

Biodiversity Strategy

2022



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Cover photo by Brett Mezen

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Executive Summary

Camden Council first adopted a Biodiversity Strategy in 2013, to assist Council and the community work toward achieving the vision for biodiversity established under the Camden Community Strategic Plan 2017:

Camden is a place where the natural environment is protected and enhanced and contributes to a sustainable future for the place and its people.

A number of priority actions have been implemented since this time to protect and improve biodiversity, and the Biodiversity Strategy 2022 builds upon the previous Strategy to continue the long-term protection, enhancement and management of biodiversity values in the Camden Local Government Area (LGA). Relevant actions that are ongoing or yet to be implemented are included in this present Strategy, as are new actions that respond to changing conditions and pressures on biodiversity.

This Strategy reflects the strategic land use and legislative changes that have occurred since 2013. The Greater Western Sydney region is subject to rapid population growth and urban expansion, which have resulted in the acceleration and magnification of impacts on biodiversity values. The Greater Sydney Region Plan 2018 and Western City District Plan 2018 set priorities for sustainability at the regional scale. The Biodiversity Strategy 2022 is a means by which Council can reflect regional actions and priorities at the local level and protect this important aspect of Camden's character.

A long history of clearing for agriculture has contributed to biodiversity decline in the Camden district, now exceeded by clearing for urban development. The Camden LGA is expected to accommodate an additional 140,000 people over the next 20 years, more than doubling the

population, which presents a range of risks to the natural environment. This urban expansion is considered one of the key threats to biodiversity in Camden, contributing to habitat loss and fragmentation, impacts on waterways and increasing the vulnerability of natural values to other threats.

Climate change is another key pressure on biodiversity in Camden. Notably, Western Sydney is one of the hottest areas in New South Wales with one of the lowest extents of canopy vegetation. The impacts of climate change on biodiversity, and the implications this has for conservation management, are not clearly understood, and this knowledge gap is one aspect addressed in the Strategy.

The Strategy sets out the framework for conservation in Camden and the actions establish substantive measures to protect, enhance and manage biodiversity values. Actions are arranged under four key themes:

- 1. Caring for biodiversity** – the technical studies and on-ground actions required to identify, protect, enhance and manage natural areas and values.
- 2. Planning to protect biodiversity** – providing for the protection of biodiversity through land use planning.
- 3. Community and stewardship** – recognising the essential role our community and Council has in caring and advocating for biodiversity.
- 4. Improving knowledge** – recognising that improving our understanding of natural values and the pressures on these will better enable us to protect biodiversity.

The Biodiversity Strategy 2022 will enable Council to continue working toward the vision of Camden as a place that encompasses significant natural values, where the natural environment is appreciated and protected by the Camden community.

Council acknowledges the Dharawal people as the traditional custodians of this land and pay our respect to their Elders both past and present.

This artwork represents country, both land and water. It shows the feet at the base and the journey lines that connect across country, representing our life journey and its different paths.
Artwork by Danielle Mate Sullivan, 2020

Part 1 The Strategy

Introduction

Camden's Unique Character

Situated amongst the urban growth centre of the Greater Sydney region, the Camden Local Government Area (LGA) still retains extensive rural landscapes and unique areas of ecological importance. Its location within the Cumberland Plain and distinctive topographical features, such as the Nepean River corridor and Wianamatta Shale hills, provide a backdrop for regionally and nationally significant biodiversity.

Camden is characterised by low rolling hills, wide valleys and wetlands on the floodplains of the Nepean River, South Creek and Narellan Creek. This creates numerous diverse ecosystems that provide habitat for a variety of plants and animals.

As the rural lands and floodplains of the LGA become urbanised, the importance of conserving our unique biodiversity is critical not only for our community, but also both regionally and nationally.

Biodiversity and Urban Ecology

There are many definitions of biodiversity. Consistent across them is the principle that biodiversity encompasses the variability in and amongst all living things; the different plants, animals and other organisms, and the ecosystems they form. It includes diversity within species – genetic diversity; between species – species diversity; and the diversity of ecosystems – ecosystem diversity.



Genetic diversity

The variety of genes within one species. It is important to conserve different populations of a species to conserve genetic diversity.



Species diversity

The variety of species within a habitat or region. Each type of habitat is suitable for particular species of animals and plants that rely on each other.



Ecosystem diversity

The variety of ecosystems in a particular place. An ecosystem includes all the living things in an area, interacting with each other and their environment (weather, earth, sun, climate, air). Each living thing has an important and interconnected role in the ecosystem.

Genetic diversity photo by Yanik Armstrong
Ecosystem diversity photo by Kelly G

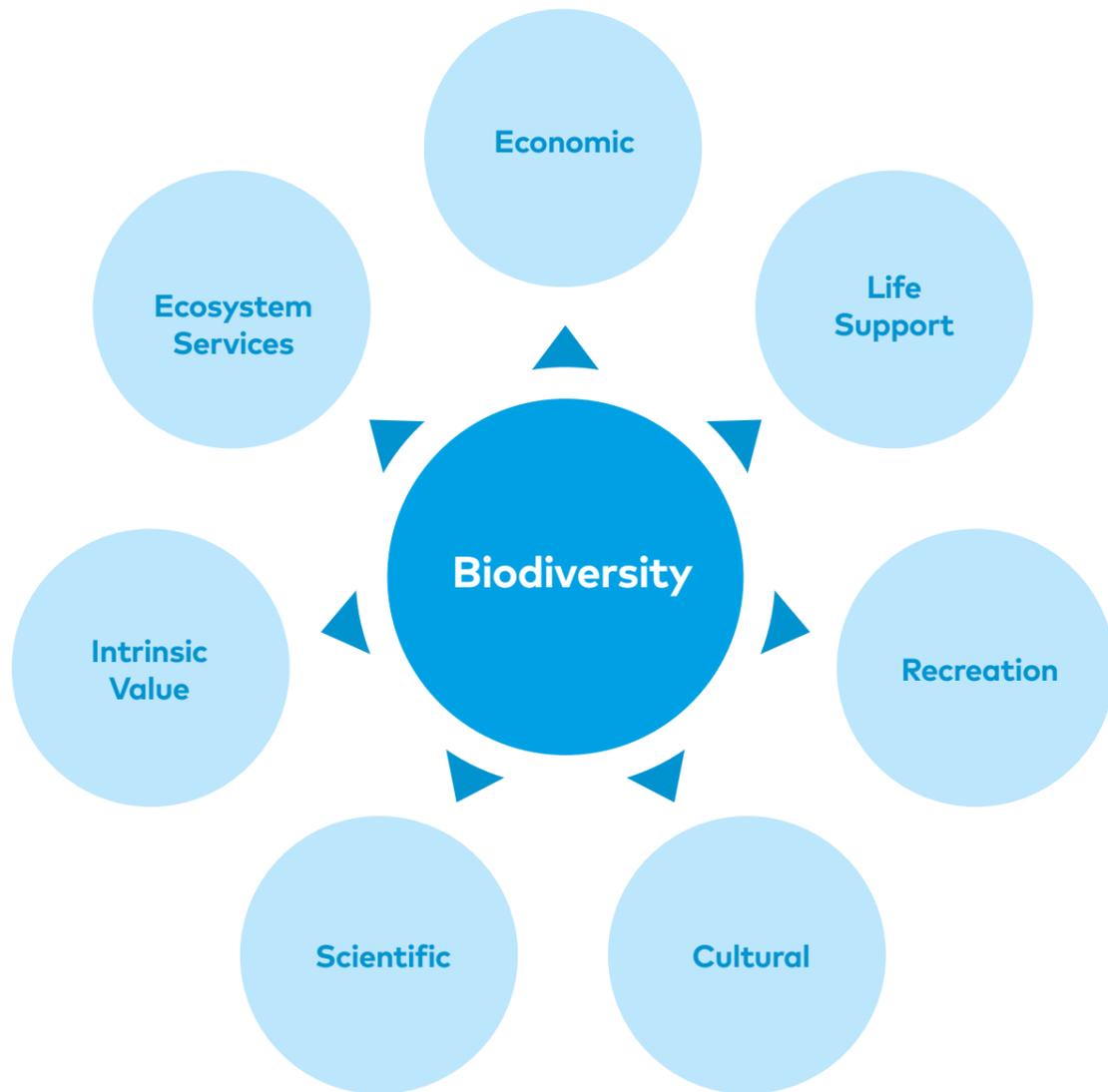
**Biodiversity is the variety of all life forms on earth.
The different plants, animals, and micro-organisms,
and the ecosystems of which they are a part.**

Australia's Strategy for Nature
2019-2030 (Australian Government)

Why is biodiversity important?

All species, including humans, and the ecosystems they inhabit are linked. Biodiversity is important for our survival, as it sustains fundamental support functions, such as supplying clean air and water, and provides materials that support the systems humans have established to produce goods and services. Impacts that lead to the loss or deterioration of biodiversity will ultimately affect human health and well-being.

Australia's Commonwealth Scientific and Industrial Research Organisation (the CSIRO) has identified five core biodiversity values. Biodiversity also possesses intrinsic value, which means that nature has value in its own right, independent of human uses. This, in addition to the ecosystem services that biodiversity provides, makes for seven key biodiversity values.



Key biodiversity values

Ecosystem services include:

Provisioning: production of food, fibre and water

Regulating: control of climate and disease

Supporting: nutrient cycling and crop pollination

Cultural: spiritual and recreational benefits.

Urban ecology

Retaining biodiversity within the urban footprint is a vital component of the natural environment. Urban ecology recognises the challenges that multiple impacts and large numbers of people pose to biodiversity and helps us to understand and improve the interactions between people and nature in urban environments.

As most of our population lives in residential suburbs, biodiversity in the urban environment provides the sum total of interactions many people have with nature on a daily basis. Nature in cities provides extensive benefits:

- Those that live in cities with more trees have better general health and well-being and are likely to live longer;
- Reconnecting people with nature;
- Providing shade and reducing temperatures, minimising the urban heat island effect and potentially cooling cities by up to 8°C in summer;
- Habitat for threatened plants and animals;
- Improving resilience to climate change, mitigating the impacts of flooding and other extreme weather events; and
- Reducing air pollution.

One objective of Australia's Strategy for Nature 2019-2030 is to enrich cities and towns with nature. This means prioritising the inclusion of green space in design and planning, as well as encouraging green building initiatives by residents and developers. Ways in which green spaces can be integrated into urban areas include increasing tree canopy, establishing greenways in place of old linear infrastructure such as disused rail lines, and building green walls and rooftop gardens. Urban ecology does not have to be restricted to reserves, with vegetation such as street trees, nature strips, road corridors, waterways and in residential gardens, all important components of urban space.



Photo by Jason Rothery



Pressures

Biodiversity is under pressure from a range of threats. The most significant of these are identified in the current Australian and New South Wales governments' State of the Environment (SoE) reporting and are summarised on page 13.

These threats do not exist in isolation. The cumulative impacts of multiple pressures and the interactions between them increase the threat

to biodiversity. For example, climate change contributes to altered fire regimes, which can lead to the catastrophic loss of wildlife and habitat. Urban and industrial expansion lead to an increase in invasive species, which subsequently impact upon native animals and vegetation.

Photo by Amy Semmelweis

Key pressures on biodiversity



Invasive species and pathogens

Invasive species and pathogens are widespread across the landscape. Pest plants and animals have major impacts on both land and in aquatic systems, whilst pathogens pose a considerable risk to native flora and fauna, as well as the agricultural sector.



Climate change

The effects of climate change are expected to become more pervasive, increasingly severe and will exacerbate existing pressures on biodiversity. Climate change also drives the intensity and frequency of extreme weather events, such as heatwaves, as well as bushfire, drought, storms and flooding.



Land clearing

Land clearing leads to habitat loss, degradation and fragmentation. Habitat for flora and fauna is diminished and populations are more likely to be impacted by human activities.



Population growth and urban expansion

Creating homes and building the infrastructure to support our growing population places enormous pressure on biodiversity through vegetation clearing, diminishing habitat, decreased water quality and the introduction and spread of pest plants and animals.



Altered fire regimes

This encompasses the extent, seasonality, frequency and intensity of fires. Whilst fire has always been present in the Australian landscape, the risk to our biodiversity posed by fire has increased. Climate change is making fire seasons longer, the landscape drier and fires more intense. Clearing and urban expansion mean that our biodiversity becomes restricted to smaller areas and is less able to move between habitats. This makes flora and fauna more vulnerable when fires occur.



Overgrazing

Prolonged and excessive grazing activity affects native woodlands, shrubs and grasses, reduces plant cover and increases erosion. It is also difficult to regenerate land where grazing continues to occur. Plant diversity and habitat decrease as a result, and it becomes easier for invasive plants and animals to spread across the landscape. Water quality is also affected.



Lack of knowledge about biodiversity

There are scientific gaps in our understanding of biodiversity, particularly knowledge about the extent and impact of invasive species, impacts of climate change, Aboriginal land management and long-term impacts on biodiversity. There are also many opportunities to improve our collective appreciation for nature and involve the community in developing knowledge. Citizen science contributes a great deal to our understanding of the state of, and trends in, biodiversity.



Changes to water regimes

The health and availability of water in the environment is altered by water diversion, extraction, containment, development in floodplains and the modification of wetlands. More significant impacts to biodiversity occur where the natural water regime has changed the most. A drier climate exacerbates these impacts and further reduces the quantity and quality of water, with subsequent impacts on biodiversity.



Artwork by K. Lawrence

Biodiversity Strategy 2022

The Camden LGA is currently one of the fastest growing LGAs in Australia, with more than 100 new residents calling Camden home each week. As such, Camden's natural areas are subject to considerable pressures from urban development. Approximately one third of the LGA is part of the

Greater Sydney South West Growth Area (SWGA), where housing and supporting infrastructure is prioritised. This future development, in addition to continuing growth within the established urban centres, will limit opportunities to retain green spaces and conserve biodiversity.



The Strategy sets out actions to counterbalance the impacts of development and other threatening processes, to protect natural areas and establish new, or improve existing, areas of high biodiversity value within the Camden LGA.

It also provides guidance about how Council can plan for biodiversity conservation and work with the community, scientific experts and industry to achieve better biodiversity outcomes.

What is a key threatening process?

A process that threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community.

The pressures that pose a particular threat to Camden's biodiversity are described in Section 3 of the Strategy.

There are also numerous **key threatening processes** for biodiversity listed under the NSW Biodiversity Conservation Act 2016 (BC Act) and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The NSW Government implements the *Saving our Species* program to manage key threatening processes, whilst the Commonwealth may prepare threat abatement plans to mitigate those key threatening processes it determines will be most effectively mitigated through such a plan.

The Strategy has three parts:

Part 1	<p>Strategy</p> <p>Identifies the importance of Camden's biodiversity and provides the context for Council's strategic approach to protecting and enhancing biodiversity.</p>	Part 2	<p>Action Plan</p> <p>Details Council's actions and recommendations to achieve the strategic priorities set out in Part 1.</p>	Part 3	<p>Technical Information</p> <p>Technical Information Data, plans and other information, used to prepare the Strategy and support management actions is available on Council's website.</p>
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Photo by Lee McKerracher

Context

Purpose and Objectives

Council's adoption of a Biodiversity Strategy acknowledges both the intrinsic importance of biodiversity and the services it provides. It is a recognition that Camden's natural values are an essential element of the character of the LGA and therefore require specific protections to ensure their continued existence.

The overarching purpose of the Strategy is to protect and enhance Camden's biodiversity through a range of complementary technical and strategic measures that direct conservation planning and on-ground actions. It recognises and balances the urban development outcomes envisaged for the LGA and the emphasis on sustainability that is carried through the many agreements, legislation and policy that inform biodiversity management.

Framework for Biodiversity Protection

Biodiversity is protected through a framework of international agreements and national, state and local laws, policies and programs. These instruments influence and guide biodiversity

Strategy objectives include:

1. **Clearly defining Council's role, and the role of the Strategy, within the framework for biodiversity protection.**
2. **Identifying conservation priorities for the LGA and establishing a program of actions that address these priorities and inform strategic decision-making.**
3. **Increasing strategic protections for biodiversity to achieve rehabilitation and enhanced landscape connectivity.**
4. **Improving the Camden community's collective knowledge of biodiversity and increasing engagement with conservation programs.**

conservation and management at the regional and local level. The principal documents in this structure are summarised on page 17.

International

Australia participates in a range of international agreements dealing with biodiversity conservation including global and regional conventions, treaties, and bilateral agreements.

- Convention on Biological Diversity
- RAMSAR Convention on Wetlands of International Importance
- Framework Convention on Climate Change
- Convention on the Conservation of Migratory Species (Bonn Convention)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Migratory bird agreements (JAMBA, CAMBA and ROKAMBA)

National

The Australian Government sets the national agenda for biodiversity through policies, strategies, and legislation.

- *Environment Protection and Biodiversity Conservation Act 1999*
- Australia's Strategy for Nature 2019-2030
- Australia's Native Vegetation Framework
- Australian Weed Strategy 2017-2027
- Australian Pest Animal Strategy 2017-2027

State

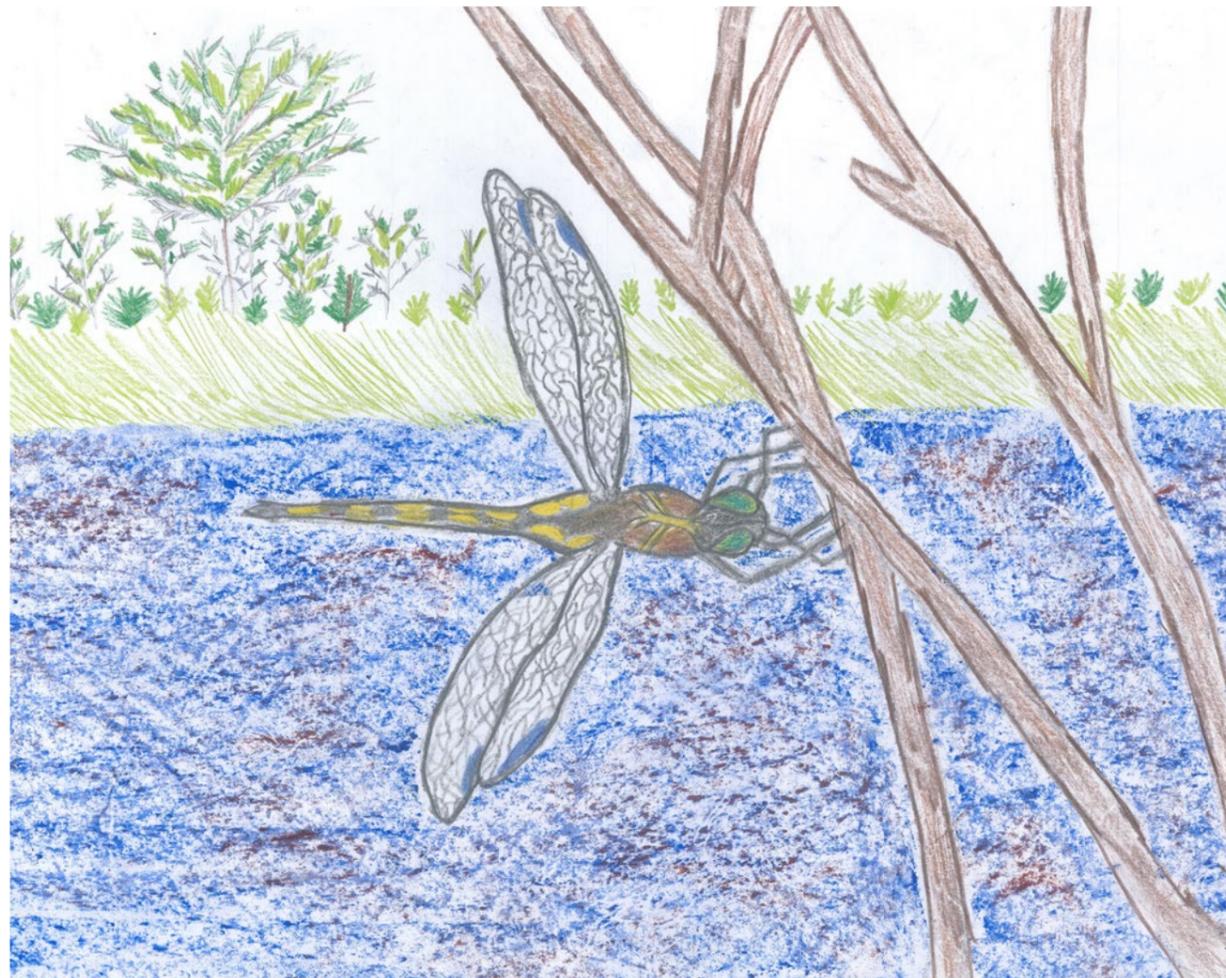
The NSW Government oversees local government and develops frameworks, policy, legislation, and strategies on a range of biodiversity issues.

- *Biodiversity Conservation Act 2016*
- *Environmental Planning and Assessment Act 1979*
- State Environmental Planning Policies
- Draft Cumberland Plain Conservation Plan
- Greater Sydney Region Plan
- Western City District Plan

Local (Camden)

Biodiversity management in Camden is guided by local instruments, plans and strategies.

- Camden Community Strategic Plan 2017
- Camden Local Environmental Plan 2010
- Development Control Plans
- Camden Local Strategic Planning Statement
- Greener Places, Healthier Waterways (draft)
- Sustainability Strategy 2020-2024



Emerald Dragonfly by Chloe Farr

Sustainability

An important component of the Strategy is to give effect to the 'Sustainability' theme that is carried through regional and local laws and plans, specifically, the *Greater Sydney Regional Plan 2018*, *Western City District Plan 2018* (WCDP) and *Camden Local Strategic Planning Statement 2020* (LSPS). Sustainability is also a key aim of the *Camden Local Environmental Plan 2010* (LEP) and *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (Growth Centres SEPP), which are the primary strategic planning tools for land use and development in the Camden LGA.

Council has also adopted the Sustainability Strategy 2020-2024, that details actions that Council will take to create a Sustainable Camden. These actions align with the sustainability objectives of the LSPS and the Community Strategic Plan 2017 and are also recognised in the key themes of the Biodiversity Strategy.

Both documents seek to:

- Increase community awareness, knowledge and capacity to respond to biodiversity and sustainability issues;
- Integrate sustainability and biodiversity management principles into urban design and planning;
- Improve the collective understanding of climate risk for the LGA and build resilience;
- Better protect the natural environment through improved management of biodiversity and waterways; and
- Demonstrate Council's commitment to improving biodiversity management and sustainability, and leading by example.

Strategic Approach Strategy Review

Protecting biodiversity requires a commitment to an integrated program of both technical and cooperative actions, to ensure biodiversity values are managed and protected in the long term. Fostering and supporting an understanding and appreciation of the value of biodiversity by the community and Council is an essential component of this program.

As one of a suite of strategic documents, legislation and policy that protect biodiversity, the Strategy must be responsive to changes in this framework. The Strategy will therefore be reviewed and updated in five years, to ensure it reflects not only the contemporary strategic direction for conservation planning, but also developments in knowledge and technology that provide for better biodiversity outcomes.

The Strategy establishes four key themes that:

1. Build on the sustainability theme of local and regional planning documents, setting out specific objectives for the Camden LGA;
2. Establish the framework for on-ground management actions;
3. Recognise the importance of partnerships in protecting biodiversity; and
4. Provide for community stewardship of natural areas and values.

These themes, and the specific objectives for each, are set out in Part 2 (the Action Plan) of the Strategy.



Photo by Kellie Taylor

Camden's Biodiversity

Setting

The Camden LGA, which covers approximately 200 square kilometres, is primarily urban in nature with small areas of rural land and few remaining, sizeable areas of bushland. Dominant within the landscape is the Nepean River and Upper South Creek, along with their tributaries and floodplains. The LGA is characterised by country towns and residential suburbs and despite its location over 50 kilometres west of Sydney City, urban expansion has, and will continue to, resume a large extent of the remaining rural land and remnant bushland areas.



Aboriginal Culture and Biodiversity

The first people to inhabit the Camden area were the Dharawal people. The Dharawal people lived and derived a range of foods and plant material from the woodlands and forests on the floodplains of the Nepean River. Dharawal seasonal campsites were mostly concentrated along the Nepean and its tributaries, where water and seasonal food was most plentiful. Women did most of the food gathering, learning where all the best vegetables, yams and fruit could be found, while the men used tools for fishing and hunting, including fish, eel, kangaroos, wallabies, and emus.

It is uncertain if in any traditional Aboriginal language there is a single word that directly corresponds to 'biodiversity'. Instead, the various references to plants, animals and ecological processes, and an understanding of the relationships that connect people to 'Country' and all living things, represent an Aboriginal concept akin to the English interpretation of biodiversity (Walsh et. al 2014).

Aboriginal peoples possess a unique knowledge and understanding of the interrelationships in nature, as well as many interests in the protection of biodiversity, such as for conservation, management and use of natural values. There is a circular association between cultural heritage and biodiversity – the protection of heritage often helps to preserve natural values; as is often true when biodiversity is protected, thus conserving areas and resources of cultural heritage significance.

Aboriginal ecological knowledge offers potential solutions to biodiversity decline and is informed by a long history of observation, residence within the Australian landscape and an oral history tradition. Aboriginal peoples have a critical interest and role to play in conserving biodiversity, augmenting science with lived experience. Knowledge exchange must be a mutually beneficial relationship, where science is readily accessible by Aboriginal land managers to inform conservation practices.

The Greater Sydney Region Local Land Services Natural Resource Management Group works with Aboriginal communities on a range of activities, including the recording of traditional ecological knowledge and engagement through reference and advisory groups.

Aboriginal cultural heritage in the Camden LGA is primarily protected through environmental planning instruments, such as the LEP, Growth Centres SEPP and DCP, which establish development controls to protect Aboriginal heritage and cultural values of the land. This is achieved through the establishment of environmentally sensitive areas and conservation zones, in which development is excluded or must be carried out in such a way as to protect Aboriginal heritage. The DCP in particular, sets out detailed land use controls, acknowledging that:

Aboriginal people are the cultural owners and managers of information relating to their heritage. It is vital to Aboriginal people and to the richness of Camden's heritage, that these important spiritual and cultural links to land are maintained by preserving and protecting places of cultural significance.

The objective of the DCP in relation to Aboriginal culture and heritage is, "To manage Aboriginal heritage values to ensure enduring conservation outcomes."

Council will work to establish strong links with Camden's Aboriginal community and build programs that share their unique knowledge of Camden's biodiversity.



Photo by Bron King

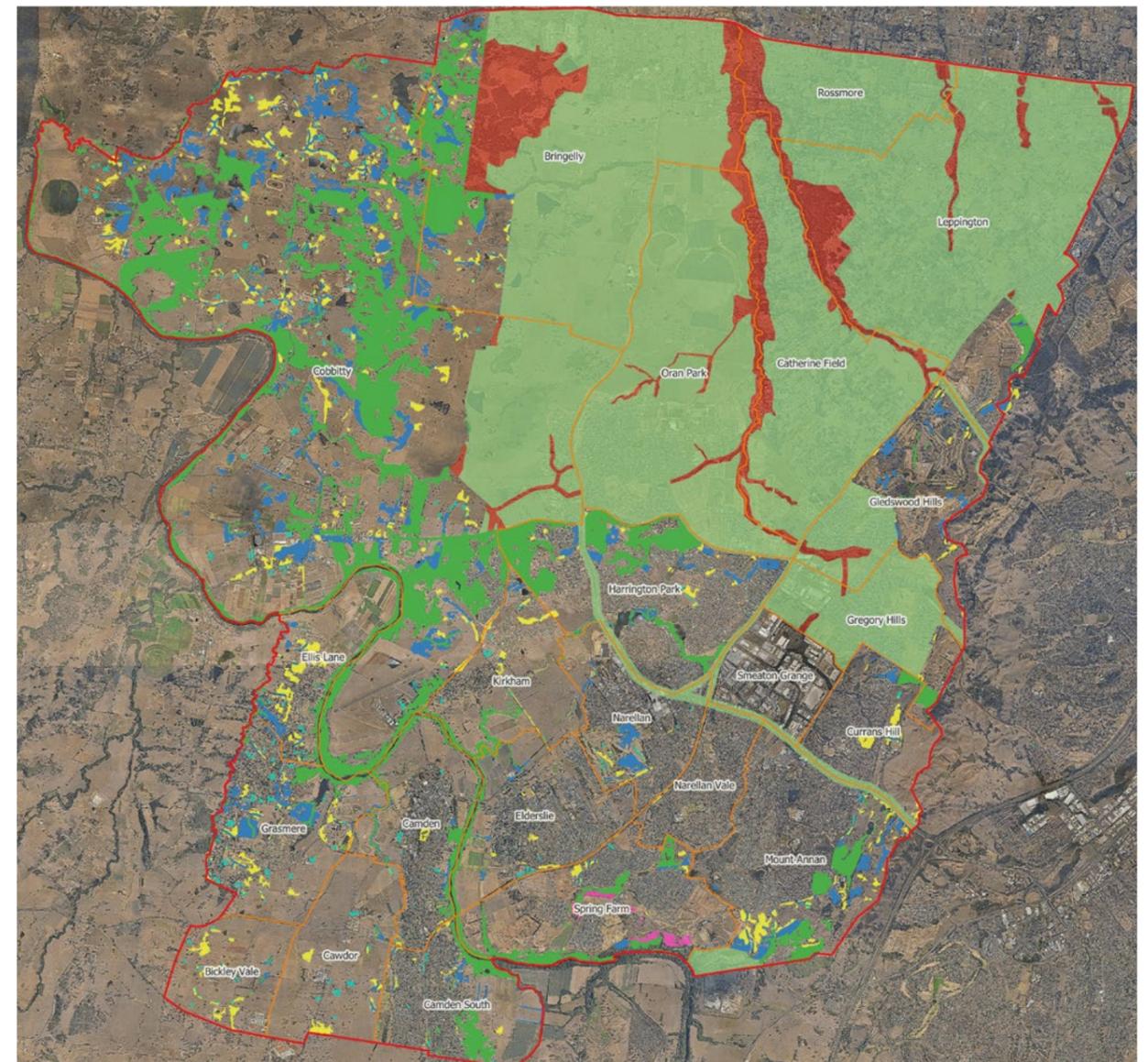


Figure 1 – Environmentally Sensitive Lands

Biodiversity Values

Landscape

The Camden LGA is located within the Sydney Basin Bioregion and the Cumberland Plain Subregion. The Cumberland Plain is characterised by low rolling hills and wide valleys which are formed from underlying shales and sandstone lenses. The Nepean River runs through the south-west of the LGA and creates a wide floodplain where deep sediments have accumulated over time. These alluvial soils support different vegetation types compared to the shale-derived clay soils further away from the floodplain.

Most of the native vegetation within the Camden LGA has been previously cleared or altered

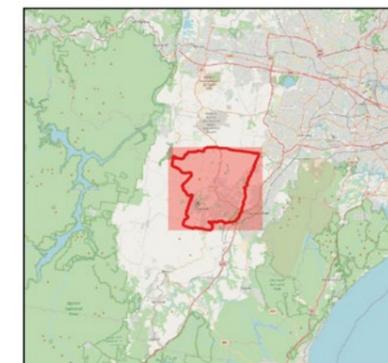
to accommodate agricultural production or residential development. Large patches of remnant vegetation do, however, still occur along the Nepean River corridor and in the central and northern parts of the LGA. Unfortunately, most of these patches are not protected within reserves and face further degradation from surrounding land uses. Figure 1 provides an overview of environmentally sensitive land within the LGA, identifying remaining areas of important vegetation and habitat. This is a strategic map and is only indicative of the location and extent of these significant areas.

Camden Council Biodiversity Strategy 2020

Environmentally Sensitive Lands

Legend

- Camden Local Government Area
- Suburb
- Growth Centres:
 - Growth Centre Certified Land
 - Growth Centre Non-Certified Land
- Conservation Significance Status:
 - 1. Critically Endangered
 - 2. Core Habitat - Regionally Significant
 - 3. Core Habitat - Locally Significant
 - 4. Support for Core
 - 5. Other Native Vegetation



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 Ref: 20-062 Camden Council Biodiversity Strategy
 Update 1 Figure 4 - Environmentally Sensitive
 Lands
 Author: D. Perkovic
 Date created: 04.11.2020
 Datum: GDA94 / MGA zone 56





Photo by Tess McEvoy-King

Plants

A Plant Community Type (PCT) is an assemblage of plant species that occur together and is the standard level for vegetation mapping in NSW. At least six PCTs have been recorded within the Camden LGA:

- **Elderslie Banksia Scrub Forest – PCT 774**
Only occurs on sand deposits near the Nepean River and considered as Critically Endangered under both the BC and EPBC Act.
- **Cumberland Moist Shale Woodland – PCT 830**
The woodland occurs on sheltered slopes, often with a southerly aspect, and is classed as Critically Endangered under both the BC and EPBC Acts.
- **River-flat Eucalypt Forest – PCT 835**
Woodland located on floodplains and in riparian zones that is considered Critically Endangered under the EPBC ACT and Endangered under the BC Act.
- **Cumberland Shale Plains Woodland – PCT 849**
An open woodland with sparse shrubs and diverse groundcover that is Critically Endangered under both the BC and EPBC Acts.
- **Cumberland Shale Hills Woodland – PCT 850**
Similar to PCT849 but located at slightly higher elevations and classed as Critically Endangered under both the BC and EPBC Acts.
- **Cumberland Swamp Oak Riparian Forest – PCT 1800**
This forest is characterised by stands of Swamp Oak (*Casuarina glauca*) found along waterways. It is classed as Endangered under both the BC and EPBC Acts.

Each of these PCTs forms part of a listed Threatened Ecological Community (TEC). This means that all ecological communities occurring within the LGA face extinction due to rapid declines in geographic distribution and ecological function. This decline is a result of threatening processes such as the clearing of native vegetation, inappropriate fire regimes, invasion of exotic species, climate change, water diversion, pollution, and urban development. Figure 2 identifies the different vegetation communities within the Camden LGA and Appendix B provides a description of the vegetation community condition, that should be read concurrently with this map.

TECs may be categorised as Vulnerable, Endangered, or Critically Endangered. In the case of a Critically Endangered Ecological Community (CEEC), there is an extremely high risk of extinction within as little as 10 years unless the factors threatening its survival cease.

Cumberland Plain Woodland is one such CEEC and comprises most of the native vegetation within the LGA. Another CEEC, Elderslie Banksia Scrub Forest, is entirely confined to an area of 4 square kilometres in the Spring Farm area, none of which is adequately reserved (NSW Scientific Committee 2015). River-flat Eucalypt Forest, also a CEEC, is present in patches mostly along the Nepean River.

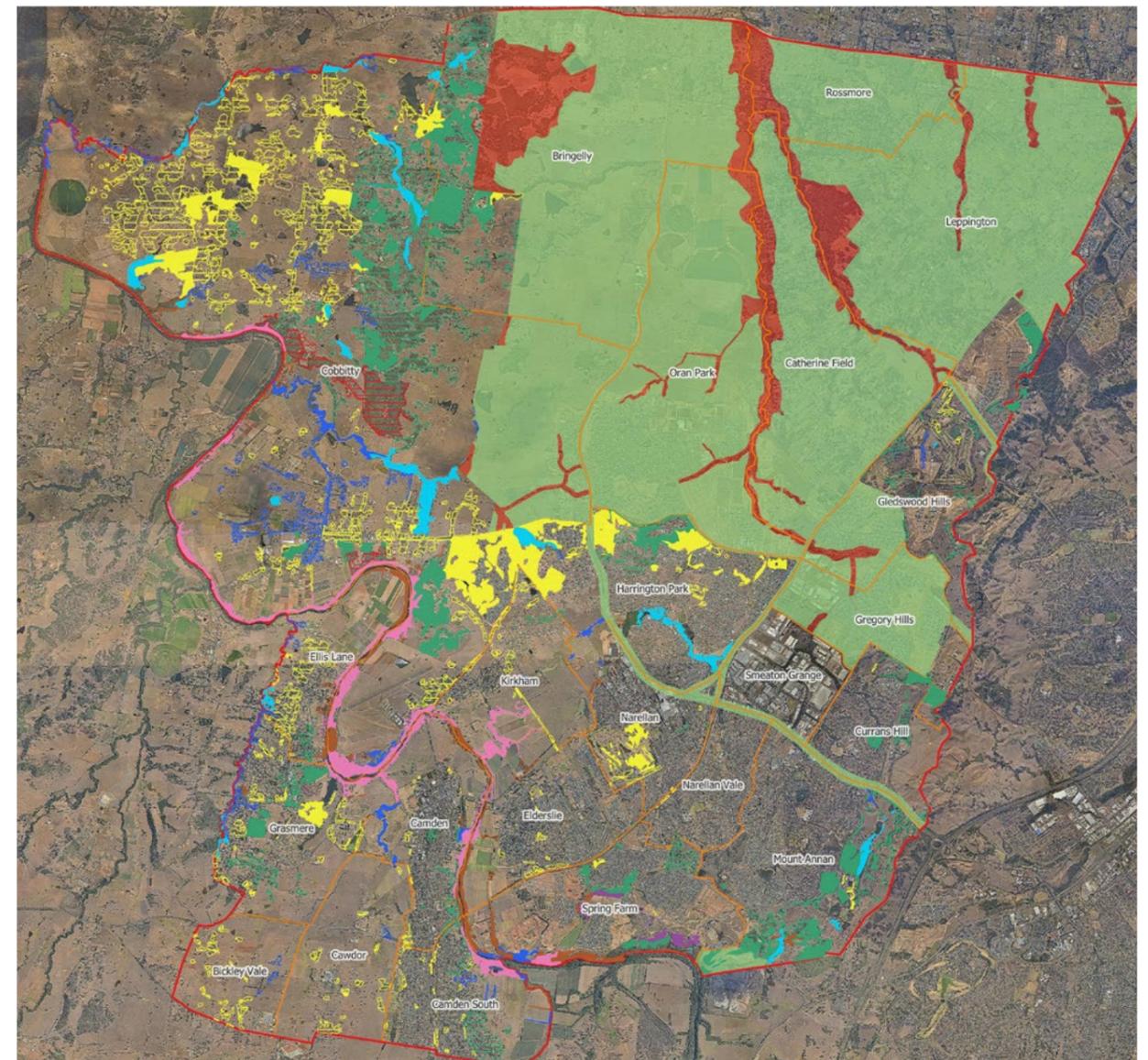


Figure 2 – Vegetation Communities in Camden LGA

Camden Council Biodiversity Strategy 2020

Vegetation Communities in Camden LGA

Legend

- | | |
|---|--|
| Camden Local Government Area | Elderslie Banksia Scrub Forest, TX/TXR |
| Suburb | Planted Native Trees, TX/TXR |
| Growth Centres: | Riparian Forest, ABC |
| Growth Centre Certified Land | Riparian Forest, TX/TXR |
| Growth Centre Non-Certified Land | Riparian Forest/Woody Weeds, ABC |
| Vegetation Community & Condition Code: | Riparian Forest/Woody Weeds, TX/TXR |
| Alluvial Woodland, ABC | Shale Hills Woodland, ABC |
| Alluvial Woodland, C/Cmi | Shale Hills Woodland, TX/TXR/TXU |
| Alluvial Woodland, TX/TXR/TXU | Shale Hills Woodland/Woody Weeds, TX/TXR |
| Elderslie Banksia Scrub Forest, ABC | Shale Plains Woodland, ABC |
| | Shale Plains Woodland, TX/TXR/TXU |

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Camden White Gums at Elizabeth Macarthur Reserve

Threatened Flora

Up to 1,189 species of plants have been recorded in the Camden area, including 712 native species (Appendix B). Of these, seven are listed as threatened under the BC or EPBC Act, including:

- White-flowered Wax Plant (*Cynanchum elegans*);
- Camden White Gum (*Eucalyptus benthamii*);
- Juniper-leaved Grevillea (*Grevillea juniperina* subsp. *juniperina*);
- Marsdenia viridiflora (*Marsdenia viridiflora*);
- Spiked Rice Flower (*Pimelea spicata*);
- Pomaderris brunnea (*Brown Pomaderris*); and
- Malted Bush-pea (*Pultenaea pedunculata*).

A further 35 threatened flora species are known to have occurred historically or are predicted to occur, however there are no recent records of these.



Spiked Rice-flower (*Pimelea spicata*)

Spiked Rice-flower is a small herbaceous shrub that grows to 50 centimetres and is often found tangled amongst other herbs and grasses. It has a wiry, spreading habit and in spring produces small white flowers tinged with pink. It occurs on shale-derived clay soils and is associated with Shale Plains Woodland and Moist Shale Woodland vegetation communities.

Once widespread on the Cumberland Plain, Spiked Rice-flower now occurs in two separate areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour

to northern Kiama) (OEH 2019a). The largest population of Spiked Rice-flower is found within the Camden LGA (ELA 2013).

Spiked Rice-flower is listed as Endangered under both the BC Act and EPBC Act. This means it faces a high risk of extinction in the near future; with a greater than 20% chance of extinction within 20 years unless factors threatening its survival cease (Threatened Species Scientific Committee 2018). These factors and how they can be mitigated are addressed in the National Recovery Plan that has been prepared for the species (DEC 2005).

Animals

Up to 376 fauna species have been recorded in the Camden LGA, including 341 native species and 35 exotic species (Appendix C). Of these, 30 are listed as threatened under the BC Act or EPBC Act, with only three species classified as Endangered, including:

- Australasian Bittern (*Botaurus poiciloptilus*);
- Swift Parrot (*Lathamus discolor*); and
- Cumberland Plain Land Snail (*Meridolum corneovirens*).

A further 31 threatened fauna species are known to have occurred historically or are predicted to occur, however, there are no recent records of these.

Swift Parrot (*Lathamus discolor*)

The Swift Parrot, the world's fastest parrot, is bright green with patches of red, yellow and blue around its face. It has bright red patches under the wings and a long, dark red tail, which distinguishes it from other similar lorikeets. It only breeds in Tasmania during Spring and Summer and migrates to south-eastern Australia to forage during Autumn and Winter (OEH 2019b). It forages on blossom nectar, lerp-insects in foliage, soft fruits, berries, and sometimes in grasses (Pizzey and Knight 2007).

There are multiple records of Swift Parrots foraging in the Camden LGA, especially in the south-east corner and patches of bushland in the central and northern part of the LGA. These records occur in patches of Cumberland Plain Woodland and River-flat Eucalypt Forest, which

contain some of the Swift Parrot's preferred feed trees: Forest Red Gum, *Eucalyptus tereticornis* and Grey Box, *E. moluccana*. Swift Parrots are known to return to foraging sites on a cyclic basis depending on food availability, meaning they are likely to return to Camden in the future.

The Swift Parrot is listed as Critically Endangered under the EPBC Act and Endangered under the BC Act. This means it faces an extremely high risk of extinction in the immediate future, or a greater than 50% chance of extinction within 10 years unless factors threatening its survival cease to operate (Threatened Species Scientific Committee 2018). These factors and how they can be mitigated are addressed in the National Recovery Plan that has been prepared for the species (Birds Australia 2011).

Photo by Timothy Paasia

Connectivity

Connectivity across the landscape is crucial for the retention of biodiversity, providing for species movement and viability, particularly when flora and fauna are subject to pressures such as vegetation clearing, climate change, fire and urban development. Connections allows species to move safely and access alternative habitat. Urban vegetation, including trees and understorey

in parks and on streets, as well as private gardens, is an important component of Camden's corridor network, providing connections between larger habitat areas.

Corridor habitat can range in size and structure and includes elements such as core areas, stepping stones, linear links and buffers (also see Figure 3).

Core Areas

Areas of bushland or waterways that are largely undisturbed, structurally intact and retain significant biodiversity. The protection of core habitat is fundamental to biodiversity protection and ecosystem health.

Linear Links

Roadside vegetation and street trees provide safety and movement opportunities for many species to move through urban environments. Waterways and utility corridors, such as the Upper Canal, also provide important movement opportunities.

Stepping Stones

Small patches of vegetation throughout the landscape. These can include single trees or small areas of bushland, such as a park with trees. A native garden or green roof may even be a stepping stone for some species.

Buffer Areas

These are located at the boundary of natural areas and adjoining land uses, such as urban areas or farms, and protect them from threats. Examples of buffer areas include riparian zones and urban parks.

Reserves also play a critical role in Camden's, and Greater Western Sydney's, corridor network. Within the Camden LGA, Council reserves are concentrated in the south. These reserves provide important linkages to larger areas of core habitat, including William Howe Regional Park, which is managed by NSW National Parks and Wildlife Service. They act as stepping stone corridors in an increasingly urbanised landscape and provide connectivity for more mobile fauna species, such as bats and birds. The Nepean River and South Creek also function as linear corridors, providing habitat and connectivity for a variety of flora and fauna species, especially where riparian vegetation is more extensive and intact. Important biodiversity corridors and reserve areas in the Camden LGA are shown in Figure 4.

Since the adoption of Council's 2013 Biodiversity Strategy, biodiversity corridor master planning has been a priority to identify management measures that provide for the long term protection of high value regional and local corridors. A masterplan has since been prepared for the Western Hills (Cobbitty Hills) Biodiversity Corridor and the Nepean River Biodiversity Corridor. Future biodiversity corridor masterplans are planned for the Scenic Hills, South Creek and Harrington-Wivenhoe biodiversity corridors.

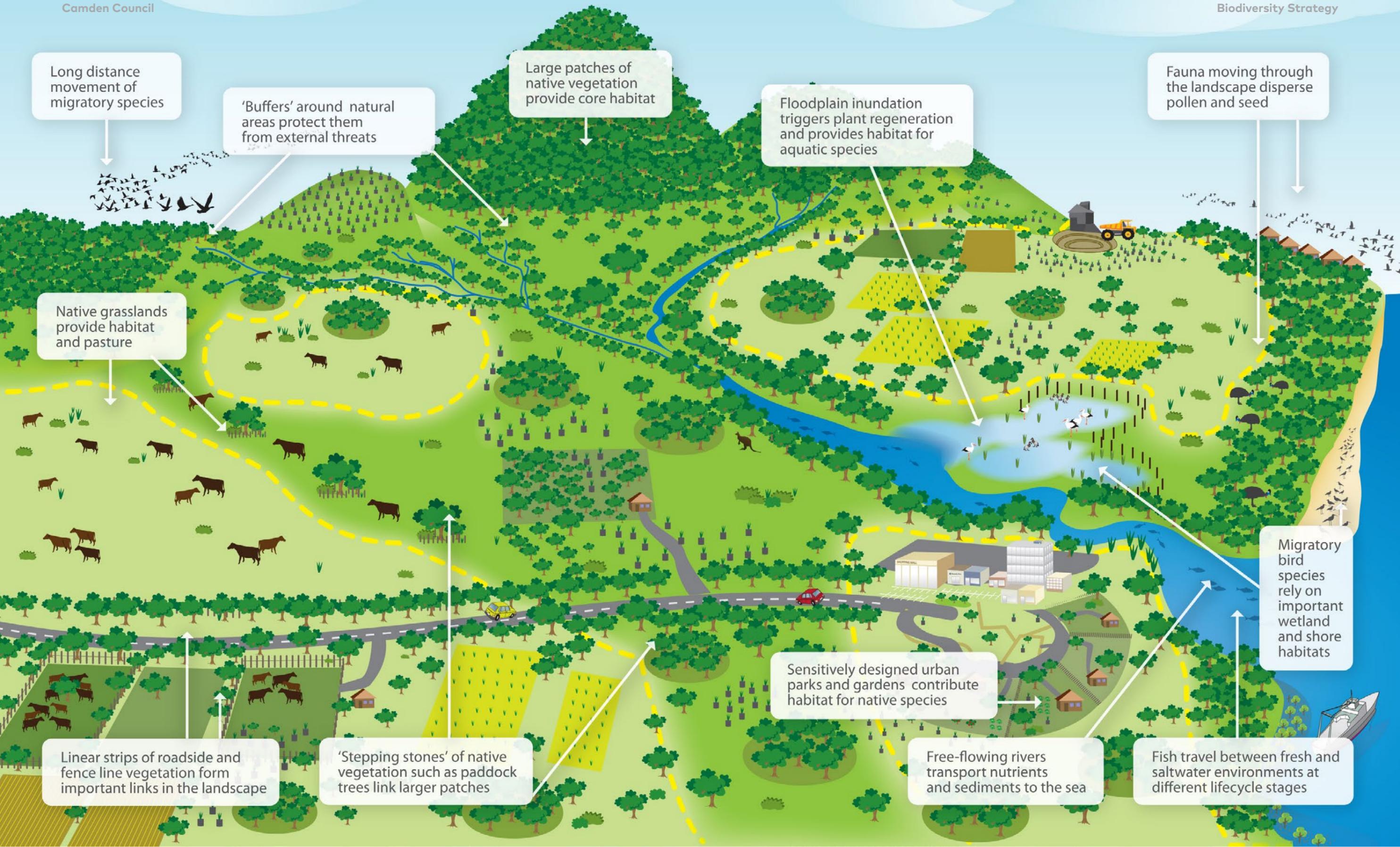


Figure 3 – Landscape elements that contribute to wildlife corridors

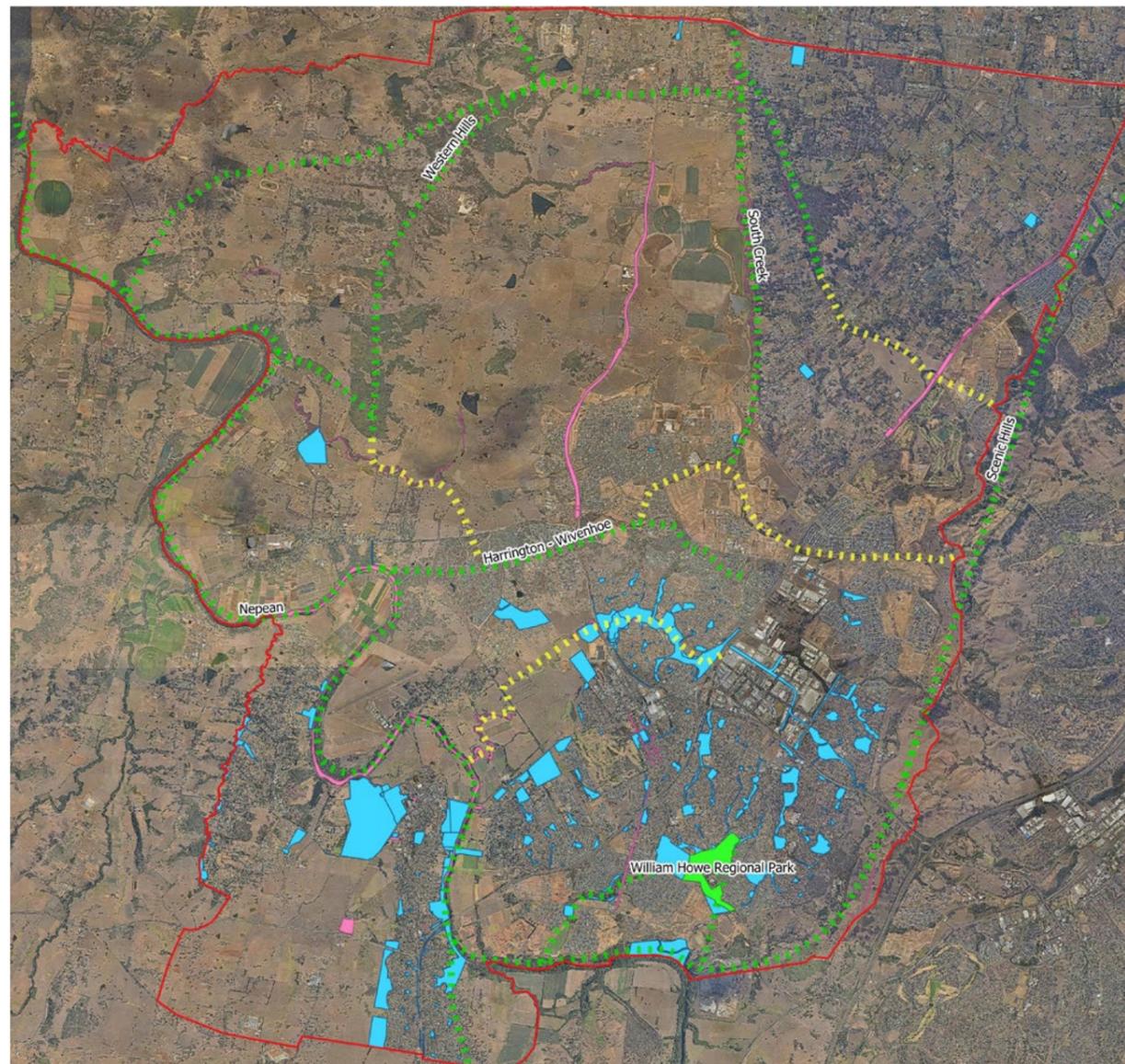


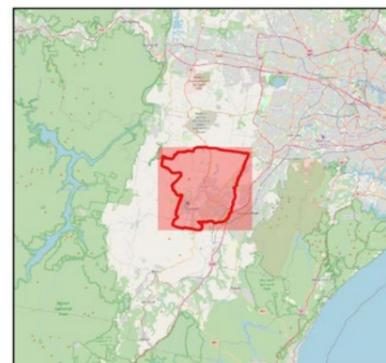
Figure 4 – Reserves in Camden LGA and Biodiversity Corridors

Camden Council Biodiversity Strategy 2020

Reserves in Camden LGA & Biodiversity Corridors

Legend

- Camden Local Government Area
- Crown Land
- Parks and Reserves
- National Parks Land
- Regional Biodiversity Corridor
- Local Corridor



Data Attribution
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 Ref: 20-062 Camden Council Biodiversity Strategy
 Update 1 Reserves in Camden LGA
 Author: D. Perkovic
 Date created: 05.11.2020
 Datum: GDA94 / MGA zone 56



Artwork by Sophia Napoleone

Water

Camden's waterways are an important feature of the landscape and are recognised at both the regional and local scale for their role in maintaining biodiversity. Council's adoption of the platypus logo acknowledges that healthy waterways are an essential component of Camden's natural environment, as platypus are an important indicator of water quality.

The most recently publicly available data for the Nepean River system indicates that there is an overall water quality deterioration and recommends better land use planning to achieve an improvement in the overall health of the system.

The major waterways in the Camden LGA are the Nepean River, and the upper reaches of South Creek and Narellan Creek. Protecting and enhancing these waterways is a local priority under the LSPS. They are also recognised under the WCDP for their contribution to regional green infrastructure that supports the movement of wildlife and cools the urban environment.

Vast areas of natural vegetation around these waterways, particularly Narellan Creek, have been cleared for housing, agriculture and industry. Water quality is affected by chemical and nutrient run-off from farms, homes and industry, water extraction and treated waste from sewage treatment plants. The resultant impacts include:

- Excess nutrients, leading to algal and aquatic plant growth, reduced water flow and lower dissolved oxygen in the water;
- Harm to animals and plants from chemicals and pesticides; and
- Increased weed growth in riparian areas.

Protecting South Creek

South Creek is within the SWGA and it is of critical importance to protect this waterway from the impacts of the significant development planned for the region (Figure 5). The WCDP acknowledges that this growth will place pressure on the health of the waterway and establishes a strategy to integrate South Creek into urban green space, creating a continuous corridor.

The South Creek Corridor Project has been planned to make the waterway the central element of urban design and water management in the SWGA. Maintenance and restoration of riparian corridors will be prioritised, as will wildlife movement along the corridor. A Protection of the Environment Policy for the South Creek catchment may also be implemented.

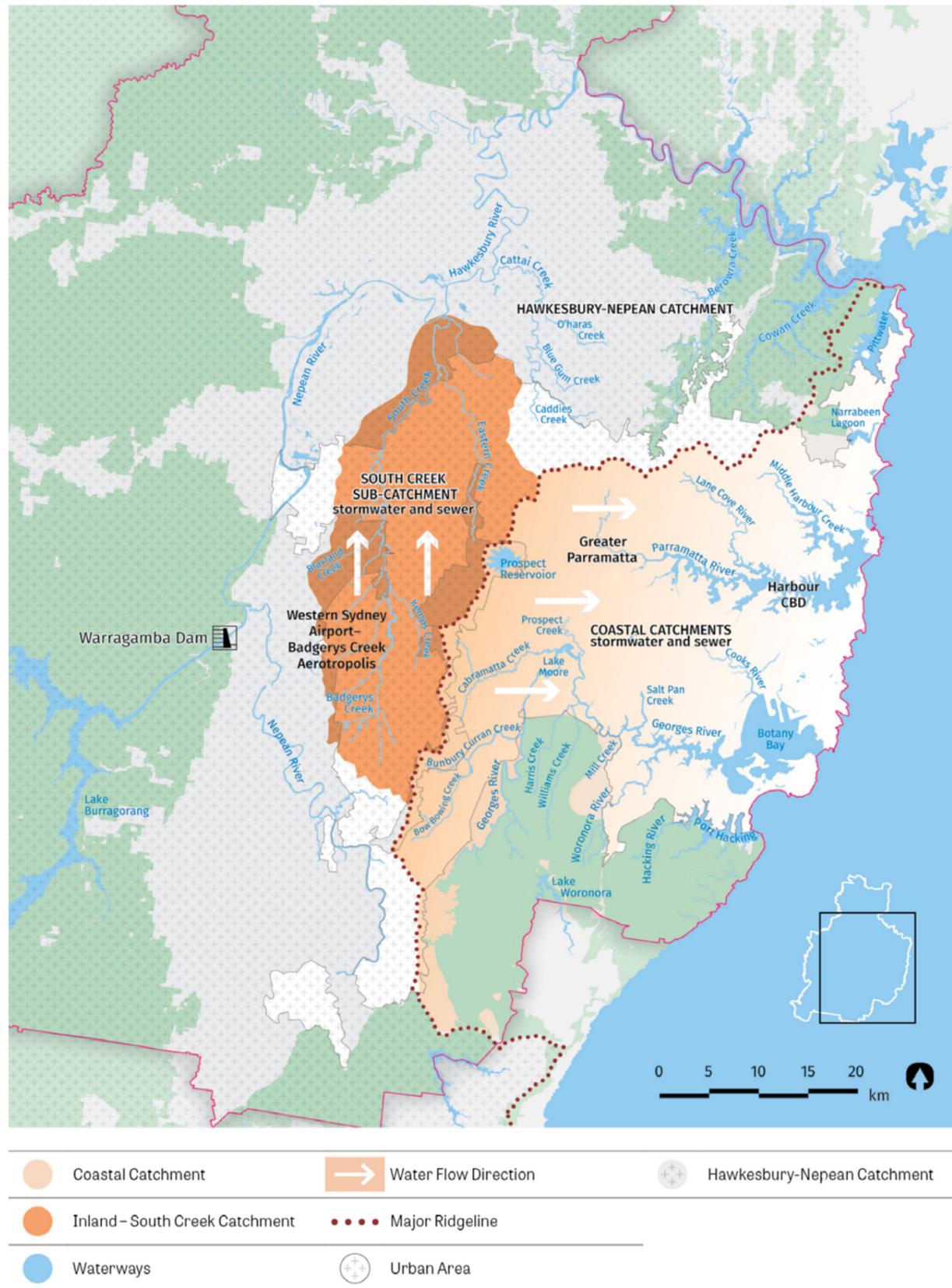


Figure 5 – Location of South Creek catchment within South West Growth Area

© State of New South Wales through the Greater Sydney Commission

Pressures on Camden's Biodiversity

While Camden's biodiversity is susceptible to all the pressures broadly identified by National and State environmental reporting it is critically impacted by a number of key threats. This Biodiversity Strategy is an important tool for managing pressures at the local scale and establishes the context and actions required to reduce the impact of these threats.



Land use, population growth and urban expansion

The 2013 Biodiversity Strategy identified significant urban development as the greatest threat to biodiversity in the Camden LGA, acknowledging that Camden's estimated population growth would place considerable pressure on biodiversity through vegetation clearing, waterway degradation and the spread of pest species. This pressure has accelerated due to Camden's rapid growth and there is an increasing urgency to improve sustainability as urban development expands through the Greater Sydney Region.

Camden was established as an agricultural centre in the late 1700s, preceding development of the township by 40 years. Since the first township land was offered for sale in 1840, Camden has continued to experience a considerable increase in settlement. Both agriculture and urban development have led to significant land clearing, with more than 90% of vegetation across the LGA cleared or degraded since European settlement.

The large scale removal of vegetation to facilitate urban expansion results in habitat loss and fragmentation. The loss of functional linkages, or vegetated corridors, reduces the ability of wildlife to move through the landscape and

reduces ecosystem function and resilience. It also leaves plants and animals more vulnerable to other threats, such as invasive species, and climate change, as remnant areas are less able to withstand temperature increases and extreme weather events. There are also indirect impacts of urbanisation, such as vehicle strike and predation by domestic animals.

Clearing of riparian corridors increases erosion and sedimentation of waterways, resulting in pollution and reduced water quality. Low lying areas may also be drained, or waterways and wetlands modified, to facilitate development and agriculture. These actions change natural water regimes, including the frequency and scale of flooding and increased stormwater runoff from hard surfaces.

Camden is under considerable pressure to balance urbanisation and retention of its rural character and natural landscapes. This will require a sustainable approach to development, including the incorporation of green space into new and existing urban areas, protecting existing natural areas, and increasing urban canopy cover and green linkages through the green and blue grid.

Case study – Western Sydney Airport

The northern region of the Camden LGA lies just within the footprint of the Western Sydney Aerotropolis, a precinct that surrounds the site of the Western Sydney International (Nancy Bird Walton) Airport (Airport). In addition to the Airport, the Aerotropolis will accommodate significant urban growth encompassing housing, industry and commercial infrastructure, as well as new and upgraded major transport infrastructure. The Airport is expected to commence operations in 2026, whilst development of the Aerotropolis precinct will proceed over the next 30 to 40 years.



Planning for the Aerotropolis precinct incorporates conservation measures, such as through the strategic identification of areas to protect biodiversity values and those locations suitable for urban development. This includes part of the SWGA located within the Camden LGA, which is already biocertified. Zoning will be applied to protect environmental values, most particularly the Wianamatta- South Creek precinct.

Airports also require specific measures to ensure safe air operations. With respect to biodiversity conservation, this means managing wildlife around the airport and mitigating the risk to aircraft from wildlife strike. This is proposed to be achieved, primarily, through the implementation of radial wildlife buffers of three, eight and 13 kilometres, within which certain vegetation and development will be excluded or restricted and actions may be taken to limit the presence of certain wildlife (Figure 6).

Parts of the Camden LGA fall within the eight and 13 kilometre buffer, largely the suburbs of Cobbitty, Oran Park and part of Harrington Park. The greatest restrictions will likely be imposed on the airport site and within the three

kilometre buffer beyond the immediate airside. Surrounding areas are a lower priority for wildlife hazard management. Wildlife controls typically implemented at or in the vicinity of airports include monitoring, dispersal using noise and trained animals, trapping and remote release, and in some cases lethal control.

Impacts within the outer buffers, whilst likely to be minimal, may affect biodiversity conservation. These could include disturbance and dispersal of wildlife as a result of low altitude aircraft noise and the severing of wildlife corridors through the use of wildlife exclusion fencing around airports. Impacts on biodiversity may also arise from restrictions and management activities that may apply in the outer buffers, such as planning controls and landscaping restrictions for new development.

Biodiversity conservation, particularly in the northern area of the Camden LGA, may therefore need to be balanced against any potential requirements and compensate, where possible, for any impacts arising from this proximity to the airport wildlife buffers.

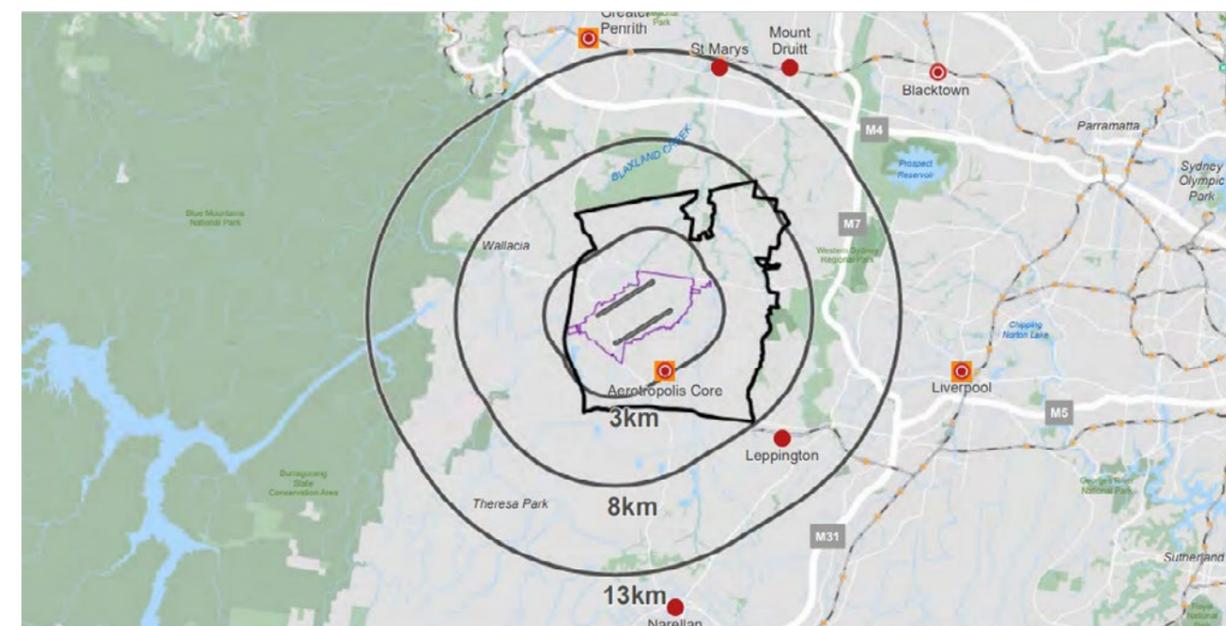


Figure 6 – Wildlife Buffer Zones map from the Western Sydney Aerotropolis Plan 2020

Invasive species

Plants

More than 450 weed species have been identified in the Camden LGA, including 18 Weeds of National Significance (WONS). WONS are weeds identified by Australian Government as management priorities, due to their invasiveness and potential environmental, social and economic impacts. Council has designated Parthenium Weed as a particular threat in the LGA and implements a control program for aquatic weeds, such as Alligator Weed, Salvinia and Water hyacinth. Best practice weed control techniques are also incorporated into Council's Natural Areas Program, for Council's priority reserves.

Weeds are widespread across the LGA. They are easily transported and enter the environment on people, animals, vehicles, through waterways and in contaminated soil and mulch. The closer people and human activities are to natural areas, the more likely it is that weeds will enter the environment. Bushfires, which may become more frequent due to climate change, can also make large areas of land vulnerable to weed establishment.



Integrated weed management, using a variety of control measures, is an effective way to manage weeds. The main control measures include:

- Biological control – using natural agents, such as fungi, insects, rusts and mites to reduce and suppress weeds;
- Herbicides – chemical control;
- Slashing – mechanical control with a tractor, slasher or hand-held brush cutter;
- Fire – using controlled burns; most effective for managing woody weeds; and
- Mulching – using physical barriers, such as plastic or matting to exclude sunlight and prevent the establishment of weeds.

Integrated weed management is an important part of Council's Natural Areas Program, to manage weeds in Camden's priority reserves.

Animals

Camden is home to 35 recorded species of pest animal. Council has identified a number of species that have a significant impact on biodiversity in the Camden LGA, including the Red Fox (*Vulpes vulpes*), European Rabbit (*Oryctolagus cuniculus*), Deer (various species) and the Indian Myna Bird (*Acridotheres tristis*). Council supports the Menangle and Cobbitty Pest Animal Control groups and undertakes limited rabbit control, targeted at reserve areas and aligned with specific regeneration/revegetation projects. Invasive animals have significant environmental impacts, including:

- Destruction of habitat;
- Land and water degradation;
- Competition with native animals for food and shelter; and
- Disease transmission.

It is not only invasive species that impact upon biodiversity. In an urbanised environment such as Camden, predation by domestic animals is a considerable threat to native wildlife. It is estimated that cats alone kill or injure millions of native mammals each year.



The Australian White Ibis (Ibis) population has significantly increased in urban areas due to displacement from its traditional habitat in Western NSW as a result of ongoing drought and changes to water regimes. The Ibis is a native species, protected under the BC Act.

In Camden, Lake Annan has become an important refuge for Ibis and is the second largest breeding and roosting site in Sydney. The large numbers of Ibis at Lake Annan have negatively impacted upon biodiversity, water quality and public amenity, prompting the need for intervention and active management of Ibis in the area.

Council has implemented a Management Plan for Ibis at Lake Annan, to manage the impacts of the species in the urban environment in a responsible, ethical and sustainable way. The purpose of the plan is to ensure the Ibis population is maintained at a sustainable level, whilst also protecting the habitat requirements of other native birds that use the Lake Annan island for breeding and roosting.

For more information and to read Council's Management Plan for Australian White Ibis, visit the website:

www.camden.nsw.gov.au/environment

Climate Change

Climate change is a significant threat to biodiversity and also poses challenges for cities and the built environment. Camden's environment, and our communities, have already experienced increasing temperatures, unpredictable rainfall and extreme weather events.

Managing urban growth in the context of a changing climate is challenging and there is a critical need to improve urban resilience to climate change impacts. These impacts are projected to include more heatwaves, extreme rainfall and flooding, and more frequent and intense fires. Camden already experiences climate challenges; with very little urban canopy cover, the hard urban surfaces increase the impacts of warmer conditions, creating an 'urban heat island' effect. This effect will worsen as the Greater Sydney Region continues to expand into the Camden LGA and more natural and agricultural areas are resumed.

Climate change is expected to reduce the abundance and range of many species, restrict the ability of fauna to move through the landscape and affect natural lifecycles. It is also a biosecurity risk, as it creates conditions suitable for the wider distribution of pest and weed species. Camden's main vegetation community, the Critically Endangered Cumberland Plain Woodland, is one such ecological community feeling the cumulative impacts of climate change and urban growth.

The NSW Government has prepared the Guide to Climate Change Risk Assessment for Local Government in NSW, as well as the Integrated Regional Vulnerability Assessment Tool, to help local governments assess their vulnerability to climate change and identify information that can be used to prepare adaptation strategies and increase resilience.

Climate change data for each region is also available, which provides details of current climatic conditions and likely changes in climate, fire weather, hot days and cold nights, to help local governments plan their climate change response. Council is currently undertaking a climate change risk assessment, which will be reviewed and updated on a regular basis and will use the tools provided by the NSW Government to inform targeted programs to increase resilience for local biodiversity.

Photo by Ian Hollis



Tree canopy is an essential element of urban areas, providing shade and reducing ambient temperatures while also providing essential habitat and food for local wildlife. Recent canopy cover mapping, undertaken by the NSW Government, shows canopy coverage of 15% across the Camden LGA. This level of canopy coverage is similar to other urban LGAs including Burwood, Canterbury-Bankstown, Randwick and the City of Sydney, but is lower than many other

parts of Sydney including Parramatta (25%), Liverpool (26%) and Penrith (21%).

The NSW Government has adopted a target to increase tree canopy cover in the Sydney metropolitan area to 40%. This target has been supported by funding to local governments under the Greening our City and the Greener Neighbourhoods programs, as well as a commitment to plant five million trees by 2030.

Cumberland Plain Woodland

Cumberland Plain Woodland is particularly susceptible to the impacts of climate change.

Approximately 200 years ago, 125,000 hectares of this critically endangered ecological community existed in the Western Sydney region and was habitat for 450 species of plants and 60 native mammal species.

Clearing for agriculture and urban development has caused significant fragmentation of this Woodland and less than 4%, or just 3,462 hectares, now remains. Only some areas of Woodland are protected in reserves, with Woodland also occurring on private property.

A changing climate, including high rainfall events, more intense fires, and the spread of weed species are expected to compound the impacts of land clearing into the future.



Photo by Paul Heath

Protecting Camden's Biodiversity

Retaining vegetation and controlling clearing

In an increasingly urbanised environment, it is critical to preserve remaining native vegetation, particularly remnant vegetation, on both public and private land. There are valuable areas of bushland and remnant vegetation across the Camden LGA and there are multiple ways that clearing and other tree work is managed in these areas.

Trees on public and private land

Remnant vegetation can be found throughout Camden's urban areas and in addition to patches of bushland across the LGA, individual remnant trees remain within established residential areas. This vegetation is protected in different ways, depending on the extent of the proposed clearing or tree works.

SEPP (Precincts – Western Parkland City)

The SEPP (Precincts – Western Parkland City) applies to land in the SWGA. In the Camden LGA much of this land is biocertified (certification is discussed in further detail on page 46). Figure 7 illustrates the land to which this applies. This means that vegetation clearing is already authorised to the extent set out in the certification.

There is a portion of Camden's growth area that is non-certified. Future development on this land needs to consider the biodiversity impacts and vegetation clearing requirements under the Growth Centres SEPP. This establishes approval and/or consent requirements for clearing in

Native Vegetation Protection areas and Riparian Protection areas. Planning controls for the protection and preservation of native vegetation are included in Appendix 2 and 5 of the SEPP to ensure valuable vegetation is retained.

Biodiversity and Conservation SEPP

The Biodiversity and Conservation SEPP consolidates, transfers and repeals provisions of 11 individual SEPPs into a single planning instrument which came into effect in March 2022. This SEPP regulates clearing in urban areas, except when that clearing is linked to a development consent. This is because clearing associated with a proposed development is generally assessed as part of the overall assessment process.

For clearing that is not part of a development application, the SEPP works with the BC Act to ensure that biodiversity offsets are provided when:

- Clearing exceeds the thresholds established under the Biodiversity Offsets Scheme (BOS); and
- Clearing will occur on land identified on the Biodiversity Values (BV) Map.

The BV Map identifies land that is sensitive to impacts from development and clearing. If an area where native vegetation clearing is proposed is located on the BV Map, biodiversity offsets will apply.





Council measures

Council has additional measures in place to regulate clearing or tree works, to ensure trees are protected and managed in accordance with relevant legislation, such as the Biodiversity and Conservation SEPP, or other policies and plans. These include:

- Council's Tree Management Policy, which sets out guidelines for the protection, conservation, maintenance, and enhancement of trees in the LGA;
- Environmentally sensitive land and terrestrial biodiversity mapping, which identifies and protects remnant vegetation on public and private land;
- LEP zoning, including, most relevantly, Environmental Conservation, Public Recreation, Private Recreation and Environmental Living zones;
- Land use controls applied under the DCP, such as requiring development to mitigate adverse impacts on remnant vegetation; and
- A risk based approach to assessing Tree Permit or Tree Development applications for all clearing or tree work.



Riparian corridors

Vegetation in riparian areas helps maintain bed and bank stability, provide habitat and shade, produce a cooling effect, helps to improve and maintain water quality, reduce sedimentation and increase productivity. It is therefore important to protect riparian vegetation in the first instance, and to ensure it is restored and rehabilitated if it is impacted by development or other works.

Development or work carried out in riparian areas, as well as vegetation clearing in riparian areas, are regulated under the *Water Management Act 2000* (NSW). A condition of approval for these activities will require the restoration and

rehabilitation of the riparian corridor, generally through the preparation and implementation of a Vegetation Management Plan (VMP).

The Camden DCP and Camden Growth Areas DCP include controls to protect riparian corridors. Development or works carried out within riparian areas are required to comply with DCP controls and the Water Management Act 2000. Unlike most other riparian areas, the South Creek riparian area is not biodiversity certified, and development within this land is subject to further conditions for assessment and approval.

Photo by Glenn Smith

Biodiversity certification and offsets

The BC Act establishes the Biodiversity Offsets Scheme and a framework for biodiversity certification of land, setting out these two approaches for mitigating the impacts of development that is likely to have a significant impact on biodiversity.



Certification

Biodiversity certification (biocertification) involves an assessment at the landscape scale to identify and quantify the impacts of development on biodiversity values. It is a streamlined approach that enables the assessment of impacts on biodiversity, particularly threatened species, in the early stages of planning, which then informs the design of a development footprint.

Certification considers biodiversity impacts up front and identifies land within a defined area to be set aside for development and those that must be retained and conserved. This means that impacts on threatened species are not required to be considered in future development applications within the certified area, provided the conditions of the biodiversity certification order are complied with.

There are currently three biodiversity certification orders applicable to areas within the Camden LGA (Figure 7):

- El Caballo Blanco, Gledswood and Camden Lakeside;
- Emerald Hills Estate; and
- State Environment Planning Policy (Sydney Region Growth Centres) 2006.



Offsets

Under the Biodiversity Offsets Scheme, those undertaking development must avoid, minimise, and offset the impacts on biodiversity. The scheme applies to development that is likely to significantly impact threatened species and their habitat, threatened ecological communities and/or result in the clearing of native vegetation that exceeds an area threshold.

The Scheme has two main components:

1. Development that generates an offset obligation

The extent of the impact of a development is assessed to determine the number and type of credits required to offset the impacts of the development.

Once an offset is determined, the proponent can make their development application. If approved, the credit obligation becomes a condition of the development approval and must be satisfied before the development can commence.

2. Establishing biodiversity stewardship sites

Landholders, including Council, can enter into a voluntary, in-perpetuity agreement to conserve and manage land, to protect native vegetation and threatened species. Biodiversity Stewardship Agreements enable landholders to generate credits that can be sold to development proponents seeking to offset the impacts of their development, or to generate funds to manage and improve the biodiversity values of the land.

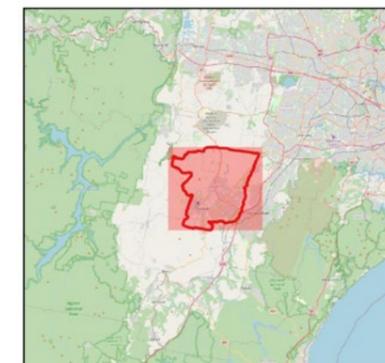


Figure 7 – Certified and Non-Certified Land in the Growth Area

Camden Council Biodiversity Strategy 2020

Growth Centre Certified & Non-Certified Land

- Legend
- Camden Local Government Area
 - Suburb
 - Growth Centre Land
 - Growth Centre Certified Land
 - Growth Centre Non-Certified Land



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 © ELA 2013
 Ref: 20-062 Camden Council Biodiversity Strategy Update \ Growth Centre Certified and Non-Certified Land
 Author: D. Perkovic
 Date created: 05.11.2020
 Datum: GDA94 / MGA zone 56



Achievements under Biodiversity Strategy 2013

Many actions under the Biodiversity Strategy 2013 have been implemented since its adoption. Council continues to proactively manage biodiversity to ensure the care and improvement of a healthy urban and natural environment.

Of the 22 actions recommended under the Biodiversity Strategy 2013, 15 are complete, in progress or remain ongoing for Council. The remaining seven actions have been reviewed and incorporated into this Strategy.

Achievements include:

- Ongoing management and restoration of almost 95 hectares of natural areas across the Camden area including partnering with seven Bushcare groups;
- A review of Council's Bushcare program, with new groups to be established for Camden Town Farm and Kolombo Creek;
- Registration of Gundungurra Reserve as a Biobanking / Biodiversity Stewardship site, protecting almost 40 hectares of Critically Endangered Cumberland Plain Woodland;
- Completion of the Masterplan for the Western Hills (Cobbitty Hills) and the Nepean River Biodiversity Corridors, along with landholder and community guides to encourage coordinated management;
- Planting of almost 1,000 iconic and Vulnerable Camden White Gums (*Eucalyptus benthamii*) along the Nepean River at Camden Town Farm, Rotary Cowpasture and Elizabeth Macarthur Reserves;
- Restoration of Elderslie Banksia Scrub Forest, an Endangered Ecological Community, located in Spring Farm in partnership with the NSW Government under their Saving our Species program, and preparation of a Vegetation Management Plan to guide management in the coming years;
- Partnering with Campbelltown and Wollondilly Councils to deliver successful community engagement around biodiversity including the Threatened Species Art and Writing Competition, and the Macarthur Nature Photography Competition;
- Hosting numerous community tree planting events in Camden's natural areas and working with schools, early childhood centres and corporate groups to host planting days;
- Development of a range of videos and activity guides as part of the Connect with Nature program to engage the community around backyard biodiversity;
- Development and implementation of a Platypus Monitoring Program for the Nepean River using eDNA technology, with evidence of a population identified in the north of the local government area; and
- Training of staff in biodiversity management and assessment.



Wildflower wonderland

Council has implemented a pilot program, in partnership with Greening Australia, to transition mown areas of parkland to biodiverse native wildflower gardens. Sites where the program is underway include Rotary Park, Camden South, Parrotts Farm Reserve, Camden Golf Course, and some roundabouts.

Council's Bush Regeneration Team prepared each site by removing weeds, scalping and levelling the ground surface. The ground was then direct seeded with over 100 native wildflower and grass species collected from the local area.

Re-introducing native wildflowers and grasses to parklands has returned some of the natural habitat unique to the Cumberland Plains, to Camden's urban areas. Native plant communities are more resilient to the impacts of climate change and invasive species, outcompeting pest plants. They also provide habitat for bees and other insects, which are important pollinators.

Council is now looking to expand this successful program, to brighten up our urban environment with native wildflower gardens.



Strategy Themes

The Strategy is built on four key themes, under which Council has identified strategic objectives that reflect conservation priorities for the Camden LGA. These are central to the achievement of the vision for biodiversity established by the Camden Community Strategic Plan 2017.

The Action Plan in Part 2 of the Strategy sets out the specific programs and tasks that will be implemented over the next five years to accomplish these objectives.



Planning to Protect Biodiversity

Using planning tools to protect biodiversity from urban development



Caring for Biodiversity

- Conserving and enhancing natural areas
- Increasing connectivity to link natural areas
- Reducing threats and fostering resilience



Community and Stewardship

- Improve communication
- Grow participation
- Foster appreciation



Improving Knowledge

- Establish partnerships with experts and the community
- Study biodiversity in the Camden LGA

Part 2 Action Plan

Action Plan

Purpose

Council has committed to creating a healthy urban and natural environment and improving sustainability. This Action Plan details the various activities that Council plans to undertake through the next five years and beyond, to enhance and protect Camden's biodiversity and help to achieve the Council's objectives for the environment.

Achieving the Themes and Key Objectives

The Action Plan is linked to the stated objectives and directions for each Strategy theme:

1. Caring for biodiversity
2. Planning to protect biodiversity
3. Community and stewardship
4. Improving knowledge.

These align with the priorities identified under the Sustainability theme of Camden's LSPS and strategies to achieve a healthy environment set out in Camden Community Strategic Plan 2017.

Prioritising Actions

Actions will be targeted for implementation in the short (0-2 years), medium (3-5 years) or long (>5 years) term:

Artwork by Noah Szakos

Resourcing

Natural areas require ongoing maintenance, not only to protect biodiversity values. Appearance, safety and use for recreation are all key values associated with natural areas and, for urban areas in particular, a consistent program of maintenance is essential for sustaining community support for green spaces.

Many of Council's environmental programs are funded by general revenue and implemented by Council staff and contractors. This includes the Natural Areas Program, a key component of the Biodiversity Strategy, which sets out a maintenance program for Council's priority reserves. The Program identifies the management requirements for high value natural areas to inform the allocation of both human and financial resources.

There is also a range of alternative funding mechanisms available to Council for program implementation, as well as measures that provide the dual benefits of increasing conservation land within the LGA whilst concurrently securing funding for conservation management of that land. These include potential income received from stewardship sites and grants from various

government and private sector organisations. Many of these grants are also open to community groups and private landholders, to implement management actions on land to protect, restore and maintain biodiversity values.

Our community

Biodiversity protection and management does not depend only on financial resources; people are also essential in implementing actions to improve biodiversity values across the LGA. Camden's communities make a valuable contribution to protecting biodiversity through participation in community environmental events and programs. These include Bushcare, tree planting events and biodiversity engagement projects, including the Macarthur Nature Photography Competition.

Better collaboration with our community to encourage greater participation and stewardship is one of the key themes of the Strategy. Council will seek opportunities to work directly with landholders, and in partnership with community groups, providing support to carry out conservation works and improve biodiversity outcomes in key areas.



Artwork by Hayley Lorenz



Artwork by Tenille Lindley

Monitoring and Review

Actions will be monitored to determine if they are achieving the performance indicators and measures. This is an important component of the Action Plan, as it:

- Establishes whether the actions are achieving the key objectives of the Strategy;
- Informs resourcing requirements and the allocation of Council funds;
- Supports grant funding applications and reporting, which is generally required when grants are awarded; and
- Provides transparency in the allocation of public funds.

The five-year timeframe of the Strategy and Action Plan means that some actions may have to change over time. The monitoring and review process will enable the progress of each action to be measured and evaluated in the context of changing conditions, policy, knowledge, and science.

Reporting

Council will monitor, review and report on the success measures outlined in the Action Plan to ensure we are on target to reach the stated objectives and directions for each Strategy theme.

Progress on achieving the Action Plan will be monitored on an annual basis and will be recorded in Council's Annual Report. This will include information on the status of actions, achievement of indicators or measures, any issues encountered, significant changes to policy or legislation and any new actions that may be required.



Caring for Biodiversity

Preserving Camden's biodiversity is a high priority and Council implements best practice land management to protect natural values. Our Natural Areas team, often in partnership with the community, cares for over 600 hectares of reserves and parklands.

Land management works typically include weed control and eradication, and habitat restoration and enhancement. On-ground actions are

supported by the strategic prioritisation of land management activities, to inform resourcing decisions and address key threats to biodiversity.

Caring for biodiversity in the long-term requires the provision of adequate resources, establishment of partnerships to continually improve knowledge and the implementation of measures that improve ecological resilience.

Key objective: Invest in the protection, restoration, and enhancement of Camden's natural areas on a prioritised basis, using best practice land management techniques, which are informed by ongoing monitoring and developments in technical knowledge.

We will:

1. Conserve and enhance natural areas:

- Actively manage Camden's natural areas to protect and improve biodiversity values.

A Natural Areas Program for Council's priority reserves has been prepared to guide management and restoration actions on high ecological value Council land. The Program sets out specific management actions for each reserve, including revegetation, weed control, maintenance, and monitoring. These reserves are considered high value as they have habitat trees, many with hollows, including good fauna habitat and linkages across the landscape and also provide good opportunities to increase ecological values. Their enhancement and management is critical to biodiversity protection across the LGA.

Reserves to be managed through the Natural Areas Program, a Council or private Biobanking agreement or a Biodiversity Stewardship Agreement can be seen in Figure 7.

- Increase the area of land under active management to protect biodiversity values.

As land is obtained by, or dedicated to Council through developer contributions or strategic land purchases, it is important to actively manage these natural areas.

- Implement relevant threatened species recovery plans on Council-managed land.

Both the EPBC Act and BC Act provide for recovery plans to be made for threatened species, populations, or communities. The recovery plans most relevant to the Camden LGA include the Cumberland Plain Recovery Plan (Figure 8), *Pimela spicata* Recovery Plan and the Draft National Recovery Plan for the Grey-headed Flying fox, *Pteropus poliocephalus*.

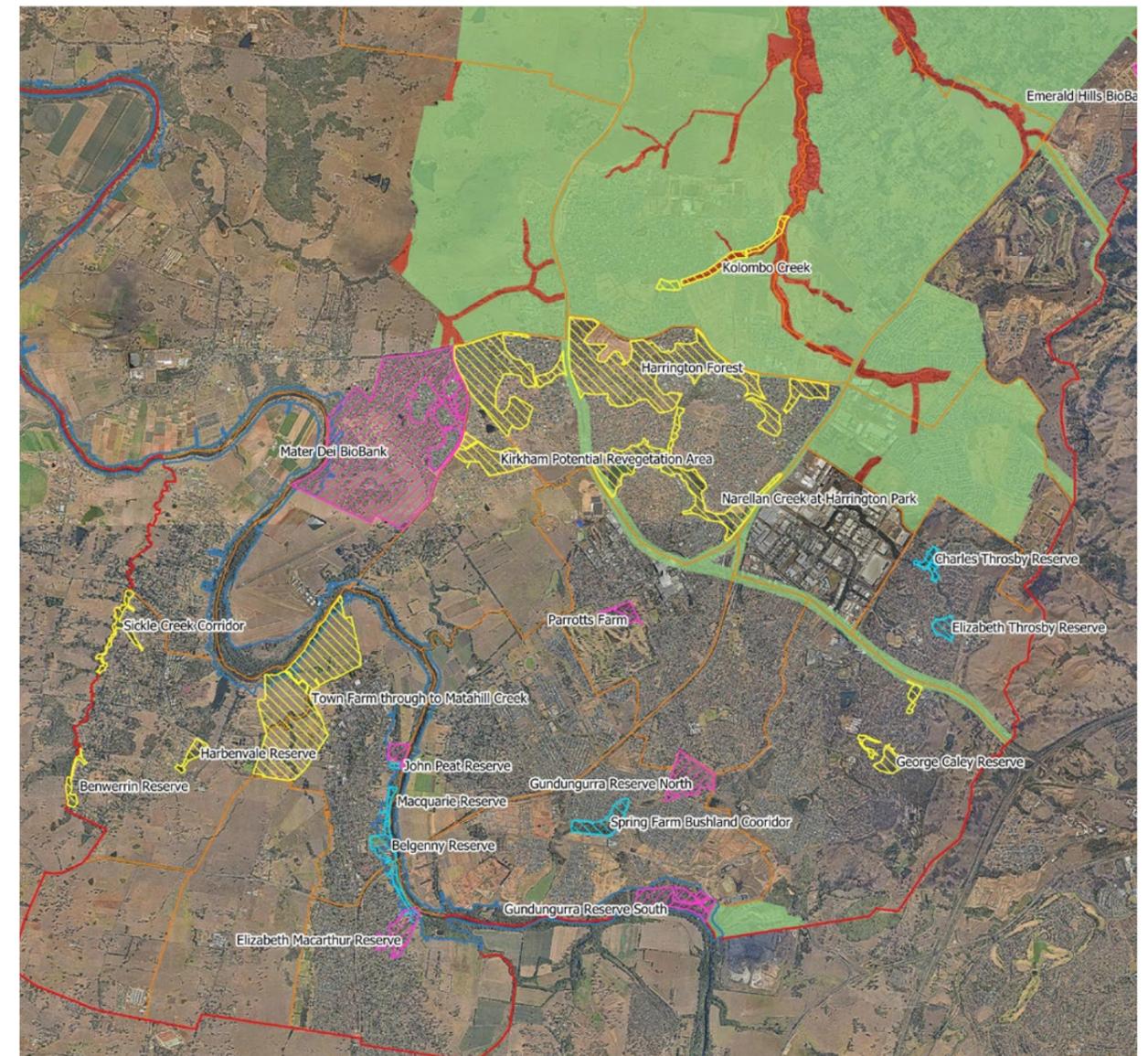


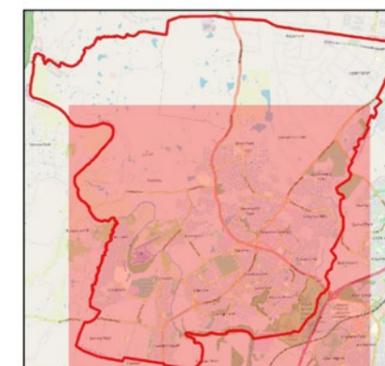
Figure 8 – High Ecological Value Reserves for Natural Areas Program and Biodiversity Stewardship Sites

Camden Council Biodiversity Strategy 2020

NAP Sites and Additional Priority Areas

Legend

- Camden Local Government Area
- Biobank and BSA Sites
- NAP Sites
- Additional Priority Sites for NAP Inclusion
- Nepean River Biodiversity Corridor
- Suburb
- Growth Centres
 - Growth Centre Certified Land
 - Growth Centre Non-Certified Land



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 Ref: 20-062 Camden Council Biodiversity Strategy Update \ NAP Sites and Additional Priority Areas
 Author: D. Perkovic
 Date created: 05.11.2020
 Datum: GDA94 / MGA zone 56



Cumberland Plain Recovery Plan

The Cumberland Plain is rich in biodiversity and home to seven threatened species, four endangered populations and nine threatened ecological communities, including the Critically Endangered Cumberland Plain Woodland. The Recovery Plan was prepared to conserve these natural values, in recognition of the extraordinary pressures posed by urban development. You can find the Recovery Plan at www.environment.nsw.gov.au.

The Recovery Plan sets out actions for implementation by local authorities, including the preparation and review of biodiversity strategies. Through the Strategy, Council has also realised a number of other actions such as adopting best practice standards for the management of conservation areas containing threatened biodiversity listed in the Recovery Plan. This will be achieved through the implementation of the Natural Areas Program in Council's priority reserves.

Artwork by Adi Mohan

2. Increase connectivity

- Create urban green space to connect waterways, bushland, parks, and open spaces through the built environment.
- Protect and restore links along biodiversity corridors and between core habitat.

The long-term viability of biodiversity is largely dependent on habitat linkages that connect core areas of habitat across the landscape. These linkages are often limited or severed by urban development, especially roads and other infrastructure corridors, and development that does not include green space such as gardens or street trees.

Connecting habitat is important at both the local and regional scale, and is envisaged in the objectives of the WCDP, Sydney Green Grid Project, NSW Government's Green Corridors Program and the Greener Places Design Guide prepared by the NSW Government Architect. These documents recognise that enhancing linkages, including along waterways, will improve biodiversity, increase resilience, and help keep urban areas cool. Council's LSPS also acknowledges the benefits of connectivity and this is further reflected at the local level through the development of Camden's Greener Places, Healthier Waterways (draft).





Artwork by Jessica Charnock

3. Reduce threats and foster resilience

- Control key pest species.

This will include the implementation of existing management plans for key invasive species, for example, the Greater Sydney Regional Strategic Pest Animal Plan 2018–2023, and the development of measures specific to priority areas, such as through Council's Natural Areas Program.

- Manage fire risk to protect natural areas, whilst also using fire to manage and protect biodiversity.

Bushfires have direct and immediate impacts on native flora and fauna, killing animals and

destroying habitat. There are also ongoing biodiversity impacts, such as starvation and habitat loss, pollution of waterways by ash and subsequent increases in nutrient concentrations, leading to algal blooms and the establishment of weeds over large areas of land.

Fire, in the form of controlled burning, can protect biodiversity. It is an effective control measure for certain types of weeds and is also an effective tool to prevent bushfires. Traditional Aboriginal fire management practices can be adopted to address a variety of land management problems and, when local conditions, climate, flora, and fauna are taken into consideration, these practices may also promote biodiversity.

Council will develop a Bushfire Action Plan, which will be an important tool for the protection of biodiversity in Camden's natural areas.

- Increase restoration and revegetation to improve resilience to climate change.

Higher temperatures, reduced rainfall and more frequent fire and severe weather events undermine the resilience of biodiversity. Habitat patches may become less dense, drier and expose trees and plants to wind and other weather effects. Increased natural light within patches allows weed establishment and the intrusion of artificial light drives away native

animals. Establishing and maintaining buffers around existing habitat increases the capacity of bushland to maintain its local micro-climate and reduce these impacts.

Natural areas and green space also play a significant role in mitigating the impacts of climate change, for example, sequestering carbon and creating cooler micro-climates. Whilst there is an urgent need to prevent vegetation clearing, it is also necessary to increase restoration and revegetation. This has multiple benefits, such as increasing canopy cover, buffering remnant vegetation, creating and linking habitat, and cooling the urban environment.

Caring for Biodiversity – Actions

Actions	Timeframe	Outcomes
1	Short term	Integration of identified species into natural areas management.
2	Short term	Adoption and implementation of the prioritisation process by key Council groups involved in natural areas management.
3	Medium term	Proportion of bushland under active management by Council. Implementation and resourcing of the Natural Areas Program. Ongoing reduction in area of key weed species. Increase in species cover and abundance of key revegetation species.
4	Medium term	Scenic Hills Biodiversity Corridor Masterplan complete within the Strategy timeframe. South Creek and Harrington-Wivenhoe Biodiversity Corridor Masterplans in progress within the short term.

Actions	Timeframe	Outcomes
5	Medium term	Consultation with local government partners. Preparation of a scoping study.
6	Medium term	Feasibility study and community consultation finalised to identify suitable locations. Wildlife Protection Area/s set aside in Council reserves. Implementation of appropriate compliance and management measures to protect wildlife from domestic dogs and cats.
7	Medium term	Best practice environmental standards are implemented for Council projects.
8	Medium term	Commencement of projects identified in Greener Places, Healthier Waterways (draft).
9	Medium term	Application of best practice land management by Council works crews. Increased biodiversity awareness across Council's workforce.
10	Long term	Endorsement of the Plan for implementation.
11	Long term	Implementation commenced within the five-year Strategy timeframe. Funding available to commence prioritised actions.



Planning to Protect Biodiversity

Council's land management role is not limited to caring for public land. It also encompasses regulating land use through strategic planning and making decisions about development proposed in the LGA.

Land use planning is about the use, development, and protection of land in the present and long term. Its purpose is to integrate social, economic,

and environmental aspects to deliver sustainable outcomes.

Council has at its disposal, a range of planning mechanisms to achieve biodiversity conservation objectives. These tools reflect the sustainable development theme set out in the WCDP, LSPS and LEP, and also consider the challenges posed by future development in Camden.

Key objective: Use planning mechanisms to protect natural areas from the impacts of development and expand the area of land conserved for nature.

We will:

1. Protect biodiversity from urban development

- Use planning tools to retain remnant vegetation in areas identified for urban development.
- Work with private landholders and developers to conserve natural areas.
- Use local planning controls within the LEP, Growth Centres SEPP and DCPs to achieve the protection and enhancement of biodiversity in our urban areas.

This should be accompanied by measures to monitor and enforce relevant development controls that provide for habitat enhancement, mitigate against cumulative impacts to habitat and avoid habitat loss.

- Maintain the urban-rural interface and protect the Scenic Hills, and rural hills and ridgelines from urban development.

2. Enhance biodiversity through the planning framework

- Integrate requirements that enhance biodiversity into Council's planning documents (the LEP, Growth Centres SEPP and DCPs).
- Embed biodiversity enhancement measures into urban planning and design.

Measures could include the creation of new ecosystems by integrating green space into urban design, green roofs and walls, wetlands, as well as the revegetation of open space and riparian areas. These act to create habitat linkages and provide green infrastructure for biodiversity enhancement, climate adaptation and resilience.



Artwork by Lilly Snell

Planning to Protect Biodiversity – Actions

Actions	Priority	Outcomes
Strategic Policy		
1	Short term	Adopted Plan of Management.
2	Medium term	Identification of biodiversity corridors and high value remnant patches for consideration in precinct planning. Pre-emptive protection of identified areas.
3	Long term	Resolution by Council supporting the preparation of the Strategy. Drafting of Waterway and Riparian Land Use Strategy commenced.
Planning Policy		
4	Ongoing	Remnant vegetation and riparian areas protected.
5	Medium term	Preparation of draft planning control measures. Preparation of draft development control measures to support the biodiversity planning amendment.

Actions	Priority	Outcomes
6	Medium term	Preparation of draft planning control measures. Increase in new development that integrates green design.
7	Long term	Zoning is consistent with recommendations of the South Creek Corridor Project.
Stakeholder Engagement		
8	Medium term	Identification of private land holdings suitable for conservation. Preparation of an engagement strategy. Increased conservation of private land.
9	Long term	Preparation of a draft policy.
Planning Agreements		
10	Short term	Adoption by Council of the Policy.
11	Long term	Consultation with local government partners.



Community and Stewardship

Camden's local community is one of our greatest resources and contributes considerably to programs for the protection of green space. As the population grows, the area welcomes newcomers and infrastructure is expanded to support and house our people, it is essential to continually engage with the community to encourage ownership of our shared natural areas.

We know that vegetation in urban areas is considered very important by our communities, not only for aesthetic reasons, but also because it provides places to relax, exercise, recreate and is also habitat for wildlife.

One of the biggest concerns for communities when it comes to green spaces in the urban area

is maintenance – making sure the plants are healthy, pests and weeds are controlled, litter does not become a problem and that the areas are generally safe. Although having safe and clean green spaces close to home is important to most people, a majority surveyed indicated that they did not have the time or are unwilling to volunteer to maintain natural areas.

Community members are most active in tree planting, Bushcare and participation in regional competitions, such as the Macarthur Nature Photography Competition. Council has identified that engaging new participants in on-ground activities is essential to maintain and grow these programs in the long term, and new initiatives, such as citizen science, may assist in building engagement.

Key objective: Support and grow partnerships with the community to increase communication, knowledge sharing and participation in activities that protect and enhance biodiversity.

We will:

1. Improve communication

- Use all available and emerging communication platforms to reach a wider audience.

Digital communication (including SMS) has the capacity to engage more people especially younger people and those from diverse cultural backgrounds. Research indicates that most people want to know about programs that care for green space, however how they want to find this out differs. Using a broad range of ways to engage with our community is essential.

2. Grow participation

- Diversify programs and adopt new approaches.

Community participation in on-ground biodiversity programs remains limited in Camden, primarily consisting of one-off planting days and Bushcare, which is often attended by a small group of long-term members. There are many opportunities to expand practical engagement and implement programs that may appeal to a broader audience.

- Communicate the benefits of participation.

Community participation in biodiversity management has many benefits, both for Council and for those who volunteer. If this can be effectively communicated, more people may be encouraged to contribute to programs and activities.

Involvement in environmental programs:

- o Provides social interaction, community building and an opportunity to learn new skills and knowledge;
- o Fosters an appreciation for, and pride in, natural areas and values;
- o Supports grant applications and funding requests, enabling the Camden community to implement new, or continue existing programs; and
- o Demonstrates a commitment to environmental protection by the community, thereby encouraging political support for biodiversity protection.

3. Foster appreciation

- Connect the community with Camden's biodiversity.

Improving communication and growing participation both contribute to an increased appreciation for natural values. These three aspects are essential to creating a positive feedback loop that helps to grow community investment in, and stewardship of, Camden's biodiversity.

Council's Connect with Nature Program explores the unique plants and animals of Western Sydney that are found in the critically endangered Cumberland Plain Woodland and the Nepean River Corridor. Developed in partnership with Penrith City Council, the videos encourage residents to explore the creatures living in their own backyard or local nature reserve, and are supported by activity guides to make your own backyard wildlife friendly.

Community and Stewardship - Actions

Actions	Priority	Outcomes
1 Monitor and review Council's Bushcare program to identify: • Measures to improve and expand the program; and • Opportunities for the establishment of new Bushcare groups, particularly in the urban growth areas of Camden.	Short term	Ongoing Bushcare volunteer hours increase. New Bushcare groups.
2 Expand available information about biodiversity on Council's website and actively promote resources.	Short term	Public availability of up to date information.
3 Prepare a Community Biodiversity Education and Engagement Strategy, which identifies opportunities to actively engage the community in biodiversity protection and management, as well as citizen science.	Short term	Adoption by Council of the Strategy. Resourcing of programs.
4 Implement the Community Biodiversity Education and Engagement Strategy to engage the community in biodiversity protection.	Medium term	Number and diversity of participants. Effectiveness of initiatives in building awareness of biodiversity management.
5 Investigate opportunities to engage with Camden's Aboriginal community to protect and manage biodiversity.	Medium term	Addition of further sites and interpretive experiences.
6 Investigate the establishment of a plant nursery to supply plants for Council projects.	Long term	Nursery established.



Improving Knowledge

Ongoing improvement of our knowledge of biodiversity and the impacts of the pressures upon it is critical to inform appropriate conservation and management actions. The Australian Government's State of the Environment Report (2016) identified the five most important knowledge gaps hindering effective biodiversity management as:

- Lack of data and basic knowledge of species;
- Understanding of ecological/threatening processes/thresholds;
- Impact of climate change;
- Effective invasive species control/impacts; and
- Effectiveness of management practices.

Community engagement and general understanding of biodiversity was also acknowledged as a significant impediment to the effective conservation of biodiversity.

Key objective: Continually seek and share knowledge to promote and guide best practice biodiversity management.

We will:

1. Develop partnerships

- Collaboration with landholders, the local Aboriginal community, business, industry, universities, environmental organisations and community groups.

To implement best practice biodiversity management, we need current information about how best to protect it. Many of the pressures on biodiversity require a collaborative effort to ensure their impacts are avoided or minimised to the greatest extent possible. Council will seek and share information to manage threats and protect biodiversity. We will also continue working with existing partners, such as Greening Australia, and establish new relationships with experts and traditional owners.

2. Undertake local studies

- Improve our knowledge of Camden's biodiversity values.

Lack of knowledge about the status and threats to, and the social and economic value of, biodiversity is a driver of biodiversity loss. Knowledge gaps may exacerbate biodiversity loss when ineffective management measures are adopted. Council is committed to undertaking studies that provide a detailed picture of our local biodiversity values, such as the extent and condition of vegetation and threatened flora and fauna.



Improving Knowledge – Actions

Actions	Priority	Outcomes
1	Ongoing	Monitoring of platypus population. Implementation of research projects to improve knowledge of local population(s).
2	Short term	Preparation of fit-for-purpose database. Established internal procedures for the collection and entry of data and information.
3	Short term	Preparation of a climate change risk assessment in accordance with the NSW Government Guide to Climate Change Risk Assessment for NSW Local Government. Development of a whole-of-Council Climate Change Mitigation and Adaptation Strategy. Identification of key areas of vulnerability to direct research partnerships.
4	Short term	New citizen science biodiversity events added to Council's events calendar.
5	Medium term	Preparation of draft measures for consultation with experts and the community.
6	Medium term	Current, accurate vegetation map. Verified data for vegetation communities. Undertake a survey of vegetation communities to: <ul style="list-style-type: none"> • Verify state vegetation mapping for the LGA; • Confirm the presence of environmentally sensitive land (ESL); and • Inform the preparation of a current, accurate ESL map.

Actions	Priority	Outcomes
7	Medium term	Amended Bushfire Management Plan and plans/strategies for natural areas, incorporating traditional land management techniques. Work with the local Aboriginal community to better understand and integrate Aboriginal land and fire management practices into natural areas management programs.
8	Medium term	Program of projects to build climate change resilience to be undertaken in partnership with research organisations and the community. Investigate opportunities to partner with research organisations and other experts on projects that quantify the impact of climate change on local biodiversity and develop strategies to build resilience.
9	Medium term	Reduction in the extent of illegal land clearing. Prosecutions for illegal land clearing. Investigate the establishment of either an Approved Land Clearing Register, or the implementation of a program to monitor illegal land clearing through aerial imagery.



Artwork by Jenny Phan



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