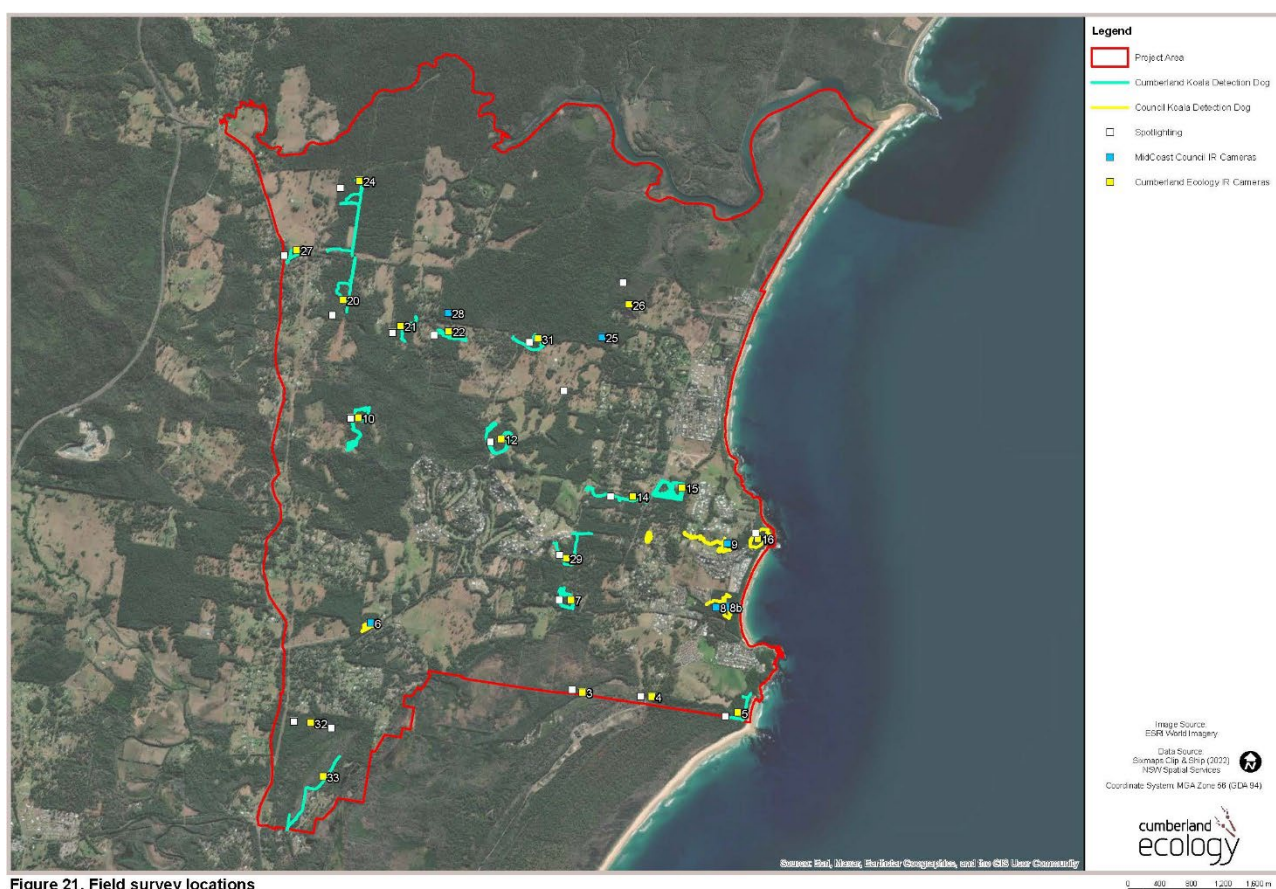


Figure 21. Field survey locations

Further details of each survey method are provided below, and a summary is shown in **Table 17**.

7.1.1.1. Motion Sensor Camera Surveys

Nineteen (19) arboreal motion sensor cameras were set out throughout the locality between 1 – 5 August 2022 and were collected between 22-23 August 2022 at the locations shown as 'Cumberland Ecology IR Cameras' in **Figure 21**. A further six (6) cameras were set out by Council on 12 September 2022 and were collected on 19 September 2022 at the locations shown as 'MidCoast Council IR Cameras' in **Figure 21**.

Drip feeder bottles suitable for small mammals and birds were mounted on the side of trees at a height of approximately 2 m and filled with a mixture of honey and water, while the trunk the tree below the feeder was sprayed with a honey and water mixture. Another feeder design of mesh-ended cannisters filled with a mix of peanut butter, honey and oats was used to provide an alternate option. Each camera was set to take three photos in succession when triggered and was focused to capture arboreal nectar feeding mammals such as the Brush-tailed Phascogale and the Squirrel Glider utilising and traversing the locality.

An example image is provided in **Photograph 6**.

Photograph 6 Motion sensor camera set up



7.1.1.2. Koala Detection Dog Surveys

Koala detection dogs sampled each suitable survey site to detect the presence of the Koala as shown in **Figure 21** and **Table 17**. Steve Austin, a recognised dog trainer and handler, was engaged to conduct the surveys alongside a Cumberland Ecology ecologist. Two (2) Working Line English Springer Spaniels dogs that have

been trained to detect koala scat and koala scent were used throughout the survey that occurred between 1 August 2022 – 4 August 2022 over four consecutive days (see **Photograph 7**).

With one dog working at a time, Steve Austin and the ecologist walked through areas of treed vegetation while the dog scouted within an approximate buffer area of 30 m either side. A hand-held GPS was used to track the area walked by the ecologist throughout the surveys and a GPS collar was attached to the dog, with the resultant tracks provided in **Figure 21**.

In addition, MidCoast Council undertook koala detection dog surveys in proximity to survey locations 6, 8, 9, 16, 25 and 28 on 1 June 2022 – 2 June 2022 and on 6 June 2022, as shown in **Figure 21**.

Photograph 7 Koala detection dog surveys



7.1.1.3. Spotlighting and Call Playback

Spotlighting was undertaken via random meander at survey locations throughout the locality using high power hand-held torches. It focussed on treed habitats, targeting the potential presence of the Koala and Squirrel Glider.

Call-playback was undertaken for the Squirrel Glider and Koala (plus Masked Owl and Powerful Owl) using a recording of the calls of these species and broadcasting them through a loudspeaker. Each call was broadcast for two minutes followed by a three-minute listening period with the process repeated once (totalling ten

minutes) and then actively searching the surrounding habitat for ten minutes. This was conducted for approximately 30 minutes at each survey location within the locality as shown in **Table 17**.

7.1.1.4. Habitat Assessment

During the field surveys a fauna habitat assessment was undertaken at each survey location visited. The project area was assessed for important components of habitat for native species including ground, shrub/understory and canopy cover, number and size of hollows present, habitat features such as bush rock and fallen trees, and signs of fauna usage such as scats and scratches. Particular attention was given to feeding evidence of the Glossy Black-cockatoo, being chewed Allocasuarina species cones. During this assessment, any fauna species seen or determined to be present from calls or other evidence were recorded.

7.1.1.5. Incidental Fauna Sightings

Any incidental fauna species that were observed, heard calling, or otherwise detected because of tracks or signs, were recorded and listed in the total species list for the locality (**Appendix B**).

Table 17 Fauna surveys within the locality

Survey Location Number	Private or Public Land	Flora Plot Completed	IR Camera	Detection Dog Survey	Spotlighting	Site Access Notes
3	Public	Yes	Yes - Cumberland Ecology	-	-	Site access unsuitable for Koala Detection Dogs due to 1080 baiting.
4	Public	Yes	Yes - Cumberland Ecology	-	-	Site access unsuitable for Koala Detection Dogs due to 1080 baiting.
5	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
6	Public	Yes	Yes - Cumberland Ecology	MidCoast Council	-	-
7	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
8	Public	Yes	MidCoast Council	MidCoast Council	-	-
8b	Public	No	MidCoast Council	MidCoast Council	-	-
9	Public	Yes	MidCoast Council	MidCoast Council	-	-

Survey Location Number	Private or Public Land	Flora Plot Completed	IR Camera	Koala Detection Dog Survey	Spotlighting	Site Access Notes
10	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
12	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
14	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
15	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
16	Public	Yes	Yes - Cumberland Ecology	MidCoast Council	-	-
19	Private	Yes	-	Cumberland Ecology	-	-
20	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
21	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	-	-
22	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	-	-
24	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	-	-
25	Public	Yes	MidCoast Council	MidCoast Council	-	-
26	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	-	-
27	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
28	Public	Yes	MidCoast Council	MidCoast Council	-	-
29	Unknown	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-

Survey Location Number	Private or Public Land	Flora Plot Completed	IR Camera	Koala Detection Dog Survey	Spotlighting	Site Access Notes
31	Private	Yes	Yes - Cumberland Ecology	Cumberland Ecology	Cumberland	-
32	TBC	Yes	Yes - Cumberland Ecology	Cumberland Ecology	-	-
33	TBC	Yes	Yes - Cumberland Ecology	Cumberland Ecology	-	-

7.2. Results of Surveys for Priority Fauna

Four threatened fauna species listed under the BC Act and/or EPBC Act were recorded within the project area during the targeted wildlife surveys conducted between June and September 2022 for this Local Conservation Action Plan and as detailed in **Chapter 9**. Two (2) of the threatened fauna species recorded were designated priority umbrella species, the Koala and the Glossy Black-Cockatoo. The species recorded, the record type, their threatened species listing status, and the survey methodology used for detection is provided in **Table 18** and the location of the records is shown in **Figure 22**. Example images of the Koala and Glossy Black-Cockatoo are provided in **Photograph 8** and **Photograph 9**, respectively. An example image of feeding evidence (chewed *Allocasuarina* cones) for the Glossy Black-Cockatoo is provided in **Photograph 10**,

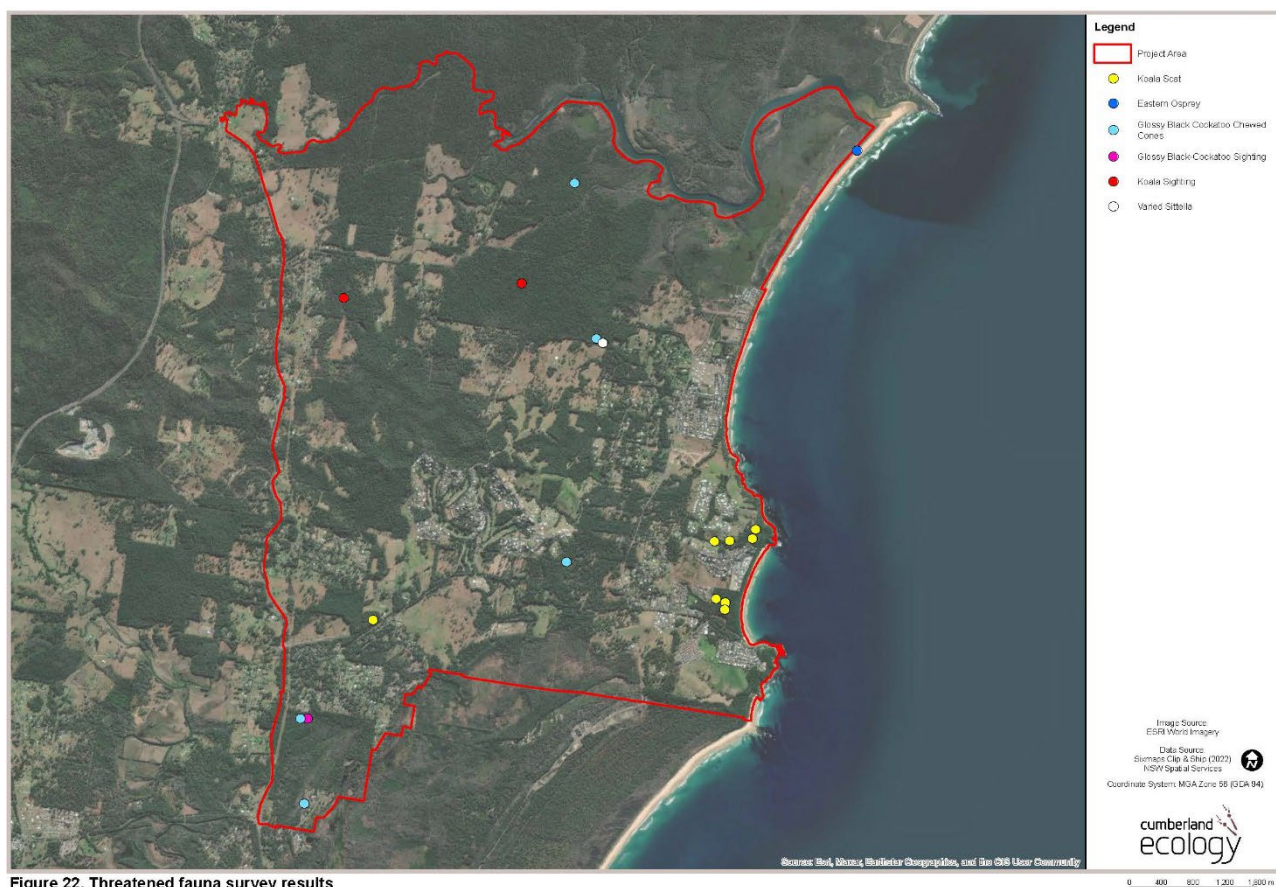


Figure 22. Threatened fauna survey results

Table 18 Threatened fauna species recorded within the project area

Common Name	Scientific Name	BC Act Status	EPBC Act Status	Record Type	Survey Methodology	No of Records
Koala	<i>Phascolarctos cinereus</i>	E	E	Sighting	Incidental	1
				Sighting	Spotlighting	1
				Scat	Koala Detection Dogs	8
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	V	-	Sighting	Incidental	1
				Feeding evidence (chewed <i>Allocasuarina</i> cones)	Habitat Assessment	6
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V	-	Sighting	Motion Sensor Camera	1
Eastern Osprey	<i>Pandion cristatus</i>	V	-	Sighting	Incidental	1

Photograph 8 Koala within the project area



Photograph 9 Glossy Black-Cockatoos within the project area



Photograph 10 Chewed cones of Allocasuarina: evidence of feeding by Glossy-Black Cockatoo in the project area



7.3. Summary

The surveys for priority umbrella species found more threatened fauna records within the eastern portion of the locality than in central and western areas. The reason for this pattern is unknown, but two factors are likely to have contributed:

- **Accessibility and survey effort:** the eastern area was more accessible and so subject to higher survey intensity than central and western areas. Notwithstanding that, the higher concentration of records is out of proportion to the differences in accessibility and surveys. The differences therefore cannot be solely attributable to variation in survey effort.
- **Wildfires:** The central and western areas were subject to extensive wildfires in 2019, whereas the eastern areas were burnt less intensely. The wildfires may have reduced the suitability of habitat for threatened fauna in the central and western areas in the short term.

Areas of native forest on private lands in the eastern area not only have more threatened species records, but they also provide a substantial habitat link between Khappinghat NP in the north and Darawank NP in the south.

Development pressure conflicts with the patterns of occurrence of priority umbrella species and corridor linkages, as it is focussed primarily on the eastern/coastal lands. Future development proposals should avoid or minimise impacts to such corridors and where possible provide for improved connectivity.

Larger tracts of wet and dry sclerophyll forest occur in the centre and west of the locality. Within this area, the forest patches are also within larger landholdings which are likely to be more feasible to conserve in the long term compared to the mosaic of small holdings in the east. Although fire and past logging may have diminished current habitat suitability, there is potential for such habitats to be improved in time for hollow dependent threatened fauna species, such as the Squirrel Glider, Brush-tailed Phascogale and Glossy Black-Cockatoo. These larger tracts of treed vegetation will also be key to maintaining wider biodiversity corridors and nodes of significant patch size to link between these vegetation types and the expansive habitat in Khappinghat NP to the north and Darawank NP to the south. It will also be fundamental to identifying an interconnected network in between the west and eastern portions of the project area.

8. Catchment and Riparian Health

8.1. Catchment and Riparian Health

There is a direct connection between the health of a catchment and the quality of water in downstream areas, including rivers, creeks, lakes, lagoons and estuaries. Poor catchment conditions can have significant impacts on estuarine health and the environment, and negatively affect the aesthetic, biodiversity, recreational and production values of these areas. Protecting the quality of water in all waterbodies is very important and is a shared responsibility between council and other agencies and the community.

Waterways in the project area are at risk from a range of pollution sources, including:

- Sediments;
- Litter;
- Pesticides and chemicals;
- Nutrients, such as phosphorous and nitrogen;
- Algae; and
- Pathogens and disease-causing micro-organisms (from unmanaged human effluent and animal sources).

Water from the Hallidays Point project area enter downstream receiving waterbodies that include Khappinghat Creek estuary, Black Head lagoon, the Pacific Ocean and the lower Wallamba River (via the Darawank Creek / Frogalla Swamp Wetland). Water quality testing data suggests that Khappinghat Creek estuary and Black Head lagoon suffer water quality related stress. Within the MidCoast Council 2022 Waterway and Catchment Report Card, the Khappinghat Creek estuary received a B-score, upgrading C-scores in 2020 and 2021. This estuary was high-performing in respect to water quality in testing during the period 2013 – 2017, where it received A-scores. The recent deterioration in water quality is attributed to nutrient inflows after 2020 following the catchment bushfire impacts, as well as increased incidence of catchment land clearing. Black Head lagoon has had events of poor water quality mainly from sewage in-flows and an increasingly urbanised catchment. The catchment of Black Head lagoon is highly developed.

The NSW Water Quality Objectives are the agreed environmental values and long-term goals for NSW's surface waters. They set out:

- the community's values and uses for rivers, creeks, estuaries and lakes (i.e. healthy aquatic life, water suitable for recreational activities like swimming and boating, and drinking water); and
- a range of water quality indicators to help us assess whether the current condition of our waterways supports those values and uses.

Water Quality Objectives have been agreed for Fresh and Estuarine surface waters and Marine Water Quality Objectives. The objectives are consistent with the agreed national framework for assessing water quality set out in the ANZECC 2000 Guidelines. These guidelines provide an agreed framework to assess water quality in terms of whether the water is suitable for a range of environmental values (including human uses). The Water

Quality Objectives provide environmental values for NSW waters and the ANZECC 2000 Guidelines provide the technical guidance to assess the water quality needed to protect those values.

The protection of water quality and achievement of water quality objectives and targets relies on the adoption of a coordinated and strategic range of targeted actions, including:

- Preventing stock access to waterways, maintaining and enhancing riparian vegetation, using nutrients wisely and maintaining adequate ground vegetation cover;
- Preventing soil erosion from all sources;
- Preventing chemical pollution of waterways and regulating licensed premises and industries;
- Maintaining on-site wastewater treatment systems and avoiding leaks from domestic sewer networks;
- Carefully planning and developing land and adopting high standards for water sensitive urban design;
- Protecting and managing wetlands; and
- Protecting and managing areas of native vegetation, including vegetation on steep slopes and in riparian zones.

One of the most effective tools for protecting water quality and catchment health is to protect the function and integrity of source waters to the highest degree possible. Protecting riparian zones has both water quality and biodiversity benefits. Many wildlife species preferentially utilise riparian zones for habitat, water sources and movement.

Many land uses and activities, including development, are regulated by the *Water Management Act 2000* (WM Act). This is discussed in **Section 2.1.10**. In particular, the WM Act establishes a framework for the protection of riparian zones, which is based on the Strahler stream order categories. A map of the riparian zones associated with different stream orders is provided in **Figure 23**. All future development will need to demonstrate achievement of riparian zone objectives of the WM Act. This will mean that vegetated riparian zones will be protected, improved and managed in development areas. These riparian zones will contribute to biodiversity outcomes, by providing local corridors and connecting habitats and protecting areas of native vegetation and wildlife habitat.



Figure 23. Riparian corridors

9. Conservation Action Plan

9.1. Local Conservation Action Plan Strategy

This Local Conservation Action Plan identifies actions and strategies for effective, balanced, long-term biodiversity protection and management. The plan documents:

- The over-arching goals to achieve practical, efficient and achievable biodiversity conservation outcomes for the Hallidays Point project area; and
- The conservation actions that are to be implemented to achieve these goals.

9.2. Community Feedback

Members of the community have expressed a concern with respect to future development. In community consultation undertaken during the early phases of the preparation of this Study, the community has indicated:

- Two of the key reasons for liking where they live as identified by residents included:
 - *"the natural environment"*, and
 - *"the low scale development"*
- The highest broad focus priority was the *"retention of biodiversity and natural assets"*;
- The top two priorities for aspects of the character that should be retained were:
 - *"environmental areas"*, and
 - *"landscaping, vegetation and tree coverage"*
- *"Protecting the natural environment"* was a consistent priority by the community respondents.

Two relevant themes within the consultation involved the *natural environment* and *thoughtful growth*. Within the natural environment theme, the community identified that Hallidays Point has recognised and highly valued natural environments that include key fauna habitats, littoral rainforests, wetlands, stunning coastlines, and established areas of vegetation.

Four pillars were identified for the natural environment theme and they comprised:

- *Protecting wildlife corridors;*
- *Improving sensitive environments (dunes, wetlands, littoral rainforests and threatened ecological communities);*
- *Connecting with nature;* and
- *Retaining natural environments.*

9.3. Goals

The Hallidays Point Local Conservation Action Plan seeks to identify and facilitate viable long-term conservation of the full array of local biodiversity, including all existing communities and native species in a manner that contributes positively to the liveability of the area and addresses the communities' conservation aspirations. It seeks to inform future growth and conservation in the Hallidays Point area in the short, medium, and long term. In this way, it will provide the foundation and guidance for the co-occurrence of the localities' biodiversity within well-planned and well-delivered future development.

To achieve this, the biodiversity goals of this Plan are:

- **Goal 1:** Protect enough of the landscape in a functional and naturally vegetated state to conserve biodiversity, maintain liveability for residents and visitors and deliver valuable ecosystem services provisions. Proactively manage these protected areas for long-term conservation outcomes. Expand the habitat within public conservation reserves and private conservation areas.
- **Goal 2:** Conserve, restore and actively manage enough habitat to provide for secure, permanent viable populations of threatened ecological communities and priority umbrella threatened species including but not limited to: Koala, Brush-tailed Phascogale, Squirrel Glider and Glossy Black-Cockatoo.

Note: For planning purposes, a viable population is regarded as one which has adequate numbers and distribution of reproductive individuals to ensure its continued existence in the project area. To ensure that viable populations will be maintained, births must exceed deaths over an extended period. This requires maintaining adequate habitat, monitoring populations, and minimising mortality and threats.

- **Goal 3:** Connect the Darawank National Park and the Khappinghat National Park by effective habitat nodes and sub-regional biodiversity corridors. Identify and protect habitat nodes and local wildlife corridors between these Reserves, and the west towards the Kiwarra SF / Talawahl NP complex.
- **Goal 4:** Secure the conservation, restoration and management of wetlands and riparian zones, particularly along Moor Creek.
- **Goal 5:** Control or manage key threats to biodiversity, including threats associated with weeds, feral pest animals, disease, high-intensity bushfire, clearing and modification of habitat, traffic mortality, domestic animals, pollution and artificial lighting across the landscape using a collaborative approach.
- **Goal 6:** Maintain and enhance broader catchment health, including water quality in identified sensitive receivers such as Black Head lagoon and the Khappinghat Creek estuary.

These goals are to be achieved through the implementation of the actions identified in this Plan, as well as other related and aligned activities.

The actions within this Plan do not override or replace any statutorily required process or action, such as actions associated with biodiversity impact assessment for development applications and planning proposals.

9.4. Biodiversity Corridors and Nodes

For the purposes of this Plan:

- **Biodiversity corridors:** are avenues of land that allow or provide a pathway for animals to travel from one patch of habitat (node) to another. Generally, they contain connected areas of vegetation / habitat but sometimes past land uses have fragmented or reduced areas of land that are important for connectivity.
- **Habitat nodes:** in this project, are core patches of vegetation which play an important or key role in providing habitat for populations of native plant and animal species. This includes habitat that provides for refuges. Nodes are connected by corridors.

A high proportion of forested land in the locality is privately owned and is not currently managed for conservation purposes. Biodiversity on such lands may be damaged or degraded over time. To achieve the goals of this plan, most naturally vegetated land needs to be actively managed and retained to conserve native species. The conservation management of land should be directed to identified habitat nodes and corridors. These activities need a feasible and effective resourcing scheme and administrative arrangements.

Habitat connectivity needs to be improved if the goals of this Local Conservation Action Plan are to be achieved. Habitat connectivity relies on key areas of habitat ("*nodes*"), together with connecting habitats ("*corridors*"). Optimally, connecting habitats are suitably wide avenues of continuous, unfragmented native vegetation. However legacy clearing, existing infrastructure and land uses has reduced these avenues in some areas. Where roads and other linear infrastructure interrupts corridors, then retrofitting of measures to reduce conflict is important. Gaps in important connections should be revegetated, but sometimes this can only be to a standard of a stepping-stone or a very narrow avenue. For instance, street tree planting or encouraging shrub and landscape planting on private property may be all that can be achieved in already fragmented corridors. Corridors which are reduced by legacy land uses include those into Blackhead Beach and some of the corridors into Tallwoods (eg. WC2). Reduced connections can be better than no connection at all, except under the circumstance that the avenue leads to a risk or impact situation (a "*population sink*"). Where a wide corridor can be retained or created, the appropriate width should be realised.

Riparian corridors are those wildlife corridors that flank watercourses. The requirements of legislation such as the Water Management Act places a legal importance and protection on riparian corridors. These riparian corridors play a significant role in connectivity for wildlife, as well as assist protect stream flows and water quality.

Due to the legacy clearing, past developments and current land use, there is limited ability to provide wide connectors all the way from Darawank NP to Khappinghat NP and from the coast west to habitats within the Kiwarra SF / Talawhal NP complex in the wider locality. There are pinch points. Connectivity must therefore be provided by numerous smaller connectors, with larger, intact, well-managed and conserved nodes of habitat.

The important biodiversity corridors and nodes of the project area are mapped in **Figure 24**. These comprise:

NODES

- N-1/2: Darawakh / Wards Road node
- N-3: Coastal Reserves node
- N-4: East Tallwoods node
- N-5: West Tallwoods node
- N-6: North Tallwoods node
- N-7: Khappinghat / Old Soldiers Road node
- N-8: West Old Soldiers Road node
- N-9: Idlewoods Crescent node

CORRIDORS

Wildlife corridors

- WC-1: Coastal corridor
- WC-2*: Darawank NP to Black Head Flora Reserve corridor (west of Hallidays Shores)
- WC-3: Black Head Road corridor - west of The Pines Road
- WC-4: 166 Black Head Road corridor
- WC-5: Darawank NP – Oakview Drive – Heritage Close – Black Head Road corridor
- WC-6: Idlewoods Crescent eastern corridor
- WC-7: Black Head Flora Reserve to Red Head Road
- WC-8: Seascapes – Red Head corridor to Diamond Beach Road
- WC-9: N6 to N7 corridor (east)
- WC-10: N6 to N7 corridor (west)
- WC-11: Treeview Drive eastern corridor

Riparian corridors

- RC-1: Darawank NP to Tallwoods riparian corridor
- RC-2: Moor Creek riparian corridor
- RC-3: West of Figtree Drive riparian corridor
- RC-4: Allard Creek riparian corridor

The Lakes Way east – west connection improvements:

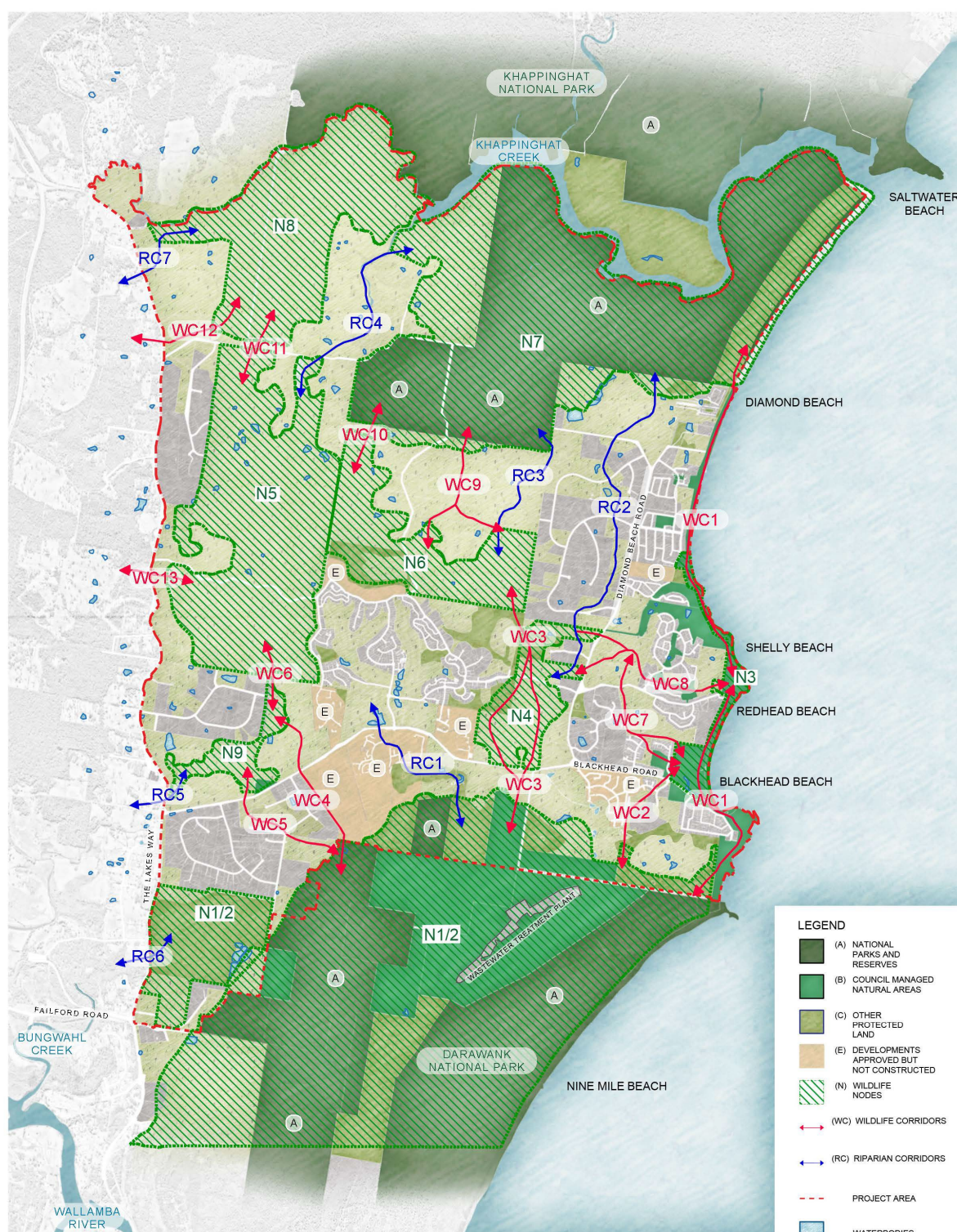
- RC-5: Black Head Road - Chelmsbrook Drive
- RC-6: Wards Road to Failford Road
- RC-7: Koorak Place
- WC-12: Old Soldiers Road
- WC-13: Tallwood Drive

** It is noted that a connection from Black Head Lagoon / Flora Reserve to the Froggalla Swamp habitats is important for the persistence of animal populations around Black Head Lagoon. WC2 has been identified in previous biodiversity / habitat studies. Recent developments have significantly reduced the functional performance of this corridor. WC2 is still represented in this Plan and on Figure 24, but there may be a requirement that an alternate pathway be identified for this connection.*

Treed rural residential areas (not mapped) such as Homestead Estate and Panorama Drive / Figtree Drive provide diffuse corridors.

This Local Conservation Action Plan identifies the actions and mechanisms to secure these biodiversity corridors and nodes. They include:

- Identifying and actively conserving corridors and nodes in Urban Release Areas;
- Ensuring the commitments in existing consents are delivered;
- Identifying and actively conserving corridors and nodes in development approvals on already zoned residential land;
- Retaining native vegetation and habitat, wherever possible;
- Providing development incentives for conservation in certain areas;
- Enhancing corridor and node function by improving the management of public reserves; and
- A range of other measures as identified in **Sections 9.5 – 9.9**.



DISCLAIMER: This map contains information that is for indicative purposes only.

Figure 24.
Hallidays Point Wildlife Corridors and Nodes Plan

TaylorBrammer
TAYLOR BRAMMER LANDSCAPE ARCHITECTS PTY LTD

project name: Hallidays Point
project location: Hallidays Point
project number: 25-001a
client: MidCoast Council

date: 12-05-2025
revision: B
drawn: SC
checked: AL

SCALE 1:30000 @ A3
0 300 600 1200 1800m

9.5. Actions – Development

9.5.1. Urban Release Areas

Action 1. Planning proposals for Urban Release Areas shall be progressed in a way that contributes to the strategic biodiversity conservation outcomes identified in this Plan (and other subject scale biodiversity outcomes). Planning proposals in the Hallidays Point area are to actively resolve key biodiversity issues and deliver local biodiversity outcomes.

Strategic planning is considered the most effective planning level to strike the balance between delivering positive environmental outcomes and supporting and facilitating appropriate development and growth for the future. The statutory process of rezoning land requires consideration of the impacts of the proposed zones (and land uses facilitated by those zones) on biodiversity, including threatened species. Generally, planning proposals are to:

- Identify the biodiversity values of the study area (via Stage 1 of the Biodiversity Assessment Methodology);
- Identify and respond to a detailed understanding of biodiversity constraints and opportunities;
- Evaluate the biodiversity impacts of development facilitated by the proposed rezoning and describe the measures to avoid, minimise / mitigate and offset biodiversity impacts; and
- Describe the conservation measures to be deployed to protect biodiversity values and features, such as the creation of new reserves, bushland restoration and revegetation outcomes, conservation zoning, conservation and restoration funding, and site controls.

Planning proposals inform where development will take place for new homes, commercial centres, tourist facilities, and other developments. The MidCoast Council approach to planning proposals seeks to:

- Protect or improve the network of conservation areas and wildlife corridors;
- Protect or improve important biodiversity and threatened species values and other special features and values of the natural environment;
- Help design liveable communities; and
- Deliver efficient and effective priority development and growth, including housing and infrastructure, in a way that doesn't compromise biodiversity values and assets.

Biodiversity assessments in planning proposals in the MidCoast Council LGA include consideration of biodiversity impacts (of development arising from the rezoning). These assessments are near to or at the level of requirement of the development assessment process (ie. Stages 1 – 2 of the Biodiversity Assessment Method). This “*front-loading*” of biodiversity assessment means that ecological uncertainty is resolved at the rezoning rather than the development application stage. This may or may not lead to formal biocertification but typically ensures the streamlining of approvals for developments that follow the rezoning of land in the MidCoast LGA.

Planning Agreements are valuable tools in planning proposals to deliver identified biodiversity outcomes, such as the dedication of land, the payment of financial resources for the management and conservation of land, and other identified actions.

There shall be consideration given to the establishment of Special Rates for future lots in certain urban release areas in a manner that generates funds for Council to manage associated natural area reserves.

Several of the Hallidays Point Urban Release Areas have key biodiversity issues that need to be actively resolved within the planning proposal process. Biodiversity outcomes are to be funded by the developer. The resolution of these biodiversity issues will assist deliver goals in this Local Conservation Action Plan. These are summarised below in **Table 19**.

Ecologically, there appears to be less complexity associated with the rezonings of land in the Black Head, Blackhead Road and Red Head URAs, because these tend to be less ecologically constrained and are associated with better road access and bushfire protection arrangements. Diamond Beach URA1 is an exception.

Table 19 Key biodiversity issues and outcomes in rezoning

Urban Release Area	Key Biodiversity Issue(s) and outcomes required in a rezoning
Diamond Beach URA1	This URA is essentially unconstrained from an ecological perspective; other than minor coastal vegetation / landform issues in the east. Buffer to Khappinghat NP: High conservation value land is to be restored or re-constructed to an approved condition, contained within a separate lot, and added to National Park estate or otherwise a Council public reserve, with funding for ongoing management. Demonstrably no negative impact is to be caused to the National Park and the buffering area will assist protect the existing National Park from any direct, indirect or related impact associated with development arising from any rezoning. Coastal Wetlands: All Coastal Wetland areas are to be actively restored to an approved condition and conserved, with funding for ongoing management. Wetland proximity areas are to be regenerated with functional native vegetation as wetland buffers and actively protected.
Diamond Beach URA2 – Clearwater Grove	Key Fish Habitats: All Key Fish Habitat areas are to be actively restored to an approved condition and conserved. Moor Creek riparian zone: A naturally vegetated riparian zone along Moor Creek is to be restored to an approved condition and protected, and this riparian zone is to be dedicated to Council, with funding for ongoing management. The Moor Creek channel is to be stabilised, and riparian and aquatic habitats shall be re-constructed and / or enhanced. Threatened species and ecological communities: Threatened species habitats and areas of threatened ecological communities are to be avoided, restored to an approved condition, and conserved. Offset requirements for residual biodiversity impacts are to be secured only in the Hallidays Point locality.

Urban Release Area	Key Biodiversity Issue(s) and outcomes required in a rezoning
	Groundwater dependent ecosystems: Future development, including any land formation or filling, shall demonstrate (via flooding and groundwater modelling and evaluation) that they do not cause obvious changes to the pre-development hydrological regimes and conditions of wetlands and other groundwater dependent ecosystems in the project area and its surrounds. Biodiversity impacts: Measures are to include one-sided (perimeter) roads and fencing to all riparian and natural areas, domestic pet exclusions / controls, street trees and urban forest cover, management of edge effects and artificial lighting, and management of impacts of new traffic generation. The biodiversity preference in this URA is for an eastern precinct to comprise a rural residential density development to transition (reduce) the developmental intensity to the high conservation value lands in the north and west and for the western precinct to be abandoned due to the high level of anticipated ecological constraint.
Diamond Beach URA3	Diamond Beach URA3 is discussed below in Section 9.5.6 (Old Soldiers Road).
Red Head URA1	Littoral Rainforest: The mapped littoral rainforest proximity area is to be actively revegetated with littoral rainforest and wet forest vegetation and dedicated to Council for management as part of an extended Red Head Reserve, with funding for ongoing management. New littoral rainforest is to be created in the mapped littoral rainforest proximity area. Seascapes – Red Head Koala Corridor: An extension of the Seascapes – Red Head Reserve Koala Corridor is to be actively revegetated and / or restored with wet / dry forest koala habitat and dedicated to Council for management as part of an extended Red Head Reserve, with funding for ongoing restoration and management. Biodiversity impacts: Measures are to include one-sided (perimeter) roads and fencing to all riparian and natural areas, domestic pet exclusions / controls, street trees and urban forest cover and the management of edge effects and artificial lighting. The biodiversity constraints of this URA are clear and there is a distinct development and conservation balance to be delivered. Residential density development is suitable in the north-west sector of the URA, with a one-sided road off Waitpinga Circuit. Any secondary access through the Koala Corridor to Red Head Road needs to include koala vehicle strike avoidance measures, such as directive fencing and an underpass.
Red Head URA2	Seascapes Natural Area Reserve addition: The residential development footprint is to be confined to the north-west sector. The existing forest land (and some open land) in the south and north-east is to be restored / revegetated to an approved condition. and dedicated to Council for protection as part of an extended Seascapes Reserves (at the rear of the property). Biodiversity impacts: Measures are to include one-sided (perimeter) roads and fencing to natural areas, domestic pet exclusion / control, street trees and urban forest cover and management of edge effects and artificial lighting.
Red Head URA4	Koala corridor: The part of this URA that comprise Lot 2 DP1078853 requires a koala corridor to be revegetated and protected that links Black Head Flora Reserve with the

Urban Release Area	Key Biodiversity Issue(s) and outcomes required in a rezoning
	Seascapes – Red Head Koala Corridor. Koalas in Black Head Flora Reserve have been increasingly isolated from those in Red Head. With sea level rise / coastal erosion threatening the long-term presence of the coastal corridor between these Reserves, koala conservation relies on a safe connection between Black Head Flora Reserve and the Seascapes – Red Head Koala Corridor. A koala corridor is required the southern and western boundaries of Lot 3. This corridor needs to be established through biodiverse native forest plantings and maintenance. It needs to connect with the habitats on Lot 140 DP562849. It should be integrated with water management and quality infrastructure and assets. Steep land: Land too steep for reasonable access and residential development is to be revegetated to an approved condition and protected as a greenspace. Biodiversity impacts: Measures are to include one-sided (perimeter) roads and fencing to the koala corridor, domestic pet exclusion / control, urban forest cover (street trees) and management of edge effects, including artificial lighting. The koala corridor identified above would contribute to a valuable physical / landscape separation of the villages of Black Head and Red Head. Buffer to Hallidays Point Wastewater Treatment Plant perimeter lands: A natural area is to be created, restored and dedicated to Council that creates a buffer between residential development land and the Hallidays Point Wastewater Treatment Plant perimeter lands. Coastal Wetlands: All Coastal Wetland areas are to be actively restored to an approved condition and conserved. Coastal Wetland proximity areas are to be revegetated with functional native vegetation as wetland buffers and be actively protected. These lands are to be dedicated to Council, with funding for ongoing management. Blackhead Road Corridor: A corridor of dry forest is to be restored / revegetated on the southern side of Blackhead Road and the land is to be dedicated to Council. Threatened species and ecological communities: Threatened species habitats and areas of threatened ecological communities are to be avoided and conserved. Residual offset requirements for biodiversity impacts are to be secured in the Hallidays Point locality. Connectivity for the koala from Frogalla Swamp / Darawank NP into Black Head Flora Reserve is to be provided on the eastern boundary of this URA. Biodiversity impacts: Measures are to include one-sided (perimeter) roads and fencing to all riparian and natural areas, domestic pet exclusion / control, street trees and urban forest cover, management of edge effects and artificial lighting, and management of impact of new traffic generation.
Black Head URA1	
Tallwoods URA1 (The Boulevard / Coastal View Drive)	Threatened species: Threatened species habitats are to be avoided, restored to an approved condition, and conserved. Residual offset requirements for biodiversity impacts are to be secured in the Hallidays Point locality. The existing dry forest habitat in the north-east of Lot 2 DP1273130 and an existing dam / watercourse are valuable wildlife habitat.

Urban Release Area	Key Biodiversity Issue(s) and outcomes required in a rezoning
	Biodiversity impacts: Measures are to include one-sided (perimeter) roads and fencing to riparian and natural areas, domestic pet exclusion / control, street trees and urban forest cover, and management of edge effects.
	Threatened species: Threatened species habitats are to be avoided, restored to an approved condition, and conserved. Residual offset requirements for biodiversity impacts are to be secured in the Hallidays Point locality. Rezoning is to protect and expand on the C2 zoned land on the adjoining Lot 612 DP 1160096 and protect the corridor of existing trees in the unformed road reserve on the western boundary of this URA.
Tallwoods URA2	Blackhead Road Corridor: A corridor of dry forest is to be restored / revegetated on the northern side of Blackhead Road and the land is to be dedicated to Council. Biodiversity impacts: Measures are to include one-sided (perimeter) roads and fencing to all riparian and natural areas, domestic pet exclusion / control, street trees and urban forest cover and management of edge effects.

9.5.2. Existing Development Consents

Action 2. Ensure biodiversity commitments and outcomes in legacy and current development consents are delivered. Utilise any opportunities to improve the biodiversity performance of legacy development consents.

Approvals have been issued for several developments that are not yet constructed. The construction and operation of these developments will have both subject-scale and cumulative biodiversity impacts. These developments may result in biodiversity population decline in species like the koala because the critical threshold for populations of these animals is not well understood. These legacy developments mean that residual areas of habitat elsewhere in the locality need to be precautionarily conserved and managed (that is, habitat clearing needs to be avoided and resources need to be provided to ensure equitable protection is provided). Areas of existing development have been discussed in **Section 6.1** and are mapped on **Figure 24**.

Some of the legacy consents have caused concern within the community. Biodiversity considerations at the time of these consents (some of which date back to the late 1990's or early 2000's) were not as rigorous as the current standards. There is limited viable means to alter the activities that have been provided with approvals in these historic or legacy developments. Modifications of these Development Applications (DAs) have strict legal frameworks. Resourcing of sufficient magnitude to support a Buyback or Land Swap system is not available at the present time. The NSW Government regulates the system of "commenced" developments.

MidCoast Council must ensure that all biodiversity commitments within statutory approvals for legacy developments are properly delivered. Any environmental requirements in conditions of development consent must also be seen to be fully implemented. Further, collaboratively working with developers of these lands as they modify their developments, to improve the biodiversity performance of and contemporise the development, would be valuable. All opportunities to revisit legacy development approvals shall be realised.

Biodiversity activities within development consents that must be delivered and seen to be delivered include the following listed in **Table 20**:

Table 20 Biodiversity actions within existing development consents

Site	Biodiversity action
166 Blackhead Road, Hallidays Point (Figure 24 – E1)	Protection and management of the habitat in the south of the land that adjoins Darawank NP and the Darawakh Creek wetlands. Protection and management of the wildlife corridor along the western boundary.
Lot 612 DP1160096 Blackhead Road, Tallwoods (Figure 24 – E2)	Protection and management of the C2-zoned land Screening of development from views from Blackhead Road
212 & 296 Blackhead Road, Tallwoods (Figure 24 – E9)	Protection and management of the wetland habitat in the south of the site. Protection and management of coastal wetlands and riparian zones in the middle and north of the site. Screening of development from views from Blackhead Road <i>In any modification, negotiation of the dedication of the C2 zoned part of the land as an extension to Darawank NP would be valuable.</i>
323 Blackhead Road, Tallwoods (Part) (Figure 24 – E3)	Protection and management of the riparian zone. Protection and management of trees within the development.
361 Blackhead Road, Black Head (Figure 24 – E4)	Protection and management of a glossy black-cockatoo habitat area; monitoring via a Glossy Black Cockatoo Monitoring Plan. Protection and management of trees and native vegetation around and within the development (via a Vegetation Management Plan)
245 Tallwood Drive, Tallwoods (Figure 24 – E5)	Development impacts to be confined to the approved footprint.
14 Seabreeze Parade, Black Head (Figure 24 – E6)	Avoiding impacts on the corridor to the south of the development site; landscaping requirements (Stage 2b).
21 Greenview Drive, Black Head (Figure 24 – E7)	Apply the conditions of the development consent relating to biodiversity.
Lot 25 DP1191907 Coastal View Drive, Tallwoods	Execute the Planning Agreement / Deed and the biodiversity conditions.
Seaview Estate 210 Diamond Beach Road, Diamond Beach	Revegetation and conservation management of littoral rainforest. Protection and management of riparian zones.
214 Diamond Beach Road, Diamond Beach (Figure 24 – E8)	Revegetation and conservation management of littoral rainforest and riparian zones

9.5.3. Development of Zoned Land

Action 3. Identify and deliver biodiversity outcomes within approvals issued for future development applications.

Zoned development land that does not benefit from an existing consent will need to lodge a development application (DA), which will be subject to a merits assessment under the NSW planning scheme, including biodiversity considerations.

Because a property is zoned for a certain development purpose does not guarantee that the land will be approved for use for that purpose. Many other considerations are incorporated into the merit development assessment process, including open space, water quality, development scale, Aboriginal cultural heritage, scenic amenity, and biodiversity and threatened species.

Consent authorities will need to assess each DA on zoned land under the biodiversity conservation legislation, including the avoid – minimise – mitigate / offset decision-making hierarchy. Impacts on biodiversity values must first be avoided, then minimised / mitigated and then potentially offset.

Several biodiversity considerations apply to land in the project area that is zoned for development purposes.

These are summarised below in **Table 21**:

Table 21 Biodiversity actions within future development consents

Site	Biodiversity action in a development consent*
52 High Street, Black Head	Avoiding biodiversity and threatened species impacts. Protecting wildlife corridors. Protecting existing forest habitats adjoining Wylie Breckenridge Park. Offsetting residual impacts (if Biodiversity Offset Scheme thresholds are exceeded) in the Hallidays Point locality
303 Blackhead Road, Tallwoods	Avoiding biodiversity and threatened species impacts. Protecting a wildlife corridor. Maintaining the amenity of Black Head Road. Offsetting residual impacts (in the Hallidays Point locality). NB. a DA has been lodged (DA2022/0665)
37 Eastern Valley Way, Tallwoods	Executing the Planning Agreement / Deed
70 Coastal View Drive, Tallwoods	Creating and protecting a wildlife corridor on northern boundary.
91 Red Head Road, Red Head	Creating and protecting a wildlife corridor on southern boundary to enable koala movements from Black Head Flora Reserve to Seascapes Koala Corridor. Offsetting residual impacts (if Biodiversity Offset Scheme thresholds are exceeded) in the Hallidays Point locality.

Site	Biodiversity action in a development consent*
96 Red Head Road, Red Head (R1 zoned land)	Restoring and conserving the C2 zoned land (dedication to MidCoast Council as part of Seascapes Corridor is preferred). Offsetting residual impacts (if Biodiversity Offset Scheme thresholds are exceeded) in the Hallidays Point locality.

* Other measures / actions may be required as part of a development consent – this list is a guide only. The list does not include biodiversity actions that are statutorily required by the NSW / Commonwealth biodiversity / environmental legislation.

9.5.4. Development Incentives for Conservation

Action 4. Deliver a development incentive for conservation scheme for certain lands within the project area. Invite landholders to prepare and submit Expressions of Interest for participation in this scheme. Define a process for the application of and develop a Planning Agreement template for the scheme.

The *Great Lakes Local Environmental Plan 2014* (LEP) includes a clause that permits development where there is a positive outcome for biodiversity and the natural environment. This is clause 4.1B. Clause 4.1B provides for the subdivision and creation of one or more low-key “bonus” lots that are below the minimum lot size where there is a permanent conservation outcome and where certain conditions are met (particularly relating to traffic generation, maintaining the character of a locality, etc). The clause is not to be used as a *de facto* for proposals or developments that need formal rezoning.

There are several landholdings where the use of a bonus lot or lots arrangement appears feasible and appropriate in which targeted biodiversity conservation outcomes can be delivered.

Several opportunities have been identified in the project area where a development incentive for conservation appears appropriate.

Therefore, a LEP clause to facilitate a development incentive for biodiversity conservation outcomes across the Hallidays Point project area will be adopted. Landholders will be invited to apply for participation in this scheme, where they meet the following criteria:

- Development lots, their boundaries and the footprints for dwelling-houses, access-ways, effluent management, and bushfire Asset Protection Zones that are created in this scheme must be capable of being sited without clearing of native vegetation / biodiversity values that exceeds the Biodiversity Offset Scheme entry thresholds;
- Development lots created in this scheme must be appropriate, capable of being serviced, have a reasonable level of accessibility, and be compatible with the character of the existing neighbourhood; and
- The ratio of bonus development lots to the area of conservation must be agreed to by Council. Except in unusual circumstances, no more than 2 bonus lots (above one existing dwelling entitlement) will be permitted for each landholding;
- A Planning Agreement must be capable of being entered; and
- The conserved land must be dedicated to either Council or the NSW National Parks and Wildlife Service at no cost to these agencies or otherwise secured in-perpetuity with an on-title conservation instrument.

The development incentive for conservation clause may be adjusted under the upcoming MidCoast Local Environmental Plan.

9.5.5. Local Development Trading Scheme

Action 5. Council shall purchase land, establish it as a Biodiversity Stewardship Site and utilise it for the purpose of local development offsets.

To address the requirements of the BC Act, local developments need to ensure a net neutral or positive outcome for biodiversity (after avoiding and then mitigating biodiversity impacts). They do this through retiring sufficient biodiversity credits to meet the calculated ecosystem and species credit requirements identified in their Biodiversity Development Assessment Report. The offset rules are established by the NSW Government. If a threatened ecological community is impacted, the offset must generally be for the same threatened ecological community. If native vegetation that is not a threatened ecological community is impacted, the offset must be vegetation that is the same vegetation class and in the same or higher offset trading group. Credits can be retired by the developer, or a payment can be made to the Biodiversity Conservation Fund. The local community has expressed concern with respect to the Biodiversity Conservation Fund payment system, as offsets can be sourced and delivered a considerable distance away from the area of impact.

Avoided vegetation in a development site, should not be used to satisfy biodiversity offset requirements.

There are no Biodiversity Stewardship Sites for which credits can be retired that are currently available in the locality.

Ensuring that there is a local offset site available for a ready and reasonable supply of ecosystem and species credits will make a positive contribution to biodiversity conservation in the project area.

A local site for advanced development offsets would need to be sufficiently large (>60-hectares), contain habitat that can be improved through management actions, be capable of being established as a biodiversity stewardship site, and contain the in-demand / required ecosystem and species credits for local developments. In-demand ecosystem credits and species credits for development in the local area would comprise:

- Substantial requirement for ecosystem credits for dry and wet forest plant community types, such as PCT1550,
- Minor requirement for ecosystem credits for swamp forest and wetland types, and
- Substantial requirement for species credits for species-credit species including the koala, southern myotis, masked owl, etc.

Establishing a local site for development offsets could be done by brokering or incentivising a private landholder to establish the Biodiversity Stewardship Site. However, this scheme is voluntary, and relying on a private Biodiversity Stewardship Site may mean there is a chance it might not be delivered.

As such, this Plan identifies that MidCoast Council purchase a site and establish and operate a Biodiversity Stewardship Site for the local supply of biodiversity credits for developments.

This scheme would require the initial land purchase and the engagement of an accredited assessor to calculate the ecosystem and species credits and establish the Biodiversity Stewardship Agreement (BSA). Funds generated from the sale of the credits to local developers or by retirements of credits by the Biodiversity Conservation Trust's fund would be used for site management and to recoup outlay costs such that the scheme is cost neutral (or even profitable) in the medium term.

Several options exist for the location of this offset site within the local development trading scheme, particularly in the N4, N5 and / or N8 habitat nodes. An analysis of the types and quantum of ecosystem and species credits that occur on the urban release areas and the land zoned but not developed shall be undertaken to inform the optimised location of a local offset site for a development trading scheme. An accredited assessor experienced in establishing and managing Biodiversity Stewardship Areas shall be engaged to assist implement this action.

9.5.6. Old Soldiers Road

Action 6. Re-aligning Old Soldiers Road is possible only if a suite of wildlife vehicle strike and wildlife connectivity measures are delivered.

Re-aligning and upgrading Old Soldiers Road would inevitably be associated with significant biodiversity impacts through a loss of existing native vegetation and habitat, severance of existing wildlife movement corridors and substantially increased roadkill risk to local wildlife, including koalas. These impacts will add to the cumulative pressures on local biodiversity.

It is understood that the financial cost of re-aligning Old Soldiers Road would be very high.

Further, upgrading Old Soldiers Road may result in infrastructure-led planning. In many circumstances, infrastructure-led planning is undesirable. Preferably, the purpose of infrastructure is to support desired local or regional growth, with land use planning setting the strategic direction and land use intent and the infrastructure planning helping implement that growth (Croke, undated).

Diamond Beach URA3 has substantial biodiversity constraint. It is undesirable to locate urban development against the interface with the Khappinghat National Park because of the edge effects and increased population of domestic cats and dogs. The footprint of Diamond Beach URA3 also contains several important avenues of wildlife connectivity. Koala viability relies on the safe connection between the National Park, the habitats north of Tallwoods and in the Panorama Drive rural residential landscape and through to the eastern occupied koala habitats at Red Head and Black Head. It would be very difficult to locate anything other than minor future development in Diamond Beach URA3 and not have a concurrent significant negative population pressure on koalas and other threatened species. As such, this study suggests that Diamond Beach URA3 is not appropriate and suggests that landholders should only be considered for future development under the development incentives for conservation schemes identified in **Section 9.5.4**.

It may be possible to independently construct Old Soldiers Road on a new alignment south of Khappinghat NP in a manner that does not significantly deplete or disadvantage local biodiversity, but only if there are very detailed biodiversity considerations and actions incorporated into the position, design, construction and maintenance of the road. This adds substantially to the inherently high cost of that work.

The realignment would need to be constructed in such a way as not to impede the north-south biodiversity corridors identified in this Plan and corridors would need to be improved, secured and managed on each side of the road.

Without avoidance and mitigation measures, the realigned Old Soldiers Road would fragment important wildlife corridors and create a wildlife vehicle strike zone. Koalas moving between Khappinghat NP and the habitats around Tallwoods and the habitats in the west Diamond Beach area, would be particularly threatened.

To avoid or reduce fauna mortality and the related or edge effects that may result from the road constriction, actions to mitigate these impacts must include:

- A minimum of three (3) underpasses, with extensive wildlife fencing along both sides of the road to direct wildlife to these underpasses;
- At least five (5) paired glider poles along both sides of the new roadway;
- A speed limit along the road of not more than 60 km/hr;
- At least two (2) flashing wildlife signs along the roadway;
- Two (2) advisory signs identifying the contact details of the local wildlife and koala care providers;
- Established and maintained cleared roadside verges in the immediate vicinity of the travel lanes and shoulders;
- A road design that is to the minimum width necessary;
- A footprint that sets the new road corridor away from the existing National Park boundary and within a corridor footprint that is of low relative ecological value (areas currently devoid of native vegetation and mature trees). The residual land between the northern edge of the road and the National Park should be satisfactorily revegetated and restored and then dedicated into (and as part of) the National Park;
- Sealing of the existing gravel sections of Old Soldiers Road to the east and west of the re-aligned section and minimising the clearing of roadside habitats and trees;
- An S-bend option for the re-aligned Old Soldiers Road through the Khappinghat NP is not favoured because of the ecological impacts. Instead, the re-aligned section should commence in front of Lot 71 DP1273315, 548 Old Soldiers Road and flank the periphery of the remnant native forest vegetation that is present there. This would necessitate land acquisitions.

The above design features and structures will add substantially to the cost of the design and construction of this possible roadway.

9.5.7. Tree Protection in Rural Residential Areas

Action 7. Manage and regulate all rural residential areas to provide diffuse habitat for koalas and other native wildlife through effective tree protection and greening schemes.

The rural residential estates comprising Panorama Drive / Figtree Drive, Ocean Ridge Estate, Federation Drive, Homestead Estate, Chelmsbrook Drive / Idlewoods Drive and Treeview Drive contain a fabric of native vegetation and tree cover that provide for some native wildlife populations and diffuse movement areas. For example, koalas rely on habitats in the Panorama Drive / Figtree Drive and Homestead Estate areas.

The preservation of native tree cover, the replacement of native trees with new plantings and appropriate landscaping of these rural residential areas contributes to valuable wildlife habitat. MidCoast Council therefore needs to:

- Maintain and extend vegetation management policy coverage to all rural residential areas of the Hallidays Point project area;
- Encourage and incentivise tree retention, replacement, and enhancement in rural residential areas;
- Make development decisions that protect remnant tree cover;
- Regulate appropriate pet ownership in rural residential areas; and
- Encourage wildlife-friendly fencing styles in rural residential areas.

9.5.8. Local Development Design Principles

Action 8. Reflect biodiversity principles and considerations in all development decision-making and adopt a cluster approach to development / biodiversity management.

Best practice management tools need to be incorporated in all developments in and near native vegetation and wildlife habitat. This needs to be communicated in all pre-lodgement discussions and established in development decision-making. These tools and management approaches include:

- Biodiversity impacts shall be firstly avoided then minimised / mitigated and then residual impacts shall be offset with local stewardship sites;
- There shall always be one-sided (perimeter) roads and suitable fencing between any development interface and natural areas / riparian zones;
- There shall be domestic pet exclusions or controls in development sites that adjoin natural areas and areas containing domestic pet susceptible threatened species (such as brush-tailed phascogales, squirrel gliders). For instance, domestic cats shall be excluded, or confined inside or in an outdoor enclosure only);
- The development shall provide for urban forest cover and street trees;
- A corridor of green shall be provided along Blackhead Road and other major roads; and
- Edge effects of developments, including pollution and artificial lighting, shall be avoided, mitigated, or otherwise managed.

There are two approaches to biodiversity conservation in the context of development. One approach is to infuse biodiversity conservation in very low-density, well-planned, well-regulated development. This is

sometimes described as “*environmental living*”, where dwelling-houses are sited amongst trees and clumps of vegetation and habitat, roads are speed-controlled and pets are excluded or contained. The second approach is to cluster high-density development and separate it from natural areas / biodiversity.

The preferred approach to the Hallidays Point project area is avoidance of the loss of native vegetation / wildlife habitat and the clustering of higher density development away from habitat nodes and corridors, areas of native vegetation and areas of wildlife habitats.

This Plan recognises the biodiversity, aesthetic, and community value of providing inter-urban, green breaks between the villages of Tallwoods, Black Head, Red Head and Diamond Beach. Delivery of biodiversity conservation activities can assist the four-separated villages concept.

9.6. Actions – Natural Areas

9.6.1. Managing Natural Area Reserves

Action 9. Manage natural area reserves in a proactive and strategic way to ensure high ecological condition and function. Invest in natural area reserves.

The natural area public reserves of the project area include National Parks, Council natural area reserves and Crown Land reserves. This study has demonstrated that these reserves provide the foundation of biodiversity conservation of the area. Koalas, for example, appear well represented in the Council, Crown Land and National Park reserves when compared with private freehold land. Koalas are using the Redhead – Seascapes Koala Corridor despite its narrow width and variety of edge pressures. However, the reserves are not capable of providing all the required biodiversity conservation of the area. They are currently too small and are disconnected. Biodiversity conservation will rely on decisions on private land, increased conservation management of freehold areas and active regulations on land use and development. A nil-tenure, strategic, evidence-based approach to natural area reserves management will be beneficial. Resourcing for the management of natural area reserves is finite so funds need to be secured and wisely spent.

Natural area public reserves benefit significantly from the dedicated efforts of community volunteers. These volunteers have provided substantial time and effort to reduce weed burdens, undertake landscape and rehabilitation plantings, install signage, install nesting boxes and many other tasks. Hallidays Point Landcare has been, and will continue to be, a dedicated group of volunteers caretaking in local reserves and natural spaces.

The natural area public reserves of the project area are relatively well-managed, however, there are areas of reduced integrity and vigour, including weed-dominated areas. Resilient and functional natural areas are particularly important as the climate changes.

Biodiversity conservation of the area will be enhanced, and the goals of this Plan will be realised, only if the natural area public reserves are managed such that ecological condition is high and natural ecological processes are maintained. Weeds and feral pest animals need to be managed. Such management requires the allocation of appropriate resources, and it would be beneficial if natural area management agencies, including Council, NSW National Parks and Wildlife Service and Crown Lands work collaboratively.

A natural area assets register is currently in preparation for the Council Reserves and Council-managed Crown Lands. The natural areas asset register will adaptively record the condition and integrity of these reserves and assist decision-making in relation to the type and location of restoration and rehabilitation efforts. A form of natural area assets register should be extended to the areas of National Parks at the peri-urban interface. A coordinated body of ongoing work is required across natural area public reserves such that:

- The quality of habitats is maximised (install nesting boxes to supplement low numbers of natural tree hollows, retain or introduce coarse woody debris, fire is well managed);
- The occurrences of priority weeds (including emerging weeds) are controlled and suppressed;
- Feral pest animals are controlled such that significant environmental damage is avoided;
- Corridor functions are maintained or improved; and
- Modified or cleared areas of reserves are revegetated such that pre-disturbance native vegetation communities are re-established.

Key focus areas include:

- The control of bitou bush in coastal reserves and sea-cliffs;
- The control of lantana and ground asparagus in dry and wet forest reserves;
- The continued suppression leading to the eradication of plume poppy from the Rainbow Flat area; and
- Strategic controls of feral deer, feral cats and foxes.

A strategy for resourcing these activities shall be devised and adopted through the Council natural area audits process and other mechanisms.

9.6.2. Tallwoods Golf Course

Action 10. Tallwoods Golf Course shall be engaged so that out of play areas and fairway edges are co-managed as habitat for local biodiversity.

Well-managed golf courses can be significant contributors to urban biodiversity, functioning as biodiversity "oases". The complexity of habitat on golf courses is a key factor in their contribution to native plant and animal species assemblages. Golf course management can also incorporate pest animal controls, particularly for foxes and rabbits.

Tallwoods Golf Course contains substantial roughs, out of bounds areas, water hazards and fairway edges that contain native plants, forests, grasslands, riparian areas and wildlife habitats, including very large and hollow-bearing trees. These areas contain a relatively high proportion of native plant species. This complexity is valuable for a wide array of animals, including small insect-eating birds, reptiles, insectivorous bats and ground and arboreal mammals. Koalas have been observed within and near the Tallwoods Golf Course and the array of retained trees provides for koala habitat and connectivity. The design of Tallwoods Golf Course incorporated

substantial patches of trees and habitat at fairway edges and management has been sympathetic to these environments.

The potential for Tallwoods Golf Course to protect habitat and improve biodiversity conservation within the context of the operational golf course is very high. Collaboration with Tallwoods Golf Course management to recognise and realise these shared outcomes is encouraged. It should include strategic programs / activities related to:

- Effective controls of priority weeds;
- Targeted controls of priority pest animals;
- Tree and habitat retention and tree planting programs (Including koala food trees);
- Habitat enhancements, including retention of coarse woody debris and installation of nesting boxes;
- Managing or avoiding the impacts of tourism accommodation and uses; and
- Wildlife monitoring, including koalas.

9.6.3. Nature Recreation

Action 11. Construct and maintain key nature recreation assets.

Whilst the focus of this Plan is on biodiversity conservation, it recognises that encouraging and providing the facilities for responsible, appropriate and low-impact nature recreation is valuable. Providing the community for opportunities to interact with nature through walking tracks, trails, picnic areas and scenic lookouts is often beneficial. Time in nature is associated with physical and psychological benefits and it can facilitate awareness and a care ethic within the community.

Several nature recreation assets exist within the Hallidays Point project area, including:

- Walking trails, scenic lookouts and interpretive signage in Red Head Reserve, Black Head Flora Reserve and Black Head Reserve / Back Beach;
- Diffuse opportunities for beachcombing and rockpool scrambles on local beaches including Shelly Beach, south Diamond Beach and Black Head Back Beach;
- Mountain bike riding in Khappinghat National Park and Darawank National Park; and

Additional opportunities to provide and promote responsible and appropriate nature-based recreation should be pursued.

9.7. Actions – Conservation

9.7.1. Private Land Conservation

Action 12. Promote and facilitate the uptake of private land conservation initiatives.

A range of mechanisms are currently available in New South Wales for voluntary private land conservation.

In NSW, a landholder can become involved in private land conservation by entering a private land conservation agreement with the Minister or the Biodiversity Conservation Trust (BCT) over some or all their land under Part 5 of the BC Act. Landholders can also become involved via schemes run by non-government organisations (e.g. Land for Wildlife or Wildlife Land Trust).

Choosing to participate in private land conservation is voluntary. However, if a landholder and the BCT enter a Conservation Agreement, which is an in-perpetuity agreement, that agreement takes the form of a permanent legal covenant on the title of the land that binds the NSW Government and the successors in title. Conservation Agreements secure the protection of private land and enable the landholder to receive up to \$15,000 per year for land management activities, as well as a Council land rate exemption for the protected area.

As an alternative to a Conservation Agreement, Biodiversity Stewardship Sites can be established on larger patches of vegetation and where there is significant threatened species habitat by way of a Biodiversity Stewardship Agreement (BSA) assessed under the Biodiversity Assessment Methodology. A BSA is a legal agreement between the legal owner of the land and the Minister administering the *Biodiversity Conservation Act 2015* to establish a Biodiversity Stewardship Site for the purpose of generating biodiversity credits under the Biodiversity Offset Scheme (i.e. to establish an offset site). A BSA identifies the land to which the agreement applies and the BSA is registered on the title of the land in-perpetuity. This mechanism of conservation may be suitable for larger tracts of land where a feasibility assessment determines a BSS would be suitable and where the landholder consents.

As a BSA conserves the land in-perpetuity and provides for ongoing management costs to maintain and enhance the vegetation integrity present, this would be an ideal conservation strategy where it can be applied, including in areas of somewhat degraded habitat that have been identified as areas for the expansion of biodiversity corridors. Additionally, for landholders there can be a financial incentive (i.e. selling of biodiversity credits generated) to establish a Biodiversity Stewardship Site.

Private land conservation shall be encouraged across parts of the Hallidays Point project area and the Plan shall seek to increase the area of land under permanent private conservation. To facilitate this:

- Council will encourage up-take of Conservation Agreements and Biodiversity Stewardship Sites;
- Council will advocate that the Biodiversity Conservation Trust reduce the area threshold for entry into the Conservation Agreement scheme in the Hallidays Point project area (from 20-hectares to 5-hectares) to help fast track the uptake of secure private land conservation in the area;
- Opportunities for external funding support to financially assist interested landholders in conducting feasibility assessments of their land for private land conservation schemes shall be pursued;
- Council will liaise with the Biodiversity Conservation Trust to facilitate Conservation Agreements across the project area;
- Council will secure an offset site as part of a Local Development Trading Scheme (**Section 9.5.5**); and
- Holders of non-title voluntary conservation schemes (Land for Wildlife, Wildlife Land Trust) shall be encouraged to uplift the status of the protected area to a permanent, on-title method.

9.7.2. Priority Conservation Targets

Action 13. Acquire or otherwise conserve immediate priority conservation targets. Zone priority areas for conservation. Expand the area of Khappinghat NP and Darawank NP to add strategically important land to the public conservation estate.

Effective biodiversity conservation across Hallidays Point requires that some landholdings are managed for their environmental benefits. Delivering this requires financing and resourcing and the mechanisms for this need to be resolved equitably and sustainably. Vegetated private land is layered with a range of constraints to developmental land uses. Actively conserving these lands, either through covenants / agreements or through transfer to public ownership means providing landholders with financial outcomes.

Primary conservation targets include areas of habitat nodes and wildlife corridors that are identified in **Section 9.4** of this Plan (and which are shown on **Figure 24**).

The means for securing these areas includes the use of planning proposals, development incentives for conservation and the delivery of a local development trading scheme. It also requires conservation acquisitions of certain landholdings for inclusion in the public natural area reserves scheme.

It is recognised that the functionality of identified Wildlife Corridor WC-2 may already have been compromised by past decision-making for developmental outcomes. An alternate pathway to reconstruct WC-2 should be negotiated with the relevant landholder(s), that reconstructs a new corridor to the south and east of Hallidays Shores.

There is inadequate recognition in the existing LEP for conservation important lands. As such, additional lands need to be zoned C2 or C3 under the applying LEP. Bushland habitats that are associated with the following nodes and wildlife corridors identified in this Plan should be progressively zoned for conservation:

NODES

- N-1: Darawakh node;
- N-2: Wards Road node;
- N-3: Coastal Reserves node;
- N-4: East Tallwoods node;
- N-5: West Tallwoods node;
- N-6: North Tallwoods node;
- N-7: Khappinghat / Old Soldiers Road node;
- N-8: West Old Soldiers Road node; and
- N-9: Idlewoods Crescent node.

CORRIDORS

- WC-1: Coastal corridor;
- WC-2: Darawank NP to Black Head Flora Reserve corridor (west of Hallidays Shores);
- WC-3: Two-pronged Black Head Road crossing west of The Pines Road;
- WC-4: Darawank NP to Tallwoods riparian corridor;
- WC-5: 166 Black Head Road corridor;
- WC-6: Darawank NP – Oakview Drive – Heritage Close – Black Head Road corridor;
- WC-7: Idlewoods Crescent eastern corridor;
- WC-8: Black Head Flora Reserve to Red Head Road;
- WC-9: Seascapes – Red Head corridor to Diamond Beach Road;
- WC-10: Moor Creek riparian corridor;
- WC-11: Treeview Drive eastern corridor;
- WC-12: Old Soldiers Road west corridor;
- WC-13: The Lakes Way east – west connection improvements:
 - A: Black Head Road to Timbertops Drive
 - B: Tallwood Drive
 - C: Old Soldiers Road
 - D: Wards Road to Failford Road
- WC-14: N4 – N6 corridors.

Landholdings shall also be engaged and encouraged to voluntarily protect the biodiversity values of certain target lands through agreeing to C2 or C3 environmental zoning in future LEP amendments. Land that is permanent protected shall always be zoned C2 – Environmental Conservation.

Lot 7001 DP1073875 is 71.8-hectares and is located between the existing Khappinghat NP and the ocean. Because of a strip of gazetted NP on the dune behind Saltwater Beach, it is an inholding within the NP. The land appears to be substantially constrained to future development due to bushfire, proximity to the NP, flooding, wetland issues, threatened biodiversity, shoreline recession and other matters. A means to integrate this land into the Khappinghat NP would be positive.

Expanding Khappinghat NP and Darawank NP through strategic acquisitions via appropriate programs (such as the coastal lands acquisition scheme of the NSW Government) is very important. This would potentially improve park management via enhanced buffers, enhanced bushfire management, improved access (eg. perimeter fire trails) and reduced land use conflicts at park boundaries. The Lot 7001 DP1073875 as well as properties or part-properties on the south-western and western edge of the existing Khappinghat NP (particularly those with wetland vegetation types) appear particularly relevant.

Additions of land to Darawank NP are also important. This should include the private lands referenced in the MOU between the then Great Lakes Council and the NSW National Parks and Wildlife Service (within the Darawakh Creek / Frogalla Swamp wetland restoration project area), as well as habitats that link the eastern and western sections of the existing NP. The Council owned Lots 21, 34 and 44 DP753207 and Lot 101 DP1169332, as well as suitable areas around the Hallidays Point Wastewater Treatment Plant should be scheduled for dedication to NPWS as part of an extended Darawank NP.

9.7.3. Environmental Outcomes Rezoning

Action 14. Permit additional Urban Release Areas where there is appropriately low-scale development combined with positive strategic biodiversity outcomes. Develop a framework for formulating and accepting Environmental Outcomes Rezoning.

This Plan recognises that planning proposals additional to the adopted Urban Release Areas (URAs) may provide an opportunity to achieve strategic biodiversity conservation outcomes (provided that all other elements of the rezoning are satisfactory). These planning proposals are referred to as Environmental Outcome URAs.

As an example, biodiversity action identified within this Plan requires a strategic conservation of Wildlife Node 2 (Wards Road area). This could involve an Environmental Outcomes Rezoning facilitating rural residential development in the south (fronting Ton O Fun Road and Wards Road), with concurrent active conservation of the residue of that land (116 hectares).

Delivery of Wildlife Corridor 6 and 7 and Habitat Nodes 2 and 9 may be facilitated by accepting Environmental Outcomes Rezoning for additional, low-scale, appropriate development to the north, south and east of the existing Chelmsbrook Drive estate. An Environmental Outcomes Rezoning may also be able to facilitate targeted, strategic biodiversity conservation outcomes in the Treeview Drive area.

Environmental Outcomes rezonings must be considered only on the merits of the proposal (inclusive of all other considerations of a planning proposal, including but not limited to, Aboriginal heritage, bushfire, planning considerations, access, sustainability, water quality / quantity, etc) and concurrently they must focus on and strategically deliver on the biodiversity goals and actions identified in this Plan. Council is under no obligation to accept any Environmental Outcomes rezoning. They must not detrimentally impact the condition and function of the nodes and corridors identified in this Plan.

A framework for receiving Environmental Outcomes rezonings shall be formulated and adopted.

9.7.4. Hallidays Point Wastewater Treatment Plant

Action 15. Create an operational area and a conservation area within the lands of the Hallidays Point Wastewater Treatment Plant. Manage the perimeter lands of the Hallidays Point Wastewater Treatment Plant for biodiversity outcomes.

The Hallidays Point Wastewater Treatment Plant Perimeter Lands is an important area for biodiversity in the Hallidays Point project area. It integrates with the adjoining Darawank NP on both its eastern and western sides and it contains known habitat for threatened species and threatened ecological communities. Native

vegetation and biodiversity habitat contribute to the operational buffer of this facility to private landholdings and residential areas.

These perimeter lands occupy 342.6 hectares of land across seven lots: Lot 23 DP1150979, Lot 55 DP753146, Lot 1 DP1102051, Lot 164 DP753207, Lots 8 & 9 DP788364 and Lot 11 DP1160728. The lands include the Hallidays Point wastewater treatment plant, disposal areas, managed lands, built assets, fencing, roads, as well as naturally vegetated areas comprising dry forest, swamp forest, heath and freshwater wetlands. Threatened species known from this land includes *Asperula asthenes*, wallum froglets, koalas and squirrel gliders.

MidCoast Council already delivers some biodiversity actions across the perimeter lands. Parts of the land have been revegetated with biodiverse native plantings, weed control activities have been undertaken, access for unauthorised vehicles is partially excluded by fencing, some tracks have been closed and remediated, and annual fox controls are delivered. Biodiversity outcomes can be consolidated and further enhanced through a strategic approach to biodiversity conservation.

The operational space for the Hallidays Point Wastewater Treatment Plant shall be defined from the perimeter lands. This shall be formally recognised by a re-subdivision of the land; creating separate lots for operational space and for perimeter biodiversity lands. Negotiations with the NSW National Parks and Wildlife Service shall determine if any of the perimeter lands should be added to the land within the Darawank NP. The perimeter biodiversity lands shall be zoned C2 and shall be actively and strategically managed by Council for biodiversity outcomes. Specific management actions shall include bushfire management, weed control, feral pest animal control, access control, rubbish collection and disposal, etc. Conserving additional lands as a buffer to the wastewater treatment plant would expand the area under active conservation around this facility, as well as reduce the risk of land use conflicts between future development and the operation of this treatment plant.

9.8. Actions – Managing Threats

9.8.1. Local Roads

Action 16. Address wildlife vehicle strike hotspots.

Local roads disconnect habitat and are a vehicle strike pressure for local wildlife, including koalas.

This Plan has identified koala / vehicle strike hotspots as being:

- The Lakes Way, from Blackhead Road to Timber Tops Drive (east – west koala movement);
- The Lakes Way, from Old Soldiers Road to Talabah Close (east – west koala movement);
- Blackhead Road, from The Boulevard to Diamond Beach Road (north – south koala movement); and
- Diamond Beach Road, from Red Head Road to Panorama Drive (east – west koala movement).

Other sites may demonstrate higher than average occurrences of vehicle strike of other wildlife, such as wallabies and kangaroos, bandicoots, ducks and their ducklings and eastern snake-necked turtles.

Whilst new road constructions can consider and include measures to avoid or minimise the negative impacts of roads on wildlife, existing roads can be challenging and / or expensive to retrofit with roadkill amelioration features. Roadkill avoidance or mitigation features can include safe passage structures (culverts, underpasses, rope bridges, glide poles, etc), management of road verges, variable message or activated signage and static signage. Interpretive or educational signage, such as advertising the contact number of FAWNA (for emergency animal care) can be valuable. There is increasing evidence that standard signage is mostly ineffective in reducing wildlife impacts on road.

The design and features of any construction of Old Soldiers Road on a new alignment must include wildlife protections. This has been discussed in **Section 9.5.6**.

This Plan has identified the following roadkill mitigation and avoidance actions shown in **Table 22**:

Table 22 Roadkill mitigation and avoidance actions

Road	Detail
Red Head Road (between 111 and 96 Redhead Road)	No recent koala roadkills reported. Enhancing WC-6 to allow koalas to move between Seascapes Koala Corridor and Black Head Flora Reserve may increase risks of incidents. As part of future road upgrade works, utilise a natural low-point and instal a box culvert at least 1.5-metres in height, with directive fencing to channel koalas into the underpass. This work is associated with Wildlife Corridor WC-6 and joins WC-9.
Diamond Beach Road (from Red Head Road to Panorama Drive)	No recent koala roadkills reported, but several sightings of koalas on and near the road suggest that risks of incidents are high. There are existing standard koala advisory signs on this road. In the short-term, this Plan suggests that the verges be maintained (slashed) to afford good driver visibility of koalas and that monitoring of road / wildlife incidents be undertaken to build knowledge to determine if further interventions / actions are required (WC-9)
Blackhead Road (from The Boulevard to Diamond Beach Road)	No recent koala roadkills reported, but relatively frequent sightings of koalas on and near Blackhead Road in this area suggest that risk of incidents is high. This Plan suggests that monitoring of road / koala incidents be undertaken to build knowledge to determine if further interventions / actions are required. There are opportunities to install koala directive fencing and retrofit or upgrade existing culverts in this section to improve the safety of koala movements. An expanded understanding of frequency of koala movements and risks is required to justify expenditure.
The Lakes Way (from Blackhead Road to Timbertops Drive)	There are recent koala roadkills in the vicinity of Black Head Road / The Lakes Way roundabout and near Timbertops Drive. There are infrequent sightings of koalas in the roadsides. This Plan suggests that monitoring of road / koala incidents be undertaken to build knowledge to determine if further interventions / actions are required. There are opportunities to install koala directive fencing and retrofit or upgrade existing culverts in this section to improve the safety of koala movements. An expanded understanding of frequency of koala movements and risks is required to justify expenditure.
The Lakes Way (from Old Soldiers Road to Talabah Close)	No recent koala roadkills reported, but occasional sightings of koalas on and near The Lakes Way in this area suggest that the risk of incidents is high. This Plan suggests that monitoring of road / koala incidents be undertaken to build knowledge to determine if further interventions / actions are required. There are opportunities to install koala directive fencing and retrofit or upgrade existing culverts in this section to improve the safety of koala movements. An expanded understanding of frequency of koala movements and risks is required to justify expenditure.
Blackhead Road (near The Lakes Way)	Install a FAWNA advisory sign. A Koala advisory sign for Koalas in Care is already in place.

9.8.2. Pests and Weeds

Action 17. Manage priority weeds and feral pests using a landscape approach. Manage roaming domestic pets in a way that reduces wildlife conflicts.

The landscape is the optimal scale to manage priority weeds and feral pest animals using a nil-tenure approach.

In this Plan, several weeds and feral pest animals have been considered priorities for targeted control / management in natural area reserves. Weeds and feral pest animals considered to be the landscape priorities include:

- Management of bitou bush in coastal reserves and sea-cliffs (asset-based protection);
- Management of ecosystem transformer weeds (including lantana, ground asparagus, coastal morning glory, etc) in dry and wet forests and littoral rainforests (asset-based protection);
- Control of plume poppy from the Rainbow Flat area (eradication);
- Strategic controls to reduce the biodiversity impacts of feral deer (and encouraging the community reporting of sightings via FeralScan);
- Strategic controls to reduce the biodiversity impacts of foxes; and
- Development of a management approach to feral cats (as well as stray cats and roaming owned cats).

The degree and severity of threats of uncontrolled domestic dogs to biodiversity across the Hallidays Point project area is not well understood. Continued (or expanded) enforcement of domestic dog regulations are very important, combined with proactive and effective education and awareness campaigns.

Stray and feral cats are expected to be a significant biodiversity problem in the area and many threatened fauna species are known to be killed by cats. This includes the Brush-tailed Phascogale and Squirrel Glider. The development of control programs (trapping) in natural areas is an important measure. The design and deployment of programs such as the RSPCA "*Keeping Cats Safe at Home*" would also be highly beneficial. Keeping Cats Safe at Home aims to encourage and support cat owners to prevent their cats from roaming away from their properties both to keep cats safe and to protect native wildlife. Within new developments, cat exclusions and cat confinements will be very important for residential areas that adjoin sensitive bushland habitats.

9.8.3. Bushfire Management

Action 18. Manage bushfire for biodiversity.

Proactive, strategic management of bushfire in the context of biodiversity conservation is required in the Hallidays Point project area, particularly as it relates to:

- Improvement in the protection of fire-sensitive communities and species from the effects of fire;

- Improvement in the management and use of fire so that fire regimes are within ecological thresholds for different vegetation communities (i.e.. widespread, deliberate use of cool, mosaic burns) and protect threatened species populations (including the koala);
- Fire is deliberately used (or excluded) to aid in the regeneration and recovery from the impacts of the 2019 bushfires;
- There is protection and conservation management of important habitat areas and corridors;
- There is recognition of the value of cultural fire management; and
- There is applied suppression and management of unplanned bushfire events to reduce the impacts of unplanned fire on sensitive assets within the natural environment.

To deliver on these focus areas / outcomes, authorities and agencies that manage, regulate or plan for fires must collaborate and cooperate, and fire planning and management activities must be deliberate and active.

9.8.4. Light Disturbance

Action 19. Regulate new developments and public lighting to avoid light disturbance to wildlife.

The National Light Pollution Guidelines for Wildlife (Commonwealth of Australia, 2020) states that *"natural darkness has a conservation value in the same way that clean water, air and soil has intrinsic value"* The guidelines while artificial light is required for human safety, amenity and increased productivity, it can have significant impacts on at-risk wildlife. It can disrupt critical behaviour or cause physiological changes in wildlife.

The Guidelines outline the process to be followed where there is the potential for artificial lighting to affect wildlife. They apply to new projects, lighting upgrades (retrofitting) and where there is evidence of wildlife being affected by existing artificial light.

The beaches of the project area are significant for nesting by threatened sea turtles. Sea turtles are known to be susceptible to impacts of artificial lighting; for example, hatchling marine turtles may not be able to find the ocean when beaches are illuminated, or lights are directly visible.

Development decisions and the construction of public lighting shall adhere to the National Light Pollution Guidelines.

9.9. Actions – Species and Ecological Communities

9.9.1. Littoral Rainforests

Action 20. Protect existing littoral rainforests and expand the area supporting littoral rainforests in the future. Develop work plans for patches of littoral rainforest to improve their condition and function.

The gazetted littoral rainforests under the *State Environmental Planning Policy (Resilience and Hazards) 2021* are mostly located on public lands (Council and Crown Reserves). This SEPP provides a powerful regulatory framework for the protection of mapped littoral rainforests (and proximity areas) from the impacts of clearing

and development. It does not however prompt active conservation or restoration outcomes, which are valuable and important.

There is approximately 2.5 hectares of mapped littoral rainforest on Lot 214 DP1098493. This habitat is identified for proposed dedication within this Plan, which would bring the occurrence of this littoral rainforest unit into public ownership.

The project to map the occurrence of littoral rainforests across the MidCoast in 2019 has identified that there are areas of littoral rainforest that are not included in the gazetted SEPP littoral rainforest areas. Council intends to prepare a planning proposal to update the SEPP littoral rainforest mapping to cover these patches.

Ungazetted occurrences of littoral rainforest also occur in private properties and these occurrences are a priority for conservation management. Substantial, ungazetted occurrences of littoral rainforests occur on Lot 214 DP1098493.

Littoral rainforests occur in positions in the project area in which they are threatened with decline and loss because of sea level rise and shoreline recession. Littoral rainforests flanking Black Head Beach appears to be particularly at risk.

The management goal for littoral rainforests in the project area would be to recruit enough littoral rainforest on stable landforms to provide a net increase in littoral rainforest area over time. Littoral rainforest is to be recruited under this Plan in the following areas:

- Private land at Lot 30 DP252725, as a requirement of the delivery of Red Head URA1, which will recruit up to 1.95 hectares of new littoral rainforest;
- Council land at Anchorage Way in Seaview Estate will recruit approximately 1.10 hectares of new littoral rainforest. This work is the commitment of the development consent;
- Private land to be dedicated to Council under a development consent at Lot 4 DP559419 will recruit approximately 0.8 hectares of new littoral rainforest,
- A mechanism should be negotiated that recruits littoral rainforest into currently cleared parts of the littoral rainforest proximity area on Lot 214 DP1098493. This may recruit approximately 0.8-hectares of new littoral rainforest, and
- Currently grassland sections of the Seascapes Reserve should be recruited as extended littoral rainforest. Specific plans shall be developed to identify the locations and areas of new littoral rainforest recruitment in this area.

Maintaining the ecological integrity and function of existing and recruited littoral rainforests in the project area is a critically important activity. Ecological integrity and functionality of littoral rainforests require direct action via weed controls, exclusion of fire, protection from direct and indirect threats and other bushland restoration activities. Littoral rainforests shall be managed within the natural assets framework of MidCoast Council specifically. Each specific littoral rainforest patch, namely the Black Head littoral rainforests, Black Head Beach

littoral rainforests, Red Head to Diamond Beach littoral rainforests shall have specific work plans and regular audits so that management activities are targeted, deliberate and active.

9.9.2. Coastal Wetlands (and Key Fish Habitat)

Action 21. Protect existing coastal wetlands and expand the area supporting coastal wetlands in the future. Develop work plans for coastal wetlands on public lands to improve their condition and function.

Gazetted coastal wetlands under the *State Environmental Planning Policy (Resilience and Hazards) 2021* in the project area occur in two patches; one is associated with the Darawank Creek / Frogalla Swamp Wetlands in the south and the other is associated with the Khappinghat Creek estuary. This SEPP provides a powerful regulatory framework for the protection of mapped coastal wetlands (and proximity areas) from the impacts of clearing and development. It does not however prompt active conservation or restoration outcomes, which are valuable and important.

The mapped Darawank Creek / Frogalla Swamp coastal wetlands occur on a combination of National Park and Council owned lands, and private lands, south of Blackhead Road. Progressing the Black Head URA1 will provide for the conservation management of an area of these gazetted wetlands and their proximity areas. Conservation management outcomes of the remaining areas will rely on activities within approved developments, the ongoing commitment to the implementation of the Darawank Creek / Frogalla Swamp wetland restoration project and the activities identified in this Plan.

The mapped Khappinghat Creek coastal wetlands are mostly within the Khappinghat National Park, with some extension onto private land in the north Diamond Beach area. Diamond Beach URA2 provides a framework for conserving additional areas of this mapped coastal wetlands and its proximity areas. This area is also associated with mapped key fish habitat.

There are mapped occurrences of coastal wetlands that occur within the Hallidays Point project area that are not currently gazetted on the Resilience and Hazards SEPP mapping. These occurrences almost invariably are threatened ecological communities; associated with floodplain swamp forests, floodplain wetlands and saltmarshes. As such, they are afforded some legal protections under the threatened species legislation.

This Conservation Action Plan has considered the presence of coastal wetland types in the Plan's actions. They are a priority target for protection, enhancement and conservation management.

9.9.3. Wildlife Corridors

Action 22. Increase the protections of wildlife corridors and habitat nodes identified in this Plan through a range of means.

Securing wildlife corridor functionality is a key issue within the delivery of the Hallidays Point Local Conservation Action Plan. Fourteen (14) wildlife corridors have been specifically identified (see **Section 9.4**). **Table 23** below identifies the mechanisms that are proposed to secure the function of these identified wildlife corridors:

Table 23 Wildlife corridors and conservation mechanisms

Wildlife Corridor	Tools
WC-1: Coastal corridor	Restore the condition and function of the coastal reserves. Provide an alternate connection for when sea level rise impacts the function of the coastal corridor section at the northern end of Black Head Beach.
WC-2: Darawank NP to Black Head Flora Reserve corridor (west of Hallidays Shores)	Analysis of re-routing opportunities; corridor reconstruction
WC-3: Two-pronged Black Head Road crossing west of The Pines Road	Targeted conservation Development incentive for conservation
WC-4: Darawank NP to Tallwoods riparian corridor	Targeted conservation Existing development consent requirement
WC-5: 166 Black Head Road corridor	Existing development consent requirement Environmental outcomes rezoning
WC-6: Darawank NP – Oakview Drive – Heritage Close – Black Head Road corridor	LEP wildlife corridor mapping Targeted conservation Environmental outcomes rezoning
WC-7: Idlewoods Crescent eastern corridor	Environmental outcomes rezoning
WC-8: Black Head Flora Reserve to Red Head Road	Enhance corridor values around Black Head Sports Field and the land to the west of the Black Head Flora Reserve Zoned land development decision-making Urban Release Area
WC-9: Seascapes – Red Head corridor to Diamond Beach Road	Urban Release Area Zoned land development decision-making Targeted conservation
WC-10: Moor Creek riparian corridor	Wildlife corridor mapping layer on the MidCoast LEP for the segment north of Panorama Drive to Old Soldiers Road.
WC-11: Treeview Drive eastern corridor	Environmental outcomes rezoning
WC-12: Old Soldier Road extension area corridors	C2 zoning of existing habitats Targeted conservation
WC-13: The Lakes Way east – west connection improvements: A: Black Head Road to Timbertops Drive	Targeted conservation
WC-13: The Lakes Way east – west connection improvements: B: Tallwood Drive	Targeted conservation
WC-13: The Lakes Way east – west connection improvements: C: Old Soldiers Road	Environmental outcomes rezoning
WC-13: The Lakes Way east – west connection improvements: D: Wards Road to Failford Road	Targeted conservation

Wildlife Corridor	Tools
WC-14: N4 – N6 corridors	Zoned land development decision-making Expanded URA

A corridors map and clause shall be developed and included in a Site Specific DCP chapter for Hallidays Point, which identifies the wildlife corridors in this Plan. The DCP Hallidays Point wildlife corridors clause should be based on the equivalent content in s16.22.1.3 of the Great Lakes DCP 2014. Development applications in and relevantly near mapped wildlife corridors shown in Figure 24 need to consider their impacts on the function of the relevant wildlife corridor.

The Wildlife Corridor clause for Pacific Palms in the Great Lakes DCP contains the following:

Objectives

To ensure that critical fauna movement corridors at Pacific Palms are protected and effectively managed.

Controls

- (1) *A Wildlife Corridor Management Plan (WCMP) is to be submitted for Council's approval with the development application for the land. The WCMP is to:*
 - (a) *Identify native vegetation communities, the habitats of native fauna (including threatened species, endangered populations and endangered ecological communities), so as to accurately define the fauna movement corridor on the land;*
 - (b) *Nominate on a plan all trees that are proposed to be removed. For all trees nominated for removal the habitat value and degree to which each tree contributes to a fauna movement corridor is to be assessed.*
 - (c) *Identify the fauna that would use the fauna corridor.*
 - (d) *Identify the potential impacts of the development of the land upon the habitats and fauna movement corridor.*
 - (e) *Having regard to items (a) – (d) above, nominate actions to mitigate the impacts of the development upon the corridor including restoration, reinstatement or rehabilitation. Other actions may include placement of nesting boxes, refuge poles, hollows, logs, rocks or other habitat elements. A detailed plan detailing the actions shall be included with the WCMP.*
 - (f) *Identify adequate and appropriate bushfire regimes with respect to bushfire intervals and thresholds;*
 - (g) *Indicate the location and style of interpretive signage to inform residents of the importance and location of the corridor/s.*
 - (h) *Identify the density and diversity of exotic flora species and the control and management of noxious weeds, weeds of national significance and environmental weeds;*
 - (i) *Identify any proposed and required tracks, trails and/ or fencing on the land and the means of establishing and maintaining such;*
 - (j) *Identify the means with which human access into retained native vegetation is to be managed and controlled;*
- (2) *Legal mechanisms, such as Community Title subdivision or s88B or s88E covenants/restrictions under the Conveyancing Act are to be put in place to prevent the following activities within the recognised wildlife corridors and core habitat areas:*
 - (a) *the planting or introduction of non local/non native plant species,*
 - (b) *clearing of native vegetation*
 - (c) *the degradation of the natural state of flow, supply, quantity, or quality of water,*
 - (d) *the removal from, the introduction or disturbance of any soil or rocks or the construction of new dams,*

- (e) *the accumulation of rubbish or the storage of any materials,*
- (f) *the removal of any timber including fallen timber.*
- (3) *Asset Protection Zones (APZ) are to function as transitional zones and buffers between development and recognised wildlife corridors and core habitat areas. In this regard, such areas shall be managed to meet the APZ formation and management requirements of the NSW Rural Fire Service document 'Planning for Bush Fire Protection 2006' or its successor. The width of APZs are to be reduced as much as possible by increasing the level of construction of dwellings under AS 3959 -2009. Specifically:*
 - (a) *The removal of native trees shall be minimised. Tree removal for APZ purposes shall be designed to achieve preferential retention of the more important habitat tree species and features (such as koala food trees, glossy black-cockatoo food trees, hollow-bearing trees, old-growth trees, special nectar trees). Pruning shall be utilised to avoid direct removal, wherever possible and particularly for any hollow-bearing trees that are of reduced safe useful life expectancy but which can be managed to assist their retention and longevity (i.e. selective canopy reduction in accordance with arboricultural standards);*
 - (b) *Reduction and suppression of the groundcover vegetation in the APZ shall be conducted in a manner that protects retained tree cover and sensitively protects rocks, logs and other features of significance for fauna, protecting and retaining clumps of native groundcover vegetation where possible; and*
 - (c) *APZ limits shall be clearly identified on the land and maintained in accordance with the approved Bush Fire Assessment Level.*

Similarly, the mapping of each Node in this Plan is a flag for future rezoning and development proposals that ensures that the impacts of the rezoning or development are properly considered, avoided where necessary and otherwise managed. Relevant offsets to acceptable residual impacts should deliver outcomes for the area of the impacted Wildlife Node. A legal process (a site-specific DCP chapter) will be prepared like the DCP requirement for corridors above and this will manage the mapped Wildlife Nodes. Any development in any mapped Wildlife Node in this Plan will need to specifically consider its degree of impact on that Nodes' function and integrity. Developments that unreasonably or substantially impact the function and integrity of mapped Wildlife Nodes will not be approved.

9.9.4. Koalas

Action 23. Take action to maintain and expand the koala population of the Hallidays Point project area.

The Hallidays Point Local Conservation Action Plan seeks to maintain (or improve) the viability of koala populations in the project area (and surrounds) in the long term. It does this by retaining, protecting and (where required) restoring and connecting habitats across the project area, between Darawank NP and Khappinghat NP, and to the habitats to the west.

This plan has summarised the existing knowledge of koalas, their population, the threats, and their habitats in **Section 4.5.**

Protecting, improving and managing important areas for conservation can secure the long-term occupancy of viable populations of koalas.

Development that is likely to result in adverse impacts on populations must not be supported. Offsets for acceptable, residual impacts will need to be delivered locally.

The following measures shall be implemented to protect and appropriately manage the habitat of these priority threatened species on the identified lands:

- Habitat conservation, including a local development offset trading scheme;
- Reconstructing habitat through tree planting; and
- Constructing or establishing vehicle strike mitigations.

9.9.5. Other Threatened Species

Action 24. Take action to maintain and expand the populations of squirrel gliders, brush-tailed phascogales and glossy black-cockatoos in the Hallidays Point project area.

The Hallidays Point Local Conservation Action Plan seeks to maintain the viability of the priority species across the project area in the long term. It does this by retaining, protecting and (where required) restoring viable, connected habitats within the project area, and between Darawank NP and Khappinghat NP, and habitats to the west. Priority threatened species include the Squirrel Glider, Brush-tailed Phascogale and Glossy Black-Cockatoo.

This plan has identified areas of the project area with important populations and habitat and has incorporated these areas into the proposed wildlife corridors which will be prioritised for conservation.

Protecting, improving and managing these areas for conservation is expected to secure the long-term occupancy of viable populations of these species.

Development that is likely to result in adverse impacts on populations of these priority threatened species will not be supported. Offsets for acceptable, residual impacts will need to be delivered locally.

The following measures shall be implemented to protect and appropriately manage the habitat of these priority threatened species on the identified lands:

- Habitat conservation, including a local development offset trading scheme;
- Reconstructing habitat especially in connecting habitats;
- Nesting boxes emplacements; and
- Planting *Allocasuarina* food trees.

9.10. Administration and Knowledge

Resourcing and an implementation framework are required to execute this Local Conservation Action Plan. Resourcing is required to ensure that MidCoast Council (and other stakeholders) have a financial capability to deliver the identified actions. Annual monitoring and implementation plans should also be developed to guide knowledge-gathering, monitoring / evaluation / review and adaptive feedback. The monitoring plans should have a clear understanding of success measures and should evaluate performance against these measures.

Individual target species and the ecological health and condition of natural areas should be incorporated into the monitoring program.

A 20-year indicative cost evaluation and resourcing strategy for the conservation actions identified in this Plan should be developed. The actions identified and how these may be funded by accessing various sources are discussed in **Table 24**. The table also includes some preliminary metrics / success measures for the different actions. This knowledge is incomplete and should be expanded through the implementation of the finalised Plan.

Table 24 Conservation activities, metrics and possible funding sources

Action	Success Metrics	Identified Funding Option(s)
1. Urban Release Areas	Planning proposals for URAs avoids important vegetation and habitat. Within the current URAs, there is >75-ha of existing native vegetation / wildlife habitat protected and >28-ha vegetation / habitat created	The proponent of the URA (the beneficiary of developmental outcomes in rezonings) funds these environmental outcomes
2. Existing development consents	Within the approved DAs, there is >25-ha of existing native vegetation / wildlife habitat protected and >5-ha vegetation / habitat created	Each development approval funds its own environmental outcomes
3. Development of zoned land (new developments)	Not calculated	Each new development funds its own environmental outcomes
4. Development incentives for conservation	Not calculated	Each Development Incentives for Conservation project funds its own environmental outcomes
5. Local development trading scheme – establishment of a local offset site	>60-ha conserved and managed	Initial investment by Council, but reimbursed as developments retire credits through offset payments such that the scheme is cost neutral or positive
6. Re-aligning Old Soldiers Road requires substantial biodiversity protection measures	Measures identified s9.5.6 are included in any re-alignment of Old Soldiers Road	Not identified; these works would be at a substantial cost.
7. Tree protection in rural residential areas	Areas covered by the Vegetation Management Policy are expanded	MidCoast Council environmental expenditure
8. Adopt biodiversity principles including clustering of new development	Not calculated	MidCoast Council in-kind
9. Managing natural area reserves	>80% of all public area conservation reserves are subject to applied management	MidCoast Council environmental expenditure, NPWS operating budget, Crown Reserves Improvement Fund, etc

Action	Success Metrics	Identified Funding Option(s)
10. Tallwoods golf course non-playing areas	Not calculated	-
11. Nature recreation asset development	Not calculated	-
12. Private land conservation	Expand the area under permanent conservation instruments	-
13. Priority conservation targets including 22. Wildlife corridors	>96-ha of priority native vegetation / wildlife habitats are conserved	Development contributions funds; MidCoast Council environmental expenditure
14. Environmental outcomes rezoning	Not calculated	Each rezoning funds its own environmental outcomes
15. Hallidays Point WWTP	Not calculated	MidCoast Council operating budgets
16. Local roads vehicle strike mitigation	Not calculated	Various sources
17. Managing feral pests and weeds	Not calculated	MidCoast Council environmental expenditure, NPWS operating budget, development contributions fund
18. Bushfire management	Not calculated	Various sources
19. Regulate new lighting	All new lights are wildlife sensitive	Responsible parties
20. Conserve littoral rainforests	>4.7-ha of new littoral rainforest is planted. All littoral rainforests subject to bush regeneration activities	Various sources
21. Conserve coastal wetlands	Not calculated	Various sources
22. Nodes and corridors	Two (2) DCP chapters are established that requires that all development applications in and near nodes and corridors consider and mitigate their impacts and conserve node and corridor function and integrity	MidCoast Council in-kind
23. Koala conservation	Maintain or expand local koala populations	Various sources
24. Threatened species conservation	Maintain or expand local populations of squirrel gliders, brush-tailed phascogales and glossy black-cockatoos	Various sources

Many of the activities of this Plan can be funded from identified sources. This draws from resources available through negotiated planning agreements within land rezoning, MidCoast Council environmental expenditure and other identified sources.

Funding for these activities must be sourced, or the Plan will not be successful. The funding model that is proposed incorporates:

- A special rate variation on all new lots created through rezonings in the Hallidays Point project area shall be established. The quantum of the special rate variation for environmental purposes on new residents is not yet defined, but will apply to residential lots and rural lots, and
- For each rezoning, a per lot development contribution for biodiversity conservation shall be established in a Planning Agreement of an amount yet to be determined. This will apply to both residential and rural lots. Land that is contributing to biodiversity planning outcomes in their project areas will not be required to fund this contribution.

To increase the functionality and transparency of the funding of works within this Local Conservation Action Plan, a MidCoast Conservation Trust shall be established. The Trust will function equivalent to that of the Ginninderry Conservation Trust. The Trust will leverage public and private partnerships to conserve and enhance natural areas and threatened species and ecological communities.

The Trust can showcase leadership in science-based conservation, restoration, with innovative community involvement, sustainable nature-based recreation and learning opportunities. The Trust can capture the economic benefits of local development and ensure the funds are appropriately invested in the protection, enhancement and appreciation of the biodiversity values of the Hallidays Point project area (and surrounds). The Trust would be a focussed partnership vehicle for residents, developers, and government agencies to come together and jointly protect and manage the sensitive values of the local environment.

The Trust would be independently chaired and include representatives from:

- MidCoast Council;
- NSW Government;
- Local development interests; and
- Residents.

It would include professional staff with extensive experience in the protection, rehabilitation and management of biodiversity and natural areas. The Trust will be primarily responsible for implementing this Local Conservation Action Plan, as well as administering, monitoring and reviewing the Plan.

10. References

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APPENDIX A :

Flora Species List



Table 25 Flora species recorded within the study area

Family	Scientific Name	Common Name	Exotic
Fabaceae (Mimosoideae)	<i>Acacia binervata</i>	Two-veined Hickory	-
Fabaceae (Mimosoideae)	<i>Acacia falcata</i>		-
Fabaceae (Mimosoideae)	<i>Acacia fimbriata</i>	Fringed Wattle	-
Fabaceae (Mimosoideae)	<i>Acacia floribunda</i>	White Sally	-
Fabaceae (Mimosoideae)	<i>Acacia implexa</i>	Hickory Wattle	-
Fabaceae (Mimosoideae)	<i>Acacia irrorata subsp. irrorata</i>	Green Wattle	-
Fabaceae (Mimosoideae)	<i>Acacia longifolia subsp. longifolia</i>	Sydney Golden Wattle	-
Fabaceae (Mimosoideae)	<i>Acacia longifolia subsp. sophorae</i>	Coastal Wattle	-
Fabaceae (Mimosoideae)	<i>Acacia maidenii</i>	Maiden's Wattle	-
Fabaceae (Mimosoideae)	<i>Acacia myrtifolia</i>	Red-stemmed Wattle	-
Fabaceae (Mimosoideae)	<i>Acacia ulicifolia</i>	Prickly Moses	-
Myrtaceae	<i>Acmena smithii</i>	Lilly Pilly	-
Rutaceae	<i>Acronychia imperforata</i>	Logan Apple	-
Phyllanthaceae	<i>Actephila lindleyi</i>	Actephila	-
Pteridaceae	<i>Adiantum aethiopicum</i>	Common Maidenhair	-
Pteridaceae	<i>Adiantum hispidulum</i>	Rough Maidenhair	-
Asteraceae	<i>Ageratina adenophora</i>	Crofton Weed	Yes
Asteraceae	<i>Ageratina riparia</i>	Mistflower	Yes
Sapindaceae	<i>Alectryon subcinereus</i>	Wild Quince	-
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-Oak	-
Casuarinaceae	<i>Allocasuarina torulosa</i>	Forest Oak	-
Araceae	<i>Alocasia brisbanensis</i>	Cunjevoi	-
Rhamnaceae	<i>Alphitonia excelsa</i>	Red Ash	-
Zingiberaceae	<i>Alpinia caerulea</i>	Native Ginger	-
Amaranthaceae	<i>Alternanthera denticulata</i>	Lesser Joyweed	-
Poaceae	<i>Andropogon virginicus</i>	Whisky Grass	Yes
Commelinaceae	<i>Aneilema acuminatum</i>		-
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass	-
Asparagaceae	<i>Asparagus aethiopicus</i>	Asparagus Fern	Yes
Asparagaceae	<i>Asparagus plumosus</i>	Climbing Asparagus Fern	Yes
Aspleniaceae	<i>Asplenium australasicum</i>	Bird's Nest Fern	-
Aspleniaceae	<i>Asplenium flabellifolium</i>	Necklace Fern	-
Araliaceae	<i>Astrotricha longifolia f. 'Inland'</i>		-
Poaceae	<i>Austrostipa rudis</i>		-
Restionaceae	<i>Baloskion tetraphyllum</i>		-
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	Yes

Family	Scientific Name	Common Name	Exotic
Pittosporaceae	<i>Billardiera scandens</i>	Hairy Apple Berry	-
Blechnaceae	<i>Blechnum ambiguum</i>		-
Blechnaceae	<i>Blechnum contiguum</i>		-
Fabaceae (Faboideae)	<i>Bossiaea heterophylla</i>	Variable Bossiaea	-
Brassicaceae	<i>Brassica fruticulosa</i>	Twiggy Turnip	Yes
Phyllanthaceae	<i>Breynia oblongifolia</i>	Coffee Bush	-
Acanthaceae	<i>Brunoniella pumilio</i>	Dwarf Blue Trumpet	-
Orchidaceae	<i>Calanthe triplicata</i>	Christmas Orchid	-
Myrtaceae	<i>Callistemon citrinus</i>	Crimson Bottlebrush	-
Myrtaceae	<i>Callistemon salignus</i>	Willow Bottlebrush	-
Myrtaceae	<i>Callistemon viminalis</i>	Weeping Bottlebrush	-
Dicksoniaceae	<i>Calochlaena dubia</i>	Rainbow Fern	-
Convolvulaceae	<i>Calystegia marginata</i>		-
Brassicaceae	<i>Cardamine hirsuta</i>	Common Bittercress	Yes
Cyperaceae	<i>Carex appressa</i>	Tall Sedge	-
Lauraceae	<i>Cassytha pubescens</i>	Downy Dodder-laurel	-
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak	-
Vitaceae	<i>Cayratia clematidea</i>	Native Grape	-
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass	Yes
Apiaceae	<i>Centella asiatica</i>	Indian Pennywort	-
Araliaceae	<i>Cephalalaria cephalobotrys</i>	Climbing Panax	-
Poaceae	<i>Chloris gayana</i>	Rhodes Grass	Yes
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	Yes
Vitaceae	<i>Cissus antarctica</i>	Water Vine	-
Vitaceae	<i>Cissus hypoglauca</i>	Giant Water Vine	-
Euphorbiaceae	<i>Claoxylon australe</i>	Brittlewood	-
Ranunculaceae	<i>Clematis glycinoides</i>	Headache Vine	-
Lamiaceae	<i>Clerodendrum tomentosum</i>	Hairy Clerodendrum	-
Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew	-
Asteliaceae	<i>Cordyline australis</i>	Cabbage Tree	Yes
Asteliaceae	<i>Cordyline stricta</i>	Narrow-leaved Palm Lily	-
Myrtaceae	<i>Corymbia gummifera</i>	Red Bloodwood	-
Myrtaceae	<i>Corymbia intermedia</i>	Pink Bloodwood	-
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum	-
Asteraceae	<i>Conyza sumatrensis</i>	Tall fleabane	Yes
Amaryllidaceae	<i>Crinum pedunculatum</i>	Swamp Lily	-
Lauraceae	<i>Cryptocarya microneura</i>	Murrogun	-

Family	Scientific Name	Common Name	Exotic
Sapindaceae	<i>Cupaniopsis anacardioides</i>	Tuckeroo	-
Asteraceae	<i>Cyanthillium cinereum</i>		-
Cyatheaceae	<i>Cyathea australis</i>	Rough Treefern	-
Orchidaceae	<i>Cymbidium suave</i>	Snake Orchid	-
Boraginaceae	<i>Cynoglossum australe</i>		-
Cyperaceae	<i>Cyperus brevibracteatus</i>		-
Cyperaceae	<i>Cyperus eglobosus</i>		-
Cyperaceae	<i>Cyperus eragrostis</i>	Umbrella Sedge	Yes
Cyperaceae	<i>Cyperus gracilis</i>	Slender Flat-sedge	-
Fabaceae (Faboideae)	<i>Daviesia ulicifolia subsp. stenophylla</i>		-
Asteraceae	<i>Delairea odorata</i>	Cape Ivy	Yes
Urticaceae	<i>Dendrocnide photinophylla</i>	Shiny-leaved Stinging Tree	-
Celastraceae	<i>Denhamia silvestris</i>	Narrow-leaved Orangebark	-
Fabaceae (Faboideae)	<i>Desmodium gunnii</i>	Slender Tick-trefoil	-
Phormiaceae	<i>Dianella caerulea</i>	Blue Flax-lily	-
Phormiaceae	<i>Dianella caerulea var. aspera</i>		-
Phormiaceae	<i>Dianella caerulea var. caerulea</i>		-
Phormiaceae	<i>Dianella caerulea var. producta</i>		-
Phormiaceae	<i>Dianella longifolia var. longifolia</i>		-
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	-
Poaceae	<i>Digitaria diffusa</i>	Open Summer-grass	-
Poaceae	<i>Digitaria milaniana</i>		Yes
Poaceae	<i>Leptochloa spp.</i>		-
Ebenaceae	<i>Diospyros australis</i>	Black Plum	-
Dioscoreaceae	<i>Dioscorea transversa</i>	Native Yam	-
Sapindaceae	<i>Dodonaea triquetra</i>	Large-leaf Hop-bush	-
Blechnaceae	<i>Doodia aspera</i>		-
Putranjivaceae	<i>Drypetes deplanchei</i>	Yellow Tulipwood	-
Meliaceae	<i>Dysoxylum fraserianum</i>	Rosewood	-
Poaceae	<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	-
Boraginaceae	<i>Ehretia acuminata var. acuminata</i>	Koda	-
Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass	Yes
Celastraceae	<i>Elaeodendron australe var. australe</i>		-
Lauraceae	<i>Endiandra sieberi</i>	Hard Corkwood	-
Poaceae	<i>Entolasia marginata</i>	Bordered Panic	-
Poaceae	<i>Entolasia stricta</i>	Wiry Panic	-
Onagraceae	<i>Epilobium billardiarianum</i>		-

Family	Scientific Name	Common Name	Exotic
Poaceae	<i>Eragrostis leptocarpa</i>	Drooping Lovegrass	-
Myrtaceae	<i>Eucalyptus carnea</i>	Thick-leaved Mahogany	-
Myrtaceae	<i>Eucalyptus grandis</i>	Flooded Gum	-
Myrtaceae	<i>Eucalyptus microcorys</i>	Tallowwood	-
Myrtaceae	<i>Eucalyptus paniculata</i>	Grey Ironbark	-
Myrtaceae	<i>Eucalyptus pilularis</i>	Blackbutt	-
Myrtaceae	<i>Eucalyptus propinqua</i>	Small-fruited Grey Gum	-
Myrtaceae	<i>Eucalyptus robusta</i>	Swamp Mahogany	-
Myrtaceae	<i>Eucalyptus siderophloia</i>	Grey Ironbark	-
Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum	-
Asteraceae	<i>Euchiton sphaericus</i>	Star Cudweed	-
Euphorbiaceae	<i>Euphorbia dallachyana</i>		-
Eupomatiaceae	<i>Eupomatia laurina</i>	Bolwarra	-
Restionaceae	<i>Eurychorda complanata</i>		-
Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat Berry	-
Santalaceae	<i>Exocarpos cupressiformis</i>	Cherry Ballart	-
Moraceae	<i>Ficus coronata</i>	Creek Sandpaper Fig	-
Moraceae	<i>Ficus obliqua</i>	Small-leaved Fig	-
Cyperaceae	<i>Fimbristylis ferruginea</i>		-
Cyperaceae	<i>Gahnia aspera</i>	Rough Saw-sedge	-
Cyperaceae	<i>Gahnia clarkei</i>	Tall Saw-sedge	-
Cyperaceae	<i>Gahnia radula</i>		-
Asteraceae	<i>Gamochaeta pensylvanica</i>	Cudweed	Yes
Luzuriagaceae	<i>Geitonoplesium cymosum</i>	Scrambling Lily	-
Geraniaceae	<i>Geranium gardneri</i>	Rough Cranes-bill	-
Geraniaceae	<i>Geranium homeanum</i>		-
Geraniaceae	<i>Geranium solanderi</i>	Native Geranium	-
Phyllanthaceae	<i>Glochidion ferdinandi</i>	Cheese Tree	-
Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining glycine	-
Fabaceae (Faboideae)	<i>Glycine microphylla</i>	Small-leaf Glycine	-
Fabaceae (Faboideae)	<i>Glycine tabacina</i>	Variable Glycine	-
Apocynaceae	<i>Gomphocarpus fruticosus</i>	Narrow-leaved Cotton Bush	Yes
Apocynaceae	<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush	Yes
Fabaceae (Faboideae)	<i>Gompholobium pinnatum</i>	Pinnate Wedge Pea	-
Haloragaceae	<i>Gonocarpus micranthus subsp. ramosissimus</i>		-
Haloragaceae	<i>Gonocarpus tetragynus</i>	Poverty Raspwort	-
Goodeniaceae	<i>Goodenia heterophylla subsp. eglandulosa</i>		-

Family	Scientific Name	Common Name	Exotic
Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil	-
Sapindaceae	<i>Guioa semiglauc</i>	Guioa	-
Araceae	<i>Gymnostachys anceps</i>	Settler's Twine	-
Rubiaceae	<i>Gynochthodes jasminoides</i>	Sweet Morinda	-
Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	False Sarsaparilla	-
Dilleniaceae	<i>Hibbertia aspera</i>	Rough Guinea Flower	-
Dilleniaceae	<i>Hibbertia dentata</i> var. <i>dentata</i>		-
Dilleniaceae	<i>Hibbertia diffusa</i>	Wedge Guinea Flower	-
Dilleniaceae	<i>Hibbertia scandens</i>	Climbing Guinea Flower	-
Malvaceae	<i>Hibiscus heterophyllus</i> subsp. <i>heterophyllus</i>	Native Rosella	-
Euphorbiaceae	<i>Homalanthus populifolius</i>		-
Apiaceae	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	-
Apiaceae	<i>Hydrocotyle sibthorpioides</i>		-
Apiaceae	<i>Hydrocotyle tripartita</i>	Pennywort	-
Asteraceae	<i>Hypochaeris radicata</i>	Catsear	Yes
Poaceae	<i>Imperata cylindrica</i> var. <i>major</i>	Blady Grass	-
Fabaceae (Faboideae)	<i>Indigofera australis</i> subsp. <i>australis</i>	Australian Indigo	-
Convolvulaceae	<i>Ipomoea cairica</i>		Yes
Poaceae	<i>Ischaemum australe</i> var. <i>australe</i>		-
Juncaceae	<i>Juncus cognatus</i>		Yes
Juncaceae	<i>Juncus planifolius</i>		-
Juncaceae	<i>Juncus usitatus</i>		-
Fabaceae (Faboideae)	<i>Kennedia rubicunda</i>	Dusky Coral Pea	-
Asteraceae	<i>Lagenifera stipitata</i>	Blue Bottle-daisy	-
Verbenaceae	<i>Lantana camara</i>	Lantana	Yes
Cyperaceae	<i>Lepidosperma gunnii</i>		-
Cyperaceae	<i>Lepidosperma latens</i>		-
Myrtaceae	<i>Leptospermum liversidgei</i>	Olive Tea-tree	-
Myrtaceae	<i>Leptospermum polyanthum</i>		-
Ericaceae	<i>Leucopogon juniperinus</i>	Prickly Beard-heath	-
Oleaceae	<i>Ligustrum sinense</i>	Small-leaved Privet	Yes
Arecaceae	<i>Livistona australis</i>	Cabbage Palm	-
Campanulaceae	<i>Lobelia purpurascens</i>	whiteroot	-
Lomandraceae	<i>Lomandra filiformis</i> subsp. <i>coriacea</i>	Wattle Matt-rush	-
Lomandraceae	<i>Lomandra filiformis</i> subsp. <i>filiformis</i>		-
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	-
Lomandraceae	<i>Lomandra multiflora</i>	Many-flowered Mat-rush	-

Family	Scientific Name	Common Name	Exotic
Myrtaceae	<i>Lophostemon confertus</i>	Brush Box	-
Lycopodiaceae	<i>Lycopodium australianum</i>	Fir Clubmoss	-
Cyperaceae	<i>Baumea juncea</i>		-
Cyperaceae	<i>Baumea rubiginosa</i>		-
Moraceae	<i>Maclura cochinchinensis</i>	Cockspur Thorn	-
Zamiaceae	<i>Macrozamia communis</i>	Burrawang	-
Euphorbiaceae	<i>Mallotus philippensis</i>	Red Kamala	-
Apocynaceae	<i>Marsdenia liisae</i>	Large-flowered Milk Vine	-
Apocynaceae	<i>Marsdenia rostrata</i>	Milk Vine	-
Fabaceae (Faboideae)	<i>Medicago polymorpha</i>	Burr Medic	Yes
Myrtaceae	<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark	-
Myrtaceae	<i>Melaleuca nodosa</i>		-
Myrtaceae	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	-
Myrtaceae	<i>Melaleuca sieberi</i>		-
Myrtaceae	<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree	-
Ericaceae	<i>Melichrus procumbens</i>	Jam Tarts	-
Poaceae	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass	-
Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow	Yes
Ericaceae	<i>Monotoca elliptica</i>	Tree Broom-heath	-
Primulaceae	<i>Myrsine variabilis</i>		-
Oleaceae	<i>Notelaea longifolia</i>	Large Mock-olive	-
Oleaceae	<i>Notelaea venosa</i>	Veined Mock-olive	-
Rubiaceae	<i>Opercularia aspera</i>	Coarse Stinkweed	-
Rubiaceae	<i>Opercularia varia</i>	Variable Stinkweed	-
Poaceae	<i>Oplismenus aemulus</i>		-
Poaceae	<i>Oplismenus imbecillis</i>		-
Poaceae	<i>Ottochloa gracillima</i>		-
Oxalidaceae	<i>Oxalis chnoodes</i>		-
Oxalidaceae	<i>Oxalis corniculata</i>	Creeping Oxalis	Yes
Oxalidaceae	<i>Oxalis latifolia</i>		Yes
Oxalidaceae	<i>Oxalis pes-caprae</i>	Soursob	Yes
Fabaceae (Faboideae)	<i>Oxytes brachypoda</i>	Large Tick-trefoil	-
Asteraceae	<i>Ozothamnus diosmifolius</i>	White Dogwood	-
Bignoniaceae	<i>Pandorea pandorana</i>	Wonga Wonga Vine	-
Poaceae	<i>Panicum simile</i>	Two-colour Panic	-
Apocynaceae	<i>Parsonsia straminea</i>	Common Silkpod	-
Poaceae	<i>Paspalum mandiocanum</i>	Broadleaf Paspalum	Yes

Family	Scientific Name	Common Name	Exotic
Passifloraceae	<i>Passiflora herbertiana</i> subsp. <i>herbertiana</i>	Native Passionfruit	-
Passifloraceae	<i>Passiflora suberosa</i>	Cork Passionfruit	Yes
Pteridaceae	<i>Pellaea falcata</i>	Sickle Fern	-
Proteaceae	<i>Persoonia lanceolata</i>	Lance Leaf Geebung	-
Proteaceae	<i>Persoonia linearis</i>	Narrow-leaved Geebung	-
Philydraceae	<i>Philydrum lanuginosum</i>	Frogsmouth	-
Thymelaeaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>		-
Pittosporaceae	<i>Pittosporum multiflorum</i>	Orange Thorn	-
Pittosporaceae	<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum	-
Pittosporaceae	<i>Pittosporum undulatum</i>	Sweet Pittosporum	-
Sapotaceae	<i>Planchonella australis</i>	Black Apple	-
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	Yes
Polypodiaceae	<i>Platyterium bifurcatum</i>	Elkhorn Fern	-
Lamiaceae	<i>Plectranthus parviflorus</i>		-
Poaceae	<i>Poa labillardierei</i>	Tussock	-
Poaceae	<i>Poa sieberiana</i>	Snowgrass	-
Fabaceae (Faboideae)	<i>Podolobium scandens</i>	Netted Shaggy Pea	-
Podocarpaceae	<i>Podocarpus spinulosus</i>	Spiny-leaf Podocarp	-
Convolvulaceae	<i>Polymeria calycina</i>		-
Araliaceae	<i>Polyscias sambucifolia</i> subsp. <i>A</i>		-
Rubiaceae	<i>Pomax umbellata</i>	Pomax	-
Phyllanthaceae	<i>Poranthera microphylla</i>	Small Poranthera	-
Acanthaceae	<i>Pseuderanthemum variabile</i>	Pastel Flower	-
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken	-
Fabaceae (Faboideae)	<i>Pultenaea retusa</i>		-
Fabaceae (Faboideae)	<i>Pultenaea villosa</i>	Hairy Bush-pea	-
Escalloniaceae	<i>Quintinia verdonii</i>	Grey Possumwood	-
Ranunculaceae	<i>Ranunculus inundatus</i>	River Buttercup	-
Ranunculaceae	<i>Ranunculus lappaceus</i>	Common Buttercup	-
Rosaceae	<i>Rubus fruticosus</i>	Blackberry complex	Yes
Rosaceae	<i>Rubus moluccanus</i> var. <i>trilobus</i>	Molucca Bramble	-
Rosaceae	<i>Rubus parvifolius</i>	Native Raspberry	-
Rosaceae	<i>Rubus rosifolius</i> var. <i>rosifolius</i>		-
Poaceae	<i>Sacciolepis indica</i>	Indian Cupscale Grass	-
Santalaceae	<i>Santalum obtusifolium</i>	Sandalwood	-
Menispermaceae	<i>Sarcopetalum harveyanum</i>	Pearl Vine	-
Rutaceae	<i>Sarcomelicope simplicifolia</i> subsp. <i>simplicifolia</i>	Big Yellow Wood	-

Family	Scientific Name	Common Name	Exotic
Araliaceae	<i>Schefflera actinophylla</i>	Umbrella Tree	Yes
Cyperaceae	<i>Schoenus apogon</i>	Fluke Bogrush	-
Flacourtiaceae	<i>Scolopia braunii</i>	Flintwood	-
Selaginellaceae	<i>Selaginella uliginosa</i>	Swamp Selaginella	-
Asteraceae	<i>Senecio dialschides</i>		-
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed	Yes
Fabaceae (Caesalpinioideae)	<i>Senna pendula var. glabrata</i>		Yes
Fabaceae (Caesalpinioideae)	<i>Senna septemtrionalis</i>	Arsenic Bush	Yes
Poaceae	<i>Setaria sphacelata</i>	South African Pigeon Grass	Yes
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	Yes
Asteraceae	<i>Sigesbeckia orientalis</i>	Indian Weed	-
Cyperaceae	<i>Schoenus melanostachys</i>		-
Elaeocarpaceae	<i>Sloanea woollsii</i>	Yellow Carabeen	-
Smilacaceae	<i>Smilax australis</i>	Lawyer Vine	-
Smilacaceae	<i>Smilax glycyphylla</i>	Sweet Sarsparilla	-
Solanaceae	<i>Solanum americanum</i>	Glossy Nightshade	-
Solanaceae	<i>Solanum mauritianum</i>	Wild Tobacco Bush	Yes
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	Yes
Solanaceae	<i>Solanum prinophyllum</i>	Forest Nightshade	-
Solanaceae	<i>Solanum stelligerum</i>	Devil's Needles	-
Asteraceae	<i>Soliva sessilis</i>	Bindyi	Yes
Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed	Yes
Menispermaceae	<i>Stephania japonica</i>	Snake vine	-
Moraceae	<i>Streblus brunonianus</i>	Whalebone Tree	-
Myrtaceae	<i>Syncarpia glomulifera</i>	Turpentine	-
Meliaceae	<i>Synoum glandulosum</i>	Scentless Rosewood	-
Blechnaceae	<i>Telmatoblechnum indicum</i>	Swamp Water Fern	-
Vitaceae	<i>Tetrastigma nitens</i>		-
Poaceae	<i>Themeda triandra</i>		-
Ulmaceae	<i>Trema tomentosa var. aspera</i>	Native Peach	-
Ericaceae	<i>Trochocarpa laurina</i>	Tree Heath	-
Moraceae	<i>Trophis scandens subsp. scandens</i>	Burny Vine	-
Apocynaceae	<i>Tylophora barbata</i>	Bearded Tylophora	-
Apocynaceae	<i>Tylophora grandiflora</i>	Small-leaved Tylophora	-
Goodeniaceae	<i>Velleia arguta</i>		-
Verbenaceae	<i>Verbena bonariensis</i>	Purpletop	Yes
Verbenaceae	<i>Verbena officinalis</i>	Common Verbena	Yes

Family	Scientific Name	Common Name	Exotic
Plantaginaceae	<i>Veronica plebeia</i>	Trailing Speedwell	-
Violaceae	<i>Viola banksii</i>		-
Myrtaceae	<i>Waterhousea floribunda</i>	Weeping Lilly Pilly	-
Monimiaceae	<i>Wilkiea huegeliana</i>	Veiny Wilkiea	-
Xanthorrhoeaceae	<i>Xanthorrhoea macronema</i>		-
Apiaceae	<i>Xanthosia pilosa</i>	Woolly Xanthosia	-
Rutaceae	<i>Zieria smithii</i>	Sandfly Zieria	-

APPENDIX B :

Fauna Species List

Table 26 Fauna species list

Scientific Name	Common Name	BC Act Status	EPBC Act Status
<i>Acanthiza lineata</i>	Striated Thornbill	-	-
<i>Acanthiza nana</i>	Yellow Thornbill	-	-
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	-	-
<i>Accipiter novaehollandiae</i>	Grey Goshawk	-	-
<i>Alectura lathami</i>	Australian Brush-turkey	-	-
<i>Anas superciliosa</i>	Pacific Black Duck	-	-
<i>Anthochaera chrysoptera</i>	Little Wattlebird	-	-
<i>Ardea ibis</i>	Cattle Egret	-	-
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo	-	-
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	-	-
<i>Chenonetta jubata</i>	Australian Wood Duck	-	-
<i>Columba leucomela</i>	White-headed Pigeon	-	-
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	-	-
<i>Cormobates leucophaea</i>	White-throated Treecreeper	-	-
<i>Corvus coronoides</i>	Australian Raven	-	-
<i>Cracticus nigrogularis</i>	Pied Butcherbird	-	-
<i>Cracticus torquatus</i>	Grey Butcherbird	-	-
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	-	-
<i>Egretta novaehollandiae</i>	White-faced Heron	-	-
<i>Elanus axillaris</i>	Black-shouldered Kite	-	-
<i>Eolophus roseicapilla</i>	Galah	-	-
<i>Eopsaltria australis</i>	Eastern Yellow Robin	-	-
<i>Gallinula tenebrosa</i>	Dusky Moorhen	-	-
<i>Geopelia humeralis</i>	Bar-shouldered Dove	-	-
<i>Grallina cyanoleuca</i>	Magpie-lark	-	-
<i>Gymnorhina tibicen</i>	Australian Magpie	-	-
<i>Haliastur indus</i>	Brahminy Kite	-	-
<i>Hirundo neoxena</i>	Welcome Swallow	-	-
<i>Larus novaehollandiae</i>	Silver Gull	-	-
<i>Lepus europaeus</i>	European Hare	-	-
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	-	-
<i>Litoria fallax</i>	Eastern Dwarf Sedge Frog	-	-
<i>Macropus rufogriseus</i>	Red-necked Wallaby	-	-
<i>Malurus cyaneus</i>	Superb Fairy-wren	-	-
<i>Manorina melanocephala</i>	Noisy Miner	-	-
<i>Meliphaga lewinii</i>	Lewin's Honeyeater	-	-
<i>Melithreptus lunatus</i>	White-naped Honeyeater	-	-

Scientific Name	Common Name	BC Act Status	EPBC Act Status
<i>Morelia spilota spilota</i>	Diamond Python	-	-
<i>Neochmia temporalis</i>	Red-browed Finch	-	-
<i>Nycticorax caledonicus</i>	Nankeen Night-Heron	-	-
<i>Ocyphaps lophotes</i>	Crested Pigeon	-	-
<i>Pachycephala pectoralis</i>	Golden Whistler	-	-
<i>Pandion haliaetus cristatus</i>	Eastern Osprey	V	-
<i>Pardalotus punctatus</i>	Spotted Pardalote	-	-
<i>Pelecanus conspicillatus</i>	Australian Pelican	-	-
<i>Phalacrocorax varius</i>	Pied Cormorant	-	-
<i>Phascolarctos cinereus</i>	Koala	E	E
<i>Philemon corniculatus</i>	Noisy Friarbird	-	-
<i>Phylidonyris niger</i>	White-cheeked Honeyeater	-	-
<i>Platycercus eximius</i>	Eastern Rosella	-	-
<i>Porphyrio porphyrio</i>	Purple Swamphen	-	-
<i>Psophodes olivaceus</i>	Eastern Whipbird	-	-
<i>Ptilonorhynchus violaceus</i>	Satin Bowerbird	-	-
<i>Rhipidura albiscapa</i>	Grey Fantail	-	-
<i>Rhipidura leucophrys</i>	Willie Wagtail	-	-
<i>Sericornis frontalis</i>	White-browed Scrubwren	-	-
<i>Strepera graculina</i>	Pied Currawong	-	-
<i>Synoicus chinensis</i>	King Quail	-	-
<i>Vanellus miles</i>	Masked Lapwing	-	-
<i>Zosterops lateralis</i>	Silvereye	-	-