Greater Sydney Parklands

Biodiversity Strategy

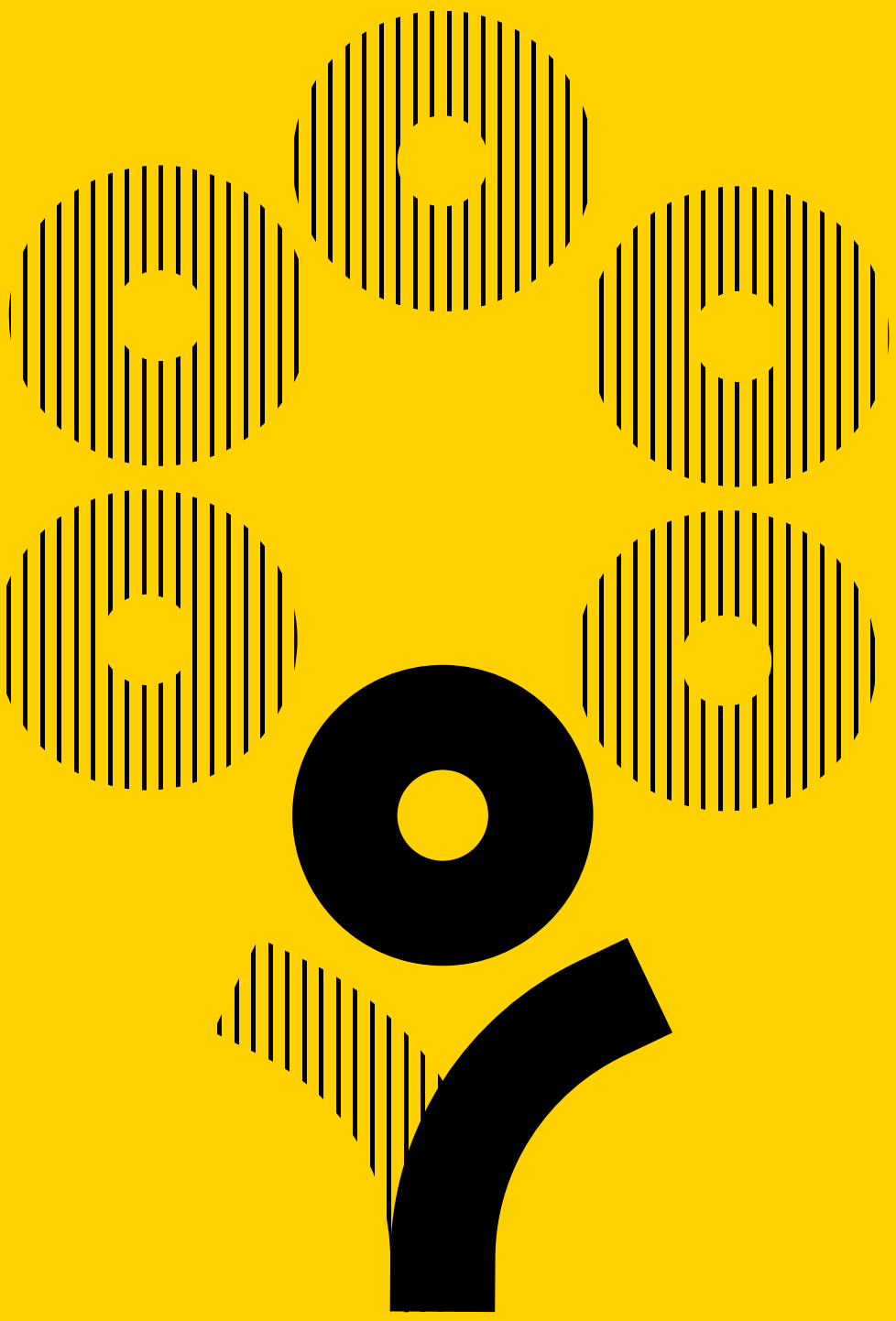
GREATER
SYDNEY
PARKLANDS

Contents

Western Sydney Parklands

Caring for Country

Greater Sydney Parklands is committed to working towards reconciliation with Traditional Custodians and Aboriginal and Torres Strait Islander communities on and with Country. We are committed to sharing this reconciliation journey with all park communities across Greater Sydney.



Introduction

The Sydney Basin stretches from the freshwater of the Nepean River in the west to the saltwater of the harbour in the east. This ancient basin features a diversity of landscapes, shaped by wind and water over millennia.

At the most outer western edge, nestled beside the Nepean River, are the low rolling hills, gently undulating broad crests and ridges on sandstone plateaus. These are framed by the Blue Mountains. The flat to gently sloping alluvial floodplains take the freshwater to the north and east; the moderate slopes, ridges and hillcrests that sweep across the centre and south of the basin provide the source of the water.

Outcrops of sandstone appear through the clay-rich soils as the water flows east. Steep cliffs and gullies among wind-blown dunes present to the eastern edge of the basin as freshwater turns tidal and salty.

A diverse and complex web of life exists within the basin's plants, soil and water. One of the key aims of the 50-Year Vision for Greater Sydney's Open Space and Parklands is to protect this biodiversity.

Managing biodiversity in urban areas requires a dynamic and adaptable approach.

About this strategy

The Greater Sydney Parklands Biodiversity Strategy is a long-term vision for protecting and enhancing biodiversity within the Greater Sydney Parklands Estate. It is led by the Greater Sydney Parklands agency.

The estate includes Fernhill Estate, Western Sydney Parklands, Parramatta Park (including Wistaria Gardens), Callan Park and Centennial Parklands (Centennial, Moore and Queens parks).

The biodiversity strategy recognises that each parkland is different in its rich cultural history, landform and biodiversity. While our broad objectives may be consistent across the estate, management approaches will vary.

The strategy aligns with the Greater Sydney Parklands Trust Act 2022 (GSPT Act). The GSPT Act requires us to manage and protect the endangered ecological communities that provide habitat and food sources for wildlife, and to connect green corridors for wildlife movement and refuge.

Each of the actions in this strategy support parks' plans of management. The strategy also fulfils the requirements of the GSPT Act, and other NSW and Australian legislation and policies that aim to preserve landscapes, habitats and ecosystems (Table 1).

Table 1: Legislation, strategies and initiatives that inform this strategy

KEY ACTS AND STATUTORY INSTRUMENTS	KEY MANAGEMENT PLANS
Greater Sydney Parklands Trust Act 2022	*50-Year Vision for Greater Sydney's Open Space and Parklands*
Parramatta Park Trust Act 2001	*Your Parramatta Park 2030 (conservation management plan and plan of management)*
Callan Park (Special Provisions) Act 2002	*Western Sydney Parklands PoM Plan of Management 2030*
Western Sydney Parklands Act 2006 (Fernhill Estate owned by this Act)	*Fernhill Estate Plan of Management PoM 2026*
Centennial Park and Moore Park Trust Act 1983	*Centennial Parklands Plan of Management PoM 2018* and other supporting documents
Biodiversity Conservation Act 2016	
Environmental Planning and Assessment Act 1979	
Environmental Protection and Biodiversity Conservation Act 1999 (Cth)	

Greater Sydney Parklands

Greater Sydney Parklands is a NSW Government agency. Our work is guided by the 50-Year Vision and its 4 strategic directions:

- growing parks for people
- connecting people to parks
- keeping Sydney green and vibrant
- caring for the environment.

We believe that long-term biodiversity management succeeds when people are connected with the bushland, the animals that live there and a love of nature. The biodiversity strategy aligns with our objective to increase scientific, cultural, and environmental values across Greater Sydney Parklands.

We want to do this through education and knowledge-sharing with Traditional Custodians, acting as an advocate for the parklands and working with volunteer groups and the broader community.

We believe nature-based recreation and nature play can help people to engage with and be immersed in the environment. We also set aside areas to conserve endangered ecological communities and threatened species, and to provide fauna refuge.

Investing in biodiversity

Greater Sydney Parklands is managed by the Greater Sydney Parklands Trust. Under the GSPT Act, the Trust commits to and secures long-term financial sources to enable strategic management and to maintain and enhance the Greater Sydney Parklands' biodiversity.

As an organisation, we employ financial strategies that balance revenue streams and operational expenses. As caretakers of the parklands estate, we will continue to seek private sector investment, revenue, activations and partnerships to support the management of each park.

The parklands estate

The parklands estate spans more than 6,000 ha across the Sydney Basin. It encompasses diverse ecosystems ranging from Cumberland Plain Woodland to rainforest gullies and meadows.

These valued green spaces foster biodiversity and provide space for people to relax, get active or enjoy the outdoors.

Much of the estate features unique vegetation communities. Some areas host critically endangered ecological communities, such as the Eastern Suburbs Banksia Scrub in Centennial Parklands.

The parklands support a variety of aquatic, terrestrial and avian fauna. The western region is home to macropods, monotremes and large reptiles; the eastern parklands harbour avian fauna, smaller reptiles and mammals adapted to urban living.

Some species, like the Regent Honeyeater and Swift Parrot, are critically endangered, emphasising the importance of conservation efforts. The Grey-headed Flying Fox is also present, listed as vulnerable under environmental legislation.

The parks of Greater Sydney Parklands

Yellow-tailed Black Cockatoos (*Calyptorhynchus funereus*)

The importance of biodiversity

Biological diversity is the variety of plants, animals and microbes, as well as the habitats and ecosystems to which they are connected. When we use the term biodiversity, we mean the flora and fauna in the environment, the genetic diversity of living things and the evolution of life in the natural world – both on land and in water.

The ongoing management, protection and enhancement of biodiversity provides the functional processes for all life on Earth, including humans. The basics such as food, fuel, shelter and medicine rely on biodiversity. Climate regulation, water purification, nutrient cycling, pollination, seed dispersal and pest control are more resilient with a diverse and healthy ecosystem.

Increasing vegetated areas provides links and connections to other patches of vegetation, allowing wildlife to move from one habitat area to another. This includes non-native vegetation – even exotic vegetation or constructed waterways such as garden hedges or naturalised stormwater systems are used by wildlife and remain important in biodiversity management.

The parklands estate also supports culture, human health, wellbeing, lifestyle, local economies and tourism and creative industries. When children spend time in the natural environment, they learn fundamental skills like observation, problem-solving, logic, creativity and imagination. This can support emotional and intellectual growth and the development of gross motor abilities.

People's connections with the environment can serve as the foundation for how they feel about biodiversity. Spending time in the parklands can bring a sense of belonging and connection to the bush.

For Aboriginal people, this connection is viewed as everything being interconnected; people exist within, as part of the soil, the water, the sky, the plants, the animals and everything in between. They are part of the environment, rather than a separate entity.

Forests, grasslands and shrublands use photosynthesis to take carbon dioxide from the air and store it, helping to mitigate the effects of climate change. The capacity to store carbon can depend on the ecosystem. For example, on a per hectare basis, mature forests are more than 10 times as effective as perennial grasslands at storing carbon.

Protecting the estate's existing biodiversity by creating more habitat and protecting bushland will ensure the best possible carbon capture potential.

Opportunities

Protecting and enhancing biodiversity within the parklands estate creates opportunities to engage the community with biodiversity and foster a sense of environmental stewardship.

We have an opportunity to advocate for bushland areas in the parklands estate. These offer a unique platform for community involvement through guided nature walks, community clean-up initiatives, educational workshops and outdoor fitness classes.

Biodiversity stewardship agreements (BSA) and other offsets place a protective covenant on bushland and provide funds for management. We have secured 7 sites under BSAs and we're seeking opportunities to sell credits and generate new credits. Funds from these credits go back into the BSA sites and support surrounding areas through tree planting and weed management.

We also fund biodiversity initiatives through our commercial activities (leases and licences). We will continue to investigate joint ventures and sponsorships to help finance these initiatives.

Grants from government and non-government sources provide allow us to accelerate our program of works or address issues that are outside of base revenue funding. In the past, we have secured funding from the Australian and NSW governments from biodiversity funds for major bush regeneration, revegetation works, sprinkler systems for the Grey Headed Flying-fox and feral animal reduction. These opportunities will continue.

Revegetation at Western Sydney Parklands

Key Threatening Processes

We use the term 'key threatening process' in the context of conservation and environmental management. It refers to any activity, process or factor that poses a significant threat to the survival, population or ecological function of a species, community or ecosystem.

Key threatening processes can result in the decline, degradation or extinction of species and can impact biodiversity and the natural environment. They include climate change, urban heat, loss of habitat, erosion, invasive species, pests and disease. Our strategies to improve species resilience, connectivity and reduce external pressures become critical.

Climate change

We're already experiencing the impacts of a changing climate. Increased rainfall events and long-lasting hot summers affect how species adapt within the environment. These events can be contrary to how species have evolved over thousands of years.

The parklands estate will experience more days above 35 degrees, higher chance of bushfires and a reduction in soil moisture. This places pressure on a plant's resilience to the climatic extremes.

Western Sydney experiences some of the hottest temperatures in the Sydney Basin due to its physical distance from the ocean and the warm desert air coming from the west. The likelihood of increased bushfires could threaten plant communities and faunal species at Fernhill Estate and Western Sydney Parklands.

Parramatta Park will experience a reduction in soil moisture which could cause die back of significant Eucalypts. Callan Park could be subject to flooding at high tide and increase bank erosion could destabilise vegetation or destroy cultural heritage sites and walking paths.

Centennial Park may experience higher rainfall, increasing flooding of the ponds. Extreme heat periods will cause stress and threaten many of the habitat trees.

Loss of habitat

The declining habitat for native species poses a severe threat to the unique biodiversity of the parklands. Past land clearing for agriculture, land use changes and expanding urbanisation have fragmented and destroyed natural habitats, leaving many native species without suitable areas for survival. Habitat loss disrupts ecosystems and hampers the ability of native flora and fauna to thrive. Fragmented vegetation communities are less resilient to pests, disease and invasive species. Impacts of fires all place pressure on habitat.

Invasive species

Invasive plant species threaten native flora through competition for resources, alteration of ecosystem structure and soil chemistry, displacement of native species, hybridisation, impacts on fire regimes, negative effects on wildlife, and the spread of diseases. Control and management strategies involve prevention, early detection, eradication and ecosystem restoration to minimise impacts on native plants and ecosystems.

Pest and feral animals

Invasive pests and feral animals – including foxes, cats, rabbits, pigs, goats, and Common Mynas – can cause biodiversity loss, altered ecosystem dynamics, habitat degradation and disease transmission.

Erosion

Although erosion is the natural process of movement of soil, rock or dissolved material from one place to another, soil erosion has increased due to human activities. Poor land management practices and land clearing has accelerated erosion causing the loss of the nutrient-rich top layer of soils. This loose soil can also end up in waterways causing pollution.

Disease

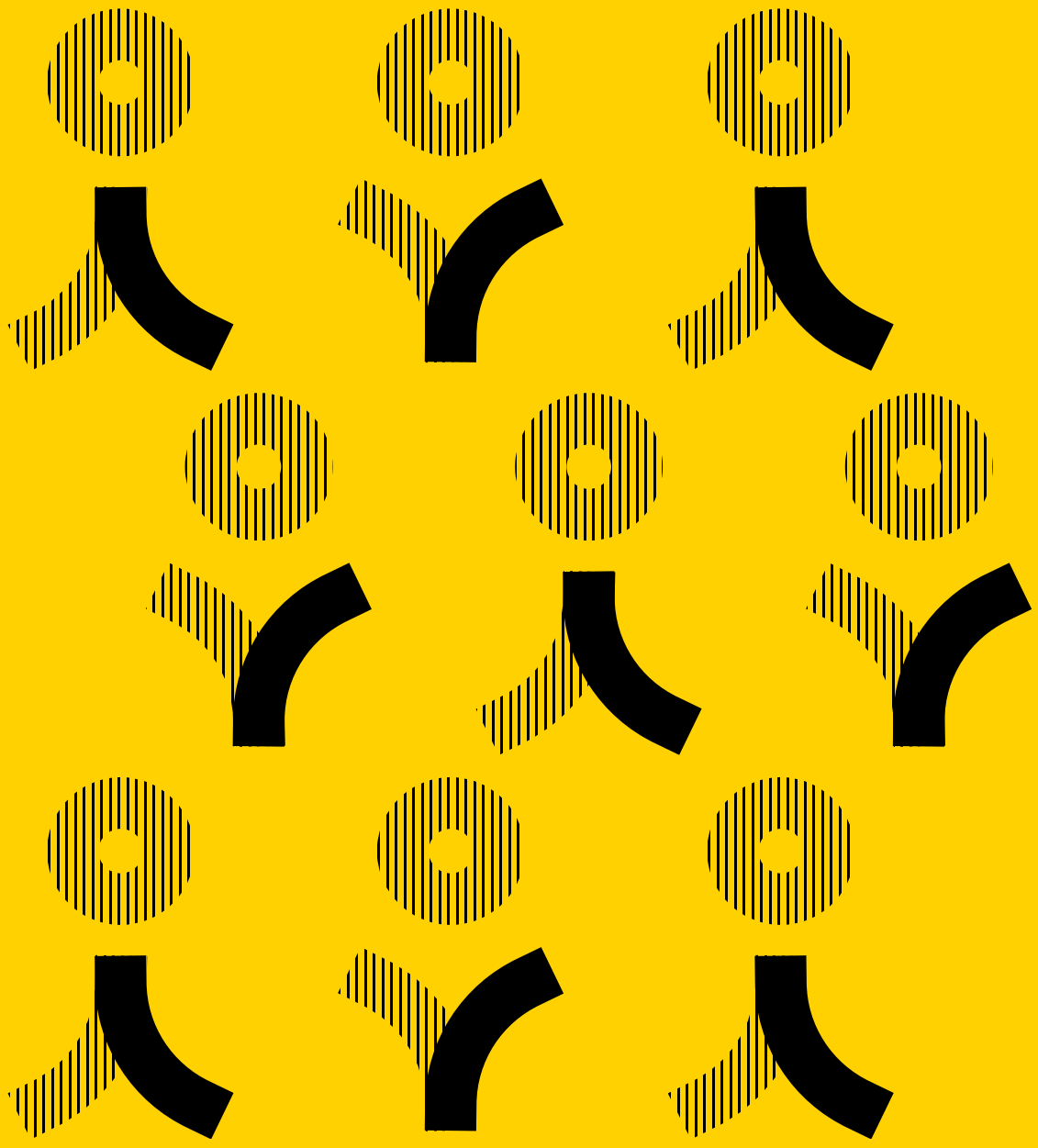
The root-rot fungus, Phytophthora cinnamomi poses a severe threat to ecosystems, easily spreading and causing disease, mortality and potential extinction in vulnerable plants. This pathogen's impact extends to the loss of habitat for animals. The resulting disease, Phytophthora dieback, often goes undetected, inflicting irreversible harm on ecosystems and landscapes before identification. Phytophthora cinnamomi can remain dormant during dry periods, making it difficult to eradicate. Prevention of its further spread is imperative for environmental preservation.

Fire regimes

Destructive fire regimes, encompassing various ecological processes, cause persistent declines in Australia's biodiversity. While many species have learned to adapt to recurring fires over millions of years, certain fire patterns – exacerbated by factors like drought, introduced species and human activities – now threaten more than 800 native species and 65 ecological communities listed as endangered under Australian legislation.

Most of the estate's diverse ecosystems vary. We manage each park through tailored threat abatement programs. We safeguard biodiversity by preserving healthy ecosystems and the species they support through adaptive management that draws on research and real-world experience.

Australasian Darter and chicks (*Anhinga novaehollandiae*)



Biodiversity in Greater Sydney Parklands

This biodiversity strategy centres on our commitment to protect and enhance the environments in the parklands estate. It establishes a vision, outcomes and goals for the parklands estate, then specific actions for each park.

In considering each individual park under our stewardship, the strategy highlights each park's flora, fauna, soil, water and the people integral to the past, present and future of the park. It then identifies opportunities, key threatening processes and management actions tailored to each park. This approach enables a seamless incorporation of biodiversity actions for any new parks incorporated into the parklands estate.

This is a draft document for public comment. We prepared it in consultation with Centennial Parklands and Callan Park bushcare volunteers, Greater Sydney Parklands working groups, various internal stakeholders and community trustee boards for each of the parks.

CONTACT US

We welcome your feedback to the vision, outcomes, goals and actions. To have your say contact us at:

email_address@greatersydneyparklands.com.au

Australian Magpie (*Gymnorhina tibicen*)

Vision

By committing to protect and enhance the environments that exist in the parklands, our vision is for an estate where:

- wildlife finds safe refuge in thriving ecosystems
- knowledge and engagement are the foundations of our efforts
- a delicate balance between human and natural systems fosters appreciation, interaction and enjoyment.

Outcomes

- Improve bushland and aquatic structure, diversity and habitat values
- Increase quantity of habitat to improve overall resilience
- Increase soil and aquatic biota and habitat structure
- Improve water quality
- Increase community connectedness to biodiversity and Country
- Improve community knowledge, appreciation and stewardship of natural places

Themes

We use 3 themes throughout the strategy:

Plants and animals: the representation of the biodiversity we protect

Earth and water: the foundations that support biodiversity, which must be enhanced for biodiversity to thrive

People: the key to future survival of species, who can understand their intrinsic links to biodiversity through engagement, knowledge and understanding.

Goals

Three goals sit under the themes.

PROTECT AND PRESERVE

We can reach this goal by enhancing ecological regimes and protecting biodiversity. We will:

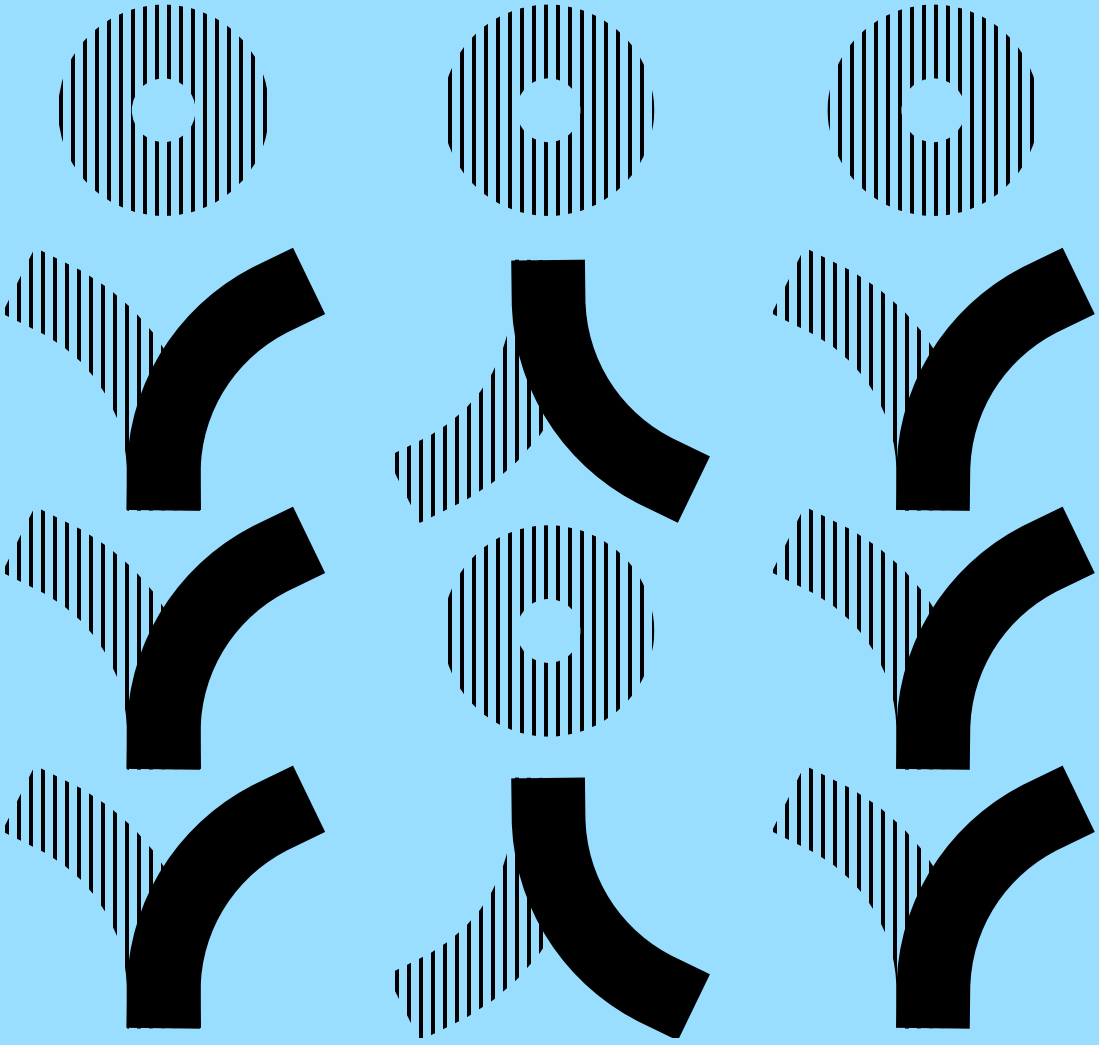
- prevent and mitigate the spread of weeds and pest animals
- ensure the appropriateness and adequacy of water flows, fire regimes and nutrient cycles
- be sustainable in our resource use
- recognise and incorporate the roles of vital species classes, such as pollinators and native apex predators like owls, in management planning.

RESTORE AND EXPAND

We can reach this goal by increasing vegetation and habitat. We will undertake planting and install hollows, so that most habitats and endangered species experience gains in habitat quality and quantity. This will achieve a net gain in native vegetation.

UNDERSTAND AND ENGAGE

We can reach this goal through research, education and engagement. This will improve our understanding of how plants and animals – and how we manage them – adapt to rising temperatures, rainfall patterns, fire frequency, urban development and emerging threats. We will engage with individuals, organisations and Aboriginal groups. We will leverage traditional knowledge and form partnerships to enable effective conservation strategies.



Fernhill Estate

Selectively retained Angophora species, Fernhill Estate

Introduction

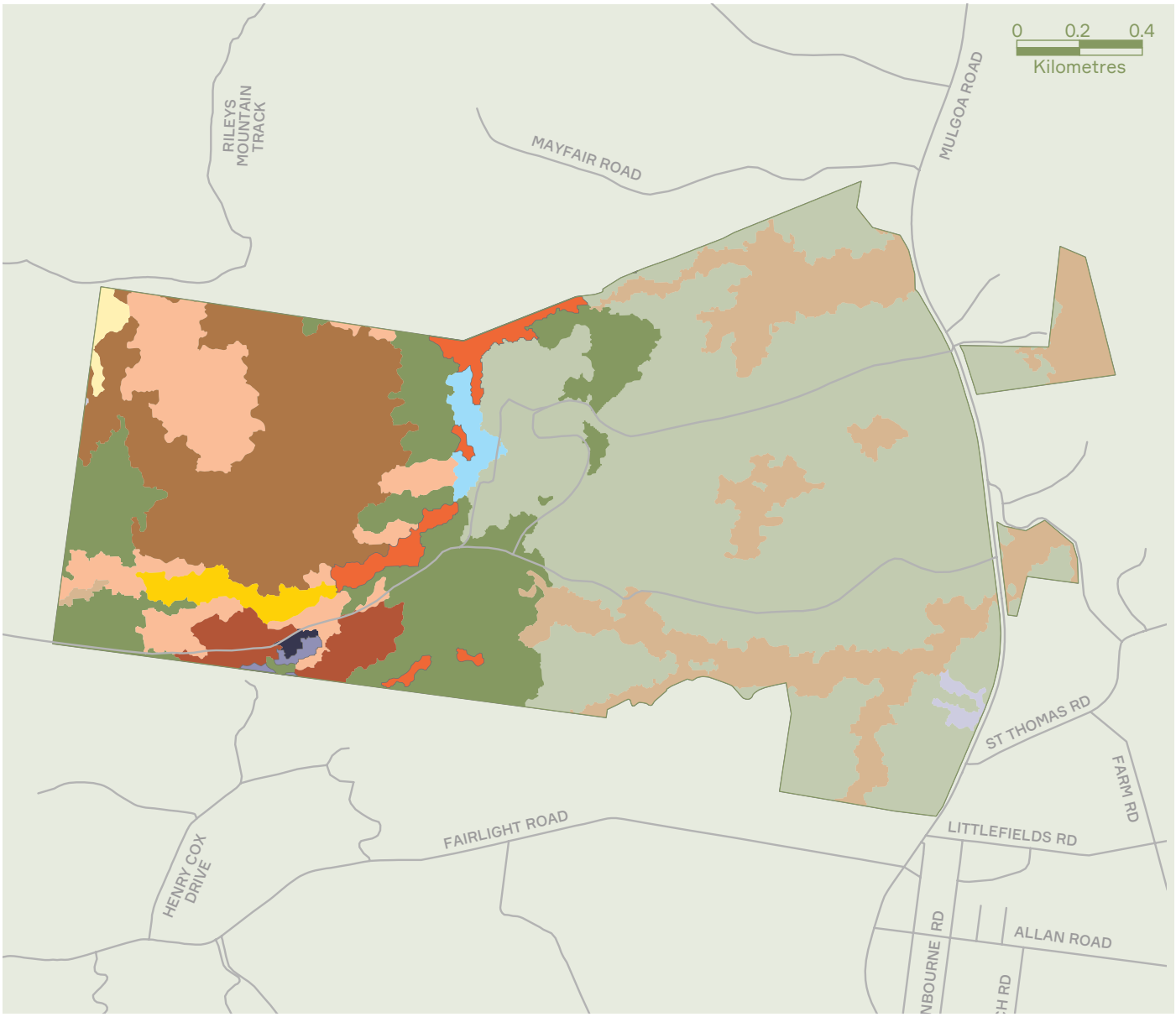
Nestled in the Mulgoa Valley adjacent to Blue Mountains National Park, Fernhill Estate Fernhill Estate is part of a larger network of open landscapes that can help to support biodiversity amidst urban development.

Positioned within the ancestral lands of Dharug and Gundungurra speakers, Fernhill Estate is a historical landscape. While some areas show signs of early clearing and selective retention of some native species by early colonists, the site's resilience is evident in regenerating vegetation.

Fernhill Estate Plan of Management 2026 aims to protect and enhance bushland, remnant paddock trees and biodiversity through BSAs, which cover more than 60% of the estate. The in-perpetuity conservation covenants and annual management payments from the Biodiversity Stewardship Payments Fund help to safeguard habitats for endangered species like the Regent Honeyeater and Swift Parrot and help to manage riparian corridors, erosion and soil landscapes.

Fernhill Estate's preservation and enhancement will help to maintain its ecological integrity within evolving landscapes.

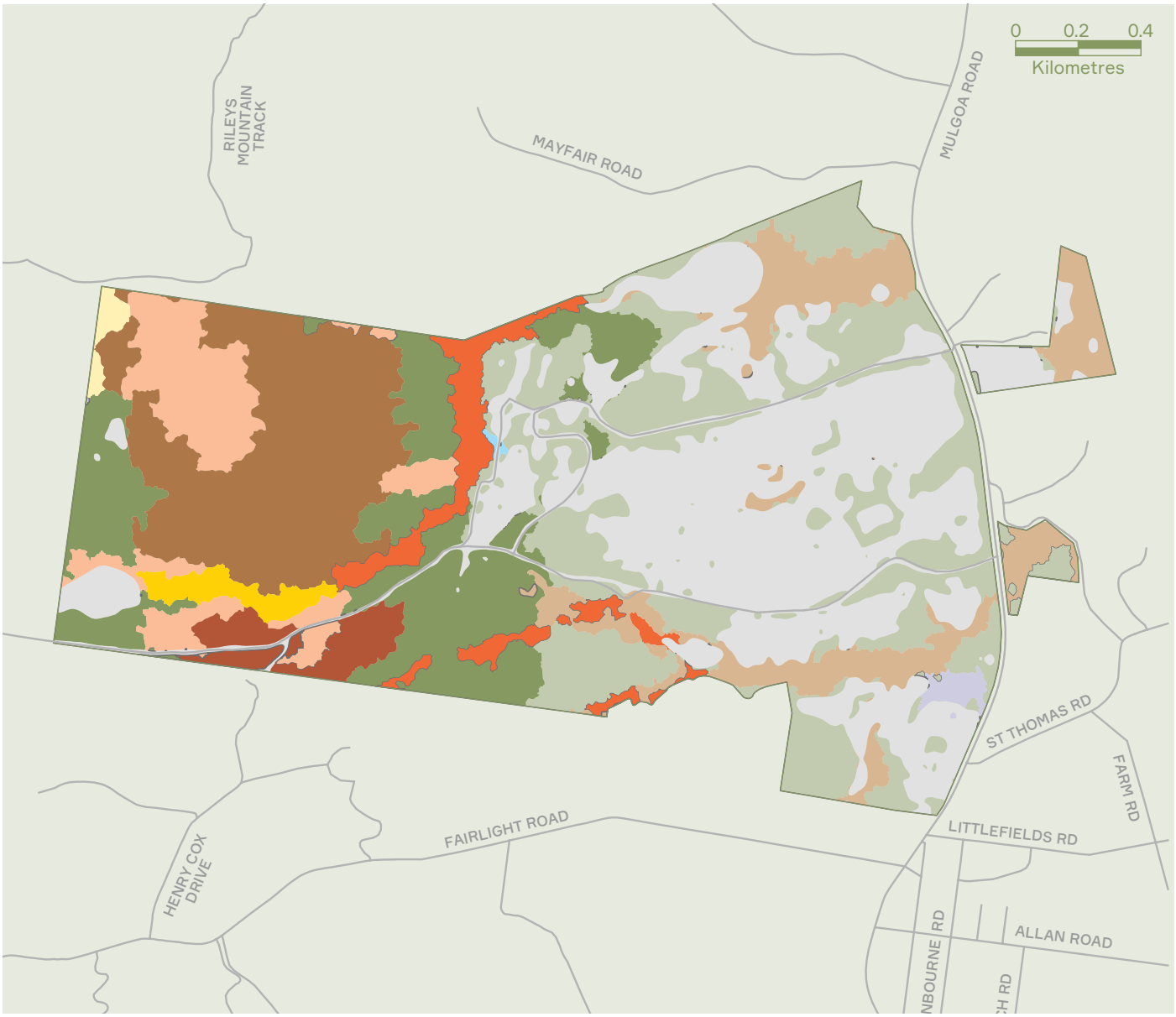
Fernhill Estate –
Pre 1750 State Vegetation Type MAP



LEGEND

- Fernhill Estate boundary
- Roads
- Sydney Hinterland Grey Myrtle Riparian Forest
- Northern Foothills Blackbutt Grassy Forest
- Sydney Turpentine Ironbark Forest
- Cumberland Moist Shale Woodland
- Cumberland Shale Plains Woodland
- Cumberland Shale-Sandstone Ironbark Forest
- Castlereagh Ironbark Forest
- Sydney Hinterland Grey Gum Transition Forest
- Sydney Hinterland Enriched Sandstone Bloodwood Forest
- Sydney Hinterland Turpentine-Apple Gully Forest
- Castlereagh Scribbly Gum Woodland
- Cumberland Red Gum Riverflat Forest
- Hunter Range Turpentine-Grey Myrtle Gully Forest
- Sydney Hinterland Turpentine Sheltered Forest

Fernhill Estate – State Vegetation Type MAP



LEGEND

- Fernhill Estate boundary
- Roads
- Not classified
- Sydney Hinterland Grey Myrtle Riparian Forest
- Cumberland Moist Shale Woodland
- Cumberland Shale Plains Woodland
- Cumberland Shale-Sandstone Ironbark Forest
- Castlereagh Ironbark Forest
- Sydney Hinterland Grey Gum Transition Forest
- Sydney Hinterland Enriched Sandstone Bloodwood Forest
- Sydney Hinterland Turpentine-Apple Gully Forest
- Castlereagh Scribbly Gum Woodland
- Cumberland Red Gum Riverflat Forest
- Hunter Range Turpentine-Grey Myrtle Gully Forest
- Sydney Hinterland Turpentine Sheltered Forest

Plants and Animals

Fernhill Estate boasts sandstone forests and open woodlands, and lush rainforest gullies and grassy meadows, albeit some altered due to clearing for agriculture. It is home t critically endangered Cumberland Plain Woodland, once widespread but now scarce. This diverse geology and topography includes Sydney Hinterland Sandstone Forest, Western Sydney Dry Rainforest, Castlereagh Scribbly Gum Woodland, Sandstone Transition Forest and River-flat Eucalypt Forest.

Old growth Angophora floribunda and Angophora subvelutina pepper the eastern part of the estate, selectively retained during past clearing practices. In addition, Eucalyptus sclerophylla and Melaleuca decora can be seen, while the sandstone gullies nurture endangered species like Rhodamnia rubescens. Xanthorroea species dominate the dense shrub layer that exist on the hill crests in the western bushland boarding the Blue Mountains National Park.

Varied terrain such as the cool shaded gullies provides refuge for the Gully Shadeskink (Saproscinus spectabilis) or the endangered Regent Honeyeater, which relies on the Eucalyptus nectar and insects found in these forests.

Fernhill Estate is home to possums, bats and owls, and iconic Australian natives like koalas, wallabies, kangaroos, goannas and echidnas. Platypus areas have been spotted nearby in Mulgoa Creek.

Dam, Fernhill Estate

Earth and Water

Neighbouring the Blue Mountains, Fernhill Estate is positioned above 2 geological faults. It boasts diverse topography, soils, water flow and vegetation.

The Mulgoa Valley was shaped 15 to 22 million years ago by Lapstone monocline uplift. A mix of soils and landscapes emerges where clay shale meets Blue Mountains sandstone at the Cumberland Plain edge. Heading west, Mulgoa Valley is defined by the Nepean River's gorge, etched through slow sandstone uplift and rolling hills cascading to plains. Notably, Mulgoa Nature Reserve's shale cliffs form through Mulgoa Creek erosion.

Fernhill Estate mirrors Mulgoa Valley's landscapes. At its western edge, permeable sandstone captures water flow down faults, creating forested hilltops and shaded gullies. These cool, moist environments protect ancient rainforests from fires.

The large mountain lake on the south-western edge fees water into the estate. It was excavated in the late 1960s. The dry Eucalypt forest on the permeable sandstone rise is fed by the water that flows east. The water comes from deep gullies, maintaining moist woodlands and dry rainforest as it penetrates the clay plains. The Turpentine-Ironbark Forest forms where sandstone meets clay in a narrow stretch of well drained soils.

Mulgoa Creek and its tributaries regenerate the River-flat Eucalypt Forest. Cumberland Plain open woodland separates this area from Littlefields Creek to the south.

The variations in soil and landform brought on by the elevation of the Blue Mountains escarpment give rise to the diversity of flora and fauna.

People

The ancestral land of the Dharug (also spelled Darug) people stretched west of the forest lands along the Nepean River near Mulgoa. Their neighbours, residing in the highlands and across the river, spoke Gundungurra. For millennia before colonialisation, Aboriginal people actively managed these environments.

Fernhill Estate's current boundaries originated from early colonial land concessions in the 1810s. Covering 423 ha, the estate included Fernhill House amid rural parklands and natural bushland. Equestrian facilities, a racing track and a small zoo were added in the late 20th century. The equestrian centre is utilised by private lease. While most zoo animals were sold, the Przewalski's horses remain on the estate today.

The NSW Government purchased Fernhill Estate in 2018 then entrusted the estate to Greater Sydney Parklands in 2020. Local Land Services has surveyed the land, as has the Mulgoa Landcare Group, which identified a male platypus feeding in the Mulgoa Creek.

Fernhill Estate is recognised as part of a scenic corridor of recreational, ecological and hydrological importance, particularly to communities in Mulgoa Valley, Penrith and surrounds.

Opportunities

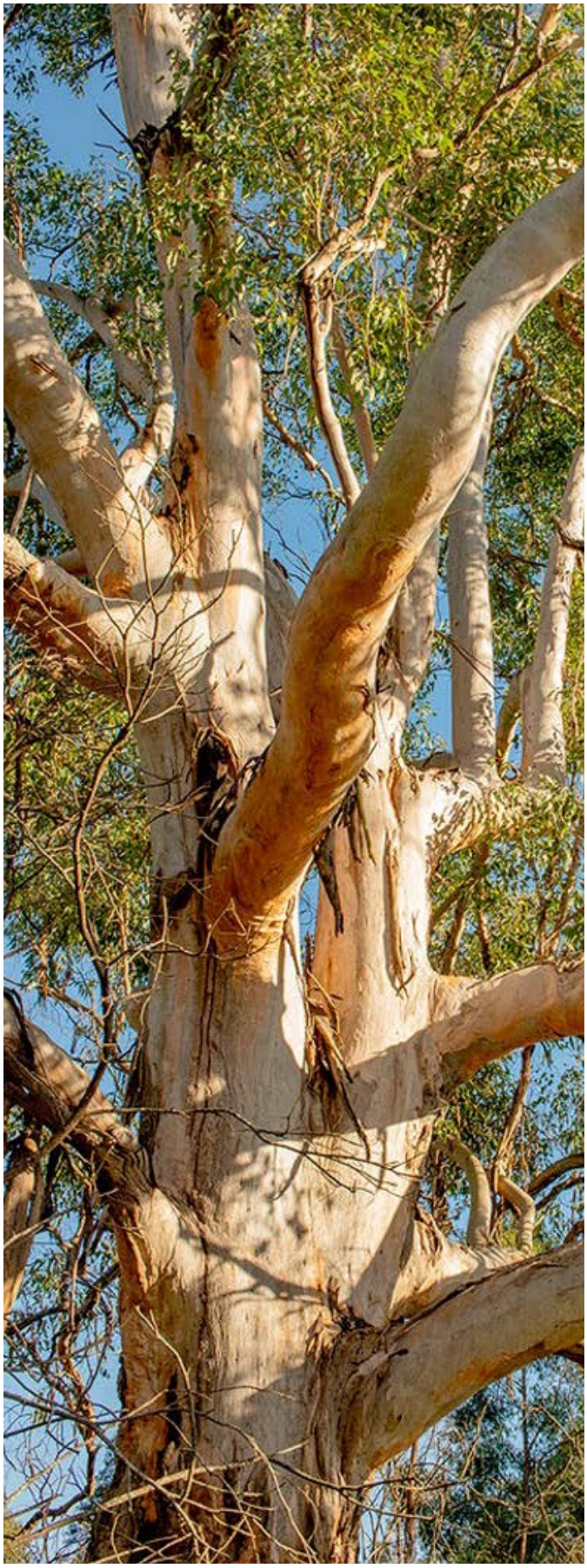
Fernhill Estate offers a unique connection to high-quality bushland that fosters wildlife movements within a picturesque landscape. The sandstone rise in the west adds a scenic dimension and acts as a protective haven for pockets of vegetation. These flourishing areas showcase resilient plant communities that have been in place since well before colonialisation.

Minimal soil disturbance creates a robust defence against invasive weeds, allowing the natural regeneration of the bushland from seeds embedded within the soil.

Conserving Fernhill Estate aligns with the NSW Government's Cumberland Plain Conservation Plan, which identifies and maps the Cumberland Plain ecological community and how it contributes to a larger ecological corridor.

The importance of fire to the estate extends across various ecological, cultural and land management aspects. We have an opportunity to work with Aboriginal people and the Rural Fire Service to manage wildfire risks. Fuel load reduction can help regenerate species from the seed bank in the soils, particularly in the quality bushland of the dry rainforest and Hinterland Forest. Cultural burning workshops can improve connections to Country, enhance cultural knowledge and improve biodiversity.

After the identification of a male platypus in Mulgoa Creek, we can work with Mulgoa Landcare Group to monitor platypus sightings and enhance riparian habitat. We can also protect nesting sites for the Regent Honeyeater and the Swift Parrot in collaboration with the Mulga Landcare Group.



Eucalyptus tereticornis

Key Threatening Processes

As heavy animals with hard hooves, the abandoned Przewalski's horses have caused soil compaction, reducing porosity and hindering water infiltration and root growth. Overgrazing removes vegetation, increasing the risk of soil erosion, particularly in areas prone to dry conditions or heavy rainfall.

Trail cameras have sighted feral pigs and deer across the estate. Pigs prey on small mammals, birds, reptiles and amphibians. They also spread disease. Both pigs and deer will damage ecosystems and out compete with other native herbivores. Like horses, their hard hooves break down the soil structure.

There are threats of weed incursion from neighbouring pastural properties to the south. Weeds compete with native vegetation for light and resources, reducing the availability of native food for wildlife. Weeds will also reduce plant diversity and ecosystem resilience.

To the east of the estate, old growth trees are all that remains of the remnant Cumberland Plain Woodland that was cleared for agriculture. Ongoing grazing of new saplings by feral animals and competition fromagricultural grasses such as whiskey grass and Chileanneedlegrass means that as the old trees deteriorate, the remaining remnant vegetation will be lost.

Erosion caused by clearing and instability of the soil at several locations – including the dam spillway and fire trails in the BSA areas – impact biodiversity on the estate. Past wildfires have modified the ecology and vegetation structure and removed understorey vegetation and grasses. This has allowed the incursion of whiskey grass, Chilean needlegrass and woody weeds such as Lantana.

Fernhill Estate's water sources, including the old farm dam used by the Regent Honeyeater, support the region's animals. The collapse of the dam walls may have impacted the survival of critically endangered species. These water sources must be safeguarded.

As temperatures, heatwaves and extreme heat days increase – including a doubling in the number of days above 35 degrees by 2050 – bushfires will also increase. Vulnerable fauna may seek refuge in the estate, for instance, if a bushfire occurs in the Blue Mountains.

The repercussions of extreme heat days, substantial rainfall and storms may require temporary park closures or the cancellation of scheduled events. Escalating temperatures could increase maintenance requirements for built infrastructure or damage archaeological sites. Rising temperatures also have the capacity to alter environmental conditions within heritage buildings, fostering invasive species or mould growth.

Banksia spinulosa var.collina

Achieving our vision

Bushland and aquatic structure, diversity and habitat values

GSP OUTCOME

BUSHLAND AND AQUATIC STRUCTURE, DIVERSITY AND HABITAT VALUES

- Reduce invasive species coverage – particularly Lantana, African love grass and whiskey grass, as well as small-leaved privet, African olive and Arum lily – along Mulgoa Creek, Littlefields Creek, the main dam, the mountain lake and the connecting gully.
- Reduce the occurrence of exotic pasture grasses such as Chilean needlegrass and whiskey grass in bushland areas.
- Increase mid and understory structure, including wildflower abundance in the western and southern bushland areas.
- Increase reporting and control of pest and feral animals.

GSP OUTCOME

QUANTITY OF HABITAT

- Expand Littlefields and Mulgoa creeks' riparian corridors.
- Increase key habitat structures such as hollows, fallen timber and rocks.

GSP OUTCOME

SOIL AND AQUATIC BIOTA AND HABITAT STRUCTURE

- Remediate erosion around key dams and restore erosion sites such as dam spillways and fire trails.
- Relocate Przewalski's horses.

GSP OUTCOME

WATER QUALITY

- Support Mulga Landcare Group's creek restoration work.
- Improve draining line and dam waterflows and reduce site pollution sources.

GSP OUTCOME

COMMUNITY CONNECTIONS

- Increase Aboriginal community partnerships, decision-making and involvement.
- Use the Freshwater Cultural Connections community consultation project to understand value of place and aspirations for the estate.

GSP OUTCOME

COMMUNITY KNOWLEDGE AND STEWARDSHIP

- Increase stakeholder commentary on Fernhill Estate's environment stories.
- Increase publicity on Fernhill Estate's environment.

Actions and management approaches

Plants and Animals 

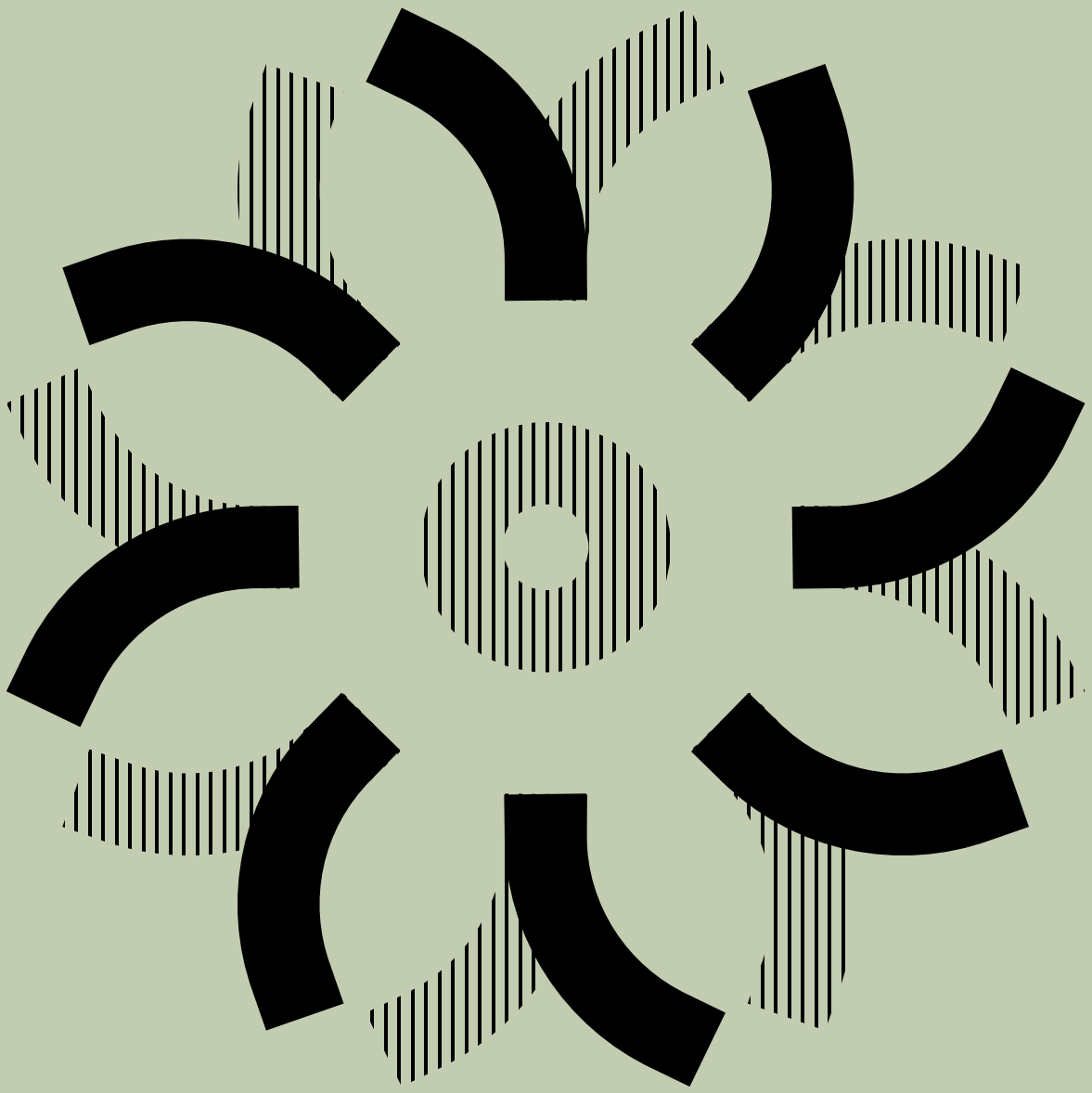
ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Improve habitat values	Continue with BSAs	High	Ongoing
	Remove Lantana, African Love Grass and Whiskey Grass in bushland sites.	High	Ongoing
	Remove *Privet ssp.* and *Dolichandra unguis-cati* (Cat's Claw Creeper) along Mulgoa Creek.	High	Ongoing
Control animal species that threaten biodiversity	Rehome Prezwalski's horses.	High	Ongoing
	Coordinate regional programs to control deer, foxes and other feral animals.	High	Ongoing
	Partner with Local Land Services to respond to pig activity.	High	Ongoing
Manage bushland to increase diversity and habitat	Undertake floristic surveys measuring species diversity and health.	High	Every 5 years
	Undertake fauna surveys measuring presence of wildlife and abundance.	Moderate	Every 5 years
GOAL: RESTORE AND EXPAND			
Encourage natural regeneration	Nurture self-seeded species through protection zones and plantings.	High	Ongoing
Utilise fire management to improve species diversity and control weeds	Undertake ecological burns or pile burns with Mulgoa Rural Fire Service and Rural Fire Service.	Moderate	Every 5 years at various sites
	Investigate incorporating cultural burns on BSA sites.	Moderate	Through BSA process
	Undertake bush regeneration following arson, natural bushfires or hazard reduction burns.	High	As needed
Protect species diversity during hazard reduction burns	Identify appropriate burn regimes in our fire management plan.	High	Fire management plan updated
	Refer to latest GIS fire history database prior to hazard reduction burns.	High	Ongoing

Earth and water

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Clear waste and weeds from waterways	Manage bushland and remove litter.	High	Ongoing
	Engage external groups to monitor water	Moderate	Ongoing
Build walking paths and viewing platforms	Improve walking paths to reduce foot traffic impacts.	Low	Infrastructure in place
Increase aquatic diversity	Remove aquatic weeds	Moderate	Ongoing
Improve current overland flows	Investigate waterway improvement in the equestrian area.	Low	Identified improvement opportunities

People

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: UNDERSTAND AND ENGAGE			
Improve species diversity and control weed threats with cultural practices	Investigate cultural burns in BSA sites.	Moderate	BSA process
Improve partnerships	Advocate for Mulgoa Landcare Group to monitor bird populations including the Regent Honeyeater and Swift Parrot.	Moderate	Ongoing
	Support Mulgoa Landcare Group to improve platypus habitat in Mulgoa Creek.	Moderate	Ongoing



Western Sydney Parklands

Turquoise Parrot (*Neophema pulchella*)

Introduction

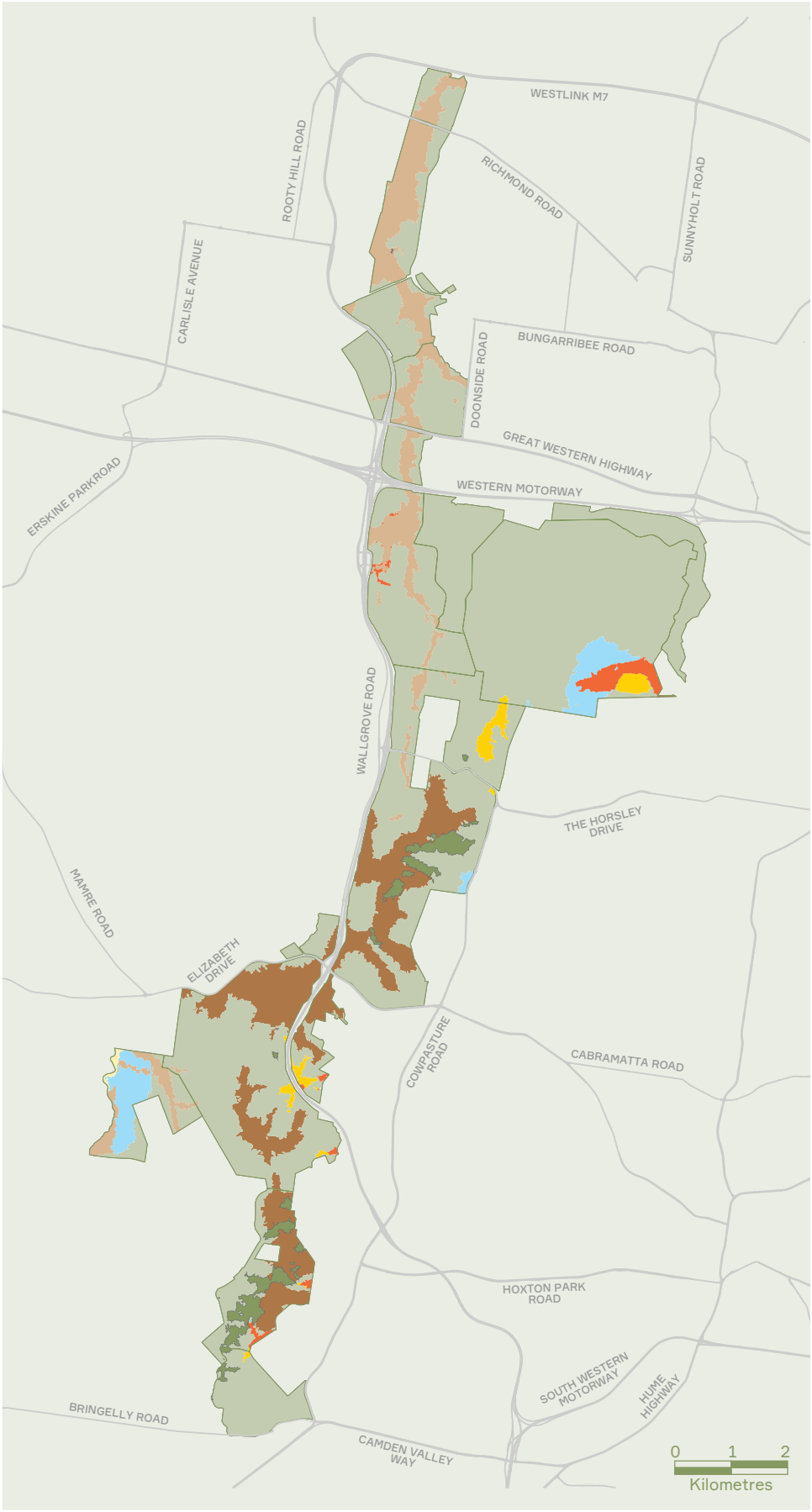
In the heart of Gandangara and Dharug Country, Western Sydney Parklands is Australia's largest urban park. It extends more than 27 km from Quakers Hill in the north to Leppington in the south.

Much of the area is reemerging woodland from historic land clearing. Meandering waterways including Eastern, Hinchinbrook and Wallgrove creeks feed and support native flora and fauna. Vegetation along the waterways and within floodplains include significant and endangered vegetation communities.

Around a third of the parklands is dedicated to bushland under the Western Sydney Parklands 2030 Plan of Management. The plan of management allocates 40% of the 5,200 ha parkland for bushland preservation; within this, 2,000 ha of bushland corridors and vegetation fragments serve as connections for native wildlife. Western Sydney Parklands seamlessly connects to national parks, regional parks and the South Creek corridor.

This is a vital large-scale sanctuary within the Sydney Basin that also provides recreational opportunities for visitors.

Western Sydney Parklands – Pre 1750 State Vegetation Type MAP



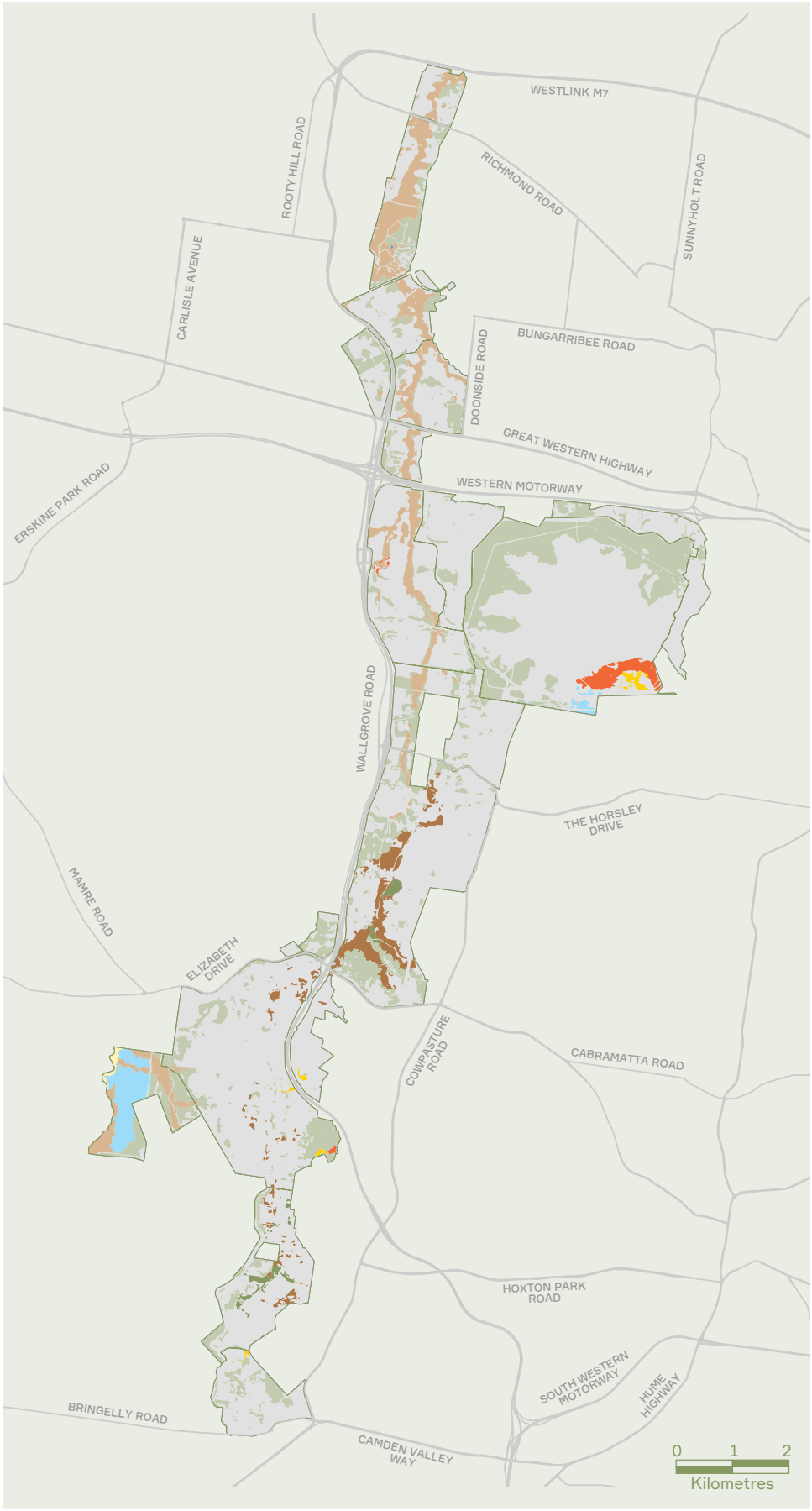
LEGEND

- Western Sydney Parklands boundary
- Roads
- Cumberland Moist Shale Woodland
- Cumberland Shale Hills Woodland
- Cumberland Shale PlainsWoodland
- Castlereagh Ironbark Forest
- Castlereagh Scribbly Gum Woodland
- Sydney Creekflat Wetland
- Southern Lower Floodplain Freshwater Wetland
- Cumberland Blue Box Riverflat Forest
- Cumberland Red Gum Riverflat Forest
- Coastal Valleys Swamp Oak Riparian Forest

Western Sydney Parklands – State Vegetation Type MAP

LEGEND

- Western Sydney Parklands boundary
- Roads
- Not classified
- Greater Sydney Enriched Grey Myrtle Dry Rainforest
- Cumberland Moist Shale Woodland
- Cumberland Shale Hills Woodland
- Cumberland Shale Plains Woodland
- Castlereagh Ironbark Forest
- Castlereagh Scribbly Gum Woodland
- Sydney Creekflat Wetland
- Southern Lower Floodplain Freshwater Wetland
- Coastal Valleys Riparian Forest
- Cumberland Blue Box Riverflat Forest
- Cumberland Red Gum Riverflat Forest



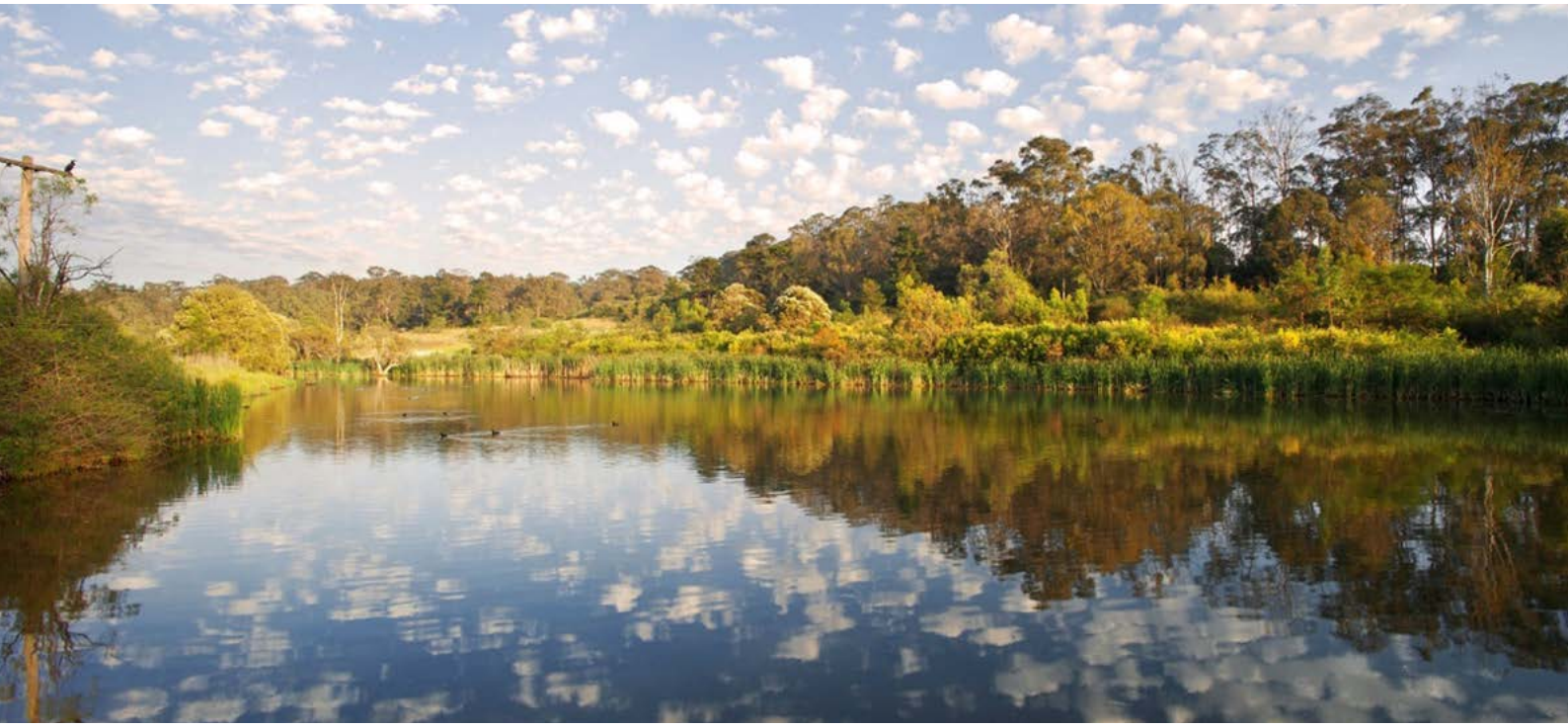
Plants and Animals

Eucalyptus mollucanna (Grey Box) dominates the grassy woodlands. It displays a trunk of fibrous bark with a smooth whitish branching canopy.

The key canopy species of the Cumberland Plain Woodland, E. tereticornis (Forest Red Gums), towers over the lower storey species, keeping a foot hold in heavier clay soils. The mature Melaleuca decora (White Feather Honey Myrtle) displays gnarly limbs throughout the landscape.

Blankets of Microlaena stipoides and Basket Grass weave through the floor of the woodlands. Einadia species such as E. nutans with brightly coloured berries are a popular food source for woodland birds and smaller lizards.

Swamp Wallabies and Eastern Grey Kangaroos feed early mornings and evenings and rest during the day in a bed of microlaena under the shade. Elusive Lace Monitors scurry up tree trunks to evade predators, while other elusive species like echidnas, possums and snakes also call Western Sydney Parklands home.



Waterway at Western Sydney Parklands

Earth and Water

On the border of 2 catchments, Western Sydney Parklands contain the headwaters of Eastern and Hinchinbrook creeks. Eastern Creek, fed by the Hawksbury River, meanders through the parklands until it reaches east of Sugarloaf Ridge. Hinchinbrook Creek feeds into a series of catchments in the southern parklands. The creeks, flood-plains, ephemeral wetlands and historic farm dams offer natural features and support native wildlife.

Luddenham erosional, South Creek alluvial and Picton colluvial make up the soils. Luddenham soils exist on undulating to rolling hills on Wianamatta Group shales, with narrow ridges, hillcrests and valleys. The soils are shallow dark Podzolic soils that change from red to yellow down the slopes, to Prairie soils on the lower slopes and drainage lines. These soils are found around Cecil Hills.

The South Creek alluvial soils exist in floodplains, valley flats and drainage areas on the Cumberland Plain. These are layered deep over bedrock or older soils with predominately Red and Yellow Podzolic soils along with some areas of Grey Clays. These are found in South, Prospect Creek and Eastern creeks.

Picton colluvial soils are found on steep slopes, Wianmatta Group shale and shale colluvial substrate, often southerly facing slopes. Picton colluvial is shallow to deep Red and Brown Podzolic soils in the upper parts of the slopes. They become brown to yellow further down the lower slopes and in the drainage lines. These soils exist within Kemps Creek and north of Cecil Park.

People

Within the boundaries of the Deerubbin and Gandangara Local Aboriginal Land Councils, Western Sydney Parklands is part of the Country of the Gandangara and Darug people.

As agriculture expanded in Western Sydney in the early 1900s, bushland fragmented. In the late 1960s, Sydney Region Outline Plan identified a green corridor. This led to the preservation and active management of the bushland.

Western Sydney Parklands falls within Blacktown, Liverpool and Fairfield local government areas. As suburban areas expand, the parklands provide recreational respite with playgrounds, picnic areas, bike and bush walking paths, and events.

Opportunities

Native vegetation in the parklands, once predominately cleared, and has regrown where the seed bank has provided natural regeneration. As the seed bank is relatively low in some areas, many active revegetation projects have restored bushland corridors, increased diversity and supported native fauna. Some of these areas provide new habitat as the trees fall and new mid storey vegetation emerges. This protects small birds such as the Superb Fairy-wren and the Silvereye from predators.

Environmental conservation in Western Sydney Parklands aligns with the Cumberland Plain Conservation Plan. While the mix of plants and animals creates opportunities for people to connect with biodiversity and learn about the natural environment, it also creates opportunities to improve the existing habitat areas.

Fire affects many biological, cultural and land management spaces. In the high-quality bushland in areas such as Cecil Park and Abbotsbury, we can work with Aboriginal people and the Rural Fire Service to manage wildfire risks by reducing fuel loads and encouraging species regeneration from the seed bank in the soil. Cultural burning workshops can celebrate Aboriginal people's connection to Country while advancing biodiversity and cultural understanding.

Key Threatening Processes

The parklands' linear nature and proximity to urbanisation is a challenge. The area is divided from other natural regions, which reduces connectivity for terrestrial species.

Invasive weeds such as African Olive and Bridal Creeper dominate valleys and creeks, while the hardy drought tolerant African Lovegrass takes a foothold in sunnier aspects. These outcompete native plants and reduce food sources for native animals.

Changes to fire regimes and reduction in cultural burns can modify the ecology and vegetation structure that is unfavourable to native species. In addition, pests like rabbits, goats and feral pigs feed on regenerating or revegetated bushland and destroy soil structure with warrens and diggings.

Phytopthora is a plant-damaging pathogen that occurs in Western Sydney Parklands. It causes crown and root rot disease, killing plants from the roots up. We need to contain this disease and prevent the introduction of new diseases.

A native Psyllid outbreak has impacted Eucalyptus mollucanna of all age structures and could be a precursor to the insect outbreaks caused by climate change. In addition, dryland salinity impacts one location in the parklands.

Mean temperatures, heatwaves and extreme heat days will increase and the number of days above 35 degrees will double by 2050. Bushfires will increase, threatening the wellbeing and safety of people and the diverse flora and fauna inhabiting the park.

Extreme heat days, substantial rainfall and storms will impact kangaroos, wallabies and birdlife. It may lead to temporary park closures, impacting businesses within the parklands. Rising temperatures may also alter environmental conditions, fostering invasive weeds.

Caption

Sulphur Crested Cockatoo (*Cacatua galerita*)

Achieving our vision

Bushland and aquatic structure, diversity and habitat values

GSP OUTCOME

BUSHLAND AND AQUATIC STRUCTURE, DIVERSITY AND HABITAT VALUES

- Reduce invasive species coverage, particularly vines along Eastern Creek.
- Reduce occurrence of exotic species such as Lantana, African Olive, vines and grasses like African Love Grass and Chilean Needle Grass in bushland areas.
- Increase mid and understory structure, including wildflower abundance in bushland areas.
- Increase reporting and control of pest and feral animals.

GSP OUTCOME

QUANTITY OF HABITAT

- Expand bushland corridors for wildlife movement and increase resilience of existing bushland.
- Increase key habitat structures such as hollows, fallen timber and rocks.

GSP OUTCOME

SOIL AND AQUATIC BIOTA AND HABITAT STRUCTURE

- Remediate erosion around creeks and restore gully erosion in Cecil Park Biobank.

GSP OUTCOME

WATER QUALITY

- Increase floodplain species to improve the floodplain and riparian landscapes.
- Improve draining line and dam waterflows and reduce site pollution sources.

GSP OUTCOME

COMMUNITY CONNECTIONS

- Increase Aboriginal community partnerships, decision-making and involvement
- Use the Freshwater Cultural Connections community consultation project to understand value of place and aspirations for the parklands.

GSP OUTCOME

COMMUNITY KNOWLEDGE AND STEWARDSHIP

- Increase stakeholder commentary on Western Sydney Parklands environment stories.
- Increase publicity about the Western Sydney Parklands environment.

Actions and management approaches

Plants and Animals 

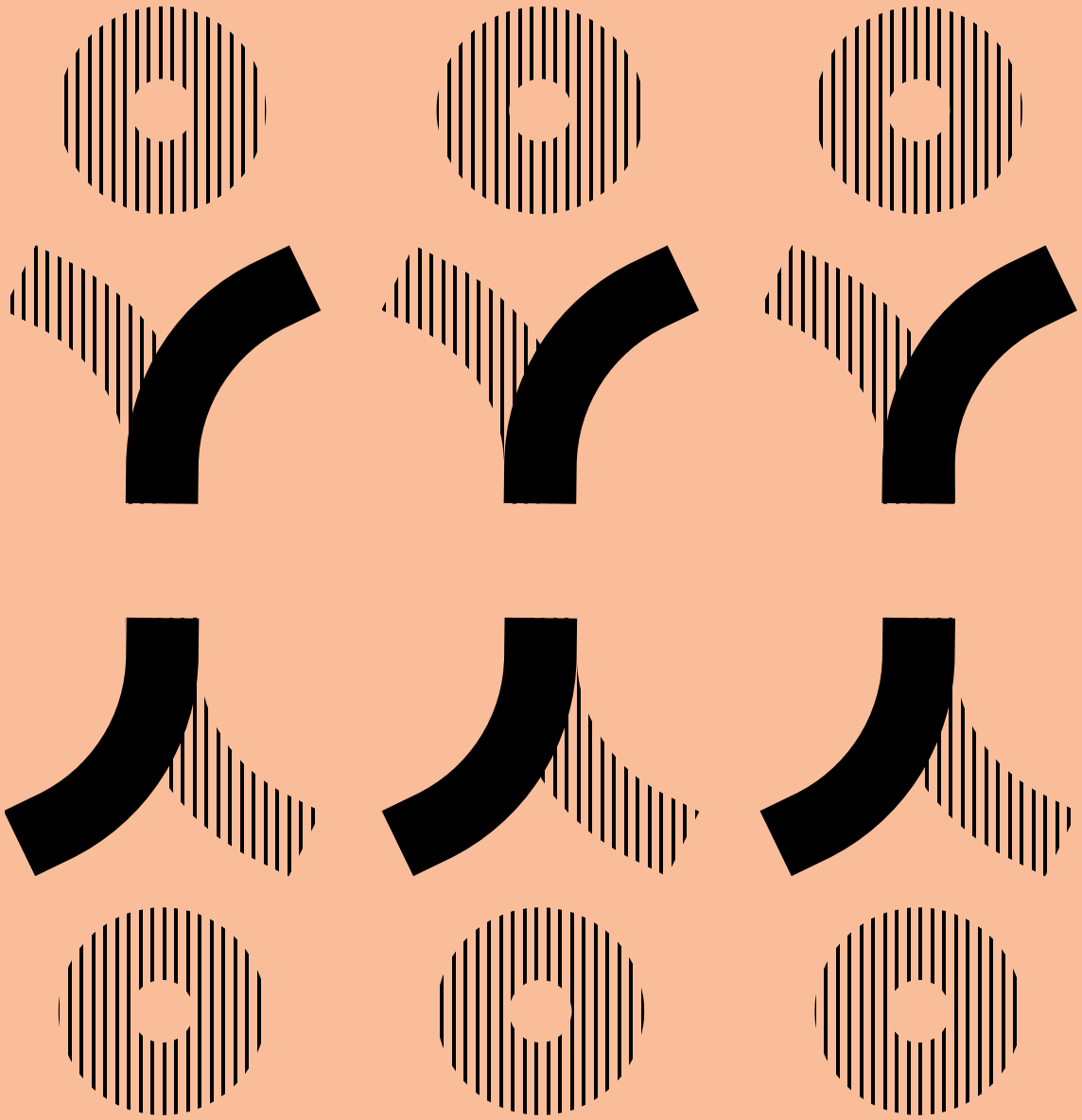
ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Manage bushland areas	Remove Lantana, Privet and African Olive from bushland sites	High	Ongoing
	Continue with BSAs	High	Ongoing
	Plant herbaceous and shrub species.	High	Ongoing
Control animal species that threaten biodiversity	Undertake regional programs for deer and fox control.	Moderate	Ongoing
	Partner with Local Land Services to respond to pig activity.	Moderate	Ongoing
Increase diversity and habitat	Undertake floristic surveys.	High	Every 5 years
	Undertake fauna surveys.	Moderate	Every 5 years
GOAL: RESTORE AND EXPAND			
Encourage natural regeneration	Nurture self-seeded species through protection zones and plantings.	High	Ongoing
	Increase the ratio of less dominant tree species in revegetation programs	Moderate	Ongoing
Utilise fire management to improve species diversity and control weed threats	Work with Rural Fire Services to undertake ecological burns or pile burns.	High	Every 5 years at various sites
	Engage with Dharug groups and other Aboriginal groups on cultural burns.	Moderate	Through BSA process
	Undertake bush regeneration following arson, natural bushfires or hazard reduction burns.	High	As needed
Protect species diversity during hazard reduction burns	Identify appropriate burn regimes in our fire management plan.	High	Fire management plan updated
	Refer to latest GIS fire history database prior to hazard reduction burns.	High	Ongoing

Earth and water

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Clear waste and weeds from waterways	Maintain waterways through bushland management and litter removal.	High	Ongoing
	Engage external groups to monitor water quality and reinstate native riparian vegetation.	Moderate	Regular monitoring
Maintain and improve habitat values	Manage riparian zone through weed removal and planting endemic species.	Moderate	Ongoing
	Manage soil structure and erosion by planting endemic species.	Moderate	Ongoing

People

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: UNDERSTAND AND ENGAGE			
Improve partnerships	Advocate for community-run planting days.	High	Ongoing
	Advocate for community-run education and workshops.	High	Ongoing
Enhance cultural connections	Encourage social procurement to engage cultural groups.	High	Ongoing
GOAL: PROTECT AND PRESERVE			
Control visitor access in ecological spaces	Maintain and repair fences and gates around bushland areas.	High	Ongoing



Parramatta Park

White-faced Heron (*Egretta novaehollandiae*)

Introduction

Parramatta River curves through the Parramatta Park, supporting floodplain vegetation like the River-flat Eucalypt Forest and animals such as the Grey-headed Flying-fox.

The park is the ancestral lands of the Barramattagul and Dharug speakers. It is listed on the State Heritage Register and the National Heritage Register. The Old Government House and Domain is one of 11 sites that form the Australian Convict Sites, inscribed on the UNESCO World Heritage List in 2010.

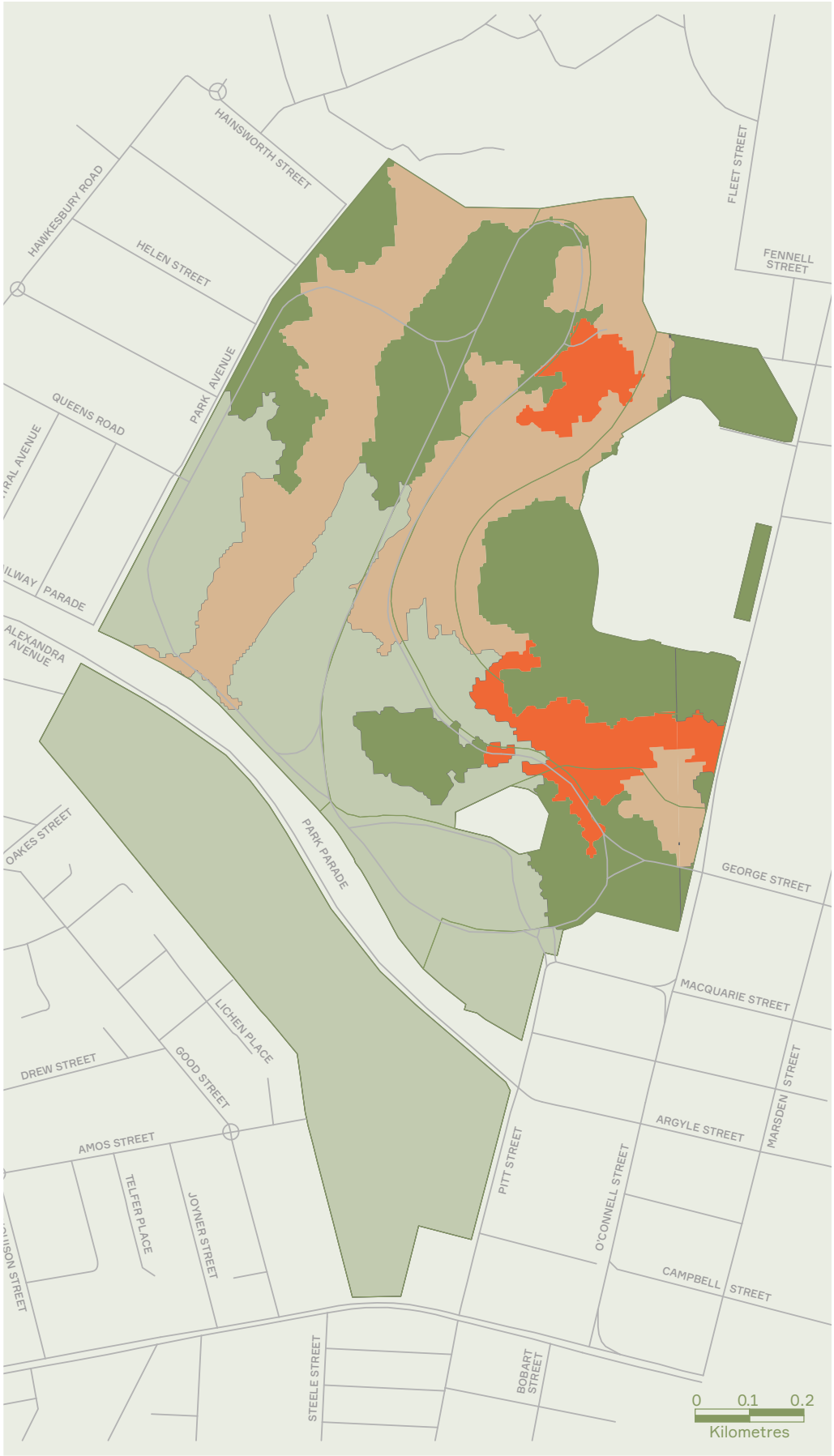
The park contains fragments of remnant and reconstructed ecosystems that once covered the Cumberland Plain. Your Parramatta Park 2030 conservation management plan and plan of management aims to protect riparian vegetation and water quality, and improve habitat and vegetation communities.

Parramatta Park attracts around 2 million visitors annually. With the neighbouring area of the park developing, demand for natural areas and open space increases. Within this context, we can manage the park's biodiversity by providing habitat refuge and improving biodiversity values.

Parramatta Park – Pre 1750 State Vegetation Type MAP

LEGEND

- Parramatta Park boundary
- Roads
- Cumberland Shale Plains Woodland
- Sydney Coastal Sandstone Gully Forest
- Cumberland Blue Box Riverflat Forest
- Coastal Valleys Swamp Oak Riparian Forest



Parramatta Park – State Vegetation Type MAP

LEGEND

- Parramatta Park boundary
- Roads
- Not classified
- Cumberland Shale Plains Woodland
- Castlereagh Ironbark Forest
- Sydney Coastal Sandstone Gully Forest
- Cumberland Red Gum Riverflat Forest

Plants and Animals

Parramatta Park showcases a mix of endemic native and exotic plant species from periods of both clearing and reestablishment. The ridgeline above The Crescent boasts remnant and reconstructed bushland of 2 critically endangered communities, the Cumberland Plain Woodland (Shale Plain Woodland) and River-flat Eucalypt Forest on coastal floodplain.

Forest Red Gums command the slopes and ridges. These mix with the occasional Broad-leaved Ironbark and Grey Box. Rough-barked Apple, Broad-leaved Apple and River Oak dominate the riparian zone interspersed with Narrow-leaved Paperbark on the swampy ground, and White Feather Honeymyrtle and Prickly-leaved Paperbark in groups on the slightly better drained terrain adjacent to the creek lines.

Pines, English Oaks, rainforest trees and Jacarandas contrast to the native and indigenous trees and provide a reference to both the Vice Regal Domain period and the 19th Century Park period. A mixture of various introduced grass species is also evident throughout the park.

A colony of the threatened Grey-headed Flying-fox has found a home in the canopy of River-flat Eucalypt Forest near Buttons Bridge. Eastern Water Dragons use the riparian vegetation near The Crescent for refuge. The elusive Red-bellied Black Snake may be spotted during warmer months curled up in the sun in soft ground cover.

The waterways also support Eastern Long-necked Turtles, Long-finned Eels and Australian Bass. The Azure Kingfisher and Dusky Moorhen rely on the habitat of the riparian zone of the river and creeks in the western and eastern Domain.

Grey-headed Flying fox (*Pteropus poliocephalus*)

Earth and Water

In the centre of the Sydney Basin, Parramatta Park bolsters the arc of the Parramatta River as it bends towards Sydney Harbour. The natural water forms have been manipulated and altered to suit different uses and are now part of the urban catchment of Parramatta River and Toongabbie and Darling Mills creeks.

The 2 geological systems in the park are the Wianamatta Group of shales in the south and the underlying Triassic sediments of Hawkesbury Sandstone in the north. The higher areas of the park are dominated by shale-derived soils that are compacted, poor- draining highly sodic soils.

These limit the vegetation type to the Cumberland Plain landscapes in the centre of the park.

The deposited alluvial matter from Parramatta River in the central east of the park supports the old growth *Eucalyptus tereticornis* and *Eucalyptus Moluccana*.

Parramatta River, Domain Creek and Murray Garden Creek act as a drainage system that has carved through the Wianamatta Group of shales to reveal sandstone outcrops and cliffs in the river valley.

Eastern Water Dragon (*Physignathus lesueurii lesueurii*)

People

Parramatta Park sits at the core of the territory of the Barramattagul, of the Dharug people. The Aboriginal archaeological evidence of camp sites and activities across the area represents the past and future of the Dharug and broader Aboriginal communities.

With the early colonial concessions, the area was utilised for farming until the 19th century when the need for more parks for people was realised. This resulted in the development of roads, walkways, gates, gatehouses, fences and bridges – and, eventually, the establishment of Parramatta Park in 1857.

Constructed landmarks and cultural plantings include the gatehouses that mark the main entrances, the Boer War Memorial, The Dairy, Old Government House, The Domain and The Crescent.

As Parramatta's population increases, so too will medium and high-density development. Parramatta CBD borders the park's eastern side. The CBD will evolve into a regional city, increase demand for and use of the parkland space.

Opportunities

The remnant and reconstructed Cumberland Plain Woodland and River-flat Eucalyptus Forest is of varying conditions from medium species richness to very low species richness. Improving the diversity of species allows for a more robust ecosystem that helps restore these communities.

Parramatta Park's environmental conservation aligns with the Cumberland Plain Conservation Plan.

Parramatta River supports native animals such fish, reptiles, birds and mammals. The presence of wildlife within a parkland gives people an opportunity to connect with biodiversity and learn about the natural environment.

Parramatta Park has a long history of Aboriginal presence. This creates an opportunity for connection to Aboriginal stories with plantings of native tucker such as Yam Daisies, which were common across the region. By holding revegetation and planting activities with Aboriginal people, we can celebrate their connection to Country while advancing biodiversity and cultural understanding.

Caption

Key Threatening Processes

The natural flow of the Parramatta River was altered with the installation of weirs in the 19th Century. While this controlled the river height and allowed people to use the river for boating and swimming, it negatively impacted fish migration and natural sediment removal. Fishways were installed to assist the migration of some native species. The most abundant species are Exotic Common Carp and the Native Long Finned Eel.

In 2010, erosion control works and stream bank revegetation was undertaken, while piping, culverts and gross pollutant traps were installed in Domain Creek to manage flooding, sediment and litter. These works are ongoing and are maintained due to the modified flow regime.

There are threats of weed incursion along the river and creek system from the upper catchment as neighbouring properties' gardens escape into the park. Invasive weed species threaten native vegetation as they compete for light and resources. This reduces the availability of native food for wildlife. Weeds also reduce plant diversity and ecosystem resilience.

The European fox is an ongoing threat as it has such a broad diet. This includes ground-nesting birds, and small to medium sized mammals and reptiles such as the Eastern Long-necked Turtles. We can work with Local Land Services to control foxes in the park.

Mean temperatures, heatwaves and extreme heat days will increase, with the number of days above 35 degrees to double by 2050. Extreme heat days, substantial rainfall and storms may lead to temporary park closures and the cancellation of scheduled events.

Escalating temperatures could increase maintenance requirements for built infrastructure and potentially damage archaeological sites. Rising temperatures could alter the environmental conditions within heritage-listed buildings, fostering invasive species or mould.

Achieving our vision

Bushland and aquatic structure, diversity and habitat values

GSP OUTCOME

BUSHLAND AND AQUATIC STRUCTURE, DIVERSITY AND HABITAT VALUES

- Reduce invasive species coverage, particularly woody weeds such as Lantana and vines such *Araujia sericifera, Passiflora suberosa* and *Anredera cordifolia* along the riparian zones and within the endangered ecological communities.
- Reduce occurrence of aquatic weeds such as *Alternanthera philoxeroides*.
- Increase mid and understory structure in the Cumberland Plain Woodland and River-flat Eucalypt Forest bushland areas.
- Increase reporting and control of pests and feral animals.

GSP OUTCOME

QUANTITY OF HABITAT

- Expand the Cumberland Plain Woodland and River-flat Eucalypt Forest to create buffer zones and increase resilience.
- Increase key habitat structures such as hollows, fallen timber and rocks.

GSP OUTCOME

SOIL AND AQUATIC BIOTA AND HABITAT STRUCTURE

- Restore and remediate erosion sites along Domain Creek.
- Undertake erosion control with riparian rehabilitation along Parramatta River.

GSP OUTCOME

WATER QUALITY

- Support City of Parramatta Council creek restoration work.
- Improve draining line and dam waterflows and reduce site pollution sources.

GSP OUTCOME

COMMUNITY CONNECTIONS

- Increase Aboriginal community partnerships, decision-making and involvement.
- Use the Freshwater Cultural Connections community consultation project to understand value of place and aspirations for the parklands.

GSP OUTCOME

COMMUNITY KNOWLEDGE AND STEWARDSHIP

- Increase stakeholder commentary on Parramatta Park's environment stories.

Actions and management approaches

Plants and Animals 

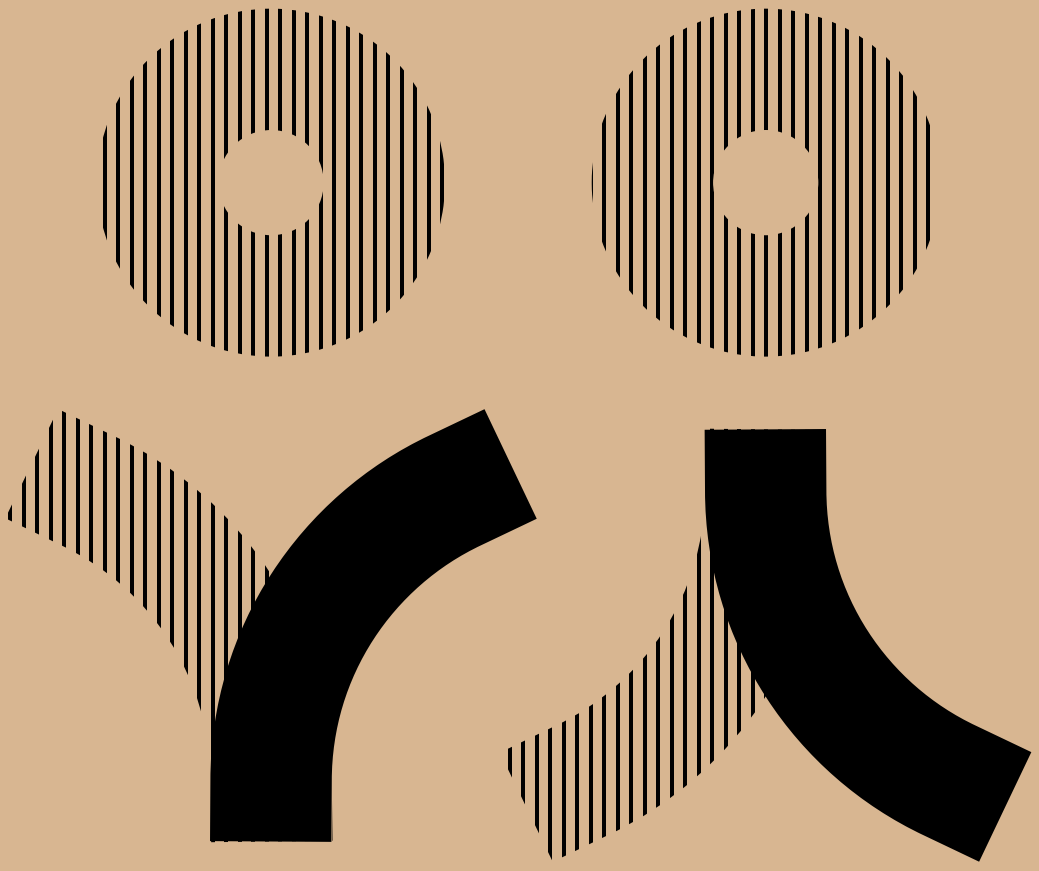
ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Manage bushland areas to increase diversity and habitat	Remove priority weeds along riparian zones.	High	Ongoing
	Increase mid storey and ground covers in Cumberland Plain Woodland and River-flat Eucalypt Forest.	High	Ongoing
	Explore opportunities to install hollows.	High	Ongoing
Control animal species that threaten biodiversity	Undertake regional programs for deer and fox control.	Moderate	Ongoing
	Coordinate with regional programs to control Ibis numbers.	Moderate	Ongoing
	Seek opportunities for carp control in Parramatta River.	Low	Ongoing
	Investigate disturbance techniques for Common Mynah and Noisy Miner.	Low	Ongoing
	Undertake a rodent control program.	Low	Ongoing
GOAL: RESTORE AND EXPAND			
Encourage natural regeneration	Nurture self-seeded species through protection zones and subsequent plantings.	High	Ongoing
Improve habitat values	Implement the Flying- fox management plan.	High	Ongoing
	Partner with WIRES.	Moderate	Ongoing

Earth and water

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Remove waste and weeds from waterways	Reinstate riparian vegetation.	High	Ongoing
	Undertake water sensitive urban design in Domain Creek.	High	Ongoing
	Encourage external groups to monitor water quality of Parramatta River.	Moderate	Ongoing
Improve habitat values	Reduce aquatic weeds such as *Alternanthera philoxeroides.*	Moderate	Ongoing
	Explore opportunities with City of Parramatta Council to control aquatic weeds.	Moderate	Ongoing
	Work with councils and Sydney Water to undertake water quality testing and riparian management.	Moderate	Ongoing

People

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: UNDERSTAND AND ENGAGE			
Improve partnerships	Advocate for community-run planting days.	Moderate	Ongoing
	Advocate for community-run education and workshops.	Moderate	Ongoing
	Advocate for WIRES to monitor and assess the Grey-headed Flying-fox camp.		
Enhance cultural connections	Encourage social procurement to engage cultural groups.	High	Ongoing
	Advocate for Aboriginal groups to undertake cultural plantings.	High	Ongoing
GOAL: PROTECT AND PRESERVE			
Control visitor access through ecological spaces	Maintain and repair fences and gates around bushland areas.	High	Ongoing



Callan Park

Foreshore of Callan Point, Callan Park

Introduction

Callan Park's natural shoreline boasts rocky outcrops that project into the waters of Iron Cove. It features sandy beaches, large sandstone ledges and remnant foreshore vegetation. It is a place that provides glimpses of a once-untouched landscape.

Callan Park is the traditional land of the Cadigal and Wangal people of the Eora Nation. Evidence such as shell middens, axe grind grooves and rock paintings illustrate a rich and productive landscape and are celebrated for their connections to Aboriginal culture and identity.

Architectural heritage is displayed with the remnants of mental health facilities and structures from the 1870s onwards.

Callan Park –
Pre 1750 State Vegetation Type MAP

LEGEND

- Callan Park boundary
- Roads
- Not classified
- Sydney Turpentine Ironbark Forest
- Sydney Coastal Sandstone Foreshores Forest
- Estuarine Swamp Oak Twig-rush Forest
- Grey Mangrove-River Mangrove Forest

Callan Park –
State Vegetation Type MAP

LEGEND

- Callan Park boundary
- Roads
- Not classified
- Estuarine Swamp Oak Twig-rush Forest

Plants and Animals

The park's Hawkesbury sandstone soils support smooth-barked apple (*Angophora costata*), Sydney peppermint (*Eucalyptus piperata*) and Casuarina glauca along the creek lines that enter the bays.

Port Jackson fig (*Ficus rubiginosa*) roots climb over the sandstone crevices and the spiky *Lomandra longigolia* clings to rocky outcrops along the foreshore. Towering scribbly gums (*Eucalyptus haemastoma*) pre-date construction of the heritage buildings. Grey ironbarks (*Eucalyptus paniculata*) and blackbutts (*Eucalyptus pilularis*) feature on the slope above King George Park.

Sydney turpentine ironbark forest on the shale slopes below the ridge on the park's north-east edge parade large blackbutt, turpentine (*Syncarpia glomulifera*) and grey ironbarks. In the park's west, a planted canopy of sandpaper fig (*Ficus coronata*), Bangalow palm (*Archontophoenix cunninghamiana*) Cabbage Tree palm (Livistona australis) create a short rainforest walk either side of a small creek.

The grey-headed flying-fox (*Pteropus poliocephalus*) often feeds from the lemon-scented gum (*Corymbia citriodora*) and Port Jackson fig. A small bat, the large bent-winged bat (*Miniopterus schreibersii*) also forages above the canopy, feeding on flying insects.

Another nocturnal feeder, the powerful owl (*Ninox strenua*), use open woodland to spot their prey, including grey-headed flying-fox juveniles.

With the long-nosed bandicoot (*Parameles nasuta*) spotted in the Inner West, it may use the park's large, open lawned areas, cement structures and abandoned buildings for nesting and foraging.

Remnant Bushland, Callan Park

Earth and Water

Callan Park slopes from the south east to the north west towards Parramatta River. Hawkesbury sandstone controls the slopes to the flat sportsfields to the north and west. These contain Quaternary sediments and man-made fill. Some of the upper slopes and ridges contain Ashfield shale of the Wianamatta group.

Gymea soil landscape occurs on the ridgetop and upper slopes along Balmain Road. This boasts rock outcrops with wide benches along the road and the smooth-barked apple and Sydney peppermint on the sheltered slopes.

Similarly, the Hawkesbury soil landscape around the Iron Cove foreshores give rise to scribbly gums and blackbutts.

The park's northern boundary is a subtidal habitat created from a built sea wall along the shoreline. Made of stones, rocks and rubble, it supports colonised species, including Sydney flat-rock oysters (*Saccostrea glomerata*), little blue periwinkles (*Austrolittorina unifasciata*) and black nerites (*Nerita atramentosa*).

People

Aboriginal people used the caves and overhanging rocks of Iron Cove for shelter and protection. From here, they could fish while being shielded from the weather. The area features some of Sydney's oldest Aboriginal artefacts. These show that over 5,000 years, Aboriginal people undertook regular visits to the Callan Park area.

From the mid-1800s, the area consisted of 3 separate estates. These were acquired in 1874 by the government to house the mentally insane. This site use continued until 2008, when the buildings were became part of Rozelle Hospital.

Today, Callan Park's vast open spaces include threads native and exotic vegetation. People use the area for functions and events, nature play, sports, dog walking and walking or running.

Opportunities

Callan Park Bushcare maintains many of the native remnant patches of vegetation, particularly in the north-eastern bushland. It is committed to preserving and enhancing the park's remaining native species. We will continue to support Callan Park Bushcare and to work with bush regeneration contractors within the site.

Many tall and ageing trees have developed natural hollows. Rainbow lorikeets use these during breeding seasons. Possums and microbats also use them. We have an opportunity to increase hollows by installing logs and nesting boxes around younger trees.

Key Threatening Processes

Erosion is an issue, particularly where inclines are steep and lack vegetation or where tracks have formed. This includes the north-eastern bushland where the slope is significant. Ongoing vegetation will help to maintain the slope's integrity.

Soil erosion from rising sea levels will impact Iron Cove and the coastline. More storms and king tides will impact the beach areas and rocky outcrops, with water taking soil and archaeological artifacts as it recedes. This will require sea walls and plantings of mangroves and sea vegetation.

Invasive weeds include lantana (*Lantana camara*) and Madeira vine (*Anredera cordifolia*) in the north-eastern bushland areas. The opportunistic *Ehrharta erecta* takes a foothold in sunny and shady areas. These weeds outcompete native plants and reduces food sources for native animals.

As mean temperatures, heatwaves and extreme heat days continue to increase and the number of days above 35 degrees doubles by 2050, resultant impacts may lead to temporary park closures or event cancellations.

Caption

Achieving our vision

Bushland and aquatic structure, diversity and habitat values

GSP OUTCOME

BUSHLAND AND AQUATIC STRUCTURE, DIVERSITY AND HABITAT VALUES

- Reduce Lantana, Madeira vine, *Alternanthera philoxeroides* and *Senecio madagascariensis* in the north-eastern bushland.
- Increase mid and understory structure where lantana is removed.
- Increase reporting and control of pest and feral animals.

GSP OUTCOME

QUANTITY OF HABITAT

- Expand bushland corridors to create buffer zones and increase resilience.
- Increase key habitat structures such as hollows, fallen timber and rocks.

GSP OUTCOME

SOIL AND AQUATIC BIOTA AND HABITAT STRUCTURE

- Monitor and revegetate potential erosion in the north-eastern bushland.
- Reduce walking tracks through bushland areas with planting.

GSP OUTCOME

WATER QUALITY

- Expand the riparian corridor to improve habitat.

GSP OUTCOME

COMMUNITY CONNECTIONS

- Increase Aboriginal community partnerships, decision-making and involvement.
- Use the Freshwater Cultural Connections community consultation project to understand value of place and aspirations for Callan Park.

GSP OUTCOME

COMMUNITY KNOWLEDGE AND STEWARDSHIP

- Increase stakeholder commentary on Callan Park environment stories.
- Promote Callan Park's Aboriginal historical sites.

Actions and management approaches

Plants and Animals 

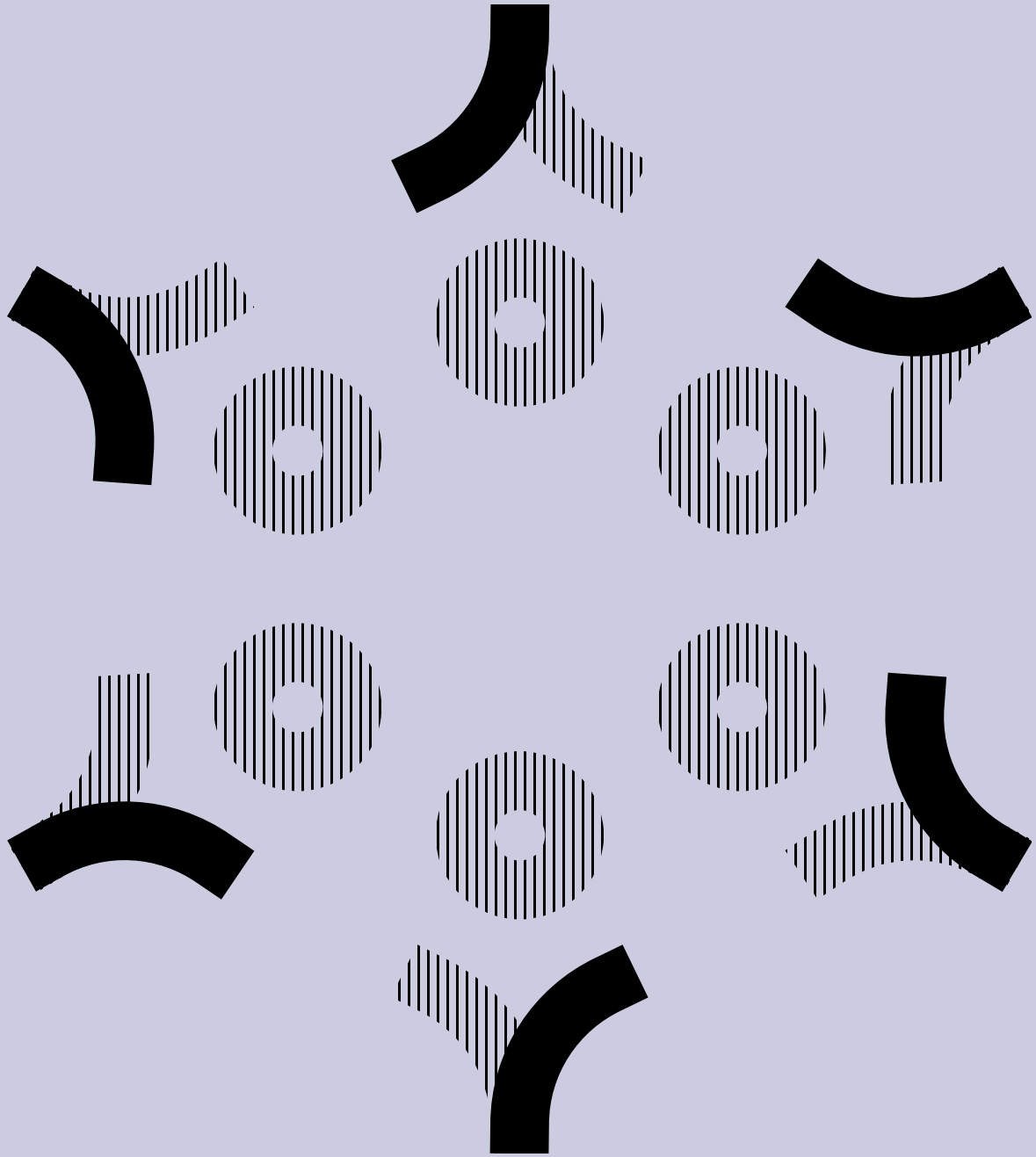
ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Manage bushland areas to increase diversity and habitat	Undertake weed control and infill planting in existing bushland.	High	Ongoing
	Manage small bird habitat through selective removal.	High	Ongoing
	Plant native flowers to create meadows for native bees.	Moderate	Ongoing
	Explore opportunities to install hollows.	Moderate	Ongoing
Control animal species that threaten biodiversity	Coordinate regional fox control programs.	Moderate	Ongoing
	Undertake a rodent control program.	Low	Ongoing
GOAL: RESTORE AND EXPAND			
Encourage natural regeneration	Nurture self-seeded species through protection zones and plantings.	High	Ongoing

Earth and water

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Maintain and improve habitat values	Undertake weed control and revegetation of endemic species along Iron Cove.	High	Ongoing
	Encourage external groups to monitor water quality of Parramatta River.	Moderate	As required

People

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: UNDERSTAND AND ENGAGE			
Improve partnerships	Advocate for community-led planting days.	Moderate	Ongoing
	Advocate for community-led education and workshops.	Moderate	Ongoing
	Advocate for local and regional fauna surveys to include Callan Park in field surveys and analysis.	Low	Ongoing
Enhance cultural connections	Advocate for Aboriginal people to undertake cultural plantings.	High	Ongoing



Centennial Park

Powerful Owl *(Ninox strenua)*

Introduction

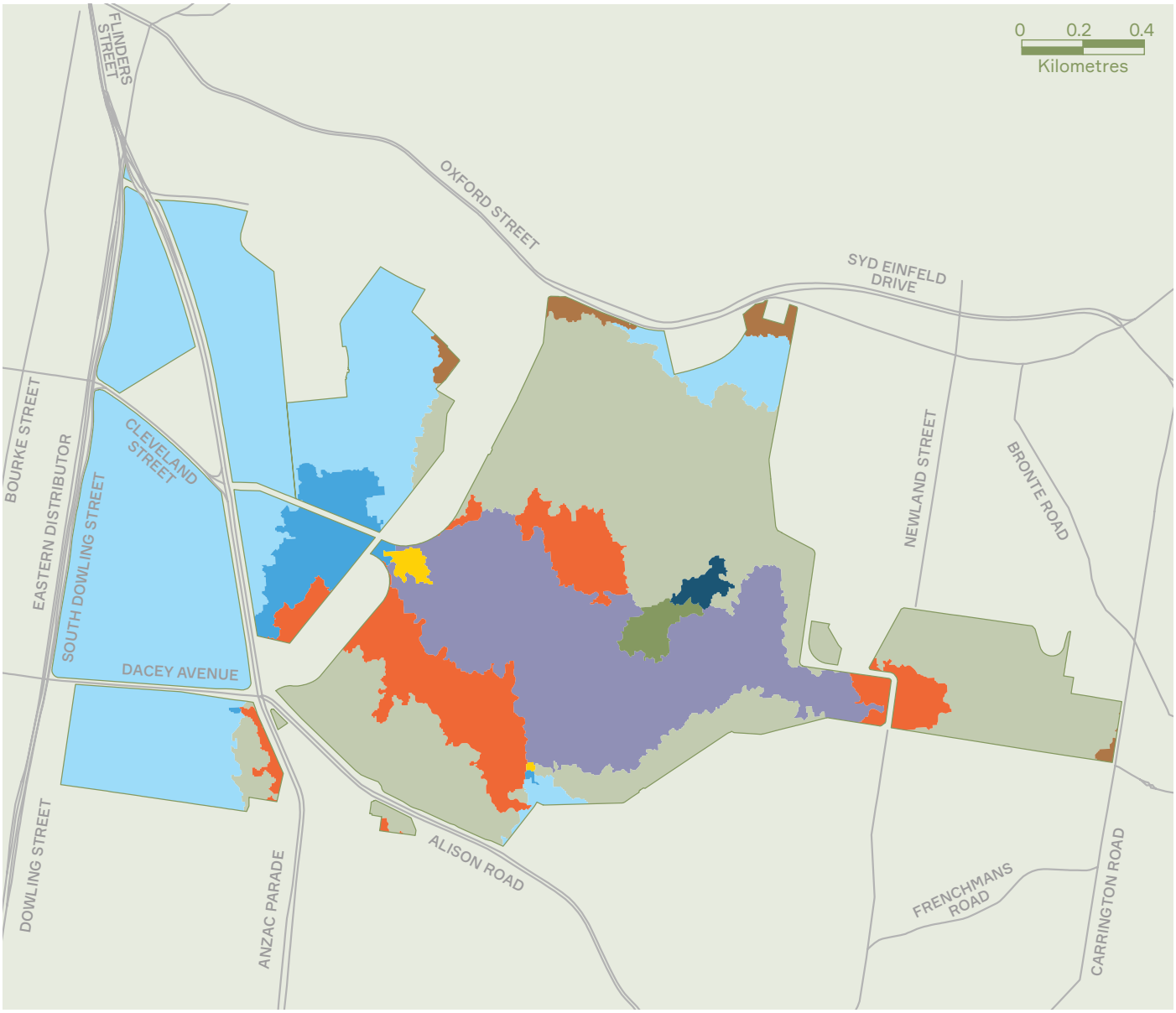
Centennial Parklands incorporates Centennial, Queens and Moore parks. It is around 5 km south-east of Sydney CBD across 3 local government areas: City of Sydney, Randwick City and Waverley.

The 360-ha parklands are a biodiverse space and a remarkable ecosystem in the heart of Sydney's Eastern Suburbs. Sitting on the ancestorial lands of the Gadigal people of the Eora nation, the parklands show signs of past landscapes. Some sections are preserved and protected, including the Eastern Suburbs Banksia Scrub and the historic raised sandstone of the cliffs within Queens Park.

Centennial Parklands Master Plan 2040 prioritises shelter and homes for native birds and animals. This includes safeguarding significant trees for the powerful owl and the grey-headed flying-fox colony and enhancing bushland in the outer wild areas.

The State Heritage Register of NSW lists the 3 parks (excluding the Entertainment Precinct) and various items are of state or local heritage significance.

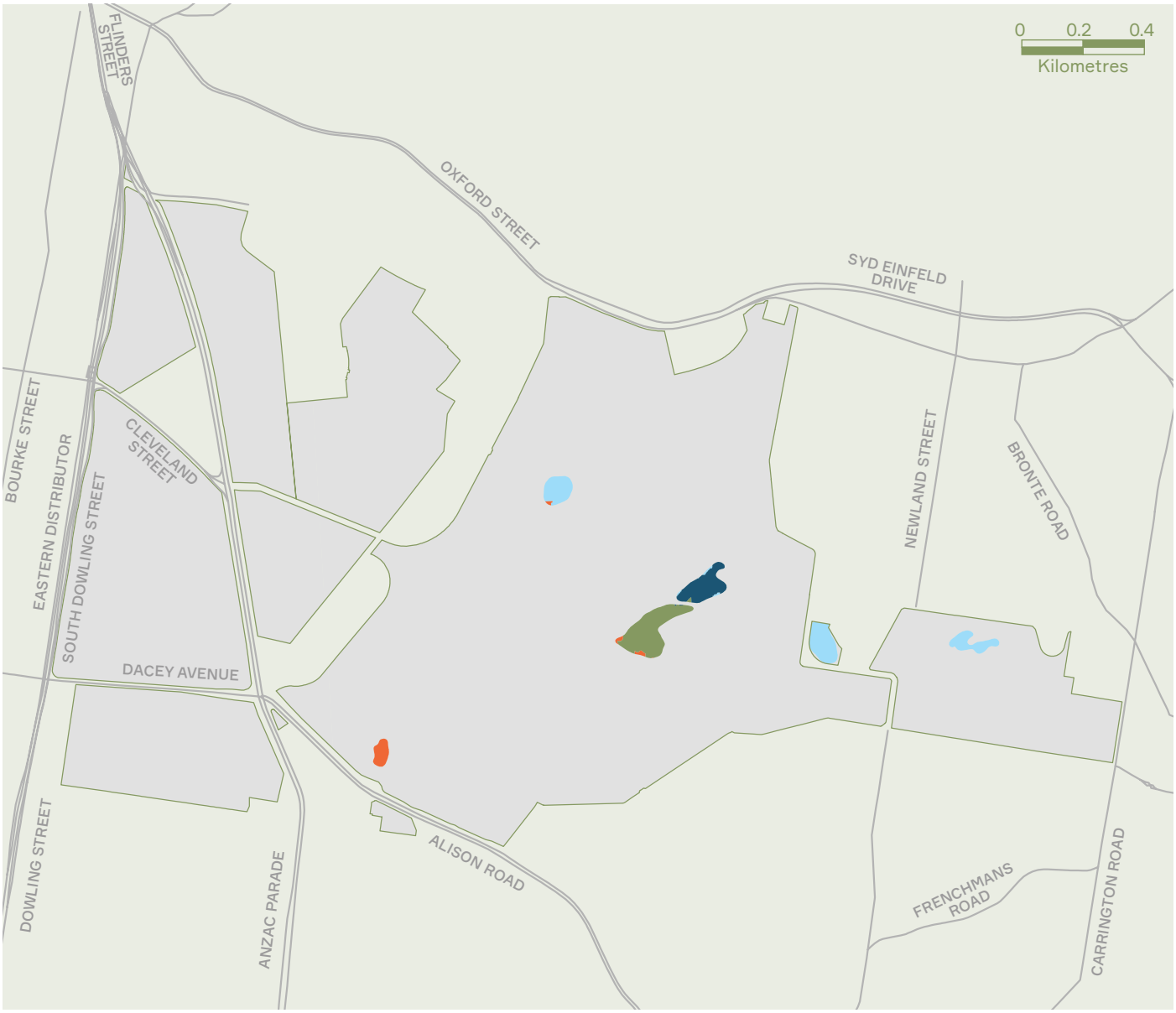
Centennial Park – Pre 1750 State Vegetation Type MAP



LEGEND

- Centennial Park boundary
- Roads
- Sydney Coastal Coachwood Gallery Rainforest
- Southern Sandplain Heath
- Sydney Coastal Sand Mantle Heath
- Sydney Coastal Sandstone Headland Heath
- Coastal Floodplain Phragmites Reedland
- Sydney Creekflat Wetland
- Coastal Sands Swamp Mahogany Rush Forest
- Cumberland Blue Box Riverflat Forest
- Estuarine Swamp Oak Twig-rush Forest

Centennial Park – State Vegetation Type MAP



LEGEND

- Centennial Park boundary
- Roads
- Not classified
- Sydney Coastal SandMantle Heath
- Sydney Creekflat Wetland3986,Coastal Sands
- SwampMahogany Rush Forest
- Estuarine Swamp OakTwig-rush Forest

Plants and Animals

Rising from small patches of coastal sand are the *Banksia aemula, Banskia ericifolia* and *Acacia longifolia subsp. sophorae*, belonging to the Eastern Suburbs banksia scrub community. These offer a glimpse of the vegetation types that existed before colonisation. The banksia scrub is a resource for rainbow lorikeets, wattle birds and New Holland honeyeaters. You can often hear corellas and sulphur-crested cockatoos high in the trees cracking open the seed pods.

Port Jackson fig (*Ficus rubiginosa*) establishes long roots from the Queens Park cliffs across the parklands. Moreton Bay figs (*Ficus macrophylla*) have been planted across the park. In lower-lying areas swamp oak (*Casuarina glauca*), Cabbage Tree palm (*Livistona australis*) and prickly-leaved tea tree (*Melaleuca styhelioides*) provide a hint of past coastal swamp and floodplain communities.

Planted broad-leaved tea tree or paperbark (*Melaleuca quinquenervia*) dominate in rows of paperbark cloisters throughout the park. Blueberry ash (*Elaeocarpus reticulatus*), cheese tree (*Glochideon ferdinandi*) and bleeding heart (*Omalanthus populifolius*) thread through the planting. Exotic trees planted in outer areas include radiata pine (*Pinus radiata*), coral tree (*Erythrina x sykesii*) and weeping willow (*Salix babylonica*).

The grey-headed flying-fox (*Pteropus poliocephalus*) roosts during the day round Lachlan Swamp in the south-east, settling after a night feeding in the city area. While the majestic powerful owl sits high on eucalypts, glossy-black cockatoos move through vegetation, feeding on nuts and seeds or perching in the radiata pine.

Grey-headed Flying fox and pup (*Pteropus poliocephalus*)

Earth and Water

The majority of Centennial Park sits on Tuggerah aeolian soils. They are quaternary (Holocene and Pleistocene) wind-blown, fine to medium grained, well sorted marine quartz sand.

The park's dunes run parallel to the coast with a north-south tendency. Rain enters through the soil, and any runoff gathers in the wetlands and swamps. These soils give rise to smooth-barked apple, Sydney peppermint and *Banksia aemula.*

The Gymea erosional soils on the outcrops of Queens Park cliffs give rise to scribbly gum and brown stringybark (*E. capitellata*) and Banksia serrata. The steep sandstone slope vegetation on Hawkesbury Colluvial formations produce an understory of *Backhousia myrtifolia* and bracken (*Pteridium esculentum*).

Water flows across the parklands from east to west via 12 ponds. The overland flows in from Model Yacht and Musgrave ponds to Kensington ponds. From here it moves towards Botany wetlands and Botany Bay. This system provides a corridor for the freshwater eel to during its journey from the Pacific Ocean to Botany Bay.

People

Centennial Parklands provided resources for the Aboriginal people from all over the region who made use of ocean and estuarine resources in Port Jackson and Botany Bay.

In the early 1800s, Centennial Parklands were part of the Sydney Commons. The area's natural aquifers were pumped for use in the city, then later dammed, creating the ponds. By 1888, the site became a parkland for the people, known as Centennial Park, to commemorate 100 years of colonialism.

As nearby suburban areas expanded, the parklands became a recreational respite with playgrounds, picnic areas, paths for cyclists and walkers, and areas for major events.

Opportunities

Centennial Parklands gives people the opportunity to connect with wildlife and native vegetation. We can encourage bird and bat movements by increasing plant diversity and structure through plantings and weed removal in Centennial Park's outer bushland areas.

Fire is essential to the Eastern Suburbs banksia scrub and to various ecological and cultural aspects. At Centennial Park and Queens Park, we can work with Aboriginal people and the Rural Fire Service to manage wildfire risks by reducing fuel loads and regenerating Eastern Suburbs banksia scrub from seed bank in the soils, particularly the banksia species.

Cultural burning workshops can boost connections to Country and improve cultural knowledge and biodiversity.

Expansion of outer wild areas – while increasing native trees, shrubs and grasses – is a pathway for small birds such as finches and superb fairy wren, and habitat for small mammals and lizards. This is a target in *Centennial Park Master Plan 2040*.

Many vegetation stands are isolated and restrictive for small birds to move through. A richer mid-storey layer of vegetation will protect small birds as they move from patch to patch and reduce the changes of predation from larger birds and foxes.

Hollows provide homes for birds, possums and microbats. Partnering with organisations that install hollows in some of the younger trees will support the fauna population.

Key Threatening Processes

Centennial Parklands is prone to weed infestation from wind-blown garden escapees to weed seeds in waterways. In outer regions areas, weeds such as coral tree (Erythrina x sykesii) dominate the south-eastern bushland corridor and African love grass (Eragrostis curvula) is present in the northern, eastern and southern edges of Centennial Park. These weeds outcompete native plants and reduce food sources for native animals.

Weed infestation from Eryngium pandanifolium and Ludwigia peruviana impact the banks of the ponds, while Nymphaea mexicana blankets the water surface during warmer months, blocking light to plants below. This reduces the amount aquatic plants and therefore oxygen in the water, which impacts aquatic fauna and favours exotic pest species like the European carp.

The European fox has a broad diet that includes ground nesting birds, and small to medium mammals and reptiles. With dens spotted around the Parklands, we will work with Local Land Services to reduce fox dens.

Mean temperatures, heatwaves and extreme heat days will continue to, doubling the number of days above 35 degrees by 2050. The repercussions of extreme heat, rainfall and storms may lead to temporary park closures or cancelled events.

Increased rainfall could contaminate the catchment ponds and aquifer due to urban runoff and contaminated stormwater. Rapid flowing water may also erode the slopes of the park. Higher levels and increased flow into the ponds will create bank erosion.

Caption

Achieving our vision

Bushland and aquatic structure, diversity and habitat values

GSP OUTCOME

BUSHLAND AND AQUATIC STRUCTURE, DIVERSITY AND HABITAT VALUES

- Reduce invasive species coverage, particularly Salpichroa origanifolia, Paspalum dilatatum and Cenchrus clandestinus in the northern and southern outer bushland areas, Guriwal Trail and Lachlan Swamp.
- Reduce exotic woody weeds in Queens Park cliffs bushland areas such as Lantana, Cestrum parqui and Rubus fruticosus.
- Reduce Nymphaea mexicana in Kensington Ponds, Lily Pond and Busbys Pond.
- Increase mid and understory structures for small bird habitat in the eastern and southern bushland areas.

GSP OUTCOME

QUANTITY OF HABITAT

- Expand outer bushland areas riparian corridors to create buffer zones and increase resilience.
- Increase key habitat structures such as hollows, fallen timber and rocks.

GSP OUTCOME

SOIL PROFILES AND HEALTH, ORGANIC MATTER AND RESILIENCE TO EROSION

- Remediate erosion around Kensington Ponds.
- Monitor and revegetate erosion around eastern outer bushland.

GSP OUTCOME

WATER QUALITY

- Increase native vegetation along ponds' banks.
- Improve draining line and dam waterflows and reduce in site pollution sources.

GSP OUTCOME

COMMUNITY CONNECTIONS

- Increase Aboriginal community partnerships, decision-making and involvement.

GSP OUTCOME

COMMUNITY KNOWLEDGE AND STEWARDSHIP

- Increase stakeholder commentary on Centennial Parklands environment stories.
- Increase publicity on Centennial Parklands environment.

Actions and management approaches

Plants and Animals 

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Improve habitat values.	Remove large sections of *Salpichroa origanifolia*, *Paspalum dilatatum* and *Cenchrus clandestinus* from bushland sites.	High	Ongoing
	Remove Lantana, *Cestrum parqui* and *Rubus fruticosus* along Queens Park cliffs.	Moderate	Ongoing
Management of bushland areas to increase diversity and habitat	Investigate options to install nesting boxes at key sites	High	Ongoing
	Increase native bushland in and around the flying-fox camp.	High	Ongoing
	Undertake flora surveys	Moderate	Every 5 years
Control animal species that threaten biodiversity	Partner with Local Land Services on fox activity.	Moderate	Ongoing
	Review the rodent control program to determine off-target impacts and implement changes.	Moderate	Ongoing
GOAL: RESTORE AND EXPAND			
Encourage natural regeneration	Nurture self-seeded species through protection zones and subsequent plantings.	High	Ongoing
Manage fires to improve species diversity and control weed threats	Explore cultural burns in Eastern Suburbs banksia scrub at York Road and the bird sanctuary.	Moderate	Ongoing

Earth and water

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: PROTECT AND CONSERVE			
Keep waterways clean from waste and weed species	Maintain waterways through bushland management and litter removal.	High	As required
	Engage external groups to monitor water quality.	Moderate	Monitoring undertaken
Improve habitat values	Explore options for European carp control in ponds	Moderate	Ongoing
	Potentially partner with councils to reduce water pollution	Moderate	Ongoing
	Reduce Nymphaea mexicana and pond edge weeds.	Moderate	Ongoing

People

ACTION	MANAGEMENT APPROACH	PRIORITY	TIMELINE
GOAL: UNDERSTAND AND ENGAGE			
Improve partnerships	Advocate for WIRES to monitor and assess the grey-headed flying-fox camp.	Moderate	Ongoing
	Advocate for water quality monitoring with school groups and universities.	Moderate	Ongoing
Utilise fire to increase Eastern Suburbs banksia scrub regeneration	Explore cultural burns in Eastern Suburbs banksia scrub at York Road and the bird sanctuary.	Moderate	Ongoing

Acknowledgements

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NSW GOVERNMENT