



BIODIVERSITY STRATEGY 2011-2021

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Executive Summary

The Marrickville Council Biodiversity Strategy 2011–2021 (the Strategy) outlines Marrickville Council’s commitment to biodiversity management over a 10-year timeframe. It provides an overview of existing biodiversity values in the Marrickville Local Government Area (Marrickville) and provides actions to guide biodiversity management over the next 10 years.

The main aim of this Strategy is to:

Preserve and enhance Marrickville’s biodiversity values and the ecosystem services they provide

Under the guidance of the Marrickville Community Strategic Plan 2021, this Strategy aims to collate and co-ordinate current and past efforts and prioritise future actions in order to achieve the best possible outcomes for Marrickville’s biodiversity, while remaining realistic about the constraints which urbanisation place on the environment. The Strategy adopts the principles of adaptive management and is sufficiently flexible to allow incorporation of new knowledge and advances in the field of urban ecology, and takes advantage of new opportunities for biodiversity that may arise in Marrickville. It is expected that information provided by monitoring programs and feedback from Council and community groups will advise the ongoing implementation of the Strategy.

The Strategy sets out six strategic Focus Areas that have specific, associated strategies to achieve the main aim:

1. Priority Biodiversity Areas:

Preserve and enhance the biodiversity value of Priority Biodiversity Areas

2. Habitat Enhancement and Connectivity:

Enhance local and regional connectivity where relevant for biodiversity values and Priority Biodiversity Areas

3. Threats:

Eliminate or mitigate key present and future threats to Marrickville’s biodiversity

4. Community and Partnerships:

Develop community engagement and education programs to engage the public to participate in the protection and enhancement of Marrickville’s biodiversity values and Priority Biodiversity Areas

5. Monitoring and Evaluation:

Implement an ongoing review program to measure the success of the Strategy

6. Knowledge Gaps:

Plan future research to address key questions that will help to better manage Marrickville’s biodiversity

Each of the above strategies is expanded on with key directions which are to be developed and carried out over a 10-year timeframe.

In order to prioritise future biodiversity works, potential sites around the Marrickville LGA were visited and assessed for their current and future biodiversity potential. This is intended as a guide to help prioritise on-ground actions in the Action Plan.

The areas are prioritised as follows (highest to lowest significance):

1. Tempe Reserve/Alexandra Canal
2. GreenWay
3. Cooks River Corridor (HJ Mahoney Reserve to Kendrick Park)
4. Cooks River Corridor (Marrickville Golf Course)
5. Dibble Ave waterhole
6. Fraser and Tillman Park
7. Urban Habitat Mosaic

The Strategy is divided into three reports. These are:

The Marrickville Biodiversity Strategy 2011–2021 (the Strategy)

The Strategy explains the rationale and context for Marrickville’s biodiversity planning. It provides an overview of Marrickville’s existing biodiversity values and sets out six strategic Focus Areas to conserve and enhance those values. Key directions for each Focus Area are to be actioned by Council’s Biodiversity Action Team over a 10-year time frame.

The Marrickville Biodiversity Action Plan 2011–2015 (the Action Plan)

The Action Plan is a practical, spatially oriented document that outlines specific on-ground actions and policy recommendations for the next 4 years. The Action Plan is a quick reference for staff developing planning documents or prioritising resources for on-ground works. The maps can be used to advise on-ground staff and guide their day-to-day management techniques.

Appendices to the Biodiversity Strategy and Action Plan (the Appendices)

The Appendices provide supporting documentation regarding the methods used to develop the Strategy and Action Plan and more detailed information regarding Marrickville’s biodiversity values and Focus Areas. Importantly, they contain protocols for scientific and community monitoring programs.

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1 Introduction

The Marrickville Council Biodiversity Strategy 2011–2021 (the Strategy) outlines Marrickville Council’s commitment to biodiversity management over a 10-year timeframe. It provides an overview of existing biodiversity values in the Marrickville Local Government Area (‘Marrickville’) and provides actions to guide biodiversity management over the next 10 years. The Biodiversity Strategy is in turn guided by the Marrickville Community Strategic Plan 2021.

The Strategy is divided into three reports. These are:

1. The Biodiversity Strategy 2011-2021 (this report)
2. The Biodiversity Action Plan 2011-2015
3. The Appendices to the Biodiversity Strategy and Biodiversity Action Plan

This report is the first of three documents. The Action Plan is a practical, spatially oriented document that outlines specific on-ground actions and policy recommendations for the next 4 years. The Appendices provide supporting documentation regarding the methods used to develop the Strategy and Action Plan and more detailed information.

1.1 What is Biodiversity?

Biological diversity, or biodiversity, has been described as the ‘web of life’, ‘the variety of living things’ or ‘the different plants, animals and micro-organisms, their genes and ecosystems of which they are a part’. Biodiversity encompasses every living thing that exists on our planet and the environment in which they live. From the smallest one-cell microbe to the enormous majesty of the blue whale. From the depths of the Pacific Ocean to peaks of our tallest mountains, biodiversity forms part of an intricate and interdependent web of life in which we are all a part (DSEWPaC 2011). The ecological and evolutionary processes which drive biodiversity can also be considered in its definition; these include dispersal, local extinctions and recolonisations, species interactions, migration, patch dynamics, adjustment of species’ distributions to climate change, and diversification of lineages (Sarkar et al 2006).

1.2 Why is Biodiversity Important?

At the most fundamental level, biodiversity supports the ecosystems that sustain life on this planet. The processes provided by biodiversity are often referred to as ‘ecosystem services’ and include plant pollination, soil formation, waste disposal, water filtration, food production, medicines and pest control, as well as providing cultural identity and recreational experiences. From the plant-pollinator interactions that allow our large-scale food harvesting, to the humble backyard Blue-tongue Lizard which preys upon garden-destroying snails, biodiversity supports humans in our everyday life.

1.3 Why a Biodiversity Strategy for Marrickville?

Council recognises that biodiversity is important and is committed to improving the natural environment. In turn, the Marrickville area hosts a highly environmentally aware and active community. Since 2003, Council has established approximately 10 hectares of native vegetation, including a range of vegetation community types predominantly in Tempe and parks along the Cooks River. The need had been identified for a strategy to guide and prioritise ongoing enhancement, maintenance and resourcing for these areas and set guidelines for future habitat development on Council land. In late 2009 Council committed to the Marrickville Cooks River Committee’s proposal

to enhance the Cooks River as a wildlife corridor. This decision was a key driver behind the development of the Biodiversity Strategy.

The development of the Marrickville Community Strategic Plan 2021 provided an opportunity to bring biodiversity to the foreground and align with some of the Plan's key outcomes.

This Strategy therefore aims to coordinate current and past efforts and prioritise future directions in order to achieve the best outcomes for Marrickville's biodiversity on both private and public land, while remaining realistic about the constraints which urbanisation place on the environment.

The methods used to develop the Strategy are described in the Appendix A.

1.4 Alignment with the Marrickville Community Strategic Plan

The Marrickville Community Strategic Plan 2021 defines the long-term aspirations and strategic directions for the whole community over the next 10 years. The vision of this plan underpins all of Marrickville Council's strategic planning documents. Sections relevant to the Biodiversity Strategy include the vision that:

In 2021, Marrickville's environment is healthy. Children can swim in the river and play in the dirt, and native plants and animals, including frogs, bees and ants, are thriving. The community is resilient to climate change and works together to minimise its ecological footprint and live sustainably.

The Biodiversity Strategy aligns with Key Result Area 3 (KRA3):

- *A well-planned, sustainable and accessible urban environment.*

The following outcome statements and associated strategies from KRA3 are particularly relevant to the Biodiversity Strategy:

- *Outcome 3.6 - Marrickville has thriving natural habitats*
 - *Create biodiversity corridors throughout the local area, including along the GreenWay*
 - *Restore the Cooks River and its foreshores*
- *Outcome 3.10 - The Community is active in finding creative solutions to complex urban sustainability issues*
 - *Develop community networks and capacity to create sustainable neighbourhoods*
 - *Support volunteers and the broader community in contributing to the environmental restoration and transformation of Marrickville*

Finally, the Community Target #20 by which the success of the Community Strategic Plan will be measured is defined as:

- *The number and diversity of plants and animals living around the Cooks River is increasing.*

2 Aim of this Strategy

The main aim of this Strategy is to preserve and enhance Marrickville's biodiversity values and the ecosystem services they provide.

2.1 Biodiversity Values and Ecosystem Services

Biological diversity has many attributes that are of existing and/or potential value to humans. These include ecosystem services, biological resources, and social, cultural and spiritual values. For the purposes of this Strategy, it is assumed that biodiversity has an intrinsic value, that is, that biological diversity is of itself a value regardless of its importance to humans. Further, for the purposes of this Strategy, it has been assumed that the elements that make up Marrickville's biological diversity are, in themselves, 'values'.

The Strategy recognises that Marrickville's biodiversity values are driven by a variety of processes that are integral to their persistence in their urban environment and that these are considered as 'ecosystem services'. The protection and enhancement of Marrickville's biodiversity values and ecosystem services forms the framework upon which all of the strategies are based.



Photo 1 (Left): Biodiversity provides food to community gardeners at Addison Road Centre, Marrickville. Photo 2 (Centre): Biodiversity has cultural and spiritual value, and is used during ceremonies. Here, local Elder Jenny Thomsen is conducting a smoking ceremony and Welcome to Country. Photo 3 (Right): Biodiversity provides ecosystem services. Ants feeding on nectar of Dwarf Apple (*Angophora hispida*) in turn help pollinate the flowers.

2.2 Strategic Focus Areas

To achieve this overall aim, the following strategic focus areas were developed:

1. Priority Biodiversity Areas
2. Connectivity
3. Threats
4. Community and Partnerships
5. Monitoring and Evaluation
6. Knowledge Gaps

The science and rationale behind the major aim and each of the focus areas are presented in the following section, and their more specific, associated strategies and key directions for biodiversity planning over the next 10 years are outlined in Section 4.

3 Setting the Scene

3.1 Biodiversity Legislation and Policy

There is a range of NSW and Commonwealth legislation and policy that addresses the conservation of biodiversity, in particular the conservation of threatened flora and fauna. Legislation and policy that is relevant to this Strategy has been identified and taken into consideration in the development of the Strategy. A brief discussion of the key legislation is provided below.

3.1.1 Commonwealth

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act lists matters that are considered to be national environmental significance. Of particular relevance to this Strategy are nationally listed threatened species, threatened ecological communities and listed migratory species. The EPBC Act provides for the development of Policy Statements and Recovery Plans for many of these taxa, lists Key Threatening Processes (KTP) and provides for the development of Threat Abatement Plans (TAP). Under the EPBC Act actions that could affect matters of national environmental significance should be assessed and, if the impacts are likely to be significant, referred to the Commonwealth.

3.1.2 State

Environmental Planning and Assessment Act 1979 (EP&A Act)

This EP&A Act provides a framework for the planning and assessment of development activities. It provides for the development of Local Environmental Plans and State Environmental Planning Policies. Under certain parts of the Act, councils are required to assess the impact of proposed developments, including their own activities on public land, on threatened species, populations and ecological communities.

Threatened Species Conservation Act 1995 (TSC Act)

The TSC Act and subsequent amendments lists species, populations and ecological communities that are considered to be threatened in NSW. The main objective of the TSC Act is to protect, and prevent the extinction of, the flora and fauna of NSW. The TSC Act also identifies Key Threatening Processes of relevance to NSW and provides for the development of Recovery Plans and TAPs. The Act also provides for the development of the NSW Threatened Species Priority Action Statement (PAS), which contains actions for the protection of threatened flora, fauna, populations and ecological communities.

National Parks and Wildlife Act 1974 (NPW Act) and National Parks and Wildlife Regulation 2009

All native mammals, birds, reptiles and amphibians and many species of native plants are protected in NSW under the NPW Act. Non-native animals (e.g. dogs, horses, and rabbits) are regarded as 'unprotected' under the NPW Act, but may be protected by other legislation (such as the *Prevention of Cruelty to Animals Act 1979*; *Companion Animals Act 1998*; *Non-Indigenous Animals Act 1987*; *Exhibited Animals Protection Act 1986*; or *Game and Feral Animal Control Act 2002*).

It is an offence to harm or possess protected fauna without a licence or development consent, although there are some exceptions (e.g. during routine farming activities or returning an animal after escape). Harming or killing a snake is not permitted unless the snake is causing a danger to person or property. Approval to harm or keep protected fauna may be obtained through application to the Office of Environment and Heritage (OEH). The OEH may also authorise groups, zoological park or individuals to rescue, rehabilitate and release protected fauna.

Native plants that are protected under the NPW Act are listed in Schedule 13 of the Act. It is also an offence to pick or possess a protected native plant without a licence. Approval to pick, grow, import or export protected native plants may be obtained through application to the Office of Environment and Heritage.

Local Government Act 1993 (LG Act)

The LG Act sets out the responsibilities of councils including public land management, and requires councils, councillors and council employees to have regard to the principles of ecologically sustainable development in carrying out their responsibilities. The Act also requires council land to be properly managed, developed, protected, restored, enhanced and conserved in a manner that is consistent with and promotes the principles of ecologically sustainable development. Under this Act, councils are required to have Plans of Management for all council-owned land.

Biodiversity Certification Assessment Methodology

This legislative mechanism aims to streamline development and biodiversity conservation at the local government level through enabling local government in areas with high development pressure to provide for the protection of biodiversity, including threatened species, at the strategic planning stage. Gazetted on 25 February 2011 (DECCW 2011), this was previously managed under the *Threatened Species Legislation Amendment Act 2004 (TSLA Act)*.

Native Vegetation Act 2003 (NV Act)

This Act regulates the clearing of native vegetation on all land in NSW, except for excluded land listed in Schedule 1 of the Act. The Act outlines what landowners can and cannot do in clearing native vegetation.

Noxious Weeds Act 1993 (NW Act)

The NW Act lists and categorises declared noxious weeds and specifies required control measures for public and private landholders. Noxious weeds declared for Marrickville are discussed in the Threats Strategy Focus Area.

Crown Lands Act

Land that is owned and managed by State Government is Crown land and includes Crown lands held under lease, licence or permit; community managed reserves; lands retained in public ownership for environmental purposes; lands within the Crown public roads network; many tidal and non-tidal waterways; and other unallocated lands. The CL Act deals with the sale, occupation and management of Crown Land.

The relationship of the Strategy with some of the main Commonwealth, State and local planning instruments and strategy documents is illustrated in Figure 1.

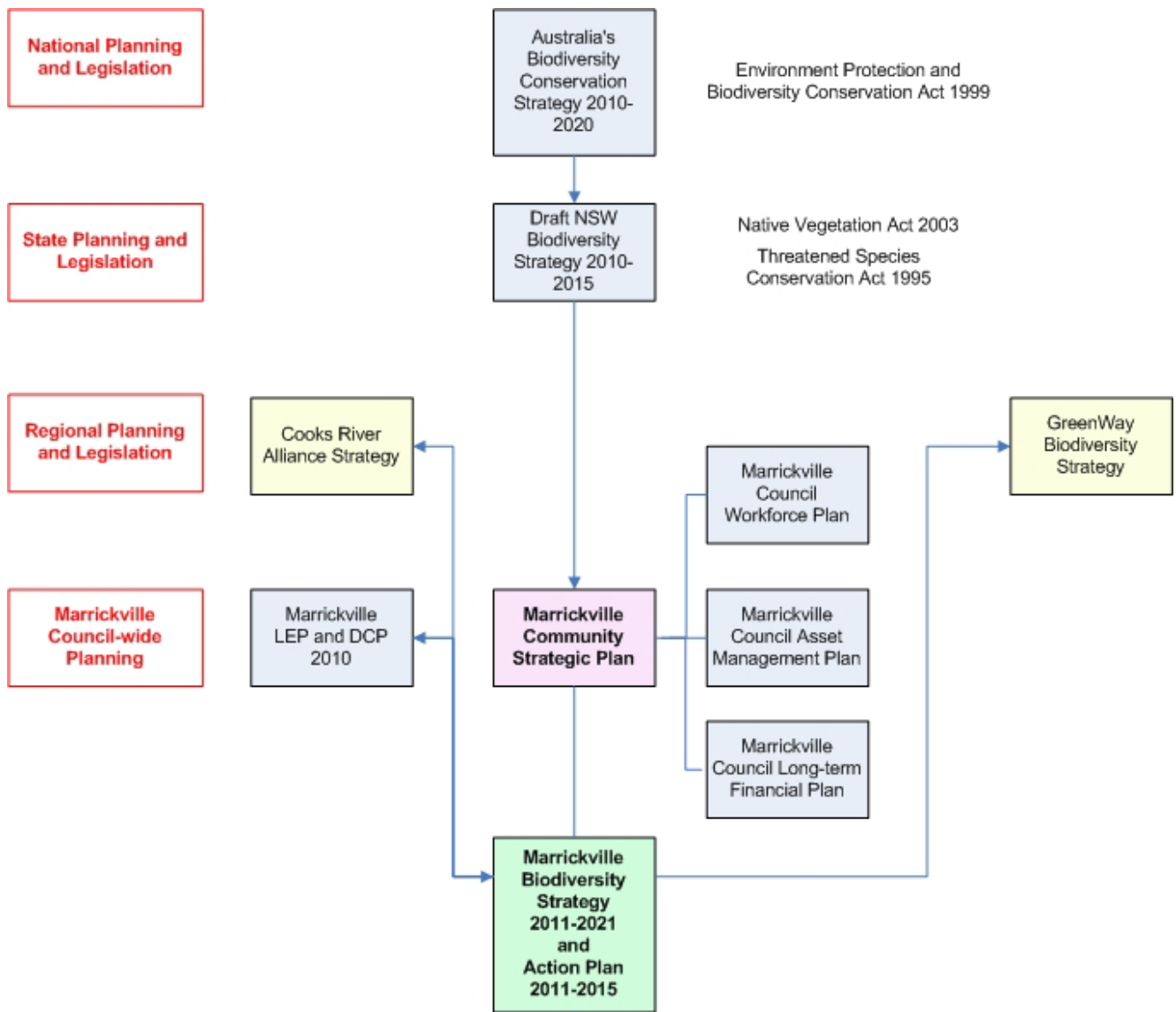


Figure 1. A snapshot of the planning context for the Biodiversity Strategy 2011 -2021 and Action Plan 2011 - 2015.

3.2 Historical and Regional Context

Prior to European settlement in 1789, the Marrickville area consisted of tidal mudflats, mangrove and saltmarsh areas that were watered by the Cooks River and were teeming with shellfish, fish nurseries and a diversity of waterbirds. These areas were bordered by Swamp Oaks and reed beds, leading up to dryer sandstone forest and heath, which was dispersed within rocky sandstone outcrops where a variety of reptiles basked. Northwards towards areas of higher elevation, tall Turpentine-Ironbark forests grew, where kangaroos, arboreal mammals and bat species were likely to abound. This forest contained the Gumbramorra swamp, a complex of freshwater and brackish wetlands running between today's suburbs of Marrickville and Sydenham. This was likely to be a popular campsite for the Cadigal Wangal people because of the availability of freshwater and abundance of food resources (Marrickville Council 2010a).

Following European settlement in 1789, wetlands in Marrickville were filled in to support a sparsely populated rural area. Between the 1890s and 1920s, Marrickville grew to a densely populated industrial area and by 1948 the population was greater than it is today. Marrickville boasted tanneries, brickworks, quarries and a flour mill among other industrial developments while the Cooks River, once an idyllic picnic spot in the late 1800s, hosted two dams, concrete and steel sheet piling banks and sewerage and industrial outflows. The highly polluted nature of the Cooks River was the subject of much public attention in the 1970s and since that time, through collaboration between councils in its catchment (notably the Cooks River Foreshores Working Group), state agencies and community organisations, the health of the river has greatly improved (Canterbury Council 2010).



Photo 4: Following European settlement, many areas of the Cooks River were highly modified.

Figure 2 shows the location of Marrickville LGA in the context of its surrounding environment, showing river systems and its proximity to the Sydney CBD. Figure 3 compares the industrial landscape of 1942 with the relatively vegetated banks of the present day along Cooks River from the Marrickville Golf Club in the west to Alexandra Canal in the east.

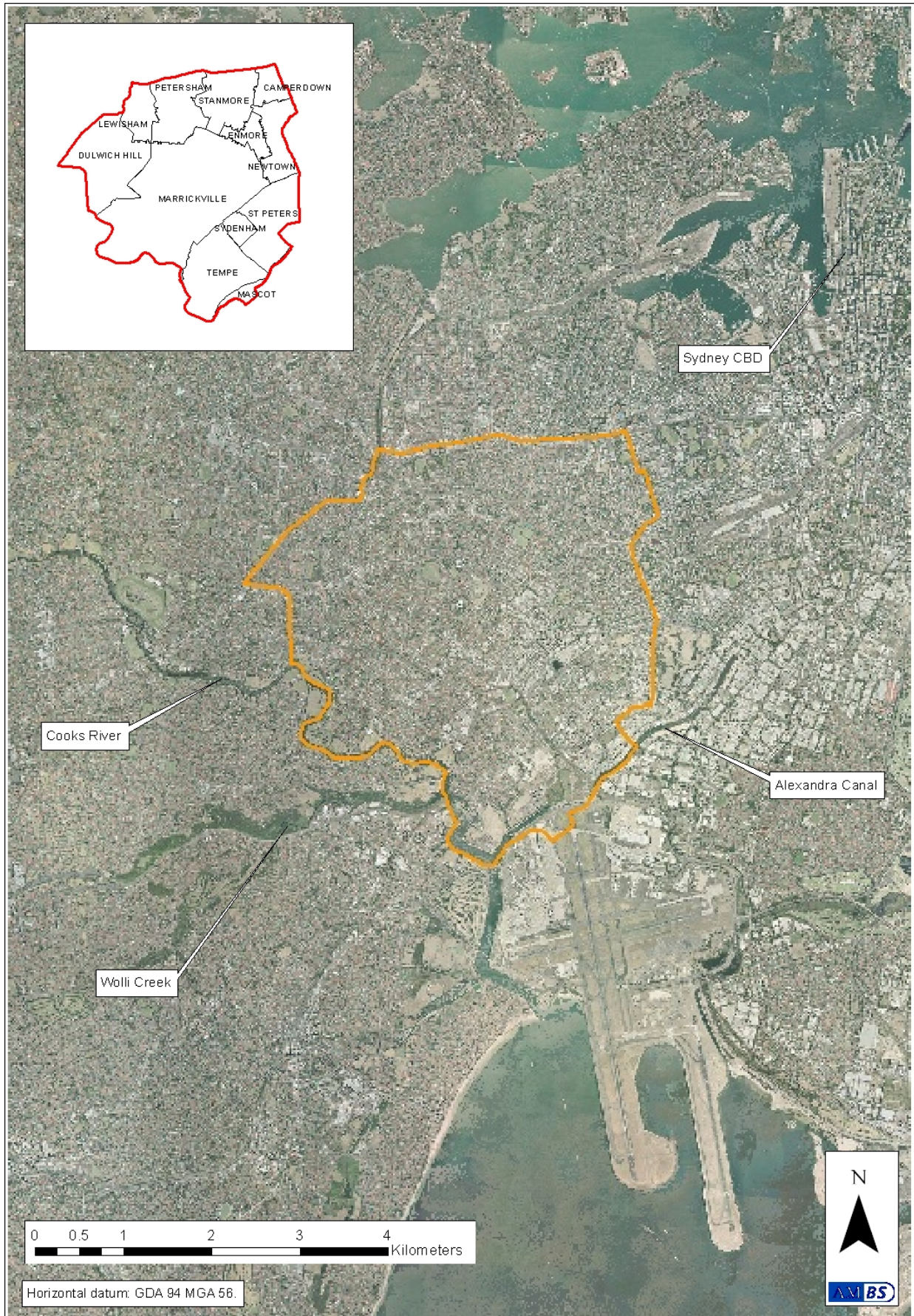
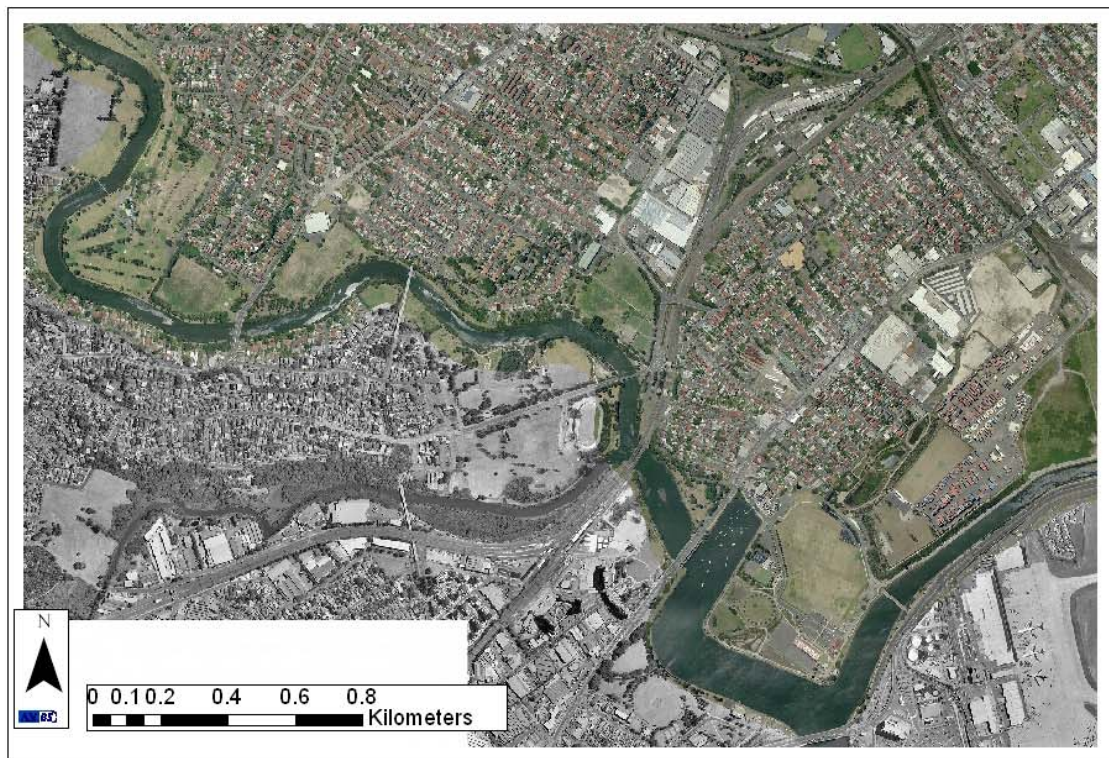


Figure 2. The location of Marrickville LGA in the context of its surrounding environment.



Aerial photos © Copyright Marrickville Council 2009 Horizontal datum: GDA 94 MGA 56.

Figure 3. Marrickville 1942 (top) and 2009 (bottom). The cleared foreshores of the Cooks River in 1942 and the partially restored vegetation of the present day can be seen.

3.3 Biodiversity in Marrickville today

Today, the Marrickville LGA is densely populated with residential and industrial areas. In an urban setting, rivers and rail corridors provide some of the largest stretches of continuous vegetation in the urban environment, for example, the GreenWay corridor, which extends through the Marrickville LGA from the Cooks River to Iron Cove. Scarce remnants of the previous vegetation communities exist along the old freight rail corridor, as well as the on the banks of the Cooks River and around sandstone outcrops. This riparian system also includes a varying amount of native vegetation, stretching inland to near Bankstown and draining into Botany Bay. Wetland systems in Tempe Reserve within the Marrickville LGA form a loose chain with wetland areas of the adjoining Rockdale and City of Sydney LGAs. Vegetation assemblages consistent with the composition of these earlier plant communities are being re-established in places by Council's on-ground works.



Photo 5: Saltmarsh at Steel Park along the Cooks River in 2011. This saltmarsh is one of several original vegetation assemblages being re-established in the area.

As it is impractical to develop planning measures for every one of the countless elements which make up Marrickville's present and potential biodiversity, criteria to prioritise a number of 'biodiversity values' were developed. These criteria assessed the conservation significance of different values, the potential for their enhancement in the Marrickville LGA and the likely impacts on other elements of biodiversity. Through selection of values based on functional groups and ecosystem services, along with consideration of ecological processes that influence biodiversity, it is intended to provide planning measures that will benefit the biodiversity of Marrickville as a whole. Biodiversity values that have been currently recorded, historically recorded/predicted, or recorded in nearby similar habitat or areas within potential for connectivity (e.g. Wolli Creek) have been considered.

A visual summary of Marrickville's biodiversity values is shown in Figure 4 and each value is discussed in more detail below.

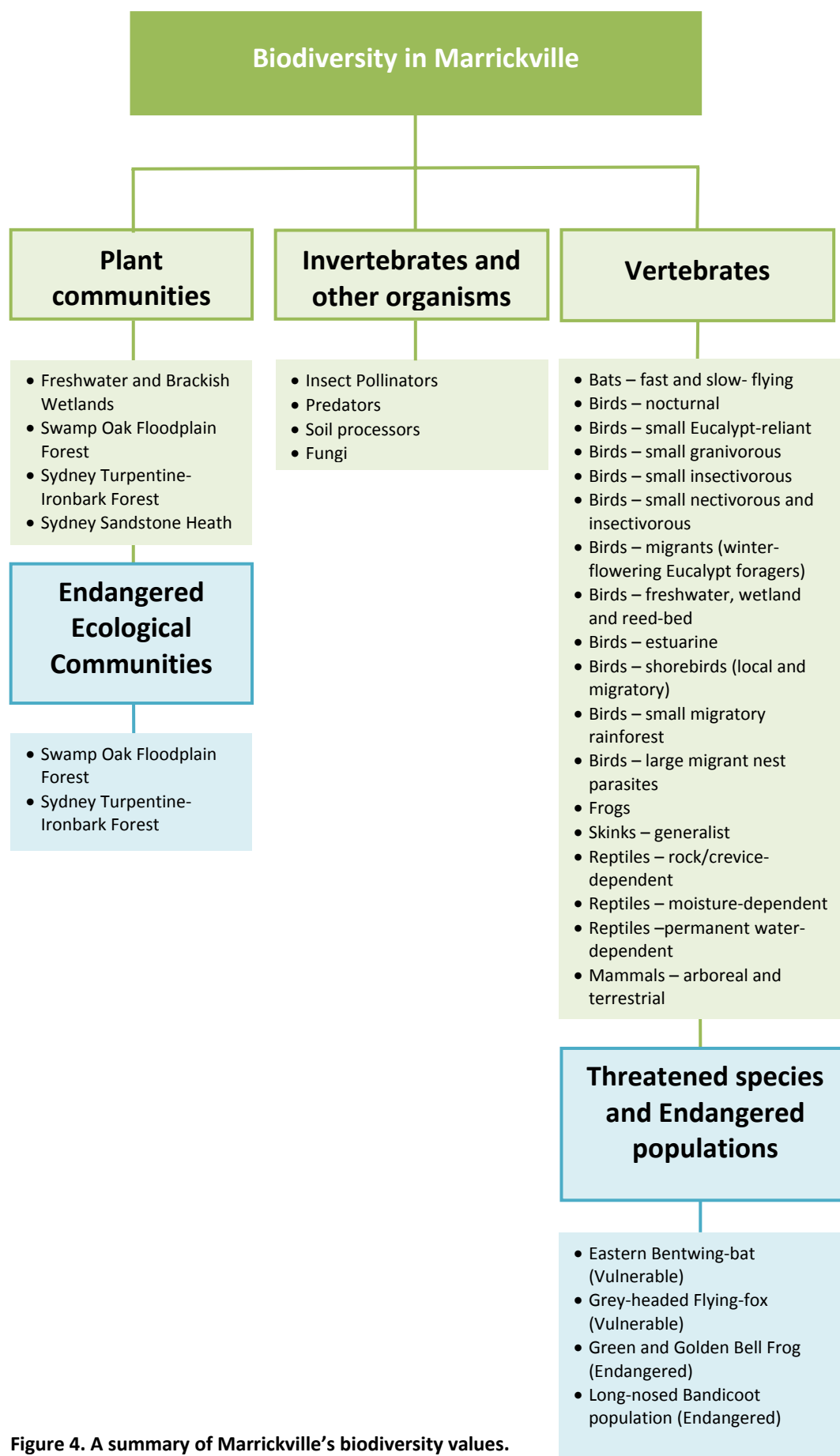


Figure 4. A summary of Marrickville’s biodiversity values.

3.3.1 Plant Communities

Marrickville currently hosts a variety of vegetation across the LGA. This includes horticultural gardens, remnant native canopy with mown understorey in parks and recreation areas, combinations of weedy and remnant species throughout rail corridors, remnant mangrove, saltmarsh and reed beds, replanted indigenous native plant communities, constructed wetlands and swales, private and community gardens and street trees.

While a variety of vegetation types will provide important habitat for Marrickville's invertebrate and vertebrate biodiversity values, this section considers the importance of Marrickville's indigenous plant communities both in their remnant and re-planted form. While care must be taken to consider changed conditions within urban environments such as soil profile, nutrient loads and water regimes, re-establishing indigenous, local provenance vegetation can be the best way of enhancing local biodiversity for the following reasons:

- local plant communities and associated mycorrhizal fungi are adapted to suit local environmental conditions such as geology and soil profile, rainfall, water regimes, temperature and elevation
- animal communities often form strong associations with plant communities, meaning establishment of local plant communities is more likely to encourage local pollinators, herbivores and their associated predators into the area
- most of the plant communities indigenous to Marrickville are Endangered Ecological Communities (EECs), which are fragmented and declining in distribution across Sydney. As such, well-planned re-establishment of these communities can benefit the recovery of these communities as a whole

The main indigenous plant communities in Marrickville are:

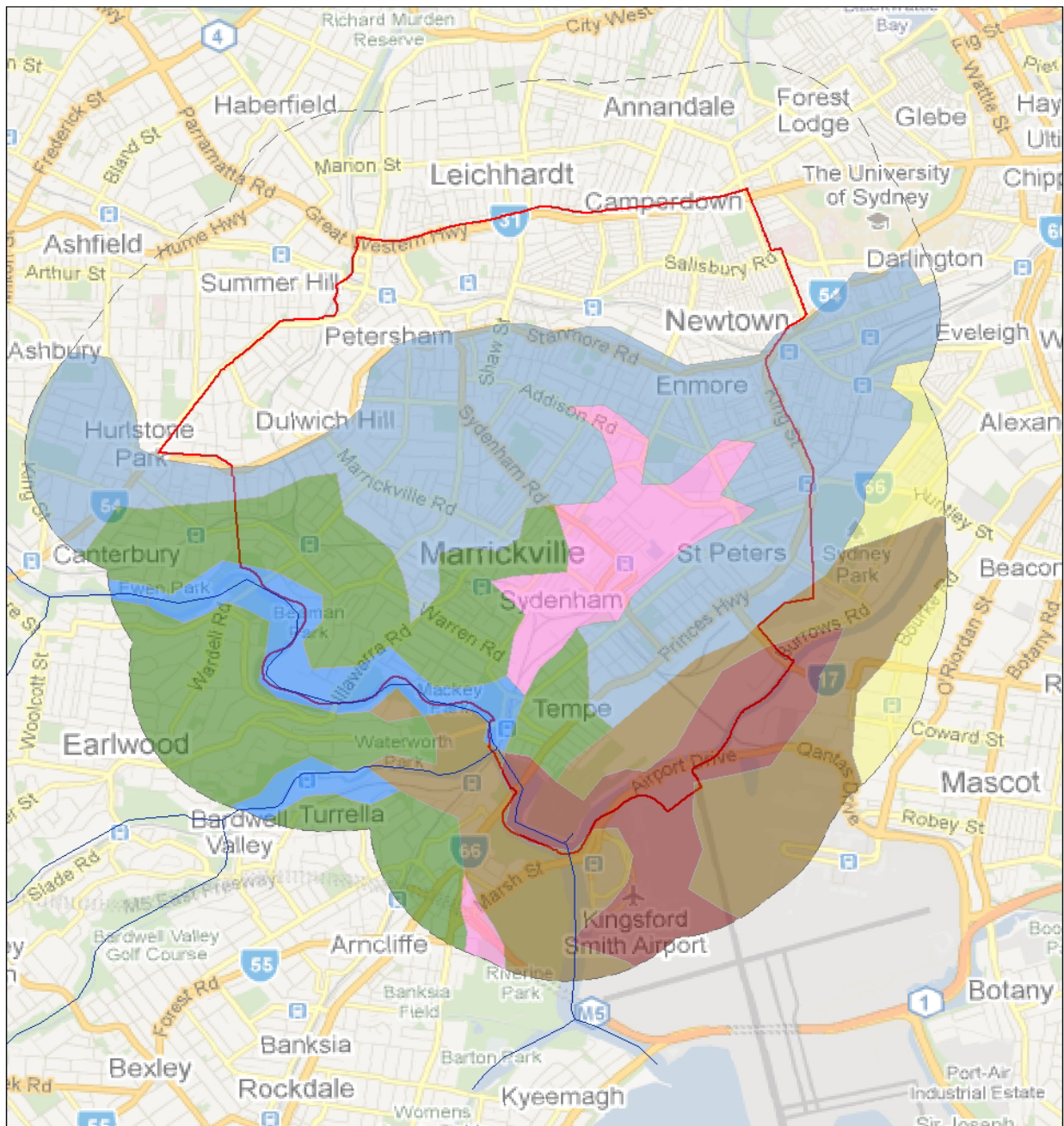
- Sydney Turpentine – Ironbark Forest
- Sydney Sandstone Heath
- Swamp Oak Floodplain Forest
- Freshwater and Brackish Wetlands
- Mangroves and Saltmarsh

Swamp Oak Floodplain Forest and Sydney Turpentine-Ironbark Forest are considered further in the Threatened Species, Populations and Ecological Communities section. The freshwater and brackish swamps of Marrickville are not considered to be part of the threatened ecological community *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (TSC Act) as they have been artificially constructed and no remnants of natural freshwater wetlands remain. Mangroves and Saltmarsh are also not considered in this Strategy as they considered in separate regional planning for estuarine vegetation.

A summary table of the main plant communities, their representative species, their status, condition/resilience in Marrickville and ecosystem services they provide are listed in Appendix B.

A full list of plant species previously recorded in the LGA, their conservation status and date last recorded is provided in Appendix H. This list includes threatened plant species which have been recorded in Marrickville in the last 10 years.

Figure 5 shows pre-European vegetation communities, reproduced from Benson et al. (1999), while some examples of contemporary native plant communities are shown in Figure 6. Figure 6 also includes Endangered Ecological Communities identified by SMCMA, which include some Swamp Oak Floodplain Forest.



Legend

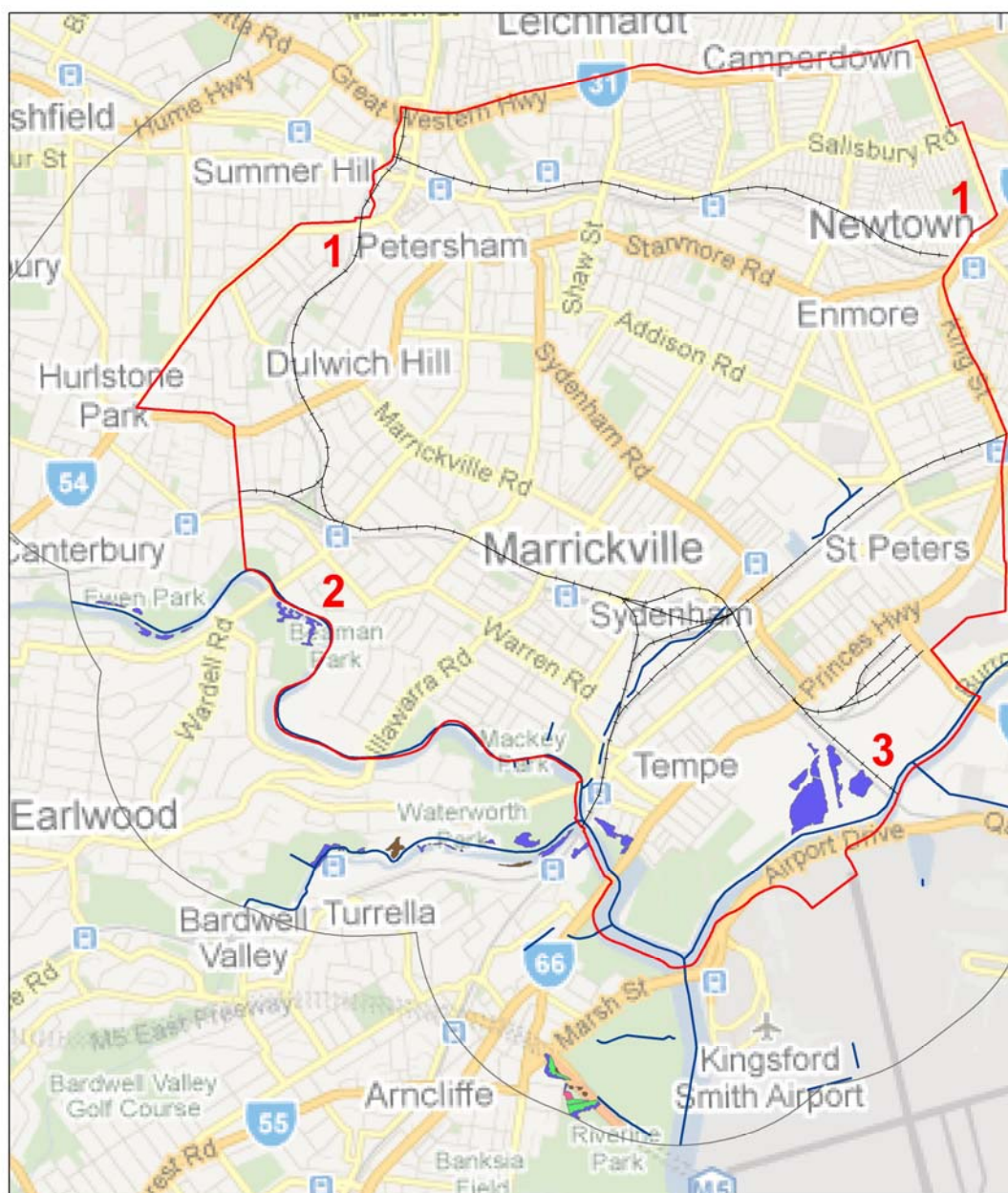
Vegetation Type

- Clay Plain Scrub Forest
- Floodplain Forest
- Sandstone Vegetation (Forest Woodland & Heath)
- Banksia Scrub
- Freshwater & Brackish Swamp
- Mangroves and Saltmarsh
- Mudflats
- Turpentine-Ironbark Forest

- Marrickville LGA
- Marrickville LGA 1km buffer
- Watercourses



Figure 5. Plant communities of the Cooks River Valley – historical vegetation extent. From “Missing Jigsaw Pieces – The Bushplants of the Cooks River Valley (Benson et al 1999), © Royal Botanic Gardens, Sydney.



Endangered Ecological Communities

- Coastal Saltmarsh
- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains
- Sydney Freshwater Wetlands

SMCMA vegetation and corridor data © Copyright SMCMA 2010.
Wildlife Atlas data © Copyright DECCW 2010.
Horizontal datum: GDA 94 MGA 56.

0 0.5 1 2 km



Figure 6. Examples of Marrickville's native plant communities – present day.

1. Degraded remnants of Sydney Turpentine – Ironbark Forest occur in the GreenWay and Camperdown Cemetery.
2. Sydney Sandstone and Sandstone Heath remnants occur around rocky outcrops at Marrickville Golf Course and along the Cooks River foreshore.
3. Swamp Oak Floodplain Forest also occurs along the Cooks River foreshore and some level of remnant exists at Container Park Wetland in Tempe along Alexandra Canal.

3.3.2 Vertebrates

Vertebrates are often the focus of urban biodiversity planning for several reasons. Firstly, they are often conspicuous in the urban environment, providing humans with direct contact to their environment and help to engage the community with conservation. Second, conspicuous species such as birds are relatively easy and less expensive to monitor. Lastly, vertebrates, as they are often at the top of the food chain, can act as indicators for changes in ecosystem condition (Sergio et al. 2008).

For the purpose of this Strategy, vertebrates have been placed into broad functional groups which relate to the ecosystem services they provide. For example, the Grey-headed Flying-fox is a threatened species that is declining nationally, but is important in distributing rainforest fruit seeds, effectively planting new rainforests and increasing the genetic diversity of existing rainforests, over a range of hundreds of kilometres. A more detailed summary of Marrickville's vertebrate values is provided in Appendix C and outlines the functional groups, some examples of representative species, examples of ecosystem services they provide and whether or not they are a target biodiversity value for this Strategy. The functional groups that are targeted as part of this Strategy include:

- Frogs
- Rocks/crevice dependent reptiles
- Moisture dependent reptiles
- Permanent water dependent reptiles
- Nocturnal birds
- Migrants foraging on winter flowering eucalyptus
- Small granivorous birds
- Small nectarivorous and insectivorous birds
- Freshwater wetland and reed bed birds
- Small rainforest migratory birds
- Long nosed Bandicoot endangered population
- Flying Foxes
- Microbats

3.3.3 Threatened Species, Populations and Ecological Communities

State Legislation

The NSW Threatened Species Priorities Action Statement (DECC 2007) is the NSW Government's approach for planning and implementing actions to recover threatened native plants and animals and manage the threats they face. The highest priority actions relevant to Marrickville from the Priority Action Statement (PAS) are listed below.

- | | |
|--|------------|
| • Sydney Turpentine–Ironbark Forest | EEC |
| • Swamp Oak Floodplain Forest (<i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>) | EEC |
| • Long-nosed Bandicoot (<i>Perameles nasuta</i>) population in inner western Sydney | Endangered |
| • Green and Golden Bell Frog (<i>Litoria aurea</i>) | Endangered |
| • Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) | Vulnerable |
| • Eastern Bent-wing Bat (<i>Miniopterus orianae oceanensis</i>) | Vulnerable |

While Green and Golden Bell Frogs have not recently been found within Marrickville, the area is part of their historical range. There have been reintroduction efforts in the past, and efforts to improve Green and Golden Bell Frog habitat will be consistent with the aims of the *Management Plan for the Green and Golden Bell Frog Key Population of the Lower Cooks River* (DECC 2008a). This plan, as well as relevant guidelines for protecting and restoring Green and Golden Bell Frog habitat (DECC 2008b;

DECC 2008c) have been considered in biodiversity planning and development of *Frog-friendly WSUD design guidelines*, which can be found in Section 5 of the Action Plan.

Commonwealth Legislation

The Department of Sustainability, Environment, Population and Communities (DSEWPaC) plans for conservation of its protected entities through development of recovery plans and conservation advices. Conservation advices are similar to Priority Action Statements and include practical on-ground activities that can be implemented by local communities, natural resource management groups or interested individuals, such as landholders, as well as containing broader scale actions. Requirements regarding Marrickville's threatened biodiversity values under the relevant federal conservation advices and recovery plans are reviewed below.

- | | |
|---|--------------|
| • Sydney Turpentine–Ironbark Forest | Critical EEC |
| • Green and Golden Bell Frog (<i>Litoria aurea</i>) | Vulnerable |

Threatened Taxa of Lower Relevance to Marrickville

- | | |
|--|--|
| • Pied Oystercatcher (<i>Haematopus longirostris</i>) | Vulnerable (TSC Act) |
| • Swift Parrot (<i>Anthochaera phrygia</i>) | Endangered (TSC Act) |
| • Regent Honeyeater (<i>Anthochaera phrygia</i>) | Critically Endangered (TSC Act)
Endangered & Migratory (EPBC Act) |
| • Powerful Owl (<i>Ninox strenua</i>) | Vulnerable (TSC Act) |
| • East-coast Freetail Bat (<i>Micronomus norfolkensis</i>) | Vulnerable (TSC Act) |

Figure 7 shows the threatened species, populations and communities that have been recorded within and 1km around the Marrickville LGA over the last 10 years.



Photo 6 (left): The grassland at the back of Camperdown Cemetery is recognised as a remnant of Sydney Turpentine-Ironbark Forest. **Photo 7 (right):** A Green and Golden Bell Frog.

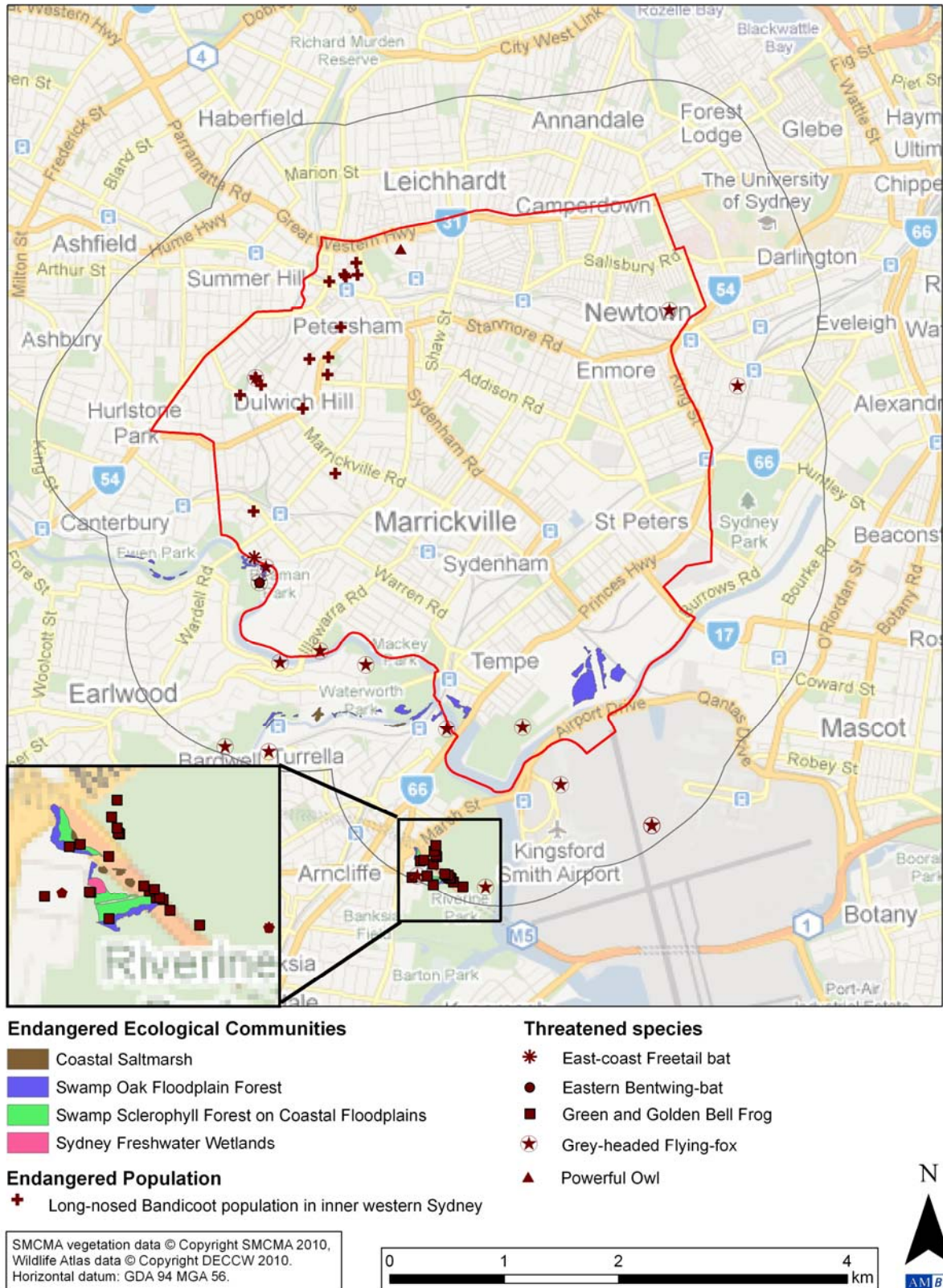


Figure 7. The threatened species, populations and ecological communities that have been recorded within and 1 km around the Marrickville LGA in the last 10 years.

3.3.4 Invertebrates and other organisms

Invertebrates form the vast majority of global diversity worldwide (measured as numbers of named organisms) and provide essential ecosystem services, from pollinating our food crops to recycling nutrients in our soil. As shown in Figure 8, invertebrates represent about 71% of known biodiversity, compared to 18% for plants and algae and 1% for vertebrates. Notably, other organisms such as fungi, protists and other non-animal taxa also show significant levels of diversity, despite their little-known status.

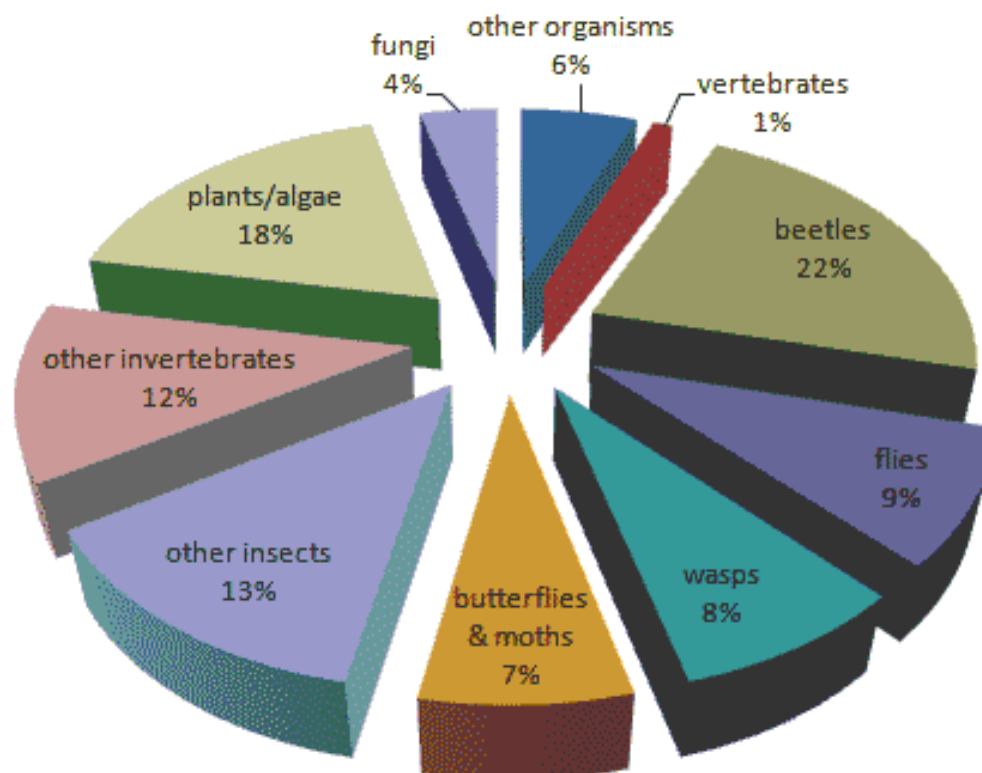


Figure 8. Relative Invertebrate Biodiversity. This chart presents the relative proportions of named organisms worldwide divided into functional groups (Conrad, 2009).

The invertebrate fauna of Marrickville has been identified as a key knowledge gap and their assessment is outside the scope of the Strategy. While they are only briefly discussed in this document, they have been included based on their role in essential ecological processes that drive biodiversity.

A summary of some of the functional groups of invertebrates, their representative taxa and ecosystem services that they provide (often along with other organisms such as fungi) can be found in Appendix D.

3.4 Why these Strategic Focus Areas?

The six Strategic Focus Areas have been developed to achieve the overall aim. Each of these strategies is expanded on with key directions, which are to be developed and carried out over a 10-year timeframe.

The following provides the context for choosing each of the Strategic Focus Areas and how they relate to the overall aim of protecting and enhancing the biodiversity values and ecosystem services they provide.

3.4.1 Priority Biodiversity Areas

Almost every part of the Marrickville LGA contains some degree of biodiversity, but some areas provide more opportunities than others in being able to provide habitat for a larger variety of species.

In order to prioritise future biodiversity works, potential sites around the Marrickville LGA were visited and assessed for their current and future biodiversity potential according to their key habitat values, local and regional connectivity potential, plant communities and other key biodiversity values that are present or likely to be present (Appendix C). This is intended as a guide to help prioritise on-ground actions in the Action Plan.

The areas are prioritised as follows (highest to lowest significance):

1. Tempe Reserve/Alexandra Canal
2. GreenWay
3. Cooks River Corridor (HJ Mahoney Reserve to Kendrick Park)
4. Cooks River Corridor (Marrickville Golf Course)
5. Dibble Ave waterhole
6. Fraser and Tillman Park
7. Urban Habitat Mosaic

Marrickville's Priority Biodiversity Areas (PBAs) are represented in Figure 9.



Photo 8: The GreenWay is recognised as a Priority Biodiversity Area as it provides continuous vegetation that connects the Cooks River to Iron Cove. This photo shows the rail corridor cutting into some remnant Sydney Turpentine-Ironbark Forest at Dulwich Hill.

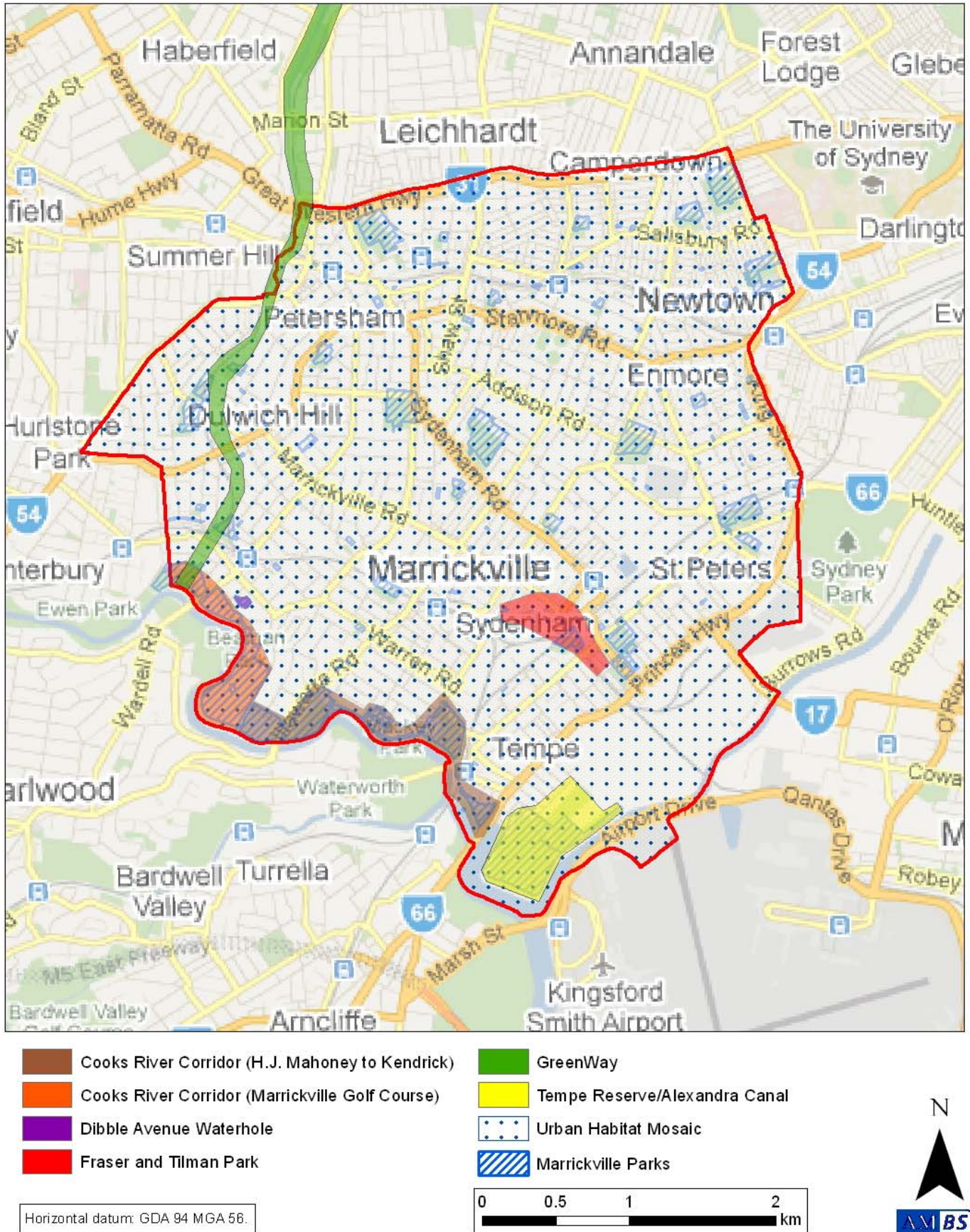


Figure 9. Marrickville’s Priority Biodiversity Areas.

3.4.2 Habitat Enhancement and Connectivity

In 2009, the Council unanimously supported the Marrickville Cooks River Committee's proposal to develop the Cooks River as a Wildlife Corridor as a key biodiversity strategy. The focus on the Cooks River as a wildlife corridor is appropriate for the following reasons:

- The majority of native vegetation in Marrickville occurs along the Cooks River, which is patchily linked to good quality native communities in Wolli Creek Regional Park and diverse native communities within Tempe Reserve and Alexandra Canal. These plant communities provide foraging resources, structural sheltering habitat and potential breeding habitat for a range of Marrickville's fauna
- There is community and political will to restore the Cooks River environment, with active working groups, committees, Bushcare groups and government agencies working to restore the area.

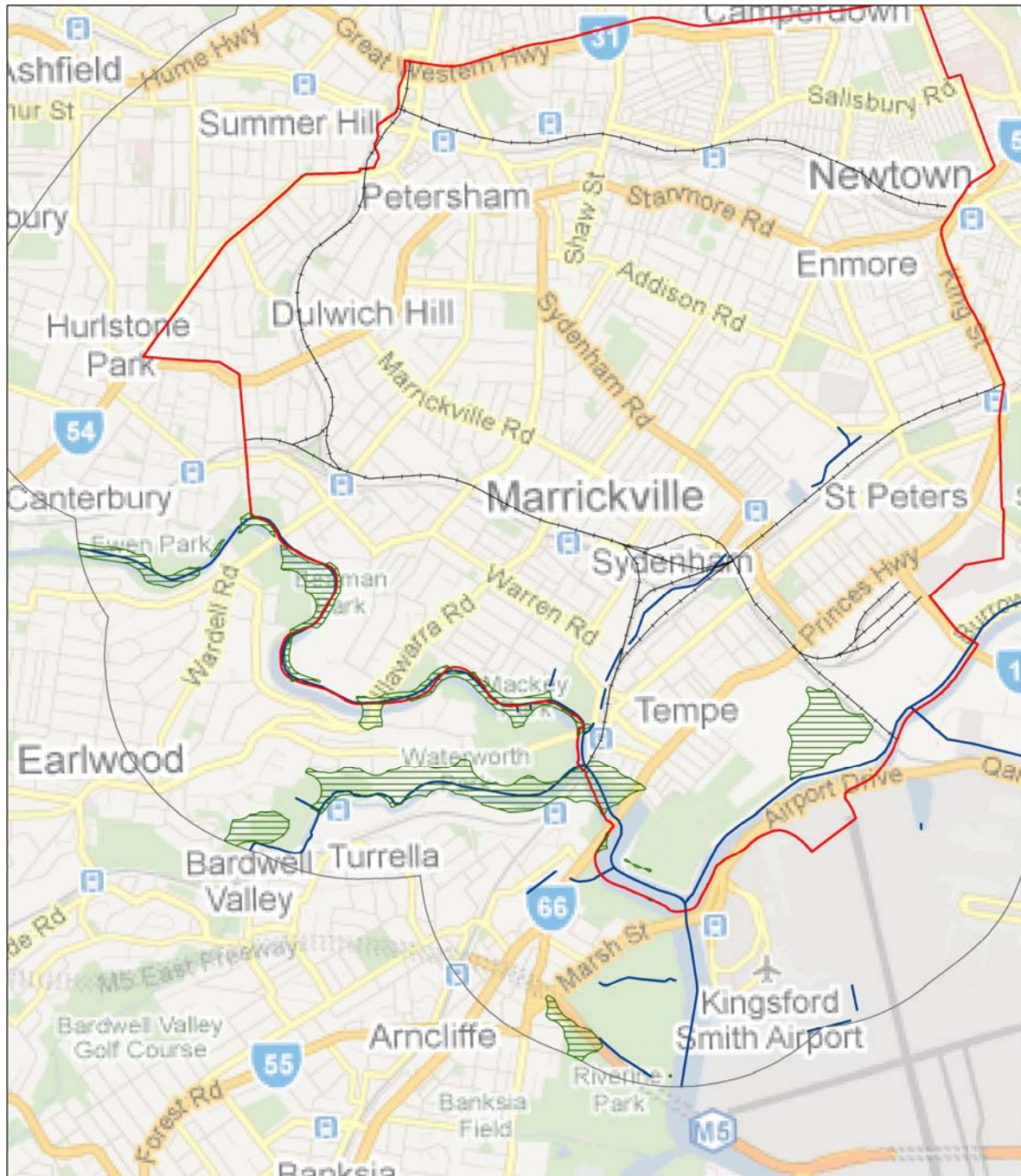
In 2010, the SMCMA conducted an assessment of the Sydney Metropolitan Catchment to identify and prioritise potential riparian and biodiversity corridors (Kerswell and Daly 2010). This study focussed on vegetation features and riparian zones, although some general dispersal barriers and opportunities were considered. As shown in Figure 10, Marrickville LGA contains four corridor fragments of the group 'Corridors connecting vegetation along riparian zones' along the Cooks River and Alexandra Canal with priority scores ranging from 8–14 (where 6 is the lowest priority and 17 the highest). This mapping provides a useful regional-scale context to increasing connectivity by enhancing what is already there.

Corridor projects have been criticised in the past for:




- focussing on direct, linear linkages of vegetation only
- neglecting to specify the flora or fauna for which they are aiming to increase connectivity for
- directing time and resources to improving linkages which would be better spent on enhancing existing habitat.

Landscape patterns that promote connectivity for species do not necessarily imply continuous linear strips of habitat, and could be stepping stones or habitat mosaics depending on the particular requirements of the species (Bennett 2003). At a local scale, connectivity could mean appropriately spaced patches of suitable habitat, allowing species to move between breeding areas, or to shelter during the non-breeding season. In urban environments, connectivity for species could consist of low dense shrubs along backyard fence lines, allowing Blue-tongue Lizards, small birds, invertebrates and possums to move around their territories, sometimes spanning many yards, sheltered from dog and cat predation.

In Marrickville, planning for habitat enhancement and connectivity for Marrickville's biodiversity values has been undertaken by assessing the potential for and importance of local and regional connectivity of their habitats according to each value's respective mobility, life-cycle habitat requirements, life-cycle dispersal requirements and ability to cross urban barriers. These have been represented spatially in the 'Habitat and Connectivity' maps in the Action Plan (Section 2: Marrickville's Biodiversity Values), giving a biotic context to the recommended on-ground actions.



SMCMA vegetation and corridor data © Copyright SMCMA 2010.
Horizontal datum: GDA 94 MGA 56.

-  SMCMA 2010 biodiversity corridors
-  Railways
-  Watercourses

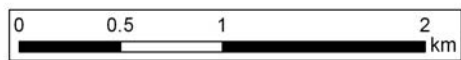


Figure 10. Regional – scale biodiversity corridors.

3.4.3 Threats

The key threats impacting biodiversity in Marrickville have been prioritised based according to their State or National significance (listing as a Key Threatening Process on the TSC and/or EPBC Acts), the risk and severity of impact on local biodiversity and the number of Marrickville's biodiversity values they are likely to impact.

The key threats to Marrickville's biodiversity, both existing and emerging, are summarised below, listed in order of most to least significant:

- Habitat removal and land management practices
- Exotic pests and companion animals
- Native pests
- Weed invasion
- Disturbance - light, noise, traffic
- Climate change (emerging threat)
- Exotic pests (emerging threat)
- Contamination, diseases, pathogens

These threats are further discussed in Appendix D and a visual summary of Marrickville's biodiversity threats is represented in Figure 11.

Biodiversity threat or public nuisance?

The following two species, increasingly common in urban environments, are considered pests by some and are often assumed to pose a threat to urban biodiversity. However, current evidence suggests they are not a threat to Sydney biodiversity.

The **Australian White Ibis** (*Threskiornis molucca*) occurred traditionally in the inland wetlands of the eastern states. Through a combination of releases of captive-bred birds and decreasing availability of habitat due to water diversions and drought, Ibis reached numbers of up to 8,900 in the Sydney region in 2008 (Martin et al. 2010). This has led in an increasing perception of the Ibis as an urban pest due to aircraft collisions, noise, smell and perceived health hazards, despite the lack of supporting scientific evidence. It has been suggested that urban refuge sites are important for the persistence of the Ibis during drought periods (Corben and Munro 2008). As at 2008, Marrickville LGA supported around 300 White Ibis, making it one of the top 10 White Ibis breeding locations in Sydney. In response to an increase in community complaints about the noise, smell and perceived health hazard of the Ibis, Marrickville Council commissioned an Australian White Ibis Management Plan in association with the National Parks and Wildlife Service in 2008 (Marrickville Council, 2008). Many of the actions within the plan have been or are currently being undertaken by Marrickville Council.

The **Common Myna** (*Acridotheres tristis*), also known as the Indian Myna, is an exotic bird of Southern Asian origin, which has colonised urban environments along the East Coast of Australia. The Myna is regarded widely as a significant pest, and was awarded 'Pest of Australia' in a 2005 ABC public survey, gaining 82% of votes. This species has been reported widely as a threat to biodiversity based on a handful of studies in Canberra (Tidemann, 2001; CIMAG, 2010) leading to many local councils prioritising resources for Common Myna education, monitoring and eradication programs (for example, Blacktown, Ku-ring-gai and The Hills Shire councils). Recent work across 18 sites throughout Sydney has indicated that Common Mynas in Sydney use significantly fewer tree hollows than native species, did not initiate a significantly greater number of aggressive encounters than native species and rarely interfered with foraging of native birds (Lowe et al. 2010a). In addition, an earlier Sydney study showed no negative correlations between the presence of Mynas and native birds (Parsons et al. 2006).

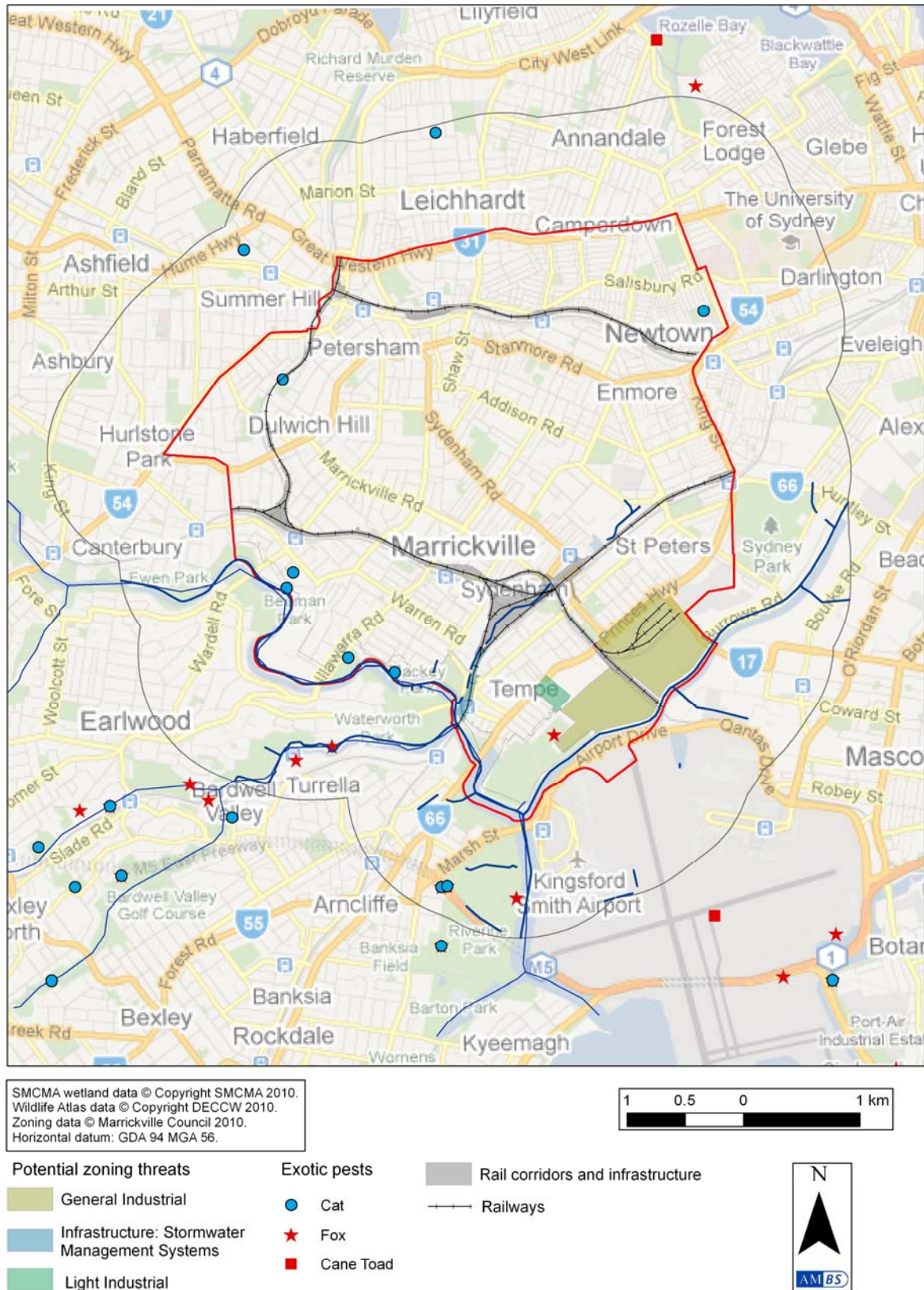


Figure 11. A summary of Marrickville’s biodiversity threats.

3.4.4 Community and Partnerships

Overall, the Marrickville LGA has a very active and engaged community. Getting people talking and sharing, contributing to action and monitoring biodiversity in the area are all a part of the community and partnerships strategy.

The Marrickville Community Strategic Plan 2021 seeks outcomes that 'Marrickville has thriving natural habitats' and 'the community is active in finding creative solutions to complex urban sustainability issues'. These emphasise that the success of the Biodiversity Strategy rests on the collective actions of residents, businesses and organisations who Council can support in achieving a more biodiverse Marrickville.

As part of the background research for this Strategy, Marrickville Council and the Australian Museum conducted a snapshot community survey entitled '*What Wildlife is in Your Backyard?*'. The survey collected records of under-researched, seldom-seen fauna which make up a large proportion of the vegetated areas in the Marrickville LGA (see Appendix G). Even as a snapshot this survey brought in some unusual reports, including a Broad-tailed Gecko, Red-bellied Black Snake and Peron's Tree Frog.

There are a number of existing community groups and activities run by or supported by Council that focus on improving biodiversity through on-ground work, including:

- Marrickville Community Nursery
- Marrickville Landcare Group
- Friends of Camperdown Cemetery
- Friends of the Cooks River Valley Garden
- Inner West Environment Group (IWEG) and GreenWay Bushcare
- Bush Pockets
- Groundwork groups
- Community water working groups
- Mudcrabs Cooks River Eco Volunteers
- National Tree Day

Marrickville has developed a broad base of other council, State government, corporate and community partners during its work in biodiversity conservation to date (and sustainability more broadly). While there is a range of potential partners, those who are likely to play the largest role are:

- Cooks River Alliance
- GreenWay councils
- Marrickville Cooks River Committee
- Environment Committee
- Cooks River Valley Association
- WIRES - Inner West branch

It is recognised that the message for biodiversity needs to focus on its importance to a sustainable society. Methods will need to range from simply drawing it to people's attention to empowering people to take action and advocate for biodiversity.

3.4.5 Monitoring and Evaluation

The success of the Strategy will be monitored and evaluated in four ways:

1. Through a scientific monitoring program that includes changes in Marrickville's biodiversity using biodiversity surrogates
2. Through community monitoring and surveys
3. Through annual performance reporting as part of Council's Delivery Program, Operational Plan and State of Environment Report
4. By reviewing on-ground achievements of the Action Plan at the completion of 2015

Scientific monitoring: the role of biodiversity surrogates

In the past, fauna surveys were conducted (1996 and 2007) to determine fauna species assemblages within the Marrickville area and compare changes over time. As monitoring all of Marrickville's biodiversity values would be prohibitive, two fauna groups have been chosen as focus groups for Marrickville's biodiversity monitoring program. These are:

- Urban bird communities, including:
 - Small granivorous birds
 - Small nectarivorous and insectivorous birds
 - Freshwater wetland and reed-bed birds
 - Small rainforest migratory birds
 - Biodiversity threats, such as the Noisy Miner
- Invertebrate communities

Monitoring a large, mobile vertebrate community, as well as a small, more sedentary invertebrate community will capture a broad range of ecosystem processes in Marrickville's urban environment and give a better picture of biodiversity in Marrickville as a whole. Preliminary monitoring protocols are included in Appendix H.

Community monitoring

While scientifically robust monitoring programs answer specific questions about the success of biodiversity and restoration planning, they can be enhanced by the knowledge of the people who live within it. Community participation in tracking changes to Marrickville's biodiversity may include:

- Backyard surveys (e.g. the snapshot community survey)
- School programs (e.g. the BugWise Web2Spider and Plant2Pollinator programs)
- Council-wide surveys (e.g. for urban bats)
- International web-based community monitoring programs (e.g. ClimateWatch)

What Wildlife Do You Have in Your Backyard?



Marrickville Council is working on a Biodiversity Strategy and we need your help. Have you ever seen any native animals in your backyard, roof, factory grounds or behind your shop? There are a few species we have no recent records of and we would love to know if they are still living in the Marrickville area.



How can you help? Let us know if you have seen any of the wildlife listed on the back of this flyer. Call us with your sightings or take a photo and send it in by post or email. Get in touch before 29th October and you could win a family pass to the Australian Museum.

Photo 9: A snapshot community survey 'What Wildlife Do You Have in Your Backyard?' was conducted as part of the development of this strategy. Community monitoring is an integral part of tracking changes and the success of work being undertaken.

3.4.6 Knowledge Gaps

The preparation of the Biodiversity Strategy has not involved detailed field surveys and is limited to terrestrial flora and vertebrate fauna. Aquatic, estuarine and riparian biodiversity will be addressed regionally through the Cooks River Alliance and the SMCMA (SMCMA, 2008).

While invertebrate fauna were not included in the initial project scope, due to the importance and diversity of this group, surveys of invertebrate biodiversity have been identified as a key knowledge gap. It is envisaged that the Strategy will be reviewed and amended as required after invertebrate knowledge gaps have been addressed.

Key future research areas

Background searches identified the following key areas for future research for Marrickville:

1. Invertebrate biodiversity and urban habitat utilisation
2. Reptile biodiversity and urban habitat utilisation
3. Utilisation of the urban environment by insect-eating bats and interactions with birds
4. Urban bird community interactions
5. The Long-nosed Bandicoot population of inner-western Sydney: population size and dynamics, origin of population, barriers to utilisation of urban habitat including dispersal corridors, key threats
6. Impacts of climate change on urban biodiversity
7. Public understanding and value of biodiversity across community cultures
8. Diversity of lower order plants and fungi and their function in an urban environment



Photo 10: Noisy Miner.

Photo 11: Long-nosed Bandicoot in a Dulwich Hill backyard. More research needs to be done on the inner west population.



4 Strategies

Based on the key result areas and outcomes from the Marrickville Community Strategic Plan 2021, initial consultation with internal and external stakeholders, fieldwork and a literature and resources review, a major aim for biodiversity management in Marrickville was established.

The Strategy then sets out six Strategic Focus Areas that have specific, associated strategies to achieve the overall aim. Each of these strategies is expanded on with key directions, which are developed to be developed and carried out over a 10-year timeframe.

4.1 Overall Aim

Preserve and enhance Marrickville's biodiversity values and the ecosystem services they provide

4.2 Strategic Focus Areas, Strategies and Key Directions

4.2.1 Priority Biodiversity Areas

Strategy

Preserve and enhance the biodiversity value of Priority Biodiversity Areas

Key directions

- *Incorporate the PBAs as assets in corporate systems and review obligations and opportunities which arise from asset listing*
- *Implement on-ground works as detailed in the Action Plan for each PBA*
- *Integrate biodiversity strategies in community land Plans of Management within each of the PBAs*
- *Review opportunities for land use controls for PBAs*

4.2.2 Habitat Enhancement and Connectivity

Strategy

Enhance local and regional connectivity for Biodiversity Values and Priority Biodiversity Areas

Key directions

- *Map opportunities for plantings of native shrubby plants in parks, streets and residential gardens to support lizards, small birds, invertebrates and possums move across the Urban Habitat Mosaic*
- *Promote/support verge gardens, Bush Pockets and other plantings throughout the Urban Habitat Mosaic*
- *Increase density of wetland community plantings around and within WSUD features, using Frog-friendly WSUD design guidelines in the Action Plan (Section 5: Biodiversity Guidelines)*
- *Increase plantings of local native species which attract insects, using the biodiversity-friendly restoration and maintenance guidelines in the Action Plan (Section 5: Biodiversity Guidelines)*
- *Promotion of increased rainforest vegetation in public land and backyards to assist the migratory passage of small rainforest migratory birds and bats*
- *Increase and encourage plantings of low, dense native shrubs within the Bandicoot Protection Area (Marrickville Council 2010b)*

4.2.3 Threats

Strategy

Eliminate or mitigate key present and future threats to Marrickville's biodiversity

Key directions

- *Integrate biodiversity-friendly restoration and maintenance guidelines provided in the Action Plan (Section 5: Biodiversity Guidelines) into corporate planning processes (plans of management, subcatchment management plans, LATM) and into operational practice by Council and contractors*
- *Integrate biodiversity-friendly lighting guidelines into public place lighting planning and feasibility studies, see the Action Plan (Section 5: Biodiversity Guidelines)*
- *Provide resources and review weed management across the Marrickville LGA for public and private domain*
- *Develop a regional biodiversity threat management plan with the Cooks River Alliance, integrating Marrickville's threat priorities*
- *Investigate opportunities and options to manage companion animals (dogs and cats) in public spaces within the Bandicoot Protection Zone*
- *Investigate traffic calming measures in West and Thomas Streets including signage alerting public to the Long-nosed Bandicoot population*
- *Maintain awareness and vigilance amongst Council employees and contractors for emerging diseases and pathogens such as Phytophthora, Myrtle Rust and White-nose Syndrome*

4.2.4 Community and Partnerships

Strategy

Develop partnerships with the broader and local community to increase the level of communication, knowledge sharing, on-ground action and monitoring of biodiversity.

Key directions

- *Develop a place-based learning program across the Priority Biodiversity Areas*
- *Use a range of media to enable the community to exchange ideas, observations and knowledge about biodiversity in their neighbourhood*
- *Develop and design a long-term community monitoring program using the Monitoring Protocols (Appendix H)*
- *Collaborate with Groundwork community gardeners to identify ways to promote biodiversity-friendly gardening*
- *Increase capacity of the Marrickville Community Nursery to be a centre for biodiversity of the lower Cooks River valley in partnership with the community*
- *Focus promotion of native plant give-aways in Priority Biodiversity Areas to encourage community members to build-up backyard habitat*
- *Support and expand community participation and volunteer programs in on-ground activities that protect and improve biodiversity*
- *Provide leadership in the field of urban biodiversity conservation through cooperative partnerships in regional committees, working groups and alliances*
- *Engage with community advisory committees to allow for strategic feedback on Council projects and to help disseminate biodiversity information to the community*

4.2.5 Monitoring and Evaluation

Strategy

Support a wide range of monitoring for biodiversity from rigorous scientific assessments to anecdotal community reporting to measure the success of the Biodiversity Strategy

Key directions

- *Implement biodiversity surrogate monitoring for invertebrates and birds according to Monitoring Protocols in Appendix H to gather baseline data*
- *Collaborate with educational partners to develop a school biodiversity monitoring program*
- *Evaluate the on-ground achievements of the Action Plan alongside results of monitoring programs*
- *Promote the ClimateWatch monitoring program to encourage community members to monitor local climate change bio-indicator species as part of a national project*
- *Complete another professional fauna survey in 2013 incorporating knowledge gaps and repeat every 5 years*
- *Participate in annual monitoring of the Australian White Ibis population*

4.2.6 Knowledge Gaps

Strategy

Plan future research to address key areas which will help to better manage Marrickville's biodiversity

Key directions

- *Define the questions around future research areas*
- *Obtain an inventory of Marrickville's terrestrial invertebrate fauna by 2015 and review the Biodiversity Strategy using this information*
- *Implement a system to record all new information about biodiversity values and ensure data is available to the community and fed into state databases (such as the National Ecological Meta Database, ClimateWatch, NSW Atlas of Wildlife and Birddata)*
- *Support a research project into the origins and viability of the inner west Long-nosed Bandicoot population*
- *Consider a research project testing mechanisms to reduce negative interactions between Noisy Miners and other species*
- *Identify opportunities to trial a non-mowing program to monitor impacts of reduced mowing on urban bird life*
- *Develop a community information campaign to target sections of the community who may have lower awareness of biodiversity and engage them about biodiversity conservation*

5 Glossary

DCP 2010	The Marrickville Council Development Control Plan 2010
DECCW	The NSW Department of Environment, Climate Change and Water (now the Office of Environment and Heritage)
Ecosystem resilience	The capacity of an ecosystem to respond to changes and disturbances, yet retain its necessary ecosystem functions such as plant pollination and seed dispersal, soil processing, habitat complexity and succession.
Ecosystem services	Services provided by biodiversity that support ecosystems, such as plant pollinators
EEC	Endangered Ecological Community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
LGA	Local Government Area
MLEP 2010	The Marrickville Council Local Environmental Plan 2010
PAS	Priority Action Statement
PBA	Priority Biodiversity Area
SMCMA	Sydney Metropolitan Catchment Management Authority
TSC Act	Threatened Species Conservation Act 1995

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