CENTRAL COAST COUNCIL

BIODIVERSITY STRATEGY

2020

Black wattle (Callicoma serratifolia)
Illustration - Dr Tanya Hoolihan

Central Coast Council

Biodiversity is complex, beautiful and an essential part of what makes the Central Coast a special place. We share our home with iconic species such as the Powerful Owl, Bush Stone-curlew, Squirrel Glider and White's Seahorse.

Biodiversity is a broad term for the many species and ecological processes that are essential for maintaining our community's health and the amenity of the Central Coast and its landscapes. As well as having economic, social and quality of life benefits, nature has intrinsic values that need protection.

The Biodiversity Strategy is the first single strategy that combines the progress of the two former Councils in conservation planning and presents a scientifically-robust roadmap for the future of the biodiversity of the Central Coast.

Council appreciates the critical importance of biodiversity to its area, and to its community. Alarmingly, many species are declining in numbers and some are facing extinction in our own patch. The Community Strategic Plan recognises the high priority that people place on protecting and preserving our local natural beauty, bushland and waterways in its 'Green Theme'.

The Biodiversity Strategy highlights the roles that Council has to support biodiversity: as a land use planning authority, a community leader, and a major landholder and land manager. Council currently manages over 6,000 ha of land in the Central Coast local government area primarily for its natural values, and the goal is to increase this in the future.

This Biodiversity Strategy outlines Council's administrative and policy framework for responding to the actions identified to progress and implement on-ground change. The Biodiversity Strategy guides Council's own actions and informs the actions of the community and a wide range of other organisations who together will shape the future of the Central Coast.

March 2020

Central Coast Council

Biodiversity Strategy 2019

Illustrations by Dr Tanya Hoolihan

Wyong Office:
2 Hely St / PO Box 20 Wyong NSW 2259
Gosford Office:
49 Mann St /PO Box 21 Gosford NSW 2550

Superb fairy-wren - (Malurus cyaneus)
Illustration - Dr Tanya Hoolihan

Contents

Platypus - (Ornithorhynchus anatinus)
Illustration - Dr Tanya Hoolihan

White-bellied sea-eagle (Haliaeetus leucogaster)
Illustration - Dr Tanya Hoolihan

Summary

Two of the main drivers for preparing the Central Coast Council Biodiversity Strategy are firstly to respond to the outcomes of community engagement where the care and protection of the natural environment was identified as important to the Central Coast community and second, the amalgamation of the former Gosford and Wyong local government areas (LGA). The document builds on the two former Councils' biodiversity strategies and plans, and guides the new Council to protect, enrich and embellish existing biodiversity values.

Areas with high natural, social or landscape values are considered critical for long-term protection and management and occur throughout the Central Coast on both publicly-owned land (such as national parks, state forests and Council-owned reserves) and privately-owned land. This Strategy outlines a framework for the identification of priority conservation areas and proposes a plan for their protection, whether that is by being in public ownership or through private land conservation.

Habitat loss and fragmentation are the largest contributors to loss of biodiversity in the local area. Climate change is an additional threat which is only starting to be understood in terms of conservation planning and land management.

Of the Council land portfolio, approximately 6,000 ha of bushland (which is 4% of the total area of the LGA) is

held primarily for the purpose of preserving natural and heritage values. Part of the portfolio may have a primary purpose of water supply, flood mitigation or visual amenity, however it also preserves natural and heritage values. This is in the context of 46,808 ha in national parks and 21,798 ha in State Forest.

This Strategy sets out an ambitious but deliverable 5-year program to direct conservation planning and on-ground activities on the Central Coast for the long-term. It seeks to establish a framework to guide conservation efforts while planning for biodiversity conservation as an integral part of future development.

The specific actions and targets are organised into the following five themes:

1. Planning and managing biodiversity in Council's natural areas
2. Ensuring adequate resourcing to enable Council to effectively manage its natural areas and expand the conservation estate
3. Promoting community appreciation and participation in biodiversity conservation
4. Protecting biodiversity through land use planning and information management
5. Demonstrating leadership in biodiversity conservation

Working together with the community, the measures outlined will help secure the future of biodiversity in the Central Coast region, and benefit the community and future generations.

Sacred kingfisher - (Todiramphus sanctus)
Illustration - Dr Tanya Hoolihan

Introduction and Biodiversity Values

What is Biodiversity?

Biodiversity refers to the variety of all life including plants, animals, fungi, insects and microorganisms, their genes and the ecosystems that they form. Biodiversity is considered at three levels: genetic, species and ecosystem.

The Central Coast LGA extends from the Hawkesbury River in the south to Lake Macquarie and the Watagan Mountains in the north, and from the forests of Dharug National Park in the west, to the coastline.

Its forested scenic landscapes, peaceful sandy beaches, dynamic and productive estuaries, lakes and lagoons, and sandstone escarpment areas are appreciated by residents and visitors to the region.

It is also the traditional lands of the Darkinjung and Guringai people who have had a long connection with the region's landscapes and ecosystems.

On the Central Coast, there are thousands of different species of plants and fungi and hundreds of different animals (including birds, reptiles, amphibians, fish and insects). There are at least 83 distinct vegetation community types, each with their unique suite of interacting species and ecological conditions.

The urban trees and remnant vegetation in each suburb together make up the regional tree canopy and contribute to landscape scale connections between larger patches of natural areas. The individual plants and animals that residents see in their local environment make up populations, communities and ecosystems. These local biodiversity values scale up to landscapes, the region and ultimately the biosphere.

The importance of biodiversity at a local scale parallels its global importance: our economy and quality of life depends on it. The $874M Central Coast tourism industry is dependent on high quality and functioning natural ecosystems, as is human health and well-being. Worldwide, the main threats to biodiversity are human population growth, resource over-consumption and climate change. Locally, these threats translate to habitat loss associated with vegetation removal and urbanisation, invasive plants and animals, and environmental degradation.

Structure of the Biodiversity Strategy

The Biodiversity Strategy document has four sections (Figure 1).

The first section explains the need for a biodiversity strategy in light of recent significant changes such as the amalgamation of the former Gosford City Council and former Wyong Shire Council and significant NSW legislation reform. It also identifies the biodiversity values of the Central Coast LGA and current threats that have already caused substantial local and regional biodiversity loss.

The second section sets out the objectives and strategic context within the national and NSW legislative frameworks and within Council's other related strategies and policies.

The third section provides an administrative and policy framework and specific actions for achieving the goals of the Strategy. This section provides direction for the proposed Conservation Management Program and Environmental Land Acquisition Program.

The last section is a detailed implementation plan for Council to achieve the stated goals and meet the targets set out in the Strategy. The actions are allocated to specific teams within Council and progress against the actions will be reported in future Strategy updates.

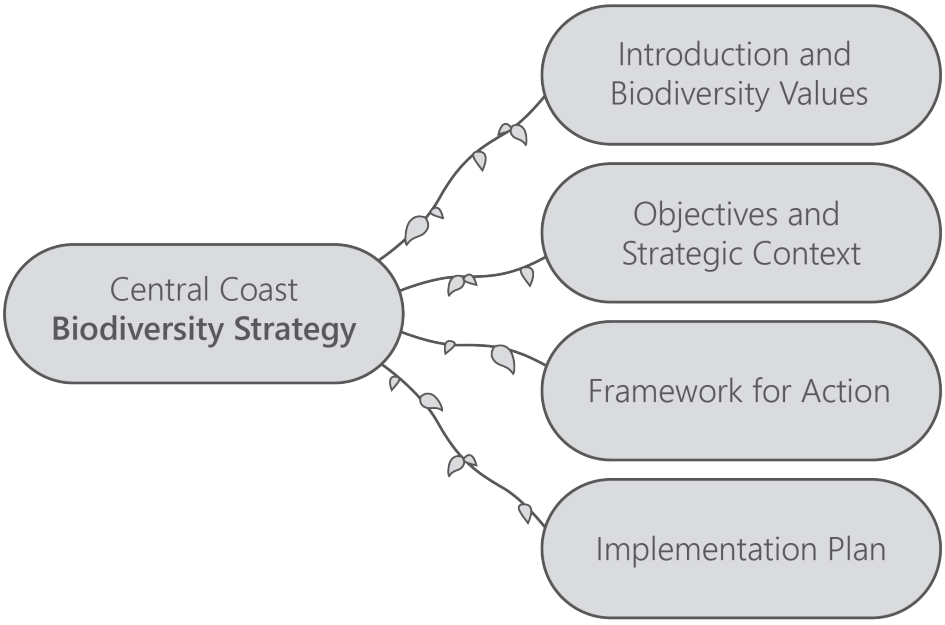


Figure 1: Structure of the Central Coast Council Biodiversity Strategy

Red necked wallaby - (Macropus rufogriseus)
Illustration - Dr Tanya Hoolihan

What has the Central Coast Community asked Council to do?

The Central Coast Council Community Strategic Plan 2018-2028 outlines the adopted direction of Council for the next decade. The actions set out in the Biodiversity Strategy will contribute to the vision, which is *to maintain a healthy, connected, and socially just community that cherishes and protects our natural landscapes, and balances social and economic needs with the protection of the environment and its irreplaceable biodiversity.*

One – Central Coast, Community Strategic Plan 2018-2028

"The values of the Central Coast community are strongly tied to its natural areas and ecosystems, such as beaches, waterways, ridges, estuaries, lakes and valley floors. The parks, gardens and natural bushland contribute to the lifestyle, culture and beauty of the region.

Large bushland and wetland areas are important for our air and water quality and provide homes for birds, animals and native plants.

We value open space that is expansive and connected and that enables passive recreation activities such as walking, cycling and getting together with family and friends. Our natural areas can be quiet and peaceful places for contemplation and enjoyment of natural beauty that enhances our emotional wellbeing as well as places for active engagement like playing sports and running on the beach.

We are committed to leaving a positive legacy for future generations through responsible stewardship of our natural areas – this is our shared responsibility as residents of the Central Coast. We encourage our community to contribute to that stewardship by minimising resource use (energy, water, and waste) and treating these natural areas with respect."

The community values that "the natural environment is well cared for and protected" as recognised in the Community Strategic Plan, prepared following extensive community engagement. Themes emerged in participant's concerns and ideas on the environment (Table 1).

Table 1: Community engagement outcomes relating to the natural environment.

Important Community Value	Community Desire	Related CSP Objective
Abundant bushland areas, parks and green spaces	Council should take a proactive approach to protect and manage the natural environment under its care	F1 Protect our rich environmental heritage by conserving beaches, waterways, bushland, wildlife corridors and inland areas and the diversity of local native species
Access to clean and well-maintained lakes and waterways	Council's Estuary Management Plan, catchment management program, Waterwatch Program and lagoon and coastal protection programs are important	E2 Improve water quality for beaches, lakes and waterways by minimising pollutants and preventing litter entering our waterways
New developments are built with consideration for the environment and local heritage	Development is removing habitat, trees and corridors – local and state government land use planning needs to protect these values	I3 Ensure land use planning and development is sustainable and environmentally sound and considers the importance of local habitat, green corridors, energy efficiency and stormwater management
Council works in the best interests of the community	Council should map wildlife corridors and extend corridors and protected areas	F2 Promote greening and ensuring the wellbeing of communities through the protection of local bushland, urban trees, tree canopies and expansion of the Coastal Open Space System (COSS)
The community is concerned about the impacts of climate change	Our community is active in environmental protection, and Council should acknowledge and encourage this by undertaking community education about wildlife and local vegetation	E1 Educate the community on the value and importance of natural areas and biodiversity and encourage community involvement in caring for our natural environment F4 Address climate change and its impacts through collaborative strategic planning and responsible land management

Assorted fungi - pretty grisette (*Amanita xanthocephala*), collared earth star (*Geastrum triplex*), *Phlebopus marginatus*, *Cortinarius* sp., *Leratiomyces ceres*, orange bracket. *Illustration - Dr Tanya Hoolihan*

The preparation of the Biodiversity Strategy is in direct response to the importance that the community places on the environment and is included as part of a suite of Council strategies aimed at implementing key Community Strategic Plan objectives. Other strategies include:

- the Urban spatial Plan;
- the Greener Places Strategy, aimed at maintaining an urban tree canopy;
- the Sustainability Strategy, a pathway to a more sustainable region; and
- the Comprehensive Local Environmental Plan.

Achieving Balance

Biodiversity contributes to, and at the same time, competes with other social and economic values, including the need for land for urban development (Figure 2). These competing interests can be resolved through community engagement and excellent strategic planning, to which this Strategy contributes.

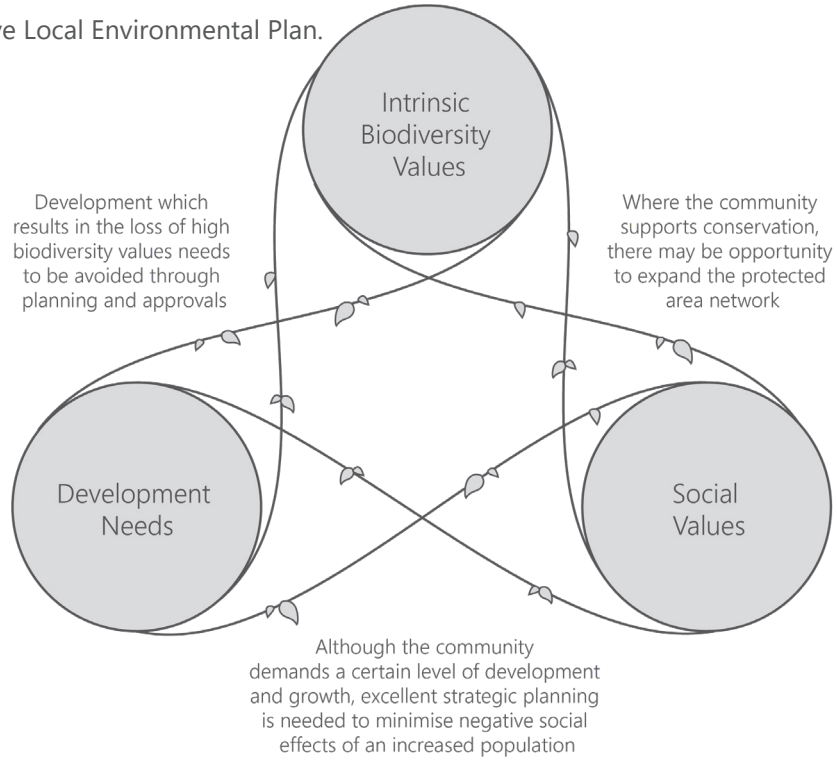


Figure 2: Acknowledging the complexity of integrating biodiversity and social values when prioritising for biodiversity conservation. Adapted from Whitehead AL, H Kujala, C Ives, A Gordon, PE Lentini, BA Wintle, E Nicholson & CM Raymond (2014). *Integrating biological and social values when prioritizing for biodiversity conservation.* Conservation Biology. doi: 10.1111/cobi.12257

The social services that Council's natural areas provide to the community include opportunities for nature based recreation (e.g. bushwalking, mountain bike riding), educating the community about the natural environment, and opportunities to undertake scientific investigation. Providing opportunities for the community to increase its understanding and appreciation of the natural environment, the threats to biodiversity, and the actions that can be taken to minimise their impacts is an important role for Council.

The reserves are known to support items of both Aboriginal and non-Aboriginal significance or interest, however many knowledge gaps exist in the location and best management practices of these sites. Involving the local Indigenous community in the management of sites of Aboriginal significance is essential in ensuring that management is culturally appropriate.

Biodiversity Values of the Central Coast

The biodiversity of the Central Coast is the result of complex processes of evolutionary history over long time periods. The biodiversity can be described in terms of ecosystems, vegetation communities, and the species of which these are comprised. A general summary description of these is provided in this section.

Over 2,100 native plant species have been recorded in the Central Coast LGA. An additional 798 exotic plant species have been recorded. There are 384 native bird, 108 native mammal and 122 native reptile and amphibian species on the Central Coast. Some of these are migratory or nomadic and use the region intermittently or seasonally. According to the Atlas of Living Australia there are 1090 species of insects and spiders recorded in the former Gosford LGA and 584 species in the former Wyong LGA. And those are just the ones that have names.

Iconic and Unique Species

Our magnificent biodiversity is of national and regional importance. For example, the Central Coast community can be proud that:

- our coastlines provide key breeding sites for the little tern and other migratory shorebirds;
- regionally important populations of squirrel glider, greater glider and yellow-bellied glider call the Central Coast home;
- we have a large diversity of microbat species;
- Kincumba Mountain Reserve and The Scenic Road Bushland Reserve are home to long-nosed potoroos;
- we have at least four permanent flying-fox maternity camps;
- there is a population of wallum froglet in the Porters Creek Wetland;
- our estuaries and coastal lakes are immensely important for the fisheries industry; and
- 46,808 ha or 25% of the Central Coast is national park.

The following are examples of species endemic to the region, meaning that they grow nowhere else in the world as they are particularly adapted to the local soils and conditions:

- Somersby mintbush (*Prostanthera junonis)*
- Blue-leaved darwinia (*Darwinia glaucophylla*)
- Tranquillity mintbush (*Prostanthera askania*)
- *Grevillea diffusa subsp. filipendria*
- *Grevillea oldei*
- *Grevillea shiressii*
- *Genoplesium insignis*
- *Microtis angusii*
- *Thelymitra adorata*
- *Corunastylis sp 'Charmhaven'*
- Heart-leaved stringybark *(Eucalyptus oblonga)*
- Charmhaven apple *(Angophora inopina)*
- Magenta lilly pilly *(Syzygium paniculatum)*.

Pink wax flower - (Eriostemon australasius)
Illustration - Dr Tanya Hoolihan

Short-beaked echidna - (Tachyglossus aculeatus)
Illustration - Dr Tanya Hoolihan

Ecosystem Drivers and Processes

The underlying geology determines the ecosystems on the land's surface, contributing to ecosystem diversity. The Central Coast formed as a delta during the Triassic period, which is characterised by three geological formations: Hawkesbury Sandstone, the Narrabeen Group and Wianamatta Shale. Quaternary sands are found along the edges of the major rivers and valley floors.

The topography of the LGA ranges from mountains and steep sandstone escarpments with narrow ridges to the west, descending to wide valley systems to the east. The Hawkesbury River collects water from the Mangrove, Popran, Mooney Mooney, and Mullet Creeks before reaching the ocean. Brisbane Water drains into Broken Bay. The entire coastal zone is characterised by estuaries, lagoons, dunes and rocky headlands.

The climate of the Central Coast is moist and temperate, with unpredictable and significant rainfall events. Rain usually falls as either east coast lows or as heavy spring/ summer thunderstorms. Winters are mild, especially on the coast, with only the occasional frost. Gosford, for example, has temperatures ranging from mean maxima of 18° C in winter to 28° C in summer.

Flora and Fauna Species

Different ecosystems associated with the variety of land forms provide for many special species, such as the glossy-black cockatoo, which is dependent on casuarina trees, eastern pygmy possums, which feed on banksia flowers in wet heath, the wallum froglet which is associated with wallum swamps on coastal plains and the red-crowned toadlet, which breeds in the drainage lines on sandstone escarpments. The diversity of ecosystems provides for high densities of some species, such as squirrel gliders that feed on winter-flowering eucalypts, banksias and the exudates of some eucalypts and acacias. The habitat of green-thighed frogs is varied, having been found in vegetation as diverse as rainforest and grassy woodland, but seems to be restricted to areas which flood after heavy rains.

Marine and estuarine habitats (tidal sandflat, tidal mudflat, lake, rocky shores, beach, and ocean) are used by a wide range of resident and migratory wading, estuarine, ocean and shore birds.

Fungi are the invisible framework of all ecosystems (both terrestrial and aquatic). They play a critical role in decomposition and nutrient cycling, help create and stabilise soils, form relationships with plant roots which are highly beneficial for the survival of plants, and provide habitat and a food resource for a multitude of other organisms.

Without fungi, plant-based habitats would not exist. Fungi are the second-most diverse group of organisms in the world after arthropods.

Arthropods are vital to the functioning of all ecosystems. Insects are ecosystem engineers, decomposers, pollinators, soil aerators and serve as food for many groups of animals such as fish, birds and mammals.

Ecosystem Types

1. Rainforest

Rainforest is typically a rich, moist forest with a diverse composition of rainforest species. There are five types of rainforest which are restricted to sheltered gullies of the sandstone escarpment areas, in riparian zones on the coastal floodplains or on sand dunes and coastal headlands. They total 6,943 ha in area, of which 98 ha is Coastal Sand Littoral Rainforest. Examples of littoral rainforest can be seen at Wyrrabalong National Park and Munmorah State Conservation Area.

2. Forest and Woodland

Wet sclerophyll forests, dry sclerophyll forests and woodlands make up the largest proportion of vegetation on the Central Coast, with 40 different types identified.

Riparian, moist and mesic forests occur along the edges of creeks and rivers and on sheltered slopes and gullies on the Narrabeen Sandstone in the west. Examples include Coastal Narrabeen Ironbark Forest, Alluvial Riparian Blackbutt Forest and Coastal Sand Bangalay Mesic Forest. Along the Hawkesbury River and its tributaries there are deeper soils which support taller alluvial forests, but much of this area has been cleared as access to harvest the taller trees was possible from the river.

Exposed headlands, outcrops of sandstone, and elevated ranges and footslopes support dry sclerophyll forests dominated by eucalypt tree species. For example, in Dharug National Park, Hawkesbury Peppermint Apple Forest occurs on sheltered slopes and minor drainage lines within the sandstone ranges, with a ground layer of grasses and herbs.

More of the dry sclerophyll forests are conserved in the west than the forests of the coastal plain, which are now only found in small remnant patches along the coast. These forests provide high value winter food sources for migratory birds, flying-foxes, gliders and possums, and complement the flowering of the swamp forests.

Woodland occurs on exposed crests or in dry rainfall areas, for example, Exposed Hawkesbury Woodland. *Corymbia* and *Angophora* occur as widely spaced trees over a diverse heathy understory.

There are very small areas of Umina Coastal Sandplain Woodland (UCSW) threatened ecological community remaining. Originally this was the vegetation on the dunes and swales and their associated swamps and creeks on the coastal sandplains at Umina, Woy Woy and Pearl Beach. Historically, this flatter area has been drained and used for housing. The UCSW's entire area is reduced to less than 14 ha and as such, is one of the smallest threatened ecological communities.

3. Swamp Forest

Swamp forests are often dominated by swamp mahogany *(Eucalyptus robusta)* and *Melaleuca* paperbark species with a dense shrub layer. These vegetation communities grow in poorly drained and waterlogged soils, along watercourses or floodplains and on the fringes of estuaries. Examples include Alluvial Floodplain Redgum Forest, Coastal Sand Swamp Forest and Estuarine Swamp Oak Forest.

One of the main ecological functions of swamp forests is their value as a food source for migratory birds and for flying-foxes which move across large areas.

4. Heath / Scrub

Dry heath is generally restricted to coastal areas and on elevated sandstone ridges with impeded drainage on rock or in dunal areas (e.g. Bouddi Sandstone Coastal Heath and Coastal Sand Banksia Scrub). Although not widely distributed, coastal heath is well represented in the national park reserves in the south (Brisbane Water, Bouddi, and Wyrrabalong National Parks).

Coastal heaths are often associated with acidic soils which can be waterlogged. Coastal Sand Wallum Heath is found in the north of the region at Munmorah State Conservation Area, Soldiers Beach and Norah Head. This vegetation community provides habitat for the rare wallum froglet and has disappeared from about 40 per cent of its former range, making it regionally significant for conservation.

Species diversity in heathlands is generally very high with the plant families Ericaceae, Myrtaceae, Proteaceae, Fabaceae and Restionaceae being particularly well represented.

Wet heath /scrub is associated with stunted vegetation in locations where drainage is impeded due to impervious clay layers and includes hanging swamps of the sandstone plateaux. Examples of Narrabeen Impeded Wet Heath occur in Bushells Ridge, Chain Valley Bay and Wyee. Coastal Floodplain Wet Heath occurs principally within the Porters Creek Wetland, south of the Warnervale airport.

5. Wetland

There are many coastal wetlands in the region mapped by the State Environment Planning Policy (Coastal Management) 2018. The vegetation community types associated with these wetlands are diverse and, in most cases, have been declared threatened ecological communities.

Nine Wetlands of National Significance are located within the region: Avoca Lagoon, Brisbane Water Estuary, Budgewoi Lake Sand Mass, Cockrone Lagoon, Terrigal Lagoon, Tuggerah Lakes Estuary, Wamberal Lagoon and Wyong Racecourse Swamp.

Porters Creek Wetland is the single largest coastal wetland in the region being 12% of the region's total wetland area (624 ha) and provides habitat for many species. A survey undertaken in 1999 recorded 168 species of plants, macroinvertebrates from 70 families, 62 bird species including 9 migratory species, and 25 mammal species including 7 species of bats.

Baumea sedgelands are only found in a few localities near Avoca and Cockrone Lagoon and around the estuaries of Brisbane Water, whereas *Juncus* sedgelands are known from estuaries in Lower Mangrove and Spencer along the larger river systems.

6. Mangrove Swamp

Estuarine Mangrove Scrub occurs immediately within and adjacent to tidal estuaries, such as along the Woy Woy Inlet, on the edges of Brisbane Water, along the Hawkesbury River and its tributaries, along Erina Creek and the southern shore of Lake Macquarie. The vegetation community is dominated by grey mangrove (or river mangrove in and near major rivers) with a ground layer devoid of any other plants.

Mangroves are well known as nurseries for fish and a source of food for wading birds and crabs. They also serve as soil stabilisers against erosion caused by wave action. Mangroves are often found on the fringes of saltmarsh, and can encroach on saltmarsh communities. Mangroves are protected under the *Fisheries Management Act 1994*.

7. Saltmarsh and Seagrass

There are a considerable number of estuaries in the Central Coast region supporting mangroves, seagrass beds, saltmarsh / grassland, and inter-tidal sand and mudflats.

Estuarine Saltmarsh / Grassland occurs immediately within and adjacent to tidal estuaries and is dominated by saltmarsh (*Sarcocornia quinqueflora* subsp *quinqueflora*) or grasses *(Zoysia macrantha)*. Estuarine Saltmarsh is found in Crangan Bay, Cockle Bay, Davistown-Saratoga and on Tuggerah Lake Estuary foreshores.

Coastal saltmarsh is a threatened ecological community. The on-going threats to saltmarsh include illegal in-filling, grazing, weed invasion and recreational vehicles.

Pink wax flower - (Eriostemon australasius) Mountain devil (Lambertia formosa), broad-leaf drumsticks (Isopogon anemonifolius)
Illustration - Dr Tanya Hoolihan

Saltmarsh protects the coastline from storm erosion and acid sulphate soil exposure. Saltmarsh provides a valuable source of food in the form of crabs, molluscs and many insects for wading birds, many of which are migratory.

Seagrasses occur in the intertidal and subtidal zones of estuaries. Common species are *Zostera capricorni* (eelgrass) and *Halophila spp.* (paddleweed).

Important seagrass areas occur in the Brisbane Water, Hawkesbury River and Tuggerah Lake Estuary. Brisbane Water supports an endangered population of the seagrass, *Posidonia australis*. Seagrasses are important habitat for a range of fauna species, including the White's sea horse (*Hippocampus whitei)* and as habitat for a range of estuarine fish such as bream (*Acanthopagrus sp*.).

8. Maritime Grassland

Natural grasslands in the Central Coast typically occur in exposed coastal places where growth of shrubs is inhibited by strong onshore winds. Coastal Headland Grassland vegetation community is part of the *Themeda* Grassland on Seacliffs and Coastal Headlands threatened ecological community. Examples can be found at Wyrrabalong National Park, Bouddi National Park, Mt Ettalong Reserve and Munmorah State Conservation Area.

Coastal Sand Beach Spinifex occurs on ocean beaches above the high water mark, particularly those that have not been disturbed through excessive recreational use or invasion by bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*).

9. Freshwater Rivers

Freshwater rivers and streams are important habitat for a range of species, including platypus, along with a range of macroinvertebrates and rainforest stream frogs, such as the stuttering frog. Riparian vegetation provides an important resource for a range of specialised aquatic and terrestrial fauna that feed along waterways (e.g. fishing bat, kingfishers, water dragons) or spend a portion of their lifecycle in water. Riparian vegetation also provides leaf and litter input to streams that forms the basis of the food chain in freshwater streams. Important freshwater streams on the Central Coast include the upper reaches of the Wyong River in Olney State Forest and the upper reaches of Mooney Mooney Creek which flow through Brisbane Water National Park.

9. Marine

The marine environment is outside of Council's responsibility; however, 75.5 km of coastal zone creates the eastern boundary of the LGA.

The Bouddi National Park Marine extension protects a range of threatened species, migratory species, and habitats including sandy beaches, intertidal rocky shores, and open ocean. It stretches from Bullimah Beach to Bombi Point (approximately 3.5 km of shoreline) and out to sea for 400 m, protects about 20 ha of marine and rock platforms, including invertebrates.

Straw-necked Ibis - (Threskiornis spinicollis)
Illustration - Dr Tanya Hoolihan

Threats to Biodiversity

Australia's biodiversity is in rapid decline. According to the 2016 State of the Environment (SoE) report, the main pressures affecting the Australian environment today are the same as reported in the previous SoE report of 2011: climate change, land-use change, habitat fragmentation and degradation, and invasive species. There are no indications that these pressures have decreased since 2011, and there is evidence that some have increased (e.g. coastal waterways are threatened by new classes of pollutants such as microplastics and nanoparticles, dumped waste in the marine environment and invasive species generally).

Globally, all species are affected by climate change. Nearly half of species on Earth are experiencing local extinctions.[1] This means that hundreds of species have already lost the race to adapt to new climate conditions and have vanished from their local habitat, even though levels of climate change so far are modest relative to those predicted in future.

In Australia, climate change is an increasingly important and pervasive pressure on all aspects of the environment. Australian average temperatures have increased by 1 °C since 1910 and there is evidence that change in climate is altering the structure and function of natural ecosystems, and affecting heritage, economic activity and human wellbeing.[2] As the concentration of CO^2 in the lower atmosphere continues to increase every decade (up to 450 ppm in the next 10 years) temperatures will rise. It is not known for certain what affects this will have on Earth's geosystems, however it is clear that the impacts of climate change are increasing, and some of these impacts may be irreversible.

If global trends are any indication of how local conditions may change, the Central Coast region can expect higher temperatures, an increase in bushfires, more intense rainfall contributing to more floods, more droughts, and sea level rise. Expected impacts on local plant and animal species include lowered populations, asynchronous flowering and emergence of pollinators, local extinctions and the spread of new diseases and weeds.

[1] John Wiens (2016) Climate-related local extinctions are already widespread among plant and animal species. PLOS Biology doi:10,1371/pbio.2001/04
[2] Australia SOE 2016

Key Threatening Processes

Key threatening processes that could apply in the LGA that are currently listed on the schedules of the *Biodiversity Conservation Act* 2016 are:

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

Purple swamphen (Porphyrio porphyrio)
Illustration - Dr Tanya Hoolihan

The key threatening processes list in the Species Profile and Threats Database under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 includes all of the above. The *Fisheries Management Act* 1994 list adds degradation of native riparian vegetation along water courses, introduction of fish to river catchment and marine areas and the removal of large woody debris from rivers and streams.

Council's natural areas, as well as most remnant vegetation community types in the LGA, are currently affected to some degree by most of the above threats. In particular, Council targets weed invasion, grazing or predation by feral or domestic animals, firewood collection, rubbish dumping, and clearing of native vegetation as part of its land management planning.

Threatened Species, Populations and Ecological Communities

The quantifiable result of the many threats to biodiversity mentioned above is that certain vegetation community types and flora and fauna species become so far reduced in extent or numbers that they are at risk of local extinction. If criteria are met and a panel of experts agree, a species, ecological community or population can be eligible for listing as being threatened with extinction. Listed entities have more legal protection and are eligible for funding for their management and restoration.

Species and populations specifically listed in the schedules of the NSW *Biodiversity Conservation Act* 2016 and the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 as threatened and that occur, or are likely to occur, in the Central Coast LGA are listed in Appendix A. There are 53 plants, 67 birds, 27 mammals, one insect, four reptiles, 9 amphibians and two populations on the list.

A total of 15 threatened ecological communities are known to occur in the Central Coast LGA (Table 2).

Table 2: Threatened ecological communities in the Central Coast local government area

Threatened Ecological Community	NSW status	Commonwealth status
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Vulnerable
Coastal Upland Swamp in the Sydney Basin Bioregion	Endangered	Endangered
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	-
Kincumber Scribbly Gum Forest in the Sydney Basin Bioregion	Critically Endangered	-
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Critically Endangered
Low Woodland with Heathland on Indurated Sand at Norah Head	Endangered	
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	Endangered	Critically Endangered
Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion	Endangered	-
Quorrobolong Scribbly Gum Woodland in the Sydney Basin Bioregion	Endangered	-
River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	-
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Endangered
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	-
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	Endangered	-
Themeda Grassland on Seacliffs and Coastal Headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	Endangered	-
Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion	Endangered	-

Sugar Glider - (Petaurus breviceps)
Illustration - Dr Tanya Hoolihan

Objectives and Strategic Context

Purpose of the Biodiversity Strategy

The Strategy recognises that the irreplaceable biodiversity values described earlier are important to the community and the purpose of the Strategy is to:

> *Provide an administrative and policy framework to support the protection and management of biodiversity on the Central Coast.*

The desired outcome of the Strategy is to protect and enhance the landscape and biodiversity values of the Central Coast, which includes maintaining functional connections between areas of habitat, maintaining core habitat as well as restoring marginal habitat, preserving threatened and iconic species and ecological communities, preserving significant Aboriginal cultural places, and protecting the scenic amenity of the region.

Mechanisms identified within this strategy seek to appropriately offset local biodiversity loss in order to try and achieve a zero net loss of biodiversity on the Central Coast.

The Strategy sets out a 5-year program to direct and drive conservation planning and on-ground activities. It seeks to establish a framework to guide conservation efforts while balancing the needs of the community for future development.

Council acknowledges that effective conservation planning is considered over a much longer period, and a time horizon of 50 to 100 years should be the basis for the objectives, programs and principles in the Strategy. However, the reality is that administrative frameworks are not static and therefore the Strategy will require a review and update 5 years after adoption and periodically thereafter.

Wyong sun orchid (Thelymitra adorata)
Illustration - Dr Tanya Hoolihan

The objectives of the Strategy are to:

1. Define Council's role in biodiversity conservation in the context of other government strategic conservation planning and private land conservation.
2. Identify specific actions to allow Council to meet the relevant objectives of the 2018-2028 Community Strategic Plan and 2018-19 to 2022-23 Delivery Programs.
3. Summarise conservation priorities for the Central Coast in a way that provides a context for decision-making and strategic planning.
4. Identify measurable targets and specific actions for Council.

Legislative and Policy Context of the Biodiversity Strategy

The focus of Council, State Government and Commonwealth Government biodiversity legislation, policy and plans is to promote and support biodiversity conservation and provide for the protection and management of the environment.

Activities in all councils in NSW are subject to legislation that seeks to ensure environmental protection, including state and federal legislation implementing international treaty obligations. Important legislative mechanisms that apply to the Biodiversity Strategy are identified below.

- Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999
- *Aboriginal Land Rights Act* 1983
- *Biodiversity Conservation Act* 2016
- *Biosecurity Act* 2015
- *Coastal Management Act* 2016
- *Crown Land Management Act* 2016
- *Environmental Planning and Assessment Act* 1979
- *Fisheries Management Act* 1994
- *Local Government Act* 1993
- *Local Land Services Act* 2013
- *Rural Fires Act* 1997
- *Water Management Act* 2000
- SEPP (Coastal Management) 2018
- SEPP (Environment) 2017
- SEPP 44 (Koala Habitat Protection)
- SEPP (Vegetation in Non-rural Areas) 2017

The *Biodiversity Conservation Act* 2016, together with the Biodiversity Conservation Regulation 2017, outlines the framework for addressing impacts on biodiversity associated with development and clearing in NSW. The Biodiversity Offsets Scheme is a framework to avoid, minimise and offset impacts on biodiversity, and to ensure land that is used to offset impacts is secured in-perpetuity.

Aside from legislation, there is a range of planning documents that guide and influence local plans and strategies, including this Biodiversity Strategy.

Australia's Biodiversity Conservation Strategy 2010-2030

The Commonwealth Government strategy identifies three national priorities for action to help stop the decline in Australia's biodiversity. These priorities for action are:

1. Engaging all Australians in biodiversity conservation through:
    - mainstreaming biodiversity
    - increasing Indigenous engagement
    - enhancing strategic investments and partnerships.

2. Building ecosystem resilience in a changing climate by:
    - protecting diversity
    - maintaining and re-establishing ecosystem functions
    - reducing threats to biodiversity.

3. Getting measurable results through:
    - improving and sharing knowledge
    - delivering conservation initiatives efficiently
    - implementing robust national monitoring, reporting and evaluation.

Under the *Environment Protection and Biodiversity Conservation Act* 1999, offsets are considered during the assessment phase of an environmental impact assessment where the impact is significant and an offset provides an appropriate benefit to compensate for any residual impact on a protected matter.

A local biodiversity offsets policy and process that is aligned with the Commonwealth offset principles is explored in this Strategy.

NSW Biodiversity Conservation Investment Strategy 2018

The Biodiversity Conservation Investment Strategy guides the Biodiversity Conservation Trust's investment in private land conservation. The state-wide program operates at the Interim Biogeographic Regionalisation for Australia (IBRA) sub-region scale. The Strategy does not identify the Central Coast as a priority investment area in the context of the whole of NSW. This leaves an opportunity for Council to identify local conservation priorities in collaboration with NSW Government agencies and support private landholders to participate in the Biodiversity Conservation Trust private land conservation program.

Central Coast Regional Plan 2036

One of the four goals of the Central Coast Regional Plan 2036 (NSW Department of Planning and Environment, 2016) is "to protect the natural environment and manage the use of agricultural and resource lands". Direction 12 in this Plan is to "protect and manage environmental values".

Importantly, the Central Coast Regional Plan 2036 recognises the need to identify land with high environmental values (including existing conservation reserves, native vegetation of high conservation value, threatened ecological communities and key habitats, important wetlands, lakes and estuaries, and sites of geological significance) and also to identify, protect and manage a network of biodiversity corridors.

The Plan identifies the following five actions:

- 12.1 - *Identify terrestrial and aquatic biodiversity values and protect areas of high environmental value to sustain the lifestyle, economic success and environmental health of the region.*

  The Central Coast Council Biodiversity Strategy identifies priority conservation areas (see map 3) and includes actions to further an assessment as part of the Comprehensive LEP process.

- 12.2 - *Identify and strengthen biodiversity corridors as places for priority biodiversity offsets.* Council has mapped local biodiversity corridors as a first step in providing protection for connectivity through the planning process (see map 4).

- 12.3 *Undertake a precinct approach to biodiversity offsetting in northern Wyong to protect riparian corridors and terrestrial and aquatic biodiversity and achieve the conservation, landscape and development objectives of the North Wyong Shire Structure Plan*. The Department of Planning, Industry & Environment is responsible for developing a long-term Central Coast Conservation Plan (see below). The Biodiversity Strategy is aligned with the objectives of the Plan and will both inform and be informed by information gathered through that process.

- 12.4 *Strengthen the Coastal Open Space System (COSS) by expanding its links and extending new corridors to balance growth in the north of the region and protect the network of natural areas across the region*. Theme 2 of this document responds to this action, as far as it being Council's role as a public land manager.

- 12.5 *Sensitively manage natural areas on the fringe of the urban areas and in the west of the region to mitigate land use incompatibility issues and provide important quality of life and tourism benefits for the region*. Local and site based decision-making will consider relevant issues through strategic planning and development assessment processes, and will take the Biodiversity Strategy into account.

By aligning the actions of the Central Coast Council Biodiversity Strategy with the Central Coast Regional Plan actions, Council demonstrates a robust and consistent policy framework is in place which provides a basis for decision making and funding eligibility.

Strategic Conservation Planning

Both State and Commonwealth legislation provides for strategic biodiversity approvals which can occur on a site, precinct or broader scale.

The Department of Planning, Industry and Environment is undertaking strategic conservation planning in the Central Coast region to balance expected growth with the protection of biodiversity at a landscape scale.

This strategic conservation planning exercise provides an opportunity to align with the Biodiversity Strategy to establish an enduring conservation legacy for the Central Coast.

Strategic conservation planning will identify the most important biodiversity areas to avoid and a package of measures to protect these values and offset biodiversity impacts, on a region-wide basis.

The Central Coast Strategic Conservation Plan will support an application for Strategic Biodiversity Certification under the NSW *Biodiversity Conservation Act* 2016 and Strategic Assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999. Approval of the Central Coast Strategic Conservation Plan will be sought from the respective NSW and Commonwealth ministers for the environment.

Strategic conservation planning provides an alternative to the current process where conservation and development decisions are made on a site by site basis and, if achieved, will streamline the delivery of housing and growth across the Central Coast.

Local Government Integrated Planning and Reporting Framework

Councils operate within an Integrated Planning and Reporting (IP&R) framework. Council's strategic plans (including this document) provide the link between the Community Strategic Plan (a 10 year timeframe) to 4-year delivery plans and annual operational plans. Progress against targets is measured and reported back to the community in annual reports.

Council's Local Strategic Planning Statement / Urban Spatial Plan

The Urban Spatial Plan is Council's vision for growing the Central Coast in a sustainable manner that enhances its character, preserves its natural attributes and improves our quality of life. It aims to provide a spatial framework to guide the Central Coast region's future growth and development over the next 20 years. The Urban Spatial Plan will inform the Local Strategic Planning Statement (LSPS).

The LSPS is the primary strategic tool to express the desired future for the LGA as a whole, and specific areas over the next 20 years. It is a legal requirement under Part 3B of the *Environmental Planning & Assessment Act 1979*.

The LSPS will:

- be the basis of strategic planning, having regard to economic, social and environmental matters;
- identify the planning priorities over the next 20 years having regard for the objectives of the CSP and CCRP 2036;
- define the actions required to achieve the identified planning priorities; and
- establish the basis for the monitoring and reporting of those actions.

The Biodiversity Strategy will be an integral component of a suite of strategic plans that will support the LSPS.

Other Council Plans and Programs

The Biodiversity Strategy targets and actions rely on other closely-related Council strategies, environmental programs and corporate systems. There is a certain amount of cross-over due to the fact that the management of environmental values is central to Council's business.

The Biodiversity Strategy does not attempt to address in detail the targets and activities within Council's programs, even within the environmental management and protection work streams. It acknowledges that components of other work programs will support the goals of the Biodiversity Strategy.

Golden-crowned Snake - (Cacophis squamulosus)
Illustration - Dr Tanya Hoolihan

Scrub she-oak (Allocasuarina distyla)
Illustration - Dr Tanya Hoolihan

Framework for Action

The goals and associated actions and targets to achieve the Biodiversity Strategy fall into six broad themes.

Theme 1	Theme 2	Theme 3	Theme 4	Theme 5	Theme 6
Planning and Managing Biodiversity in Council's Natural Areas	Ensuring adequate resourcing to enable Council to effectively manage its natural areas ane expand the conservation estate	Promoting community appreciation and participation in biodiversity conservation	Protecting biodiversity through land use planning and information management	Demonstrating leadership in biodiversity conservation	Protect and Expand the Coastal Open Space System (COSS)

The actions under the first three themes will be delivered by the proposed Conservation Management Program (CMP). The CMP is a comprehensive program of works covering natural asset planning and management, expansion of Council's natural area estate, and community involvement in biodiversity conservation (Figure 3). Output documents from the CMP such as strategies, plans and policies, will be prepared as key actions of the themes.

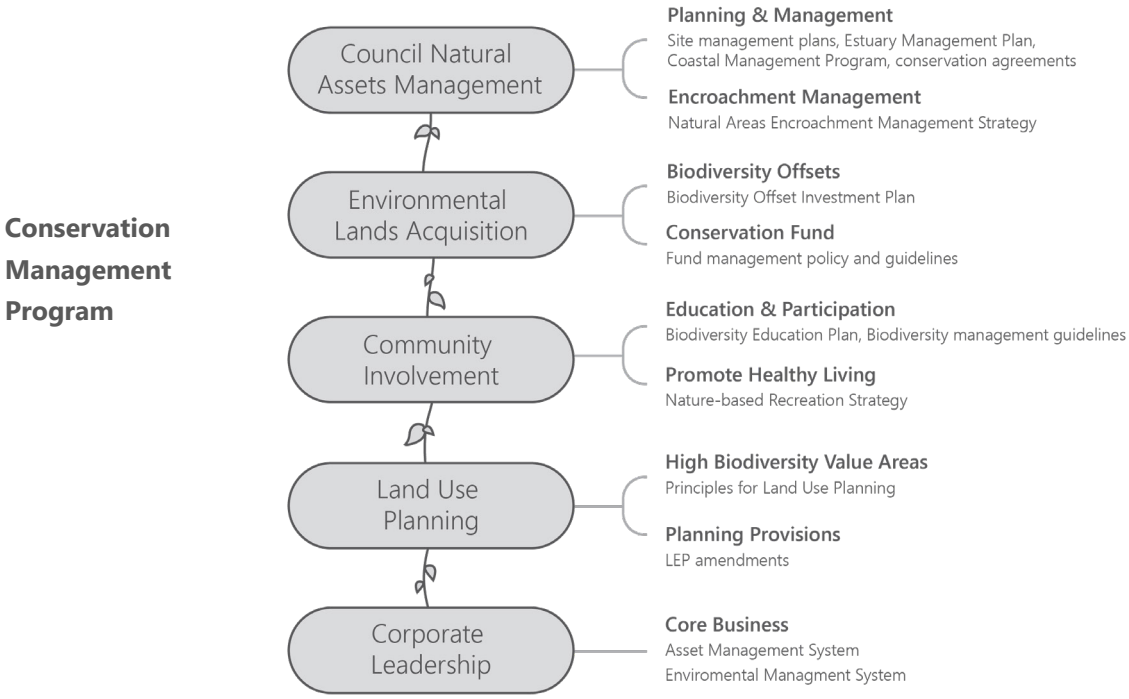


Figure 3: The main components of the Biodiversity Strategy and associated key strategies, plans and policies

While Theme 5 focuses on Council's corporate responsibilities, Theme 4 provides a link between biodiversity protection and the strategic planning framework. Council is in a unique position having two roles: a public land owner and manager; and a planning and consent authority. In collaboration with the Biodiversity Conservation Trust and the DPIE there are opportunities to strategically manage high biodiversity value land using funding generated by developers offsetting unavoidable impacts in urban growth areas.

The following sections describe each theme and explain why it is relevant to Council. A table summarises the goals, actions and targets, and is followed by more detail or background information for certain key actions.

Powerful owl - (Ninox strenua), Tuckeroo - (Cupaniopsis anacardioides)
Illustration - Dr Tanya Hoolihan

Theme 1:
Planning and Managing Biodiversity in Council's Natural Areas

Importance to Council

Council is a major landholder and land manager with legal responsibility for managing over 6,000 ha of irreplaceable and high value bushland on behalf of the community. Carefully planning the effort and resources expended across Council is critical to a well-managed network of reserves.

The establishment of the amalgamated Central Coast LGA has provided an opportunity for Council to review its approach to natural area management and ensure that it is cost efficient, effective at achieving biodiversity management goals, and aligns with recent changes to NSW legislation.

The area of bushland that Council is responsible for increases due to land dedications through the planning and approvals process and land acquisition. It is important for Council to find a way to prioritise its resources and effort and track the effectiveness of its investment through site management planning. Reserves are generally considered as isolated management units; however, a land management decision support system would view the reserves as a consolidated network of assets, allowing more strategic planning at a landscape scale.

Recent advances in spatial resolution and access to remotely sensed data, and the proliferation of citizen science will complement Council's field data collection program and lead to innovative uses of datasets to guide management actions. For example, use of historical satellite images and future modelling scenarios can contribute to Council's understanding of threats to biodiversity and the most effective management solutions.

Eastern Horseshoe bat - (Rhinolophus megaphyllus) Illustration - Dr Tanya Hoolihan

Once thorough management planning has been undertaken, implementing the plans is critical to achieving on-ground biodiversity improvement. On-ground activities typically include weed control, vertebrate pest control, access and visitor management, use of fire, habitat augmentation and long-term legal protection.

Long-term legal protection has benefits to the community in terms of securing public assets for future generations, and to Council as a way to attract funding for their maintenance and management. In perpetuity legal conservation agreements afford the highest level of on-going protection.

Summary Table of Goals, Actions and Targets (Theme 1)

ID	Action	Target
Goal 1.1: Comprehensively plan for the management of biodiversity in Council's natural areas		
1.1.1*	Identify criteria for prioritising reserve management based on biodiversity and social values, and threats to biodiversity	By the end of 2020/21, criteria within a decision support system help make resourcing decisions for natural area management that or deliver natural area management objectives
1.1.2*	Develop and resource a program to prepare and review site management plans for Council's natural areas (as well as Plans of Management as required by the LG Act)	By the end of 2023/24, all natural reserves have an up-to-date site management plan (or POM) in place
1.1.3	Identify climate change as a direct threat to natural areas in site management plans, including actions to mitigate impacts	By the end of 2023/24, progress is made towards planning for impacts associated with climate change for the majority of natural reserves such as identifying vulnerable species and new weed threats
Goal 1.2: Improve biodiversity in Council's natural areas		
1.2.1*	Implement site management plans to rehabilitate degraded bushland and coastal ecosystems.	By the end of 2023/24, implementation of site management plans is progressed in at least 50 reserves
1.2.2	Prepare a policy for natural area encroachment management, and resource and implement a program to identify and manage threats to natural areas from encroachment	By the end of 2020/21, Council has a formal process and policy in place and has commenced managing natural area encroachment
1.2.3	Develop and implement a program for planning and undertaking ecological and/or cultural burns on Council managed land that complements hazard reduction burning (in line with the Bush Fire Management Committee adopted program)	By the end of 2023/24, appropriate fire management intervals will be incorporated into the Conservation Management Program, with a schedule for prescribed burning in place
Goal 1.3: Improve information held on the biodiversity values of Council's natural areas		
1.3.1	Collect and manage data to inform land management (e.g. vegetation condition, population size or locations of habitat for threatened species or ecological communities, invasive weed and vertebrate pest incursions, nest boxes installed or other information)	By the end of 2023/24, information about specific land management issues is collated into a central information management system
1.3.3	Use traditional Indigenous knowledge and management techniques for threatened species recovery and conservation management where available and appropriate	Established and maintain relationships with traditional owners
Goal 1.4: Improve the long-term protection status of Council's natural areas		
1.4.1*	Explore available options for formal legal protection and management of Council reserves and formulate recommendations for conservation mechanisms	By the end of 2020/21, reserves strategically identified for formal protection and active land management
1.4.2	Establish conservation agreements as per recommendations in 1.4.1	By the end of 2023/24, identified reserves (see 1.4.1) are legally secured under long-term protective arrangements

* Key actions explained in more detail below

Key Actions Explained

Theme 1 - Goal 1.1 Actions 1.1.1 & 1.1.2

Comprehensive Management Planning

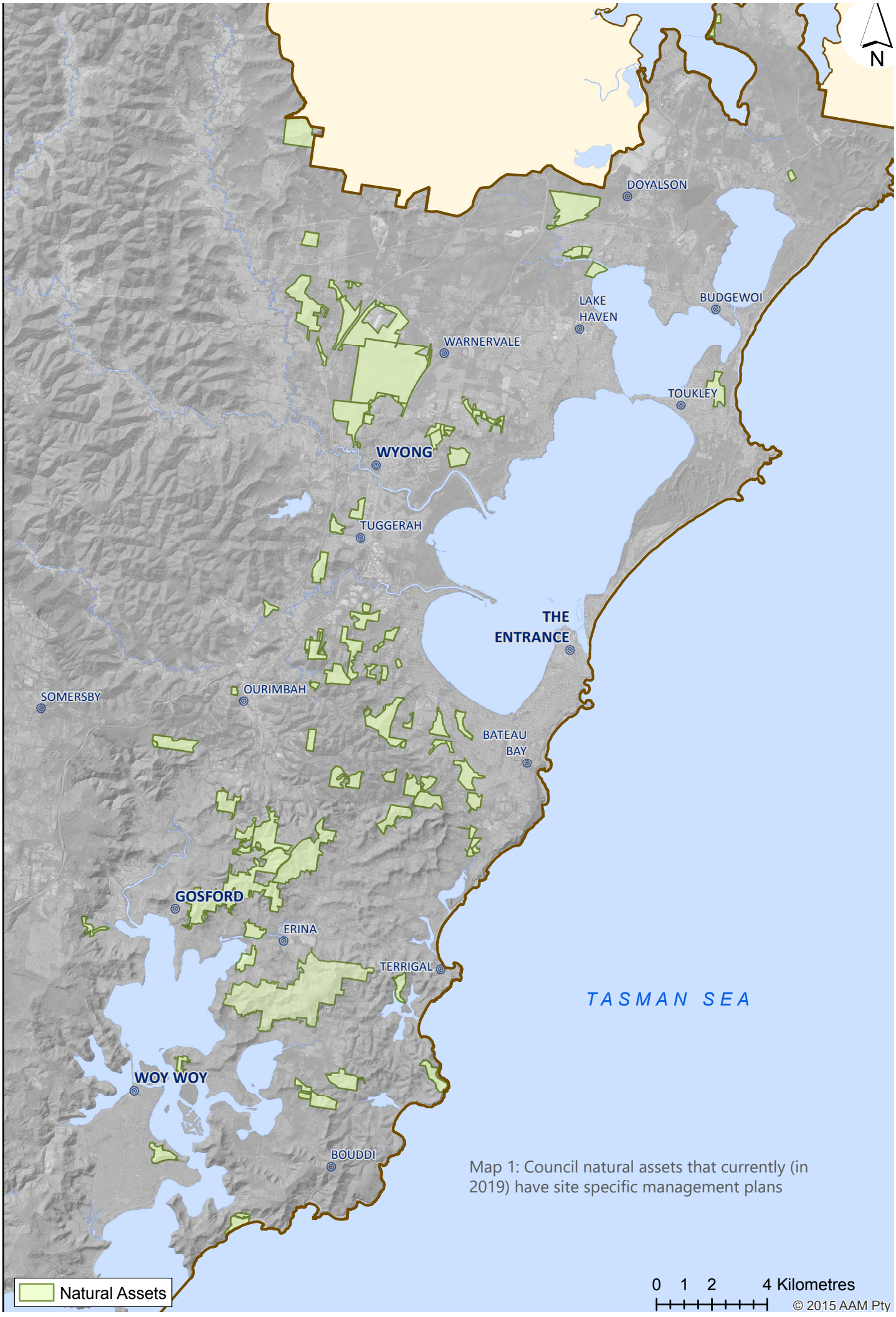
Achieving **Action 1.1.1** relies on Council identifying criteria for prioritising reserves and management issues based on biodiversity values, social values and known threats to biodiversity. The Conservation Management Program (CMP) is the way in which Council will plan for the maintenance and improvement of the values of its natural areas. The CMP will strategically guide investment in land management that increases their resilience to known future threats, such as fragmentation of the landscape, loss of connectivity, decline in habitat condition, climate change and unknown future threats.

Action 1.1.2 aims to prepare site-specific management plans that guide restoration and improvement in biodiversity values in a way that prioritises available resources. Multi-year plans ensure that management issues are fully considered and that funds are spent on the priority issues affecting biodiversity, rather than the most apparent ones.

Site management plans can take many forms: Plans of Management (which are required for land classified as Community Land under the *Local Government Act* 1993); vegetation management plans; vertebrate pest control plans; threatened species management plans; bush fire plans; or other site management plans. The choice of plan type is dependent on factors such as the size of the reserve, specific management needs, and whether the land is subject to a legal agreement.

In 2019, there are 47 Council reserves that have final site management plans. Map 1 shows the Council reserves with current management plans, most of which are being periodically reviewed and implemented. The action (1.1.2) aims to continue this program until all reserves have management plans of some type, whether that is in the form of Plans of Management, site management plans or other types of plans. With a better understanding of all the reserves and their management needs, Council aspires to becoming a more effective land manager and achieve on-ground nature conservation outcomes.

Eastern rosella (Platycercus eximius), flannel flower (Actinotus helianthi) - Illustration - Dr Tanya Hoolihan



Map 1: Council natural assets that currently (in 2019) have site specific management plans

Theme 1- Goal 1.2 - Action 1.2.1

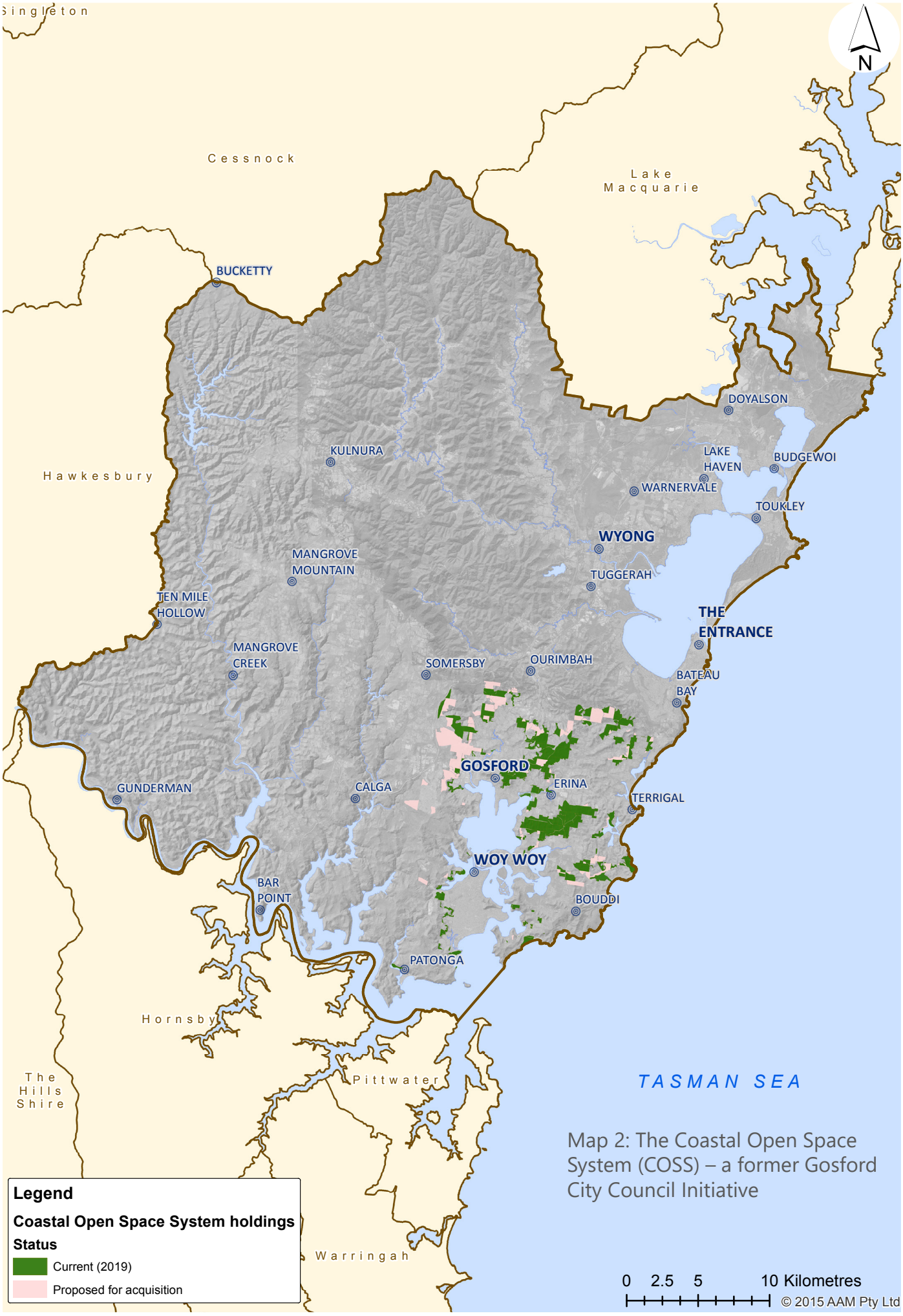
On-ground Land Management to Improve Biodiversity Values

Action 1.2.1 is to rehabilitate degraded bushland and coastal ecosystems by implementing site management plans. Specifically, on-ground actions include applying the National Standards for the practice of Ecological Restoration in Australia, planting vegetation for a future climate and vertebrate pest control.

Site-specific plans refer to a set of typical on-ground actions, which may include the following:

- weed control (unwanted woody and herbaceous plants);
- vertebrate pest control (e.g. foxes, rabbits, wild dogs, feral cats);
- enhancement of habitat and structure for fauna (revegetation or infill planting, installing nest boxes, creating new hollows, creating water features, adding ground elements (e.g. logs));
- visitor management (i.e. directing pedestrian and vehicle traffic away from sensitive areas) and recreational trails and facilities;
- installing signage (educational, interpretative, directional or prohibitive);
- fencing, gates and access control to prevent dumping, damaging activities and encroachment;
- bush fire risk management and appropriate burn frequencies;
- local community engagement (e.g. Landcare groups); and
- monitoring of vegetation condition and other biodiversity values to determine the success of management actions.

Vertebrate pest management is a shared responsibility between landholders, community, industry and government and requires a coordinated approach across a range of scales and land tenures. NSW Department of Planning, Industry & Environment (DPIE) has a lead role in managing terrestrial and freshwater aquatic pest incursions. The Greater Sydney Local Land Services (LLS) supports the strategic and coordinated delivery of vertebrate pest management activities and has a regulatory role. Council has a duty to manage the biosecurity risks posed by vertebrate pests on Council owned or managed land. There are long-term regional programs to manage European red foxes and wild dogs, which Council implements on Council land. Council participates in releases of Rabbit Haemorrhagic Disease Virus (Calicivirus) and undertakes additional control measures, as required, to control wild rabbits on Council land. Council is also involved in notifying the DPIE and LLS if Council receives any reports in relation to new incursions or alert species, such as the cane toad, to enable a rapid management response.



Map 2: The Coastal Open Space System (COSS) – a former Gosford City Council Initiative

Theme 1 - Goal 1.4 - Action 1.4.1

Long-term Protection of Natural Areas

Action 1.4.1 relies on Council to explore available options for formal protection of Council reserves. A key achievement of the Biodiversity Strategy will be to articulate Council's position on placing long-term agreements on Council reserves for the purpose of protecting their biodiversity, social and landscape values *in perpetuity*, and formulating a strategic plan to achieve this.

The two former Councils used the various protection mechanisms that were available to them at the time to secure natural areas. Former Wyong Shire Council placed Property Vegetation Management Plans over 306 ha of Council reserves. Former Gosford City Council entered into BioBanking agreements and voluntary conservation agreements. These and other historic in perpetuity agreements signed by the former Councils under previous schemes and legislation are still valid and the agreements are on the title certificates for these properties.

Former Gosford City Council managed the Coastal Open Space System (COSS) as a network of reserves supporting native vegetation to achieve environmental and community benefits. The Council-owned reserves making up the COSS network are mostly classified as Community Land and categorised as Bushland as defined by the *Local Government Act* 1993. However, the COSS is not a legal mechanism for protecting and conserving land in the long term. Since 1990, a total of 113 parcels of land covering 817 ha has been purchased, dedicated or transferred to Council for inclusion in the COSS program. As of amalgamation, the COSS network was 2,598 ha in size (Map 2). Land proposed for acquisition is private land that has been assessed as having values that are consistent with those of the public COSS reserves. Properties identified as proposed COSS are subject to voluntary acquisition by Council for inclusion in the public COSS reserve system. Affected properties have COSS messages on their property (former sec 149) certificates.

The concept of COSS should not be replaced, but rather enhanced by the opportunities presented by the amalgamation, new NSW Government legislation and associated funding for threatened species habitat management.

Council undertook a review of the COSS program which evaluated the operation of the program, identified the key elements of its success and highlighted opportunities for a future improved network. Of the 32 actions of the 2010 COSS Strategy, 22 had been at least partially completed by the former Gosford City Council.

Council, as a land manager of important environmental lands, will continue to work towards long-term legal protection of publically-owned conservation areas across the entire LGA. Council's long-term protection options under the *Biodiversity Conservation Act* 2016 include the following two types of conservation agreements:

1. Biodiversity Stewardship Agreement
    - Provides permanent protection and management of biodiversity and allows for the creation of biodiversity credits;
    - Landholders receive upfront and ongoing payments by selling credits they receive in recognition of management actions; and
    - Credits can be used to offset approved development impacts.

Red Cedar - (Toona ciliata)
Illustration - Dr Tanya Hoolihan

2. Conservation Agreement

    - Permanent or 15 year agreements
    - Typically used for higher conservation values amd land where management actions are already being undertaken to protect existing biodiversity values
    - These agreements do not apply to offsetting as they do not generate biodiversity credits

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999, a conservation agreement may be used to protect high biodiversity value areas or protected matters.

Figure 4 shows a possible framework for deciding which type of long-term protection agreement is the most appropriate for a Council reserve. There are certain thresholds and ecological criteria that can be used to distinguish between the intent of the agreement types. One of the main distinctions between a Biodiversity Stewardship Agreement and a Conservation Agreement is the ability of the agreement to generate credits that can be used to offset development impacts.

The Biodiversity Strategy actions under **Action 1.4.1** will bring Council closer to making informed decisions about the most appropriate mechanisms for the legal protection of natural areas.

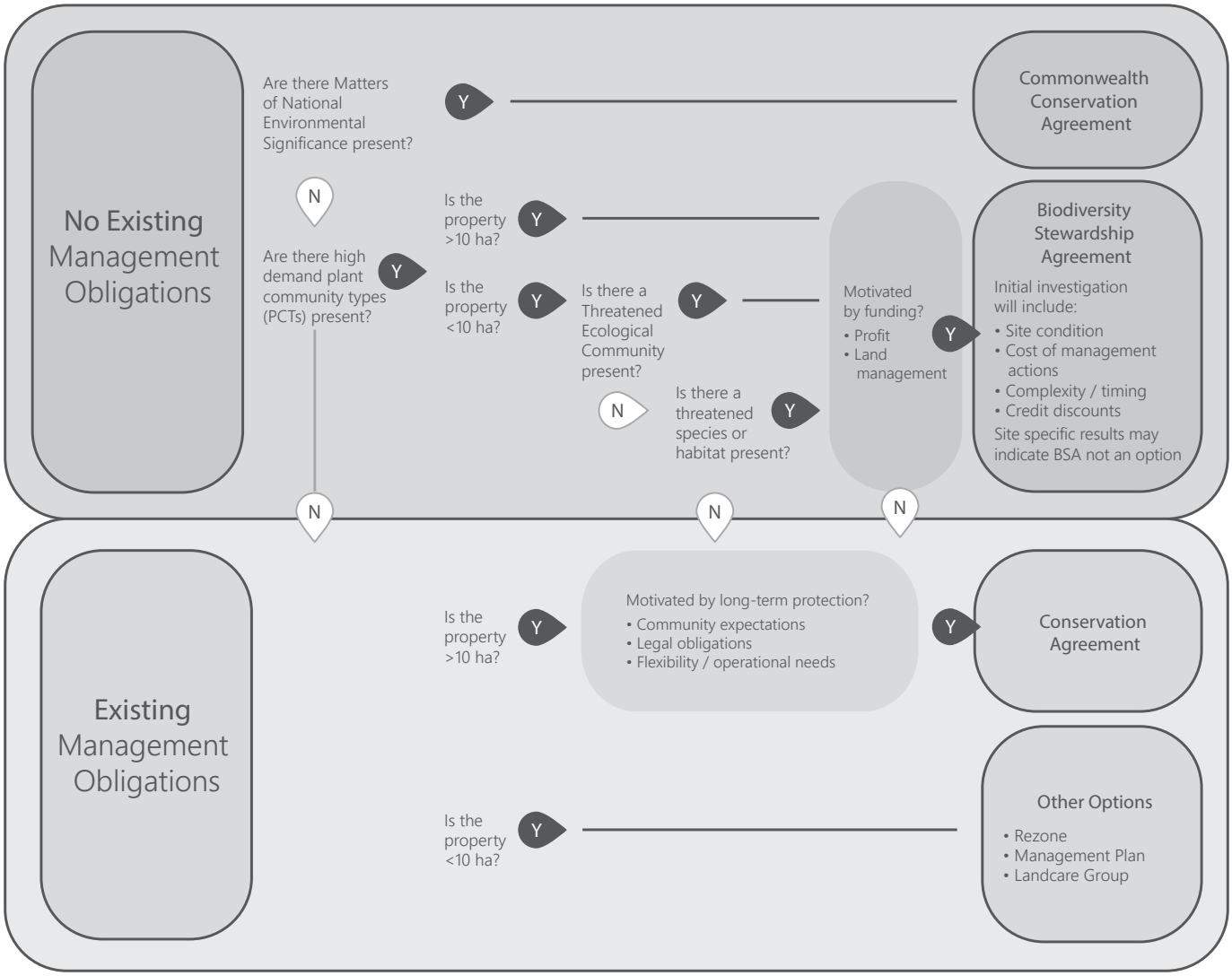


Figure 4: A decision-making framework for conservation agreement types available to Council

Theme 2:
Ensuring adequate resourcing to enable Council to effectively manage its natural areas and expand the conservation estate

Waratah - (Telopea speciosissima)
Illustration - Dr Tanya Hoolihan

Importance to Council

Maintenance of Council's natural areas is a requirement, as with any other public asset that is valued by the community, and a responsibility of Council's. The threats to natural areas are not always able to be eradicated, and therefore they generally present long standing management issues. A long-term funding commitment is essential for their upkeep. One of the key proposals of the Biodiversity Strategy is the Conservation Management Program, providing it with responsibility for biodiversity management and adequate resources and corporate support to do so.

The Strategy investigates mechanisms available to both secure land management funding and funding to expand the conservation estate. The following theme describes the NSW Biodiversity Offsets Scheme and how the funds generated by the sale of biodiversity credits will go back into the Conservation Management Program and the Environmental Lands Acquisition Program, the program nominated to acquire private land for the purpose of conservation. Land currently identified as 'proposed for acquisition' (Map 2) and other land identified for acquisition will be acquired under the Environmental Lands Acquisition Program as opportunities arise and funding allows.

Objective F2 of the Community Strategic Plan 2018-2028 is: Promote greening and ensure the wellbeing of communities through the protection of local bushland, urban trees, tree canopies and expansion of the Coastal Open Space System (COSS). Theme 2 aims to deliver on this objective for the whole LGA. The Coastal Open Space System (COSS) was an initiative of the former Gosford City Council. The two main elements of the COSS were: a) public land managed for biodiversity, heritage, education and scientific endeavours and recreation in the natural setting; and b) private land identified for addition to the COSS through acquisition. The term COSS has been used within the community as shorthand for the protection of biodiversity, even where this occurs outside the physical boundaries of the COSS reserves and the land identified for future inclusion in the COSS. Consulting the community on a name/brand for Central Coast Council's natural reserve system would provide advice to Council on how to brand the consolidated conservation estate.

As part of expanding the conservation estate, Council will accept and acquire land where biodiversity outcomes are achievable and affordable. Higher biodiversity value land will be preferred in considering commitment to a long term management obligation on behalf of the community with the aim to more efficiently use resources across the conservation estate. Historically, Council has accepted land from developers that is not suitable for development, or that was identified for acquisition. Going forward, Council will carefully consider the land that it is asked to accept and ensure that it meets certain standards. Council will only accept dedication of conservation land that is of high biodiversity value and is either funded or capable of generating its own funding. Internal processes will be developed to support this policy as part of the actions within Goal 2.3.

Summary Table of Goals, Actions and Targets (Theme 2)

ID	Action	Target
Goal 2.1: Adequately resource the Conservation Management Program		
2.1.1*	Invest in a long-term commitment to the Conservation Management Program	By the end of 2020/21, operational budget planning recognises the CMP as an on-going program
2.1.2*	Build expertise and qualifications in preparing and managing conservation agreements, community engagement on land management activities, and compliance enforcement for natural areas	By the end of 2021/22, all of Council's natural assets are managed by an adequately trained and resourced team of professional land managers
2.1.3	Investigate the benefits of investing in recruitment, training and leadership to establish and retain natural area management personnel (e.g. bush regeneration team, Indigenous officers, recreation planners, grants and trust officers)	By the end of 2019/20, undertake a cost benefit analysis to assess Council's requirements for a bush regeneration team and other positions
Goal 2.2: Implement a funding program for land management and acquisition		
2.2.1*	Establish funding for the management and acquisition of land identified by the Conservation Management Program and Environmental Lands Acquisition Program	Commencement of a Central Coast Conservation Fund by the end of 2021/22
2.2.2*	Investigate other funding options for Environmental Lands Acquisition Program	By the end of 2021/22, the feasibility of other funding options has been assessed
Goal 2.3: Expand Council's conservation estate		
2.3.1*	Strategically plan Council's Environmental Land Acquisition Program	An Environmental Lands Acquisition Program plan has been prepared and resourced by the end of 2019/20 for a 20+ year timeframe
2.2.2	Purchase environmental land as per recommendations from 2.3.1	On-going
2.3.3*	Develop criteria and an internal process for evaluating environmental land acquisition and land dedication opportunities	By the end of 2019/20, land acquisition criteria are being used as part of a land acquisition process

* Key actions explained in more detail below

Adequately Resource the Conservation Management Program

Christmas Bells - (Blandfordia grandiflora)
Illustration - Dr Tanya Hoolihan

Key Actions Explained

Theme 2 - Goal 2.1 - Actions 2.1.1 & 2.1.2

The goals and actions of the Biodiversity Strategy are best achieved where a robust program guides its implementation. By endorsing this Strategy, Council supports the Conservation Management Program as the coordinated approach to biodiversity management in the Central Coast Council.

Action 2.1.1 calls for the Operational Plan budget to acknowledge the CMP as an on-going program. **Action 2.1.2** refers to the staff resources required to run all aspects of the program, from land management and compliance enforcement, to program management and establishing legal conservation agreements.

Australian Pelican - (Pelecanus conspicillatus)
Illustration - Dr Tanya Hoolihan

Theme 2 - Goal 2.2 - Actions 2.2.1 & 2.2.2

Funding Mechanisms for Land Management

Action 2.2.1 recommends that Council implements a funding model for land management. Traditional sources of funds are grants and philanthropic trusts to complement Council's operational budgets. The Biodiversity Offset Scheme (BOS) provides an alternative option for in perpetuity management funding. An initial investigation will be required to determine each reserve's suitability for the Scheme, and other funding sources.

Specialist GIS, ecology and finance skills are required to prepare a Biodiversity Stewardship Site Assessment Report (BSSAR) for each potential natural asset. The application for an agreement is based on this document and the credit report contained therein and is submitted to the Biodiversity Conservation Trust for review and approval. Where it is in Council's best interests, Council would negotiate a Biodiversity Stewardship Agreement with the Biodiversity Conservation Trust. The agreement will require a signature from the CEO following internal financial and legal advice. The generation and sale of biodiversity credits creates an obligation on Council to undertake the management actions required by the legal agreement.

For reserves not suitable for the BOS, other funding sources will be required, including general revenue.

The *Biodiversity Conservation Act 2016* commenced on 25 August 2017. The BC Act along with the *Biodiversity Conservation Regulation 2017* outline a mandatory framework for addressing impacts on biodiversity from development and native vegetation clearing. The foundation of the framework is avoiding, minimising and offsetting impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS).

The BOS creates a consistent and scientifically-based approach to biodiversity assessment and offsetting for all types of development. The assessment methodology is referred to as the Biodiversity Assessment Method (BAM). The assessment requires a comprehensive investigation of the biodiversity values of the site, the use of an on-line calculator and standardised reports. The calculator tool calculates the credits either required or generated at a site (depending on if the site is to be developed or protected and managed in perpetuity).

The BOS will establish an open market for the trading of biodiversity credits (referred to as either 'ecosystem credits' or 'species credits'). The market will operate in the same way as a stock market and credit prices will fluctuate in response to market forces.

An offset is referred to as a Biodiversity Stewardship Site and an agreement between the land owner and the Biodiversity Conservation Trust formalises the arrangement. The agreement is registered on title and is in effect in perpetuity. On-going management funds are paid to the land owner annually to undertake the agreed management actions on the site.

Funding Mechanisms for Land Acquisition

Actions 2.2.1 and **2.2.2** recommend that Council investigate and implement mechanisms for funding the acquisition of land identified as having high biodiversity value. The following options are considered to be the extent of the legal and policy mechanisms available to Council in order to generate funding for environmental land acquisition. They will be further explored through implementation of the Biodiversity Strategy.

1. Central Coast Conservation Fund

The *Biodiversity Conservation Act* 2016 establishes a mechanism for the generation and sale of credits to offset impacts associated with clearing of native vegetation for the purposes of enabling development. The proceeds from the sale of credits from Biodiversity Stewardship Sites established on Council-owned land may be used for any purpose, according to the *Biodiversity Conservation Act*, however funding land acquisition for adding to the conservation estate is recommended in this Strategy. The money would be held as restricted revenue, in a revolving trust account, which would have strict procedures for its management, auditing and expenditure, and only to be used in accordance with the Biodiversity Strategy objectives and the fund's purpose. **Action 2.2.1** is to set up such a fund with appropriate accounting procedures, nominally named the Central Coast Conservation Fund.

The Fund could also collect other sources of contributions, such as those generated from a local biodiversity offsets policy (see Theme 5 for details), fees and charges, a special rates levy, tax deductible donations or grants (Figure 5).

2. Voluntary Planning Agreement (VPA) mechanisms

Voluntary Planning Agreements are planning agreements which are established under the provisions of Section 7.4 of the *Environmental Planning and Assessment Act* 1979. The agreement can be entered into when an amendment to an LEP has been sought (rezoning). VPAs can be utilised for the conservation or enhancement of the environment, and have been used by Council in the past for such purposes.

VPAs can be utilised to require the payment of monetary contributions not levied under existing S.7.11 plans and/or require the provision of infrastructure, works in kind or land dedication as negotiated between the landowner and Council. State Significant Development (SSD) and State Significant Infrastructure (SSI) can also utilise VPAs for biodiversity and conservation purposes.

3. Replacement Minimum Lot Size Provisions

Historically, the former Wyong Shire Council and former Gosford City Council had mechanisms through their Environmental Planning Instruments to acquire land for conservation purposes. Both former Councils had clauses known as minimum lot size provisions:

- The Wyong Local Environmental Plan 1991 (repealed) (Clause 14(3) (b)) permitted a variation to the minimum lot size requirements for land zoned 7(c) Scenic Protection Small Holdings. The clause enabled the subdivision of land below the minimum 2 ha to 1 ha, subject to the dedication of land to Council, or the payment of a monetary contribution to Council for the purchase of land for the purposes of public reserves (zoned 7(a) Conservation) or the improvement or embellishment of other public reserves (zoned 7(a) Conservation).

- The contribution fund is commonly referred to as the Bonus Provision Fund and currently has a value of approximately $4.8 million. At present, these funds are being used for the purposes intended by the clause, i.e. for the acquisition of land suitable for public reserve purposes.

- The Gosford Interim Development Order No. 122 (Clause 18(4)) operated in a similar manner. The fund currently has a value of approximately $4.6 million. At present, these funds are being used for the purposes intended by the clause, i.e. for the acquisition of land to add to the COSS.

Under the draft consolidated Central Coast LEP, there is no provision to collect contributions for the acquisition of environmental land. This cannot be dealt with as part of the draft Consolidated Central Coast LEP because a Central Coast Environmental Lands Acquisition Program Plan would be required to support these types of funding mechanisms. The plan would identify the types of conservation land to be prioritised for future conservation purchase as well as the administrative procedures to support the new funding mechanisms. Once developed, an LEP-based conservation incentive clause could then be introduced via a separate planning proposal or by way of the Comprehensive Central Coast LEP. For further discussion on this option, see Theme 4.

4. Tree or Vegetation Compensation Fee

Council currently approves over 100 private tree clearing applications per year. There is an opportunity in the future to collect a fee in lieu of replacement trees being planted when it is not feasible or desirable to do so.

The fees collected could be used to revegetate Council natural areas or purchase additional environmental lands.

The funding mechanisms discussed are summarised in Figure 5.

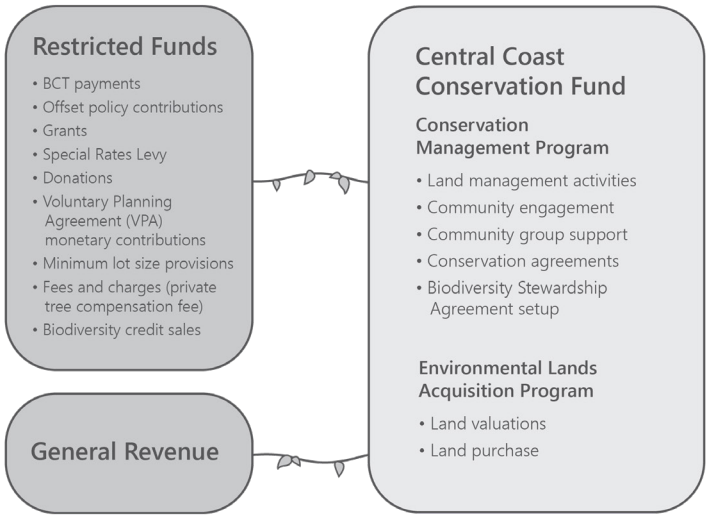


Figure 5: A proposed Central Coast Conservation Fund would collect money from various sources and hold it in a trust account for the purpose of conservation management or land acquisition.

Theme 2 - Goal 2.3 - Actions 2.3.1 & 2.3.3

Expanding the Conservation Estate

Action 2.3.1 requires Council to develop a strategic plan for expanding the conservation estate. An Environmental Lands Acquisition Program would be established to plan, oversee and implement expansion of the conservation network.

There are two motivations for expanding the conservation estate: protecting the highest biodiversity value lands in public ownership while providing for long-term management; and participation in the biodiversity offset market. As discussed above, the money generated from the sale of biodiversity credits could be used to fund land management and additional environmental land purchase.

A Environmental Land Aquisition Program Plan will be prepared, which will detail the opportunities and Council's plan for acquiring land for the purpose of meeting the projected local biodiversity credit demand. Purchasing the right land is key to generating the most valuable biodiversity credits, which will in turn fund the acquisition of more environmental land. Prioritisation of areas for acquisition will be based on plant community types in high demand from an offsetting perspective, threatened ecological communities, highly cleared and poorly represented plant communities, high priority threatened species, key habitat for threatened species and wildlife corridors.

Council's analysis of the likely demand for biodiversity credits within the Central Coast LGA has examined how projected urban growth is likely to drive the demand for credits into the next decade. The desktop analysis was limited to ecosystem credits and was based on plant community type mapping (an aggregation of local vegetation community types into a consistent NSW vegetation classification system).

Assuming that the predicted development will result in a loss of 1,446 ha of native vegetation, approximately 62,832 ecosystem credits would be required to offset the loss. Under the *Biodiversity Conservation Act* 2016, biodiversity is managed at a regional level, with local impacts able to be offset at other locations in the region and potentially outside of the Central Coast LGA. One of the core principles of the Biodiversity Strategy is to ensure that local impacts are offset within the Central Coast LGA. The Environmental Land Aquisition Program Plan will address how to offset the impacts of local development through the establishment of Biodiversity Stewardship sites to provide local biodiversity credits, which will facilitate the development objectives of the Central Coast Regional Plan.

There is an investment opportunity for Council to purchase land matching the required plant community types and enter into the Biodiversity Offset Scheme market like any other land owner. The Plan will ensure investment in biodiversity is strategic and provides value for money outcomes. For the Plan to be self-funded and perpetual, a substantial initial investment of approximately $2M-$5M is likely to be required. This can be met with existing restricted funds held for the purpose of land acquisition and is compliant with the purpose of the Clauses.

Previous agreements, land classification (i.e. Community Land vs Operational Land) and land zonings also affect the value of the site to generate biodiversity credits. It may be the case that lands already protected under agreements or within the COSS program will be low priority as offsets because of the discounting that will be applied by the Biodiversity Assessment Method calculator.

Evaluating Land Acquisition Opportunities

As part of **Action 2.3.2,** Council will develop criteria for guiding decisions around land acquisition to ensure that land purchased meets the adopted standards of the Environmental Lands Acquisition Program and that the purchase represents value for money for Council.

The acquisition of environmentally significant land will be integral to a wider strategy for landscape protection and enhancement of biodiversity in the Central Coast LGA. Land purchase may be triggered by one or more of the following:

- Property owner contacts Council asking whether Council is interested to buy;
- Council contacts property owner and expresses an interest in buying land;
- Real estate advertisement (agent or owner) that is of interest to Council; or
- Land that has been identified as proposed for acquisition for COSS comes onto the market (agent or owner).

The following five criteria are suggested for the prioritisation analysis for land acquisition:

1. Strategic value to Council

    a) The land will consolidate and build on existing areas managed for nature conservation and is consistent with a longer term strategic conservation plan. Contribution to landscape ecological function is prioritised.

    b) Adjacent reserve access plans such as gates, fencing, fire trails etc. to be built would be enabled.

    c) Timing of opportunity is critical to success of a negotiation (i.e. an offer has been made to Council or land management issues are immediate).

    d) How urgent the acquisition is for either strategic purposes or that the window for acquisition is small (i.e. the land is on the real estate market).

    e) The land represents an opportunity for Council to add a poorly represented ecosystem type into the public reserve network.

Eastern sedge frog (Litoria fallax), Peron's tree frog (Litoria peronii), broad-palmed rocket frog (Litoria latopalmata) and green and golden bell frog (Litoria aurea)
Illustration - Dr Tanya Hoolihan

2. Value for money

    a) The land represents good value for money in terms of the outright cost to Council or the size of the parcel.

    b) Council's ability to fund the acquisition (i.e. the budget has been identified or a funding source is apparent).

    c) The land will enable a biodiversity stewardship agreement under the Biodiversity Offset Scheme and generate funding.

3. Intrinsic biodiversity values

    a) The land represents and contains high biodiversity values in the Central Coast and the land has biodiversity attributes that warrant high-level protection.

    b) The land will add to an identified or potential biodiversity corridor consistent with the Biodiversity Strategy.

    c) Native vegetation condition is good and contributes to high quality habitat.

4. Threats to biodiversity and development needs

    a) Severity of management issues is not insurmountable with appropriate funding and effort.

    b) The land is identified as meeting some or all of the above criteria and is not adequately protected under statutory mechanisms and is under threat of inappropriate development or other inappropriate land use.

5. Social values

    a) Scenic value.

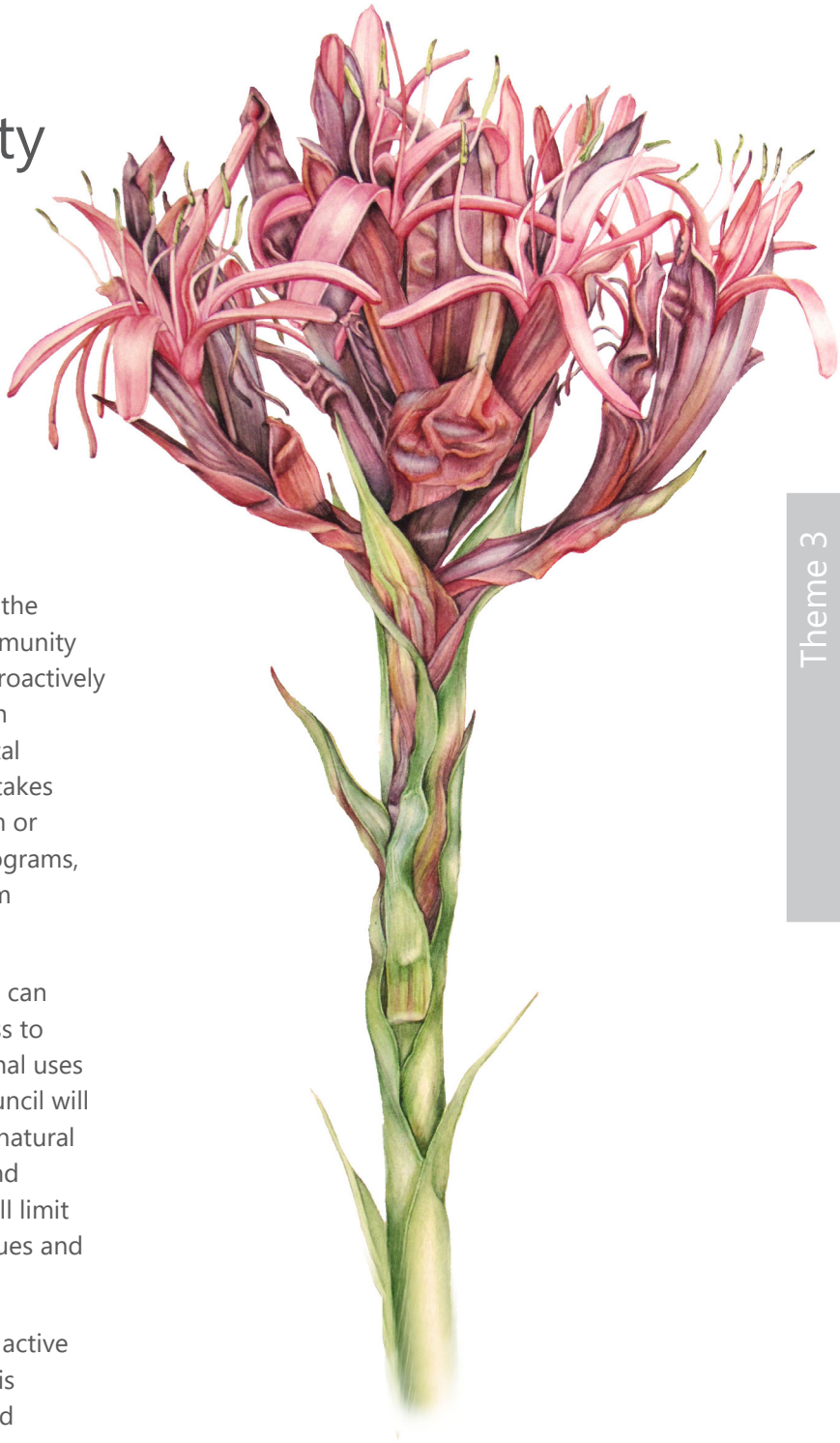
    b) Recreation value.

    c) Education and scientific research opportunities.

    d) Cultural, Aboriginal and non-Aboriginal values.

River mangrove (Aegiceras corniculatum)
Illustration - Dr Tanya Hoolihan

Theme 3:
Promoting community appreciation and participation in biodiversity conservation



Gymea lily (Doryanthes excelsa)
Illustration - Dr Tanya Hoolihan

Importance to Council

The Central Coast community is passionate about the environment in which they live and work and community appreciation for biodiversity is high. Council will proactively encourage this interest and sense of pride through its education program and proposed environmental participation programs. Community participation takes many forms, such as joining the Landcare Program or participating in citizen science and monitoring programs, or landowners protecting their land with long-term agreements and management plans.

Community appreciation for environmental values can be enhanced when people have appropriate access to nature-based activities. However, not all recreational uses are compatible with biodiversity conservation. Council will review its current approach to recreational use of natural areas, especially places vulnerable to damaging and inappropriate activities. Where needed, Council will limit access to ensure the protection of biodiversity values and reduce management costs.

As part of supporting the academic community in active participation in biodiversity conservation, Council is providing access to conservation areas, or data and information that can help researchers and students working on conservation and ecology projects. Improved ecological understanding feeds into effective management programs.

Summary Table of Goals, Actions and Targets (Theme 3)

ID	Action	Target
Goal 3.1: Planning for community appreciation and understanding of the value of local biodiversity conservation		
3.1.1*	Prepare a Biodiversity Education Plan to promote community appreciation of Council's natural areas	By the end of 2020/21, a Biodiversity Education Plan has been finalised and funded for implementation
3.1.2*	Provide guidance for biodiversity management on private land with published guidelines for land owners	Biodiversity Guidelines have been published by the end of 2020/21
3.1.3*	Prepare and publish a Nature-based Recreational Strategy for Council natural areas	By the end of 2021/22, a Recreational Strategy with Council's plan for nature-based recreation in reserves is published
3.1.4	Prepare a policy on public access to natural areas	By the end of 2020/21, a public land access policy has been endorsed by Council
Goal 3.2: Strong community involvement and participation in biodiversity conservation		
3.2.1	Develop a community biodiversity participation and education program	By the end of 2019/20, commence a biodiversity education program including citizen science
3.2.2*	Provide technical advice and assistance for community involvement in biodiversity conservation agreements (including staff resources and a grant/loan program) to reduce the barriers to entering conservation agreements	By the end of 2020/21, establish the resourcing and parameters for a community grants program and prepare technical educational materials
3.2.3	Provide additional ongoing support and resources for the Central Coast Landcare Program to address the community's demand	Maintain or increase the level of support with demand for the Central Coast Landcare Program
3.2.4	Further develop and continue existing community partnerships where appropriate and in the best interest of the Conservation Management Program	Continue providing annual support to partners and support additional partner projects when the opportunity arises
Goal 3.3: Public access to biodiversity information and promotion of understanding of the goals of the Biodiversity Strategy		
3.3.1	Investigate a tertiary education program for partnering with universities and other groups that study biodiversity with a view that the information will be shared publically	By the end of 2023/24, a tertiary education program has been established that provides support, grants or project ideas to students
3.3.2	Provide public access to Council's geospatial data and reports relevant to biodiversity	Publish vegetation community type mapping data by the end of 2019/20
3.3.3	Engage with the development industry to improve biodiveristy outcomes through development assessment	Organise and hold at least one engagement event by 2024

* Key actions explained in more detail below

Key Actions Explained

Theme 3 - Goal 3.1 - Actions 3.1.1 & 3.1.2 & 3.1.3

Planning for Community Appreciation and Understanding

A Biodiversity Education Program will be formulated within a Plan as part of **Action 3.1.1.** The Program aims to promote community appreciation through participation in nature education and biodiversity conservation. The program will include providing support, technical advice and assistance for community involvement in biodiversity conservation agreements on private land (**Action 3.1.2**).

Action 3.1.3 is to publish a nature-based recreational strategy. Nature-based recreation is defined as outdoor recreation activities that are:

- dependent on the natural environment;
- have an appreciation of nature as a key motivational factor;
- do not require substantial modification to the natural environment; and
- are environmentally sustainable as determined by an on-going monitoring program.

Nature-based recreation provides for learning opportunities and may be important in fostering a nature conservation ethic and an appreciation of the environment in participants. The demand for nature-based recreation opportunities exists and is anticipated to grow as the population of the Central Coast increases.

Theme 3 - Goal 3.2 - Actions 3.2.2

Community Involvement and Participation

There are significant opportunities for private landholders to make a contribution to regional biodiversity conservation and protection and at the same time, cover some of the land management costs. Through **Action 3.2.2**, Council will take a proactive role in building awareness in the community of the available opportunities. As there are costs associated with the initial investigations for conservation agreements, Council proposes to investigate a grant or loan program funded by the Central Coast Conservation Fund to assist land owners by reducing the cost barrier.

The Private Land Conservation Program is a NSW Government program delivered by the Biodiversity Conservation Trust (BCT) to protect and enhance biodiversity in NSW. Under the Program, the BCT enters into voluntary agreements with landholders to commit to protect and manage high value biodiversity on their properties. Council will liaise with the BCT to ensure their conservation programs are synergistic.

There are three mechanisms available for private land conservation:

1. Biodiversity Stewardship Agreements

    - Provide permanent protection and management of biodiversity and allow for the creation of biodiversity credits.
    - Initial investigations will entail a cost.
    - Management costs per hectare of land generally range between $3,000 per hectare (low) to $30,000 per hectare (high) which affects both the Total Fund Deposit and the individual price of credits, and therefore marketability of the credits.

2. Conservation Agreements

    - Typically used for higher conservation value land where management actions are being undertaken to protect existing biodiversity values.
    - Costs associated with set up are lower.

3. Wildlife Refuge Agreements

    - Entry level agreement that supports simple and effective land management.
    - Low cost.

Theme 4:
Protecting biodiversity through land use planning and information management

Coachwood - (Ceratopetalum. apetalum)
Illustration - Dr Tanya Hoolihan

Importance to Council

Theme 4 defines those actions that allow the legal implementation of the Biodiversity Strategy by embedding its aims and objectives into the local policies and strategies that guide development assessment and strategic land use planning within Council.

In formulating a framework for action, Council has developed the following five core principles to provide guidance for decision-making and other Council functions in order to achieve the objectives of the Biodiversity Strategy, especially in the context of future planning decisions and climate change impacts.

Reliable and accurate information and data is important to the planning and assessment process. Council will identify where it lacks information on biodiversity values to support decision-making and find ways to fill the gaps and share information with other government agencies.

The following three key information products will be used by Council to shape future land use policy and decision-making and will be the basis for the future Central Coast protected area network with information updated over time:

Principles for Land Use Planning

1. Preserving local and regional biodiversity is highly valued at Central Coast Council and is properly considered in all functions of Council.
2. Ensuring the protection of areas of high environmental value from the impacts of development, including corridors, is a priority for Council.
3. Loss of biodiversity is to be avoided, with mitigation measures and offset measures applied only where impacts from development are unavoidable.
4. Biodiversity offsets, when necessary, are to be sourced from within the LGA (Wyong, Yengo and Pittwater BRA sub-regions) where feasible and practical.
5. Council's role as a public land manager is a core Council function and includes expanding and managing and maintaining the conservation estate.

1. Areas of high conservation value (i.e. high quality habitat, presence of iconic, rare and threatened features, and their contribution to the biodiversity of the region);
2. The connectivity between areas of high conservation value (i.e. biodiversity corridors); and
3. Locally significant vegetation.

1. Areas of High Conservation Value

Identifying areas of high conservation value is a critical process in the development of regional land use policy and urban development planning. Information on biodiversity values informs strategic planning and helps guide further in-depth studies which are required as part of the planning and assessment process. As stated above in the Principles for Land Use Planning, protecting areas with high biodiversity value, including corridors, is a priority for Council.

A spatial analysis to identify conservation priority areas has been undertaken by Council which quantifies the ecological trade-offs of planned and proposed development scenarios. The analysis is based on biodiversity values such as observed records of species, suitable habitat, species distribution models, threatened species and threatened ecological communities (NSW and Commonwealth listings). Current representation of high biodiversity values in the protected area network (national parks, state conservation areas and Council reserves) was considered. Areas of high biodiversity value that are at risk of local extinction due to development pressure are identified as higher priority for protection and rehabilitation, and therefore high conservation priority.

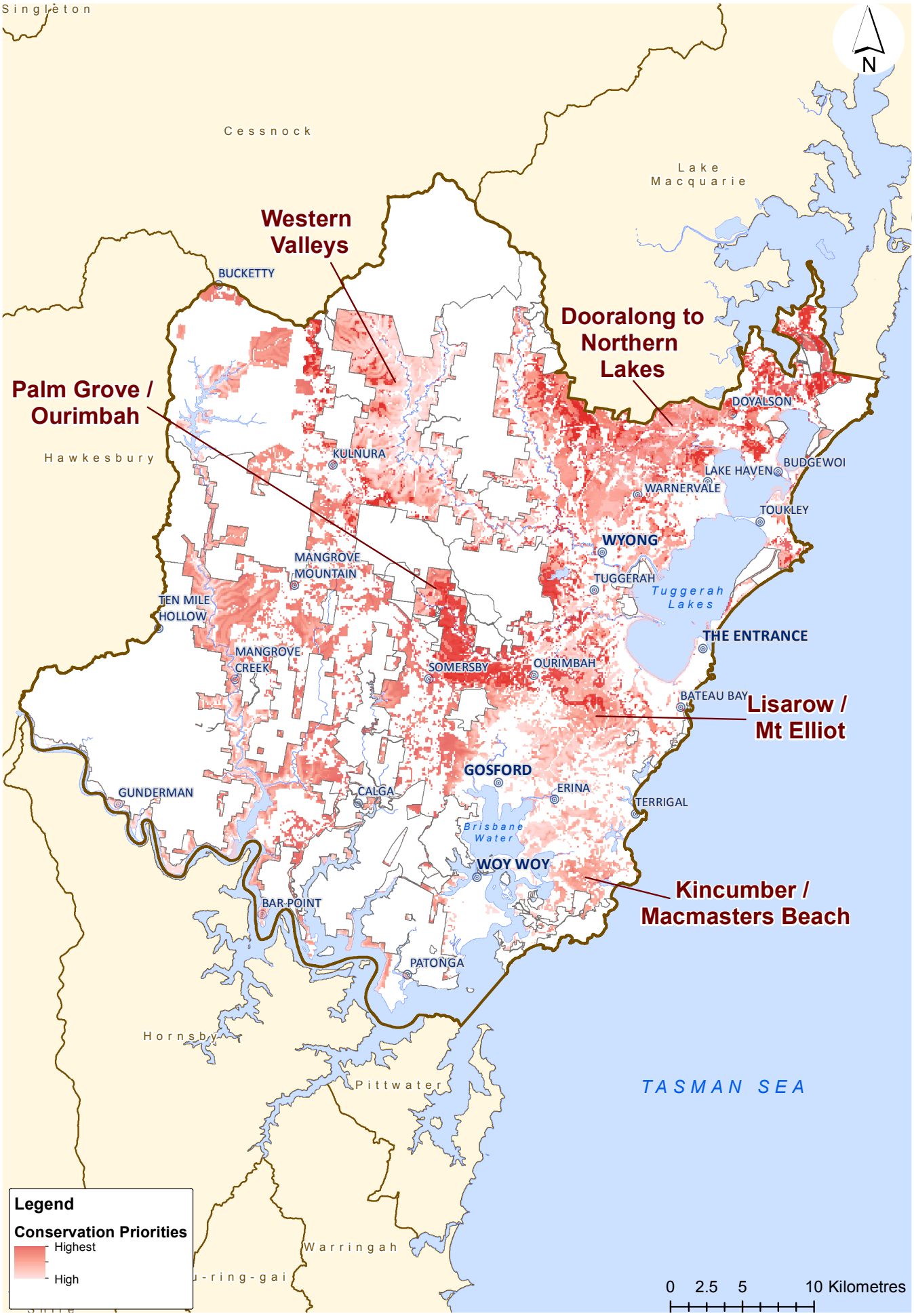
Spatial prioritisation of biodiversity values highlighted important areas for conservation as Dooralong to Northern Lakes, Warnervale, the Western Valleys, Palm Grove / Ourimbah, Lisarow / Mt Elliot and Kincumber/ Macmasters Beach (see Map 3). Expanding the protected area network to include these areas would significantly improve the representativeness of the network.

While about 50% of the LGA is owned and managed as state forest and national park, these areas protect less than half of the biodiversity in the LGA. Without formal protection, the remaining biodiversity values are potentially at risk of being lost to clearing and development.

If an additional 2640 ha of land was conserved within the identified priority areas (see Map 3), a total of 85% of the region's biodiversity values would then be protected (an increase from the current 50%). Therefore, by conserving land in suitably sized parcels in the priority areas, a minimal increase in the reserve area will provide the greatest biodiversity outcome.

Further details of the analysis can be found in reports referenced in Appendix B.

In addition to the conservation priority areas identified above, there are other areas that are of importance for particular listed threatened species, populations or ecological communities, such as: Tuggerah Lakes shoreline (Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions), Norah Head (Low Woodland with Heathland on Indurated Sand at Norah Head), Bateau Bay, Forresters Beach, Tumbi Umbi (*Eucalyptus oblonga* population) and the Woy Woy Peninsula (Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion).



Map 3: Areas of high biodiversity conservation value outside the current protected area network within the Central Coast LGA. Data source: Office of Environment and Heritage (2018) and Kujula and Whitehead (2015). Disclaimer: Map is subject to future updates. For use at the scale of the LGA only.

New Holland honeyeater - (Phylidonyris novaehollandiae), Banksia - (Banksia spinulosa)
Illustration - Dr Tanya Hoolihan

2. Connectivity and Biodiversity Corridors

Maintaining and restoring connections between protected areas and areas of high biodiversity value are vital to landscape health and biodiversity of the region. These areas of remnant vegetation are also sometimes referred to as 'green corridors' or 'wildlife movement corridors'. Council has undertaken an analysis of corridors that identifies broad regional scale connections and local scale links (down to individual trees in some cases) as potential movement pathways. Gaps in the network of linkages can occur as cleared paddocks and roads and are identified as opportunities for rehabilitation or wildlife crossing structures, if appropriate.

Defining the difference between 'core habitat' and 'corridor' was a key component of the Central Coast Wildlife Corridor project. The following criteria were used to create the core habitat class using Council's vegetation community type mapping:

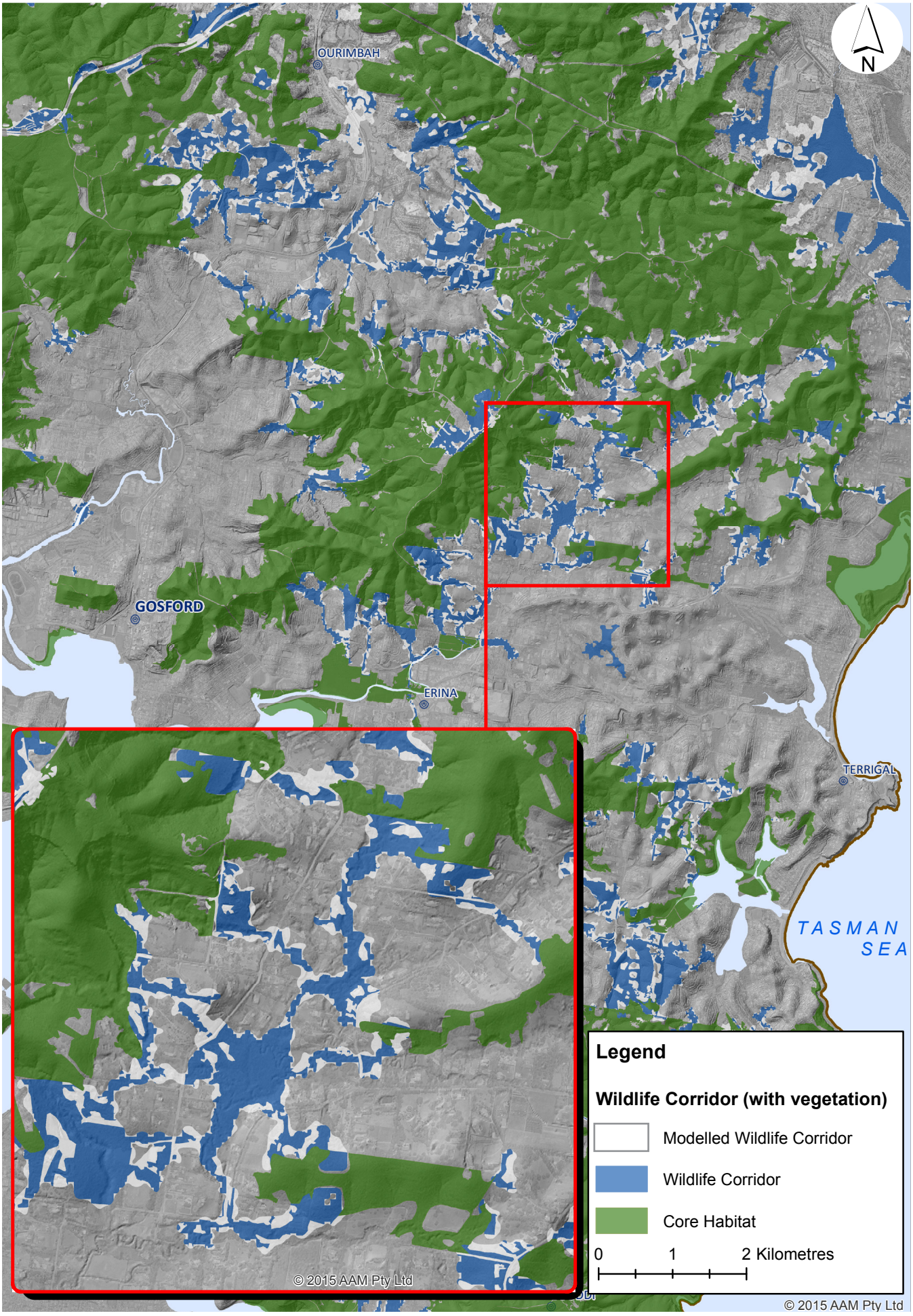
- Protected public land - all substantial parcels of public land, e.g. State Conservation Areas, are considered core habitat;
- Vegetation condition - vegetation that is in moderate to good condition[1] is considered core habitat;
- Polygon shape/configuration - core habitat areas have a low perimeter to area ratio; and
- Proximity to other areas of core habitat - i.e. if a patch of vegetation is non-linear and considered contiguous with a larger block of remnant vegetation, then it is included as core habitat.

Core habitat is used in the Central Coast Biodiversity Corridor Map to provide the user with a picture of where the large remnants are located so that it is clear where the wildlife movement opportunities lie between them. The corridor network is displayed as a combination of mapped extant vegetation nested within modelled corridors (using the Spatial Links Modelling Tool).

Places where the modelled corridor does not contain vegetation, for example, cleared paddocks or sparse vegetation, are priority locations in the landscape for rehabilitation through the introduction of vegetation to enhance the functionality of the entire corridor network (see white areas in Map 4). However, the white areas do not remove opportunities for allowable development.

Further details of the analysis can be found in a report referenced in Appendix B.

[1] Vegetation condition is based on four classes:
- Moderate to good (most areas of remnant bushland)
- Low (highly disturbed and weedy vegetation)
- Very low (could be reinstated as vegetation theoretically, e.g. golf courses, parks)
- Built environments (little to no vegetation)



Map 4: Example of the Central Coast Council Biodiversity Corridor Map showing core habitat in green, local scale corridors in blue and modelled corridors in white. Data source: Harré (2018)

3. Locally Significant Vegetation

A review of all plant community types (PCT) mapped in the Central Coast LGA (by Council in 2018) has identified 10 that have been greater than or equal to 70% cleared (i.e. less than 30% of their original extent remains across all of its range in NSW) (Table 4). The percent cleared figures for these plant community types are expert derived, that is, not based on a spatial analysis of pre-European settlement modelling and extant vegetation community type mapping.

While the majority of the highly cleared plant community types are also threatened ecological communities, two are not currently listed (PCT 1625 and PCT 1644). In addition, both of these plant community types have less than 15% of their pre-European settlement range remaining.

Table 4: Highly cleared (greater than 70%) plant community types (PCT) in the Central Coast local government area listed in order of per cent cleared.

PCT ID	Plant Community Type Name	Class	Formation	TEC	Per cent cleared
1645	Old Man Banksia - Rough-barked Apple - Bangalay shrubby open forest on coastal sands of the Central Coast	South Coast Sands Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Yes	98
1723	*Melaleuca biconvexa* - Swamp Mahogany - Cabbage Palm swamp forest of the Central Coast	Coastal Swamp Forests	Forested Wetlands	Yes	92
1720	Cabbage Gum - Forest Red Gum - Flax-leaved Paperbark Floodplain Forest of the Central Coast	Coastal Floodplain Wetlands	Forested Wetlands	Yes	90
1625	Red Bloodwood - Sydney Peppermint - *Podocarpus spinulosus* shrubby open forest of the southern Central Coast	Sydney Coastal Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	No	88
1644	Coast Tea Tree - Old Man Banksia coastal shrubland on foredunes of the Central and lower North Coast	South Coast Sands Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	No	86
1536	Tuckeroo - Lilly Pilly - Coast Banksia littoral rainforest	Littoral Rainforests	Rainforests	Yes	78
1718	Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	Coastal Swamp Forests	Forested Wetlands	Yes	74
1589	Spotted Gum - Broad-leaved Mahogany - Grey Gum grass - shrub open forest on Coastal Lowlands of the Central Coast	Hunter-Macleay Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Yes	71
1527	Bangalow Palm - Coachwood - Sassafras gully warm temperate rainforest of the Central Coast	Northern Warm Temperate Rainforests	Rainforests	Yes	70
1697	Kangaroo Grass - Coastal Rosemary grassland on coastal headlands	Maritime Grasslands	Grasslands	Yes	70

A review of the current extent of vegetation across the Central Coast LGA (excluding the national park and state forest estate) identified 20 plant community types which have less than 100 hectares remaining (Table 5).

Table 5: Poorly represented (less than 100 ha remaining) plant community types (PCT) in the Central Coast local government area listed in order of area remaining.

PCT ID	Plant Community Type Name	Extant area (ha)
1741	*Lepironia articulata* sedgeland	0.8
1700	Dwarf Casuarina - Prickly-leaved Paperbark - Hairpin Banksia Coastal Heath of the Central Coast and lower North Coast	2.4
1204	Spinifex beach strand grassland, Sydney Basin Bioregion and South East Corner Bioregion	4.4
1725	Swamp Mahogany - Broad-leaved Paperbark - Swamp Water Fern - Plume Rush swamp forest on coastal lowlands of the Central Coast and Lower North Coast	6.3
836	Forest Red Gum - Rough-barked Apple open forest on poorly drained lowlands of the Central Coast, Sydney Basin Bioregion	6.9
1697	Kangaroo Grass - Coastal Rosemary grassland on coastal headlands	17.8
1625	Red Bloodwood - Sydney Peppermint - *Podocarpus spinulosus* shrubby open forest of the southern Central Coast	21.0
978	Needlebush - banksia wet heath on sandstone plateaux of the Sydney Basin Bioregion	25.8
781	Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	26.4
1645	Old Man Banksia - Rough-barked Apple - Bangalay shrubby open forest on coastal sands of the Central Coast	31.3
1746	Saltmarsh Estuarine Complex	38.3
1071	*Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion	42.4
659	Bangalay - Old-man Banksia open forest on coastal sands, Sydney Basin Bioregion and South East Corner Bioregion	46.9
925	*Melaleuca nodosa* closed shrubland on alluvium of the Central Coast, Sydney Basin Bioregion	71.8
1588	Grey Ironbark - Broad-leaved Mahogany - Forest Red Gum shrubby open forest on Coastal Lowlands of the Central Coast	73.9
1681	Smooth-barked Apple - Cabbage Palm - Broad-leaved Mahogany woodland on Wallarah Peninsular	79.7
1724	Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast	83.0
691	Blackbutt - Tallowwood dry grassy open forest of the southern NSW North Coast Bioregion	84.7
1701	Prickly-leaved Paperbark - Fern-leaved Banksia heath on coastal headlands of Central Coast	92.2
1619	Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	96.0

The plant community types identified in Tables 4 and 5 have high local significance and high conservation priority as a direct result of historical reduction in extent. Drivers for the loss and degradation of these communities are likely to be urbanisation, increased human population and climate change. The Conservation Management Program will further investigate these drivers of change and the consequences for the future broader landscape. Actions arising in the Biodiversity Strategy relate to updating the analysis of local significance with local-scale vegetation community type mapping (rather than the coarser plant community type mapping) and updated versions of the NSW plant community type mapping for the east coast.

Summary Table of Goals, Actions and Targets (Theme 4)

ID	Action	Target
Goal 4.1 High biodiversity value areas are appropriately identified, protected and restored as part of future land use planning investigations		
4.1.1*	Develop a zoning framework for environmental zones supported by the spatial mapping project to inform comprehensive zoning amendments and spatial overlays for environmental lands	Through an amendment/s to the Comprehensive LEP, have developed and implemented a zoning framework for environmental lands
4.1.2*	Create additional local provisions or development standards/controls through the Comprehensive LEP/ DCP project	A comprehensive review of local provisions for biodiversity conservation undertaken including consideration for opportunities for bonus lot subdivision and biodiversity planning controls
4.1.3*	Update assessment procedures for planning proposal applications ensuring biodiversity values are fully considered and impacts to listed entities are avoided at the rezoning stage of developments	All rezoning of land is consistent with the principles of the Biodiversity Strategy and the zoning framework (on-going)
4.1.4	Preparation of a local policy which requires at the rezoning stage the finalisation of arrangements (e.g. Biocertification) for the *in perpetuity* ownership and management of land with high biodiversity values	By the end of 2020/21, a policy has been drafted
4.1.5	Identify appropriate mechanisms to achieve rehabilitation and enhanced landscape connectivity through the rezoning and development assessment process (such as Vegetation Management Plans)	Achieve rehabilitation of areas identified by rezoning and development assessment process through compliance with VMP and conditions (on-going)
4.1.6	Ensure developer compliance with Council's Flora and Fauna Survey Guidelines, vegetation management plans and conditions	Council has adequate resources allocated to review and enforce ecology consent conditions for all developments
Goal 4.2 The level of local biodiversity knowledge is adequate to support decision-making, conditions of consent and strategic planning		
4.2.1	Produce and keep up-to-date spatial information and analyses about areas of high biodiversity value and threats to biodiversity	By the end of 2019/20, Council will have up-to-date spatial information available for planning (e.g. vegetation community types, biodiversity corridors, conservation priorities)
4.2.2	Identify strategic planning data needs (e.g. vegetation community type mapping and updates, priority threatened species surveys)	On-going
4.2.3	Develop and use geospatial data to inform and guide strategic planning to identify critical locations where vegetation, habitat, connections or species must be avoided and protected	By the end of 2021/22, a geospatial tool is in use
4.2.4*	Design and invest in a Central Coast Biodiversity Monitoring Program in line with State and Commonwealth Government programs	By the end of 2020/21, scope a comprehensive and consistent MER program for natural areas

4.2.5	Explore options to internally share biological resource information such as receiving sites for natural resources such as soil, seeds, tree barrels, hollows, etc	By the end of 2020/21, options for sharing data internally have been explored
4.2.6	Collate all public biodiversity offsets geospatially	By the end of 2020/21, biodiversity offsets information available geospatially to Council staff through Geocortex
4.2.7	Provide regular updates to the Biodiversity Values Map held by NSW Government	On-going
4.2.8	Investigate additional State or Commonwealth threatened species or ecological community listings based on local significance information	As monitoring and spatial analyses reveal candidate listings (on-going)

* Key actions explained in more detail below

Orb Weaver
Illustration - Dr Tanya Hoolihan

Key Actions Explained

Theme 4 - Goal 4.1 - Actions 4.1.1 & 4.1.2 & 4.1.3

Implementing the Biodiversity Strategy through Land Use Planning

Council's Local Strategic Planning Statement (LSPS) gives legal effect to strategic planning priorities and actions contained within local planning strategies, including those related to the protection of biodiversity. The LSPS will provide broad strategic direction on biodiversity actions and priorities, and associated mapping

Council supports the implementation of appropriate planning controls to protect biodiversity in relevant planning instruments, and will seek to ensure that the Comprehensive LEP strengthens protection of biodiversity within the LGA.

The Biodiversity Strategy aims to give Council the direction to be able to negotiate with the Department of Planning, Industry and Environment (DPIE) to implement planning controls that are effective in protecting biodiversity.

Land Zoning Investigations

Under **Action 4.1.1** and as part of the Comprehensive LEP process, Council will prepare a zoning framework supported by spatial mapping to inform comprehensive zoning amendments to environmental zones based on contemporary biodiversity values and principles.

The Biodiversity Strategy provides guidance for the development of the zoning framework, through the five core Principles for Land Use Planning (see page 57).

The framework is to consider the current application of zones for Environmental Conservation (zone E2), Environmental Management (zone E3), Environmental Living (zone E4) and Large Lot Residential (zone R5), as well as any land identified through the Biodiversity Strategy with high ecological value.

Other factors to be considered in the framework include:

- objectives of the Environmental zones and range, application and suitability of permissible or prohibited land uses;
- the methodology and considerations applied for the zoning of existing environmentally zoned lands;
- Relevant DPIE Practice Notes
- "on the ground" application of the zones;
- the value that landscapes and landforms with lower biodiversity priority provide for scenic amenity and connectivity;
- relevant State Environmental Planning Policies (SEPPs), for example SEPP 19 – Bushland in Urban Areas; Vegetation SEPP, Coastal Management SEPP;
- Section 9.1 Ministerial Directions 2.1 Environmental Protection and 2.2 Coastal Management;
- legislation such as the *Biodiversity Conservation Act* 2016; and
- outcomes of relevant strategic conservation planning processes.

Land Use Planning Provisions

Four additional local provisions and/or development requirements for the purposes of regulating and assessing development as future amendments to the applicable LEP are to be further considered as part of **Action 4.1.2** are discussed below.

1. *Local Environmental Plan Terrestrial, Riparian and Environmentally Sensitive Mapping Layers*

Some NSW councils have introduced local biodiversity values maps which trigger additional considerations for biodiversity conservation and protection purposes for the assessment of development. Such maps promote biodiversity conservation at a local scale. Maps and considerations implemented through this mechanism could relate to range of local conservation priorities, including biodiversity conservation priorities, corridors and landscape connectivity, riparian land and wetlands.

Councils which have implemented similar provisions include Sutherland, through Sutherland LEP 2015, and Ku-ring-gai, through Ku-ring-gai LEP 2015, Lake Macquarie City Council through Lake Macquarie LEP 2014 and Lithgow Council through Lithgow LEP 2014.

2. *Subdivision of land to support conservation outcomes*

This local provision relates to the ability for the subdivision of land below the minimum lot size, provided that the lot created is conserved in perpetuity for the purposes of biodiversity conservation.

This mechanism would be most readily applied to residential subdivisions, where residue lots are created that are not identified for the purposes of development, generally as a result of the environmental features or characteristics of the land (e.g. steep slope, extensive vegetation cover etc.). Often the lots proposed are below the minimum lot size for the respective zoning. The application of the clause identified by this option would enable the subdivision, yet generate conservation outcomes by enforcing, through development consent conditions, the in perpetuity conservation of land.

This mechanism has been applied within a number of LEPs, including Lake Macquarie LEP 2014 (C14.IE).

3. *Subdivision incentives*

This opportunity differs to that above as it would enable the subdivision of land into smaller minimum lot sizes, provided a contribution, either through land dedication or financial, was made to Council for the acquisition or embellishment of conservation land.

This mechanism would operate in a similar manner to the Coastal Open Space System (COSS) Strategy, implemented through the operation of Cl. Cl.18 (4) (b) of *Interim Development Order No. 122 – Gosford* (IDO 122).

LEPs utilising the prescribed Standard Instrument formula however do not refer to, nor enable the application of the provisions of IDO 122 Cl.18 (4) (b). This is inclusive of draft consolidated Central Coast LEP 2018 (CCLEP).

Notwithstanding this, the COSS concept has been identified for expansion throughout the Central Coast by the Central Coast Regional Plan (CCRP) 2036.

It is therefore appropriate to review the IDO provisions with the view to applying a similar scheme through a subsequent amendment to the CCLEP.

The implementation method would need to be determined and the suitability of a similar approach (i.e. as an LEP provision) requires further discussion with the Department of Planning, Industry and Environment.

4. *Local policies*

Opportunities also exist for the review and strengthening of existing policy documents and the development of new guiding policy documents to support the goals of the Biodiversity Strategy. 'Green Corridors' and 'Property Transactions – Sales and Acquisitions' are examples of local policies that could be reviewed.

Correa reflexa
Illustration - Dr Tanya Hoolihan

All biodiversity loss in the LGA due to development (as assessed under Part 4 and Part 5) of the *Environmental Planning and Assessment Act* 1979) should be offset in some way. This establishes some consistency and equity across activities whether or not they trigger the BOS. This would require Council to establish a local biodiversity offset policy that imposes offset requirements for all vegetation loss. The offset requirement may be satisfied in the form of biodiversity credits in accordance with the BOS like-for-like offsetting rules, or as a contribution of funding to the Central Coast Conservation Fund (for activities below the BOS threshold).

The purpose of a local biodiversity offset policy would be to:

- provide direction on Council's position on biodiversity offsetting for Council's own developments;
- provide direction on Council's position on entering into the biodiversity offsets market;
- provide guidance for offsetting tree and vegetation loss for private development that does not trigger the BOS threshold; and
- restrict application of the BOS variation rules to meet the objectives of the Biodiversity Strategy in terms of offsetting the same values within the LGA or adjacent sub-regions (including establishing in what circumstances Council would seek to increase the quantum of credits).

Precinct Planning, Structure Planning

Action 4.1.3 seeks to ensure that suitable assessment principles continue to be in place to ensure that biodiversity values are fully considered and impacts to threatened species, threatened ecological communities and endangered local populations are avoided during the precinct planning, structure planning and rezoning and development assessment processes.

Options for implementation are outlined below:

1. *Implement strategic planning principles for precinct planning, structure planning and rezoning assessments*

The implementation of the principles of Biodiversity Strategy at the initial assessment of rezonings will ensure the conservation of biodiversity values:

- offsets need to be local, or as close as possible if local offsets are not feasible.

2. *Drafting and implementation of Development Controls*

Through further refinement of the Central Coast conservation estate, additional development provisions could also be introduced within Council's Development Control Plan (DCP). This could include, but would not be limited to:

- new chapters (e.g. biodiversity corridors and conservation priority areas, specific priority areas, species specific development controls, managing ongoing threats); and
- comprehensive review of existing chapters (e.g. wetland management, tree and vegetation management) giving particular consideration to opportunities for clearing below the Biodiversity Offset Scheme threshold, non-residential development in E3/E4 zones and Interim Conservation Areas.

Theme 4 - Goal 4.2 - Action 4.2.4

Central Coast Biodiversity Monitoring Program

Both former Councils have a long history of ecological data collection, monitoring programs and reporting requirements. The timing is right for a consolidation of approaches and a rethink of what a Central Coast Council Biodiversity Monitoring Program would look like. There are also opportunities for Council to tap into repositories of data collected by others and to contribute its own data for external agencies to use.

As part of **Action 4.2.4**, Council will review its monitoring, evaluation and reporting requirements across all areas of ecological data collection, and design a program that recognises the diversity of monitoring needs, while being efficient with resources and retaining the ability to answer land management questions and aid development assessment.

An initial step will be to articulate how the monitoring information will lead to conservation actions or decisions. There is no need for a monitoring program that collects information on species for the sake of it or which does not contribute to avoiding local biodiversity loss. The Biodiversity Monitoring Program should be embedded within site management plans and, to ensure effectiveness, be clear on how the information will inform conservation actions, specify trigger points at which management interventions will be implemented, and have the ability to detect change early enough to act.

Standards will be developed for data quality, survey design, metadata, information storage procedures, and training provided to staff who will contribute to and access data. Much of this work will be informed by State and Commonwealth data collection programs and what other councils and agencies are doing. Initial funding and resources will be required for the set up phase, and on-going resources will be required to keep the program functional.

Community participation in monitoring programs will be a key component of the Biodiversity Monitoring Program. Council will explore models for cost effective citizen science programs and how Council can be best involved in and support the myriad of community programs already collecting information. Support may be provided through the Landcare Program or community participation program in the form of training, on-going engagement, insurance and health and safety.

The priorities for a biodiversity monitoring program include monitoring required by management plans and conservation agreements and on-going collection of local biodiversity data to supplement regional and state mapping and data programs.

Yellow-tailed Black Cockatoo - (Calyptorhynchus funereus) and Charmhaven Apple - (Angophora inopina)
Illustration - Dr Tanya Hoolihan

Theme 5:
Demonstrating leadership in biodiversity conservation

The community expects Council to provide leadership in leaving a positive legacy for future generations through responsible stewardship of the environment – this is our shared responsibility with the residents of the Central Coast. By incorporating biodiversity protection into procedures, planning and corporate level programs, Council can demonstrate every day that it takes these principles seriously.

Some natural resource management issues, such as biosecurity, bush fire and emergency management and coastal area, estuary, lagoon and wetland management issues are initiated by Council but are not restricted to public land in their application. These types of programs are collected together into Theme 5.

Black-eyed Susan -(Tetratheca juncea)
Illustration - Dr Tanya Hoolihan

Summary Table of Goals, Actions and Targets (Theme 5)

ID	Action	Target
Goal 5.1 Council embeds biodiversity protection and conservation into its core business		
5.1.1*	Council's corporate Asset Management System is to include natural areas as an asset type in the technical asset register	The Asset Management System holds data on Natural Assets by the end of 2019/20
5.1.2*	Natural assets are incorporated into Council's accounting and financial management application (Oracle) as a rolling maintenance program similar to a fixed asset register	Maintenance system in use by the end of 2019/20
5.1.3*	Review of processes and extend the Vertebrate Pest Management Program to priority locations and monitor effectiveness of the program	By the end of 2020/21, a comprehensive program for vertebrate pest management across the LGA is in place, including internal policy and procedures
5.1.4*	Develop and implement the expanded Biosecurity Management Program (including a weed policy)	By the end of 2019/20, have policies, procedures and educational material prepared to implement the Program
Goal 5.2 Estuary, lagoon and wetland management is fully resourced and adheres to best practice		
5.2.1*	Prioritise staff resources and source funding to prepare Coastal Management Programs (including Tuggerah Lakes, Brisbane Water, coastal lagoons and open coastlines)	Prepare certified Coastal Management Program/s by end of 2021
5.2.2	Implement actions identified existing Coastal Zone Management Plans	The actions identified in the existing plans are implemented (on-going)
5.2.3	Review Council's water quality monitoring program for ecolgical health of lakes and estuaries	Implement indentified suitable opportunities to enhance the program.
5.2.4	Implement a fauna monitoring program for lakes and estuaries management	On-going
Goal 5.3 All areas of Council administration have an understanding of the value of biodiversity and incorporate it into their responsibilities		
5.3.1*	The Environmental Management System ensures Council operational activities adequately assess impacts to biodiversity	100% of staff who undertake and authorise environmental assessments for Council's operations are trained in Council's Environmental Assessment Procedure by end of 2019/20
5.3.2	Ensuring proper management and maintenance of roadside vegetation containing treatened species or EEC with minimal environmental impact to protect Council workers from litigation and help manage sensitive areas	By the end of 2019/20, roadside vegetation management program scoped, resourced and implemented, with responsibilities identified
5.3.3	Council operational plans, strategies and processes support the goals of the Biodiversity Strategy	Each new and revised document identifies how Council will avoid impacts on and protect biodiversity (on-going)

* Key actions explained in more detail below

Key Actions Explained

Theme 5 - Goal 5.1 - Actions 5.1.1 & 5.1.2 & 5.1.3 & 5.1.4

Biodiversity Embedded as Part of Core Business – Asset Management System

Council is consolidating the asset management of the two former councils into a corporate system that tracks all assets. Natural areas will be included in the structure of the system as asset sub-categories under the Parks and Reserves Asset type (Figure 6). Reserves and the biological values that they protect will be recognised in the same way that sporting facilities, playgrounds and beaches, and **Actions 5.1.1** and **5.1.2** will ensure that natural areas are included in the Asset Management System and financial management systems as assets.

Dusty Coral Pea - (Kennedia rubicunda)
Illustration - Dr Tanya Hoolihan

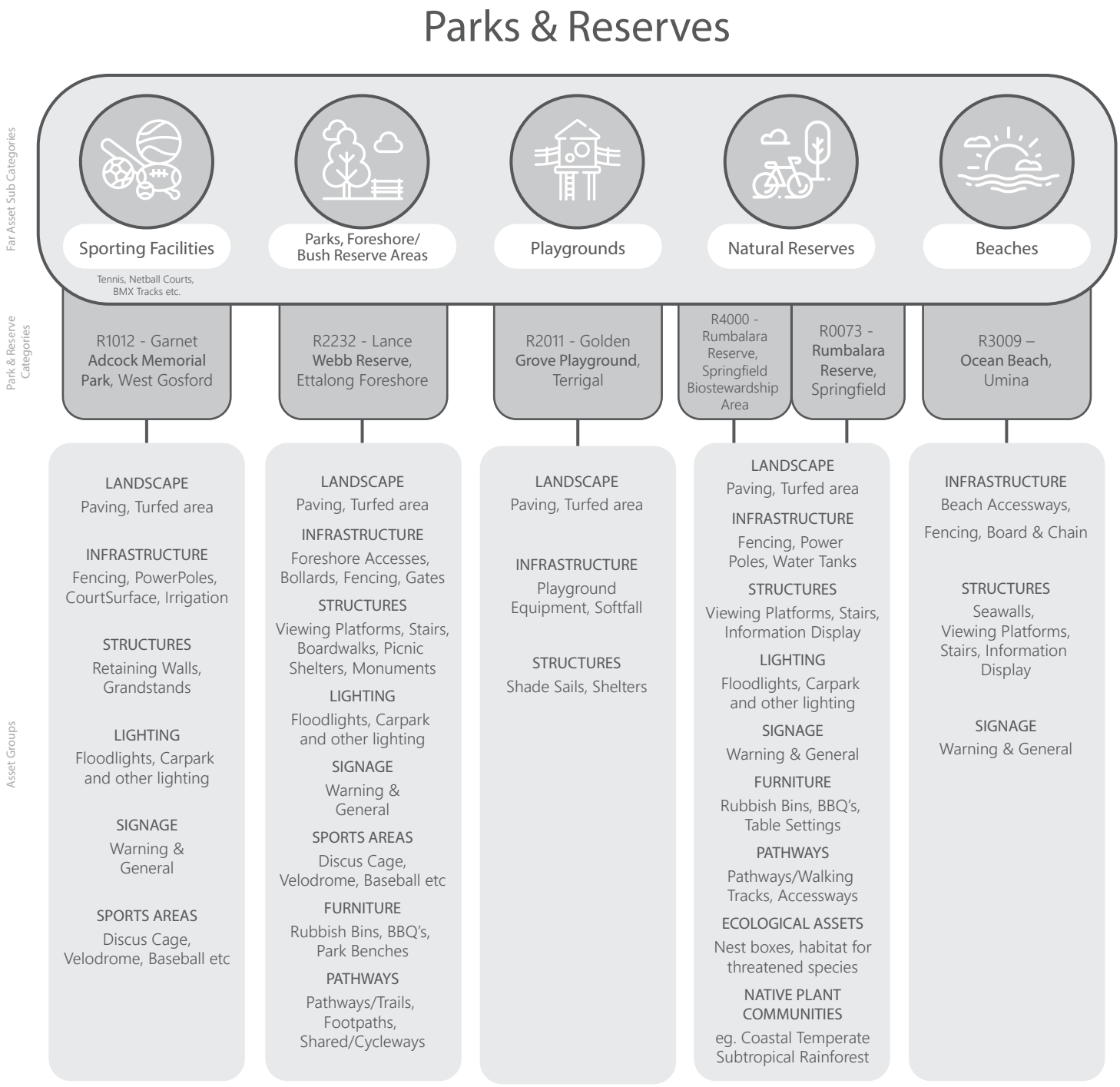


Figure 6: Natural areas are considered an asset sub-category under the asset type Parks & Reserves. Asset groups can include vegetation, habitat and threatened species.

Orchard Swallowtail Butterfly - (Papilio Aegeus)
Illustration - Dr Tanya Hoolihan

Biosecurity Programs

Actions 5.1.3 and 5.1.4 relate to Council's role in delivering regional biosecurity programs. Under these actions, Council will develop internal policies and procedures to guide implementation of weed management and vertebrate pest animal management programs. The following regional plans are relevant:

Greater Sydney Regional Strategic Weed Management Plan 2017-2022

The Local Land Services plan focuses on managing weeds to protect the region's environment, landscape, livelihood, cultural and lifestyle values from weeds.

In line with new Commonwealth biosecurity measures, NSW has reformed its weed, pest and disease legislation. Together, the NSW Biosecurity Strategy 2013-2021 and *NSW Biosecurity Act 2015* (which repeals the *Noxious Weeds Act 1993*) provide a streamlined, clear framework for safeguarding primary industries, natural environments and communities from a range of pests, diseases and weeds. Council is a local control authority and as such has a role to prevent, eliminate, minimise and manage biosecurity risks posed by weeds in the LGA.

Greater Sydney Regional Strategic Pest Animal Plan 2018-2023

The Pest Animal Plan acknowledges the negative impact of pest animals on biodiversity, identifying the most significant vertebrate pests in the region: wild dogs, feral pigs, red foxes, wild rabbits, wild deer and cats. Goats, pest birds and introduced fish are also significant pests in parts of the region.

Under the NSW *Biosecurity Act 2015*, pest animals are not defined by species. Pest species can be considered as any species (other than native species) that presents a biosecurity threat.

The *Biosecurity Regulation 2017* outlines mandatory measures for pest animal management in NSW. Council, landholders and community members should work together to ensure ongoing implementation of the most effective pest animal management practices across all land tenures.

Theme 5 - Goal 5.2 - Action 5.2.1

Estuary, Lagoon and Wetland Management

Action 5.2.1 refers to the preparation of a Coastal Management Program (CMP) in accordance with the coastal management manual and in consultation with the community and relevant public authorities. A CMP sets the long-term strategy for the coordinated management of the coast and identifies coastal management issues and actions required to address these issues in a strategic and integrated way. A CMP details how and when those actions are to be implemented, their costs and proposed cost-sharing arrangements and other viable funding mechanisms. Council is required by the State Government to prepare a CMP by 2021.

The Central Coast coastline stretches from Frazer Beach in the north to Patonga in the south. Currently, Council directly implements six coastal and estuary management plans:

- Tuggerah Lakes Estuary Management Plan (2006)
- Wyong Coastal Zone Management Plan (2011)
- Gosford Beaches Coastal Zone Management Plan (2017)
- Brisbane Water Coastal Zone Management Plan (2012)
- Gosford Lagoons Coastal Zone Management Plan (2015)
- Pearl Beach Lagoon Coastal Zone Management Plan (2014)

Additionally, Council supports the implementation of the Lake Macquarie Estuary Management Plan (1997) and the Lower Hawkesbury Estuary Management Plan (2009).

The *Coastal Management Act* 2016 (CM Act) establishes a framework for coastal management in New South Wales. CMPs will be required for all NSW coastal waterways by 2021. These will supersede the six coastal and estuary management plans and will set the long-term strategy for the coordinated management of the coast, with a focus on achieving the objectives of the CM Act. The purpose of the CM Act is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being.

The CM Act defines the coastal zone as four coastal management areas and establishes management objectives specific to each:

1. Coastal wetlands and littoral rainforest area – defined as areas with particular hydrologic and ecological characteristics.
2. Coastal vulnerability area – defined as the area subject to any of the seven coastal hazards. The vulnerability area will be identified and mapped by each council based on local conditions.
3. Coastal environment area – defined as coastal waters, estuaries, coastal lakes and lagoons, and surrounding land including beaches, dunes, headlands and rock platforms.
4. Coastal use area – defined as land adjacent to the coast where development is or may be carried out.

The State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP) identifies and maps the coastal zone according to the above definitions. The CM SEPP streamlines coastal development assessment requirements and identifies development controls for consent authorities to apply to each coastal management area.

Theme 5 - Goal 5.3 - Action 5.3.1

Council Administration's Environmental Responsibilities

Council's Environmental Management System (EMS) avoids and manages impacts to biodiversity through the systematic management of the potential environmental impact associated with Council's operational activities. The EMS has a robust environmental assessment process which incorporates the identification and assessment of any potential impacts upon flora and fauna during the planning phase of infrastructure activities and is supported by tools and resources to assist in on-site management. Training of staff and auditing of Council's operations and processes ensures implementation, monitoring and continuous improvement of the system. **(Action 5.3.1).**

Davidsonia plum
Illustration - Dr Tanya Hoolihan

Theme 6:
Protect and Expand the Coastal Open Space System (COSS)

Grey fantail (Rhipidura albiscapa)
Illustration - Dr Tanya Hoolihan

6.1 Brief History of COSS

What is known as the COSS now comprises over 499 lots with a total area of 2573 ha. The five important determinants for the significance of lands for inclusion within COSS were:

1. Scenic Quality: backdrop to the city and contribution to the sense of place of Gosford;

The prominent location of the COSS makes a considerable contribution to an aesthetically pleasing local landscape. Rumbalara Reserve, for example, provides a green backdrop to the Gosford City Centre. This vegetated land is visible from most parts of the urban areas east of the M1 between the urban settlements, adding to the attractiveness of the area for both residents and visitors

2. Natural Setting: the substantially unaltered natural ecosystem that provides a range of wildlife habitats and includes a diversity of vegetation species and associations;

Many parts of the COSS are located on ridges, such as Kincumba Mountain (formerly known as the Avoca Ridge); Rumbalara-Katandra Ridge and The Ridgeway at Matcham, which means that headwaters of a number of local creeks and drainage lines are well vegetated protecting water quality and the biodiversity values of waterways. The majority of local creeks and drainage lines that have their headwaters in COSS reserves are tributaries of Erina Creek and Narara Creek, drain directly into Brisbane Water or drain into one of four coastal lagoons.

On-ground flora and fauna surveying of the COSS has been undertaken from time to time, however, an on-going monitoring program has not been established.

3. Human interaction: the area's proximity to human activities and the opportunities it offers for recreation, education and scientific endeavours;

A number of education and awareness programs were undertaken to raise community awareness of the values of the COSS and the local natural environment.

4. Cultural significance: the Aboriginal and other cultural significance within Gosford LGA is considerable.

A 2015 heritage study described the European history and Aboriginal heritage of the COSS.

5. The System: the size, proximity and linkages of COSS enhance the overall value of individual reserves and other parcels of land.

In 1984, the COSS was initiated by the then Gosford City Council in response to the findings of a 1975 Rural Lands Study of the non-urban areas of Gosford and Wyong Shires (NSW Planning and Environment Commission 1975). The study identified several pressures on non-urban lands, including a reduction in the area being farmed in coastal valleys, rapidly increasing rateable values on rural land, and destruction and deterioration of areas of high landscape and environmental value due to rural residential subdivision. It also identified that the Gosford/Wyong area had extensive areas of aesthetically pleasing landscape that strongly contributed to the attractiveness of the region.

It was determined that important features of the landscape would be protected from further degradation and loss, including areas with steep slopes (20% and over), ridgelines, prominent hills and headlands, wetlands (estuarine and freshwater), coastal dunes and cliffs and important flora and fauna habitat. These attributes were used to assess individual land parcels for inclusion in the COSS.

The Gosford Wyong Rural Lands Study proposals which were subsequently implemented in the COSS primarily focused on scenic protection and regulation of rural residential development through minimum subdivision and density control. The use of bonus lot provisions to allow development where detailed development controls for design and siting of dwelling houses could be satisfied (e.g. topography, slope, vegetation soil, effluent management, etc) contributed to the voluntary acquisition of land by the Council.

The policy directions of the Rural Lands Study were implemented through the gazettal of Interim Development Order (IDO) No 100 on 18 February 1977, which in turn were carried through in the gazettal of IDO No 122 on 30 March 1979. These planning instruments contained clauses to allow 'bonus' development (i.e. additional subdivision potential subject to land dedication or cash contribution). The calculation of the amount of contribution/land to be dedicated in exchange for bonus subdivision rights in the scenic protection zone were established so that lands could be dedicated at no cost (if land held in the same ownership was suitable for bonus subdivision), or otherwise to contribute to a trust fund established to acquire land, improve or embellish conservation lands. These provisions were subject to modifications under Gosford Local Environmental Plan (LEP) No 36 gazetted on 20 November 1981 and Sydney Regional Environmental Plan (SREP) No 6 - Gosford Coastal Areas on 6 May 1983. These provisions which have allowed for progressive funding have been the cornerstone of the COSS and instrumental in its success in protecting areas with high environmental and scenic values.

The program integrated restriction of development of sensitive areas through land use controls with an acquisition and management program for those parts of the COSS that were of highest priority for protection. The 1984 COSS Strategy detailed and identified land which should be protected and wherever possible acquired. An active acquisition program was established for lands that were unlikely to be dedicated as part of the bonus subdivision IDO.

The 1984 COSS Strategy was reviewed and updated in 1992 with an updated management action strategy (Manidis Roberts 1992a & 1992b). This review identified important factors that made Gosford LGA unique and were determinants of the significance of land for inclusion in COSS (as discussed above).

Almost two decades after the adoption of the COSS, an expansion of the COSS westward to the M1 Pacific Motorway was considered and consultants were engaged in 2002 to undertake the western COSS assessment (Biosis 2002). COSS Stage 2 was endorsed by Council in 2003 with the component properties adopted in 2008 (Gosford City Council 2010). The western escarpment is recognised as an important landscape link between the COSS network and the national parks to the west. This vegetated link continues northward to the former Wyong Shire. COSS applied to 7(a) and 7(c) zoned land east of the M1 Pacific Motorway with a total of approximately 2,000 lots affected.

COSS was jointly initiated by the NSW Government and the former Gosford City Council, taking into account regional land use objectives. Its operation has taken into consideration the broader regional context, including the natural setting and biodiversity conservation context, and the landscape and scenic context.

The values of the COSS identified by Manidis Roberts (1992) include the geology and topography, wildlife habitats and diversity of vegetation species. This report recognised that the eastern part of the former Gosford LGA has seen a high level of urban development accompanied by a loss of native vegetation cover, a decline in the populations of native fauna and disturbance to ecological communities. The COSS plays a substantial role in the conservation of biodiversity by protecting native ecological communities and fauna species).

Despite the original intention of establishing a continuous green space network, the COSS is not continuous and varying levels of connectivity exist between COSS reserves and between the COSS reserves and other remnant vegetation. In 1980, a number of corridors between the different parts of the COSS were identified to strengthen the connectivity of the network. Due to submissions received to the public exhibition of the proposed system, a decision was made by Council to delete the wildlife corridors.

The effectiveness of COSS has been its integration across different areas of Council planning policy and administration. It is based on an overriding goal to protect the natural environment and character in areas of high landscape and environmental value.

Three principles underpinning COSS were (1) appropriate land use planning and controls, (2) a land acquisition program for land that cannot be protected by land use controls, and (3) a management program for acquired lands.

Key features of the system were as follows:

1. It was based on a land use framework that recognised the scenic and biodiversity values of the area, and limited development on environmentally sensitive lands.

2. Accurate environmental and biodiversity survey and mapping data underpinned identification and mapping of land for inclusion in COSS

3. COSS included land not only in Council ownership, but also Crown land, and land owned by State agencies (e.g. Department of Planning and Environment and Roads and Maritime Services) and Darkinjung Local Aboriginal Land Council.

4. Private land in COSS could be transferred to Council ownership through mechanisms including dedication, court order and purchase by Council using internal or external funds.

5. In later years the priority for private land acquisition was based on a 2006 assessment of the environmental values of the land, using a matrix/ checklist. Prior to 2006 acquisition priority was based on recommendations of the Gosford Coastal Open Space System Ecological Study (Mitchell McCotter 1994).

6. A trust fund was established in 2006 to provide funds for the management of the flora and fauna of the Gosford LGA and to support environmental education and research The Protection of the Environment Trust fund was managed by a committee appointed by the Council. The trust fund was supplemented by private donations of cash and land which had potential tax benefits to the donor. The investment returns on $1.5 million of restricted COSS funds provide funding for the Protection of the Environment Trust. Funds are allocated to environmental works through the Trust.

7. The Council reserves making up the COSS network were classified as Community Lands and ‘bushland’ as defined by the Local Government Act 1993 and were added to the generic Plan of Management for Natural Areas - Bushland.

8. Management of Council owned COSS lands was funded from Gosford City Council general revenue through the parks and reserves program, supplemented by external grants when available.

9. Land can be been transferred out of COSS (e.g. 300 ha to create Bouddi National Park in 2003 and Crown land was privatised through the Aboriginal land claims process).

Since 1990, a total of 113 parcels of land covering 817 ha has been purchased, dedicated or transferred to Council for inclusion in COSS. The records are incomplete due to the elapsed time and loss of corporate memory in that period.

Some land acquired for COSS was subsequently transferred to the NSW National Parks and Wildlife Service for incorporation within local national parks estate including Bouddi National Park, Brisbane Water National Park, Wambina Nature Reserve and Wamberal Lagoon Nature Reserve. In practice, there has been no real system for this, and it has been ad hoc in nature. Most recently, the NSW Government has generally been reluctant to add land to national parks where this increases management liabilities. The joint purchase of 61 hectares of land in 2014 and 2015 at Bambara Road, Kariong by the former Gosford City Council and the Office of Environment Heritage for inclusion in Brisbane Water National Park was the most recent collaboration between the two organisations

6.2 Mechanisms that Identified and Enabled COSS

6.2.1 Bonus Lot Provision

Former Gosford City Council's policy position in relation to the COSS was to retain the system of open space to preserve its environmental values and integrity. This is supported through the continuation of the bonus lot subdivision provisions and land dedication under Draft Gosford Local Environmental Plan (LEP) 2009, albeit in a different format to that in IDO 122. The collection of contributions in exchange for increased subdivision potential and dedication of identified lands is integral to the overall implementation and on-going management of the COSS.

6.2.2 COSS Levy

The COSS levy was not used to establish the COSS in 1984. Funds were levied between 1997 and 2014. During this period, former Gosford City Council took out loans for a number of other projects, including town centre upgrades. A Rate in the Dollar (RID) levy was applied to the Gosford City Council rates for 18 years. The 2014 RID for COSS was 0.00003017%. The levies, including the COSS levy, did not result in funds being accrued over time, but rather paid back the loan. Part of the loan has been used to purchase COSS land with some remaining available to acquire proposed COSS properties.

6.2.3 COSS Committee

The 2010 COSS Strategy gives an explanation of how former Gosford City Council committees were used to advise on COSS related issues. The way the advisory group operated changed over time.

The overall implementation and management of COSS has been undertaken with reference to an advisory committee of Council that comprises elected representatives, community members, representatives from government agencies and council staff as appropriate. The Committee commenced operations early in the history of COSS where its role was advisory regarding management matters in relation to COSS. This was later expanded to cover consideration of development applications on land adjoining COSS land.

6.2.4 Former Gosford City Council Environment Committee

The Committee mentioned above later came under the auspices of a formal council sub-committee, with meetings being minuted and put to Council for adoption. As a result of a review of the number and functions of all Council sub-committees, in May 2004 the COSS Committee became subsumed into the Environmental Planning and Sustainability Committee. This Committee was to be further reviewed and became the Environment Committee in September 2005, with its inaugural meeting held in December 2005.

The COSS Environmental Task Group was formed as a sub-group of this Committee. This COSS Environmental Task Group plays a key role in the administration and management of COSS. Its terms of reference are listed in Appendix III of the COSS Strategy. A number of the terms of reference identified for the COSS Task Group when it was established in 2005 have been completed or are in the progress of completion.

6.2.5 Voluntary Acquisition Process

The 2010 COSS Strategy provides a detailed description of the acquisition process at the time. Processes haven't remained static over time. The process is summarised as follows:

- Private land in COSS could be transferred to Council ownership through mechanisms including dedication, court order and purchase by Council using internal or external funds.
- In later years the priority for private land acquisition was based on a 2006 assessment of the environmental values of the land, using a matrix/ checklist. Prior to 2006 acquisition priority was based on recommendations of the Gosford Coastal Open Space System Ecological Study (Mitchell McCotter 1994).

6.3 Actions Related to the Expansion and Protection of COSS

6.3.1 Expansion of COSS Lands

The Biodiversity Strategy (Goal 2.3 Expand Council's conservation network) addresses how an expansion of COSS will be achieved through the planning and implementation of an Environmental Lands Acquisition Program.

6.3.2 Protection of COSS Lands

The mechanisms that are available for the long term protection of environmental lands, which include conservation agreements established under the *Biodiversity Conservation Act 2016*, are detailed on pages 39 and 41.

An additional mechanism for COSS lands may be a regional park concept under the *National Parks and Wildlife Act 1974*.

6.3.3 Funding Options

Funding options are considered in detail in Theme 2 of the Biodiversity Strategy. In addition, Theme 2 also explores other options for funding of biodiversity outcomes for the Central Coast in accordance with current legislation. This includes Biodiversity Stewardship Agreements and funding through Council's general revenue, as is the current funding model.

Implementation Plan

This Strategy documents the Central Coast's biodiversity values, legislative context for protection and presents a well-thought out action plan based on the latest scientific understanding of natural resource management. It aligns with the thinking in previous decades within both former Councils; and, its actions are achievable in a five year time frame.

The Biodiversity Strategy will have achieved its objectives when the following are fulfilled:

- Council supports an administrative structure and on-going resourcing for a Conservation Management Program for biodiversity conservation planning and management;
- Council explores the funding mechanisms for and supports an Environmental Lands Acquisition Program to expand the conservation estate;
- Council supports active management of natural areas to improve their biodiversity values over time;
- The community is an active and engaged participant in conservation programs across the LGA; and
- Land use planning, policy and decision-making protect lands with high biodiversity and social values.

The following section presents actions and a plan for Council to achieve the above objectives and meet the targets set out in this Strategy. The resource estimates provided are indicative only and not guaranteed to be approved in annual budget cycles. Therefore, if the resources are not available for each action, the action cannot be delivered as per the target.

As Council operates within an Integrated Planning and Reporting (IP&R) framework, progress against the Biodiversity Strategy actions will be reported through the annual report, the 4-year delivery plan and the Community Strategic Plan.

Lastly, the Biodiversity Strategy acknowledges the exceptional and comprehensive work of the Council and other government programs that contribute to biodiversity protection and management. There are many Council plans, programs, strategies and policies that are in place or are being developed that influence the success or otherwise of Council achieving the goals of the Biodiversity Strategy (See Figure 7 for some examples).

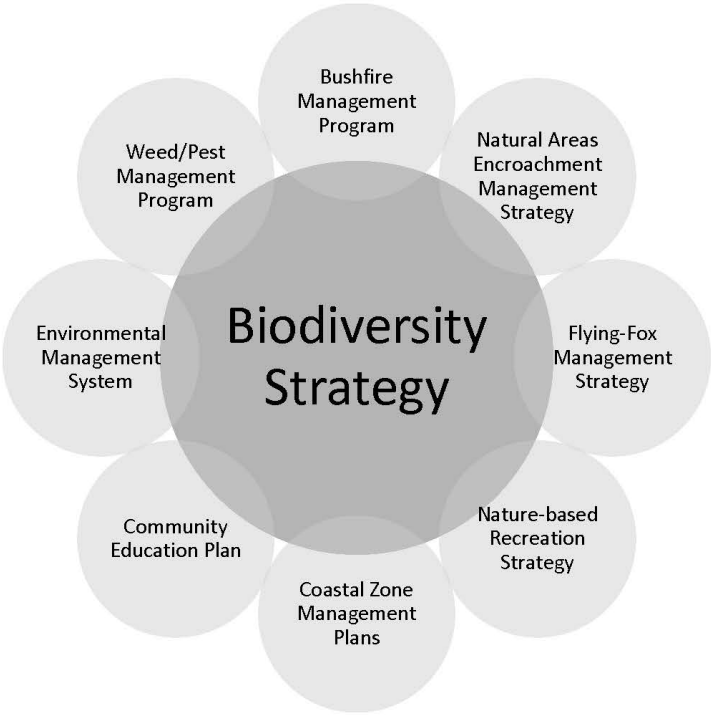


Figure 7: The actions of the Biodiversity Strategy complement other Council programs and plans, and therefore are not meant to be a comprehensive approach to all of Council's natural resource management.

Table 6: Implementation plan for the Biodiversity Strategy actions

Action ID	5 Year Action	Lead Responsibility	Indicator(s)	Resource Estimate	Source of Funds
	Theme 1 – Planning and managing biodiversity in Council's natural areas				
1.1.1	Identify criteria for prioritising reserve management based on biodiversity and social values, and threats to biodiversity	Conservation Management Program	Completion of standard criteria and a decision support system for prioritising management actions	$50,000	General revenue / Australian Research Council partnership
1.1.2	Develop and resource a program to prepare and review management plans for Council's natural areas (as well as Plans of Management as required by the LG Act)	Conservation Management Program	Proportion of reserves with recent management plans	$130,000 per annum	General revenue
1.1.3	Identify climate change as a direct threat to natural areas in site management plans, including actions to mitigate impacts	Conservation Management Program	Proportion of reserves with climate change mitigation strategies	To be determined	General revenue
1.2.1	Implement site management plans to rehabilitate degraded bushland and coastal ecosystems	Conservation Management Program	Number of management plans implemented Area rehabilitated (in Ha) Expenditure on natural assets	$1,000,000 per annum	General revenue and grant funding
1.2.2	Prepare a policy for natural area encroachment management, and resource and implement a program to identify and manage threats to natural areas from encroachment	Conservation Management Program	Endorsed policy Number of encroachments actioned	$200,000 per annum	General revenue
1.2.3	Develop and implement a program for planning and undertaking ecological and/or cultural burns on Council managed land that complements hazard reduction burning (in line with the Bush Fire Management Committee adopted program)	Conservation Management Program	Number of reserves with fire management plans Number of planned or completed burns against planned	$20,000 per annum	General revenue / Biodiversity Stewardship Agreements
1.3.1	Collect and manage data to inform land management (e.g. vegetation condition, population size or locations of habitat for threatened species or ecological communities, invasive weed and vertebrate pest incursions, nest boxes installed or other information)	Conservation Management Program	Proportion of priority reserves with specific management information	$50,000 per annum	General revenue
1.3.3	Use traditional Indigenous knowledge and management techniques for threatened species recovery and conservation management where available and appropriate	Conservation Management Program	Number of management issues benefited from traditional knowledge	-	-
1.4.1	Explore available options for formal biodiversity protection and management of Council reserves and formulate recommendations	Conservation Management Program	Analysis of options and recommendations	-	-
1.4.2	Establish conservation agreements as per recommendations in 1.4.1	Conservation Management Program	Number of agreements in place	$25,000 per annum	General revenue

	Theme 2 – Ensuring adequate resourcing to enable Council to effectively manage its natural areas and expand its conservation estate				
2.1.1	Invest in a long-term commitment to the Conservation Management Program	Council through endorsement of this Strategy	Council resolution (June 2019)	-	-
2.1.2	Build expertise and qualifications in preparing and managing conservation agreements, community engagement on land management activities, and compliance enforcement for natural areas	Conservation Management Program	Ratio of staff to size of natural area estate	To be determined	-
2.1.3	Investigate the benefits of investing in recruitment, training and leadership to establish and retain natural area management personnel (e.g. bush regeneration team, Indigenous officers, recreation planners, grants and trust officers)	Conservation Management Program	If cost benefit analysis recommends it, recruitment	To be determined	-
2.2.1	Establish funding for the management and acquisition of land identified by the Conservation Management Program and Environmental Lands Acquisition Program	Conservation Management Program	Central Coast Conservation Fund established	-	-
2.2.2	Investigate other funding options for Environmental Lands Acquisition Program	Conservation Management Program	Analysis of options and recommendations	-	-
2.3.1	Strategically plan Council's Environmental Land Acquisition Program	Conservation Management Program	Environmental Land Acquisition Program Plan completed	$20,000	General revenue
2.3.2	Purchase environmental land as per the recommendations from 2.3.1	Conservation Management Program	Environmental Land Acquisition Program implementation	To be determined	Restricted funds
2.3.3	Develop criteria and an internal process for evaluating land acquisition and land dedication opportunities	Conservation Management Program	Criteria agreed and used	-	-

	Theme 3 – Promoting community appreciation and participation in biodiversity conservation				
3.1.1	Prepare a Biodiversity Education Plan to promote community appreciation of Council's natural areas	Community Education	Biodiversity Education Plan	$30,000	General revenue
3.1.2	Provide guidance for biodiversity management on private land with published guidelines for land owners	Conservation Management Program	Local Biodiversity Management Guidelines	$5,000	General revenue
3.1.3	Prepare and publish a Nature-based Recreation Strategy for Council natural areas	Conservation Management Program	Nature-based Recreation Strategy	$50,000	General revenue
3.1.4	Prepare a policy on public access to natural areas	Conservation Management Program	Policy on public access to natural areas	-	-
3.2.1	Develop a community biodiversity participation and education program including citizen science	Community Education	A biodiversity participation and education program implemented	To be determined	General revenue
3.2.2	Provide technical advice and assistance for community involvement in biodiversity conservation agreements (including staff resources and a grant/ loan program) to reduce the barriers to entering conservation agreements	Conservation Management Program	Prepared information material	-	-
3.2.3	Provide additional ongoing support and resources for the Central Coast Landcare Program to address the community's demand	Natural Assets	Waiting list for new Land Care Program groups Number of volunteers	$170,000	General revenue
3.2.4	Further develop and continue existing community partnerships where appropriate and in the best interest of the Conservation Management Program	Conservation Management Program	Number of community partners	-	-
3.3.1	Investigate a tertiary education program for partnering with universities and other groups that study biodiversity with a view that the information will be shared publically	Community Education	Grant funding / support delivered for research projects Partnerships	To be determined	-
3.3.2	Provide public access to Council's geospatial data and reports relevant to biodiversity	Geospatial Information Services	Publically accessible reports and datasets – viewing access only	-	-
3.3.3	Engage with the development industry to improve biodiversity outcomes through development assessment	Environment and Planning	Number of people from industry engaged	-	-

	Theme 4 – Protecting biodiversity through land use planning and information management				
4.1.1	Develop a zoning framework for environmental zones supported by the spatial mapping project to inform comprehensive zoning amendments based on contemporary biodiversity values and principles	Environment and Planning	Comprehensive LEP amendments	-	-
4.1.2	Create additional local provisions or development standards/controls through the Comprehensive LEP/DCP project	Environment and Planning	Comprehensive LEP amendments	-	-
4.1.3	Develop assessment procedures and DCP provisions ensuring biodiversity values are fully considered and impacts to species, ecological communities and local populations are avoided at the rezoning stage of developments	Environment and Planning	All reports for LEP amendments (planning proposals) for Council consideration include an assessment against the principles of the Biodiversity Strategy	-	-
4.1.4	Preparation of a local policy which requires at the rezoning stage the finalisation of arrangements (e.g. Biocertification) for the *in perpetuity* ownership and management of land with high biodiversity values	Environment and Planning			
4.1.5	Identify appropriate mechanisms to achieve rehabilitation and enhanced landscape connectivity through the rezoning and development assessment process	Environment and Planning	All reports for LEP amendments (planning proposals) and development assessments for Council consideration include an assessment against the principles of the Biodiversity Strategy	-	-
4.1.6	Ensure developer compliance with Council's Flora and Fauna Survey Guidelines, vegetation management plans and conditions	Environment and Planning	Flora and Fauna Survey Guidelines updated with this information	-	-
4.2.1	Produce and keep up-to-date spatial information and analyses about areas of high biodiversity values and threats to biodiversity	Conservation Management Program	Useful decision-making tools and information available	$25,000 per annum	General revenue
4.2.2	Identify strategic planning data needs (e.g. vegetation community type mapping and updates, priority threatened species surveys)	Environment and Planning	Critical corporate datasets maintained	-	-
4.2.3	Develop and use geospatial data to inform and guide strategic planning to identify critical locations where vegetation, habitat, connections or species must be avoided and protected	Geospatial Information Services / Environment and Planning	Spatial data is used effectively in decision-making	-	-
4.2.4	Design and invest in a Central Coast Biodiversity Monitoring Program in line with State and Commonwealth Government programs including data management systems	Conservation Management Program / Waterways and Coastal Protection	Scoped CC Biodiversity Monitoring Program	$10,000	General revenue
4.2.5	Explore options to internally share biological resource information such as receiving sites for soil, seeds, tree barrels, hollows, etc	Geospatial Information Services	Information available for cross-unit collaboration through GIS	-	-
4.2.6	Collate all public biodiversity offsets geospatially	Geospatial Information Services	Biodiversity offsets are available geospatially to Council staff through Geocortex	-	-

4.2.7	Provide regular updates to the Biodiversity Values Map held by State Government	Environment and Planning / Geospatial Information Services	Service Level Agreement between E & P and GIS to provide regular updates to State Government	-	-
4.2.8	Investigate additional State or Federal listed threatened species or ecological community listings based on local significance information	Environment and Planning	As needed	-	-
	Theme 5 – Demonstrating leadership in biodiversity conservation				
5.1.1	Council's corporate Asset Management System is to include natural areas as an asset type in the technical asset register	Conservation Management Program	Works orders raised against natural assets	-	-
5.1.2	Natural assets are incorporated into Council's accounting and financial management application (Oracle) as a rolling maintenance program similar to a fixed asset register	Conservation Management Program	Maintenance management system and budget for natural assets	-	-
5.1.3	Review of processes and extend the Vertebrate Pest Management Program to priority locations and monitor effectiveness of the program	Natural Assets	Program reviewed and recommendations actioned	$180,000 per annum	General revenue
5.1.4	Develop and implement the expanded Biosecurity Management Program (including a weed policy)	Natural Assets	Targets in the Sydney Weed Action Program achieved	$135,000	General revenue
5.2.1	Prioritise staff resources and source funding to prepare Coastal Management Programs (including Tuggerah Lakes, Brisbane Water, coastal lagoons and open coastlines)	Waterways and Coastal Protection	Funding and budget sought and received for CMP preparation	Refer to action tables in existing CZMPs	General revenue
5.2.2	Implement actions identified existing Coastal Zone Management Plans	Waterways and Coastal Protection	Progress on actions tracked by WaCP	Annual approved budget	General revenue
5.2.3	Implement a water quality monitoring program for lakes and estuaries	Waterways and Coastal Protection	MER for water quality monitoring program	Annual approved budget	General revenue
5.2.4	Implement a fauna monitoring program for lakes and estuaries management	Waterways and Coastal Protection	Fauna monitoring program	Annual approved budget	General revenue
5.3.1	The Environmental Management System ensures Council operational activities adequately assess impacts to biodiversity	Corporate Governance	Number of staff who are trained in Council's Environmental Assessment Procedure	-	-
5.3.2	Ensuring proper management and maintenance of roadside vegetation containing threatened species or EEC with minimal environmental impact to protect Council workers, from litigation and help manage sensitive areas	Corporate Governance	Roadside Vegetation Management Program implemented	-	-
5.3.3	Council operational plans, strategies and processes support the goals of the Biodiversity Strategy	Corporate Governance	-	-	-

Legend for commitment or action timeframes

Immediate priority	On-going for 5 year life of Strategy

Lily Pily - (Acmena Smithii)
Illustration - Dr Tanya Hoolihan

Appendix A

Table 1: Threatened non-marine flora and fauna listed under the NSW *Biodiversity Conservation Act* 2016 and Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 for the Central Coast local government area (Bionet search 9/4/2019)

Scientific Name	Common Name	NSW status	Commonwealth status
FLORA			
Acacia bynoeana	Bynoe's Wattle	Endangered	Vulnerable
Acacia terminalis subsp. *terminalis*	Sunshine Wattle	Endangered	Endangered
Ancistrachne maidenii		Vulnerable	
Angophora inopina	Charmhaven Apple	Vulnerable	Vulnerable
Astrotricha crassifolia	Thick-leaf Star-hair	Vulnerable	Vulnerable
Boronia umbellata	Orara Boronia	Vulnerable	Vulnerable
Caladenia tessellata	Thick Lip Spider Orchid	Endangered	Vulnerable
Callistemon linearifolius	Netted Bottle Brush	Vulnerable	
Chamaesyce psammogeton	Sand Spurge	Endangered	
Corunastylis sp. Charmhaven		Critically Endangered	Critically Endangered
Corybas dowlingii	Red Helmet Orchid	Endangered	
Cryptostylis hunteriana	Leafless Tongue Orchid	Vulnerable	Vulnerable
Cynanchum elegans	White-flowered Wax Plant	Endangered	Endangered
Darwinia glaucophylla		Vulnerable	
Darwinia peduncularis		Vulnerable	
Dendrobium melaleucaphilum	Spider orchid	Endangered	
Diuris praecox	Rough Doubletail	Vulnerable	Vulnerable
Epacris purpurascens var. *purpurascens*		Vulnerable	
Eucalyptus camfieldii	Camfield's Stringybark	Vulnerable	Vulnerable
Eucalyptus parramattensis subsp. decadens		Vulnerable	Vulnerable
Galium australe	Tangled Bedstraw	Endangered	
Genoplesium baueri	Bauer's Midge Orchid	Endangered	Endangered
Genoplesium insigne	Variable Midge Orchid	Critically Endangered	Critically Endangered
Grammitis stenophylla	Narrow-leaf Finger Fern	Endangered	
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	Vulnerable	Vulnerable
Grevillea parviflora subsp. *supplicans*		Endangered	
Grevillea shiressii		Vulnerable	Vulnerable
Hibbertia procumbens	Spreading Guinea Flower	Endangered	
Hibbertia puberula		Endangered	
Lasiopetalum joyceae		Vulnerable	Vulnerable
Maundia triglochinoides		Vulnerable	
Melaleuca biconvexa	Biconvex Paperbark	Vulnerable	Vulnerable
Melaleuca deanei	Deane's Paperbark	Vulnerable	Vulnerable

Micromyrtus blakelyi		Vulnerable	Vulnerable
Olearia cordata		Vulnerable	Vulnerable
Persicaria elatior	Tall Knotweed	Vulnerable	Vulnerable
Persoonia hirsuta	Hairy Geebung	Endangered	Endangered
Pomaderris brunnea	Brown Pomaderris	Endangered	Vulnerable
Prostanthera askania	Tranquility Mintbush	Endangered	Endangered
Prostanthera cineolifera	Singleton Mint Bush	Vulnerable	Vulnerable
Prostanthera junonis	Somersby Mintbush	Endangered	Endangered
Pultenaea maritima	Coast Headland Pea	Vulnerable	
Pultenaea parviflora		Endangered	Vulnerable
Rhizanthella slateri	Eastern Australian Underground Orchid	Vulnerable	Endangered
Rhodamnia rubescens	Scrub Turpentine	Critically Endangered	
Rhodomyrtus psidioides	Native Guava	Critically Endangered	
Rutidosis heterogama	Heath Wrinklewort	Vulnerable	Vulnerable
Senecio spathulatus	Coast Groundsel	Endangered	
Senna acclinis	Rainforest Cassia	Endangered	
Syzygium paniculatum	Magenta Lilly Pilly	Endangered	Vulnerable
Tetratheca glandulosa		Vulnerable	
Tetratheca juncea	Black-eyed Susan	Vulnerable	Vulnerable
Thelymitra adorata	Wyong Sun Orchid	Critically Endangered	Critically Endangered
BIRDS			
Anseranas semipalmata	Magpie Goose	Vulnerable	
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Critically Endangered
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	
Botaurus poiciloptilus	Australasian Bittern	Endangered	Endangered
Burhinus grallarius	Bush Stone-curlew	Endangered	
Calidris alba	Sanderling	Vulnerable	
Calidris canutus	Red Knot		Endangered
Calidris ferruginea	Curlew Sandpiper	Endangered	Critically Endangered
Calidris tenuirostris	Great Knot	Vulnerable	Critically Endangered
Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	
Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	
Charadrius leschenaultii	Greater Sand-plover	Vulnerable	Vulnerable
Charadrius mongolus	Lesser Sand-plover	Vulnerable	Endangered
Chthonicola sagittata	Speckled Warbler	Vulnerable	
Circus assimilis	Spotted Harrier	Vulnerable	
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	
Daphoenositta chrysoptera	Varied Sittella	Vulnerable	
Dasyornis brachypterus	Eastern Bristlebird	Endangered	Endangered
Ephippiorhynchus asiaticus	Black-necked Stork	Endangered	
Epthianura albifrons	White-fronted Chat	Vulnerable	

Esacus magnirostris	Beach Stone-curlew	Critically Endangered	
Falco subniger	Black Falcon	Vulnerable	
Glossopsitta pusilla	Little Lorikeet	Vulnerable	
Grantiella picta	Painted Honeyeater	Vulnerable	Vulnerable
Gygis alba	White Tern	Vulnerable	
Haematopus fuliginosus	Sooty Oystercatcher	Vulnerable	
Haematopus longirostris	Pied Oystercatcher	Endangered	
Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	
Hamirostra melanosternon	Black-breasted Buzzard	Vulnerable	
Hieraaetus morphnoides	Little Eagle	Vulnerable	
Irediparra gallinacea	Comb-crested Jacana	Vulnerable	
Ixobrychus flavicollis	Black Bittern	Vulnerable	
Lathamus discolor	Swift Parrot	Endangered	Critically Endangered
Limicola falcinellus	Broad-billed Sandpiper	Vulnerable	
Limosa lapponica baueri	Bar-tailed Godwit (baueri)		Vulnerable
Limosa limosa	Black-tailed Godwit	Vulnerable	
Lophoictinia isura	Square-tailed Kite	Vulnerable	
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable	
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	
Neophema chrysogaster	Orange-bellied Parrot	Critically Endangered	Critically Endangered
Neophema pulchella	Turquoise Parrot	Vulnerable	
Nettapus coromandelianus	Cotton Pygmy-Goose	Endangered	
Ninox connivens	Barking Owl	Vulnerable	
Ninox strenua	Powerful Owl	Vulnerable	
Numenius madagascariensis	Eastern Curlew		Critically Endangered
Onychoprion fuscata	Sooty Tern	Vulnerable	
Oxyura australis	Blue-billed Duck	Vulnerable	
Pachycephala olivacea	Olive Whistler	Vulnerable	
Pandion cristatus	Eastern Osprey	Vulnerable	
Petroica boodang	Scarlet Robin	Vulnerable	
Petroica phoenicea	Flame Robin	Vulnerable	
Pezoporus wallicus wallicus	Eastern Ground Parrot	Vulnerable	
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	
Procelsterna cerulea	Grey Ternlet	Vulnerable	
Ptilinopus magnificus	Wompoo Fruit-Dove	Vulnerable	
Ptilinopus regina	Rose-crowned Fruit-Dove	Vulnerable	
Ptilinopus superbus	Superb Fruit-Dove	Vulnerable	
Rostratula australis	Australian Painted Snipe	Endangered	Endangered
Stagonopleura guttata	Diamond Firetail	Vulnerable	
Sternula albifrons	Little Tern	Endangered	
Stictonetta naevosa	Freckled Duck	Vulnerable	
Thinornis rubricollis	Hooded Plover	Critically Endangered	Vulnerable

Turnix maculosus	Red-backed Button-quail	Vulnerable	
Tyto longimembris	Eastern Grass Owl	Vulnerable	
Tyto novaehollandiae	Masked Owl	Vulnerable	
Tyto tenebricosa	Sooty Owl	Vulnerable	
Xenus cinereus	Terek Sandpiper	Vulnerable	
MAMMALS			
Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	Endangered	Endangered
Kerivoula papuensis	Golden-tipped Bat	Vulnerable	
Macropus parma	Parma Wallaby	Vulnerable	
Miniopterus australis	Little Bentwing-bat	Vulnerable	
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable	
Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable	
Myotis macropus	Southern Myotis	Vulnerable	
Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable
Petauroides volans	Greater Glider		Vulnerable
Petaurus australis	Yellow-bellied Glider	Vulnerable	
Petaurus norfolcensis	Squirrel Glider	Vulnerable	
Petrogale penicillata	Brush-tailed Rock-wallaby	Endangered	Vulnerable
Phascogale tapoatafa	Brush-tailed Phascogale	Vulnerable	
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable
Planigale maculata	Common Planigale	Vulnerable	
Potorous tridactylus	Long-nosed Potoroo	Vulnerable	Vulnerable
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	Vulnerable	
Pseudomys novaehollandiae	New Holland Mouse		Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	
Thylogale stigmatica	Red-legged Pademelon	Vulnerable	
Vespadelus troughtoni	Eastern Cave Bat	Vulnerable	
AMPHIBIANS			
Crinia tinnula	Wallum Froglet	Vulnerable	
Heleioporus australiacus	Giant Burrowing Frog	Vulnerable	Vulnerable
Litoria aurea	Green and Golden Bell Frog	Endangered	Vulnerable
Litoria brevipalmata	Green-thighed Frog	Vulnerable	
Litoria littlejohni	Littlejohn's Tree Frog	Vulnerable	Vulnerable
Mixophyes balbus	Stuttering Frog	Endangered	Vulnerable
Mixophyes iteratus	Giant Barred Frog	Endangered	Endangered
Pseudophryne australis	Red-crowned Toadlet	Vulnerable	
Uperoleia mahonyi	Mahony's Toadlet	Endangered	

REPTILES			
Hoplocephalus bitorquatus	Pale-headed Snake	Vulnerable	
Hoplocephalus bungaroides	Broad-headed Snake	Endangered	Vulnerable
Hoplocephalus stephensii	Stephens' Banded Snake	Vulnerable	
Varanus rosenbergi	Rosenberg's Goanna	Vulnerable	
INSECTS			
Petalura gigantea	Giant Dragonfly	Endangered	

Table 2: Endangered populations listed under the NSW *Biodiversity Conservation Act* 2016 for the Central Coast local government area (Bionet search 9/4/2019)

Scientific Name	Common Name	NSW status
Eucalyptus oblonga	*Eucalyptus oblonga* population at Bateau Bay, Forresters Beach and Tumbi Umbi in the Wyong local government area	Endangered Population
Eucalyptus parramattensis subsp. *parramattensis*	*Eucalyptus parramattensis* C. Hall. subsp. *parramattensis* in Wyong and Lake Macquarie local government areas	Endangered Population

Illustration - Dr Tanya Hoolihan

Appendix B

Technical reports referenced in the text

Wildlife corridor mapping

Harré, C. (2018). Technical report to accompany Central Coast Council's wildlife corridor and fauna gap crossing network GIS dataset. Report to the Central Coast Council, June 2018: unpublished.

Spatial Links Tool

Drielsma, M., Manion, G., & Ferrier, S. (2007). The spatial links tool: Automated mapping of habitat linkages in variegated landscapes. *Ecological modelling*, 200(3), 403-411.

Conservation priorities modelling

Kujala, H. and Whitehead, A. L. (2015). Identifying biodiversity priorities and assessing impacts of proposed future development in the Wyong Local Government Area in New South Wales. A draft report to Wyong Shire Council: unpublished.

Coastal Open Space System

Draft Coastal Open Space System Status Report (2018).

Central Coast Council

BIODIVERSITY STRATEGY

Central Coast Council
2 Hely St / PO Box 20 Wyong NSW 2259
49 Mann St / PO Box 21 Gosford NSW 2250
P 1300 463 954
E ask@centralcoast.nsw.gov.au
centralcoast.nsw.gov.au
ABN 73 149 644 003

MAY 2020