



**NSW National Parks and Wildlife Service**

# **Berowra Valley National Park and Berowra Valley Regional Park**

**Plan of Management**



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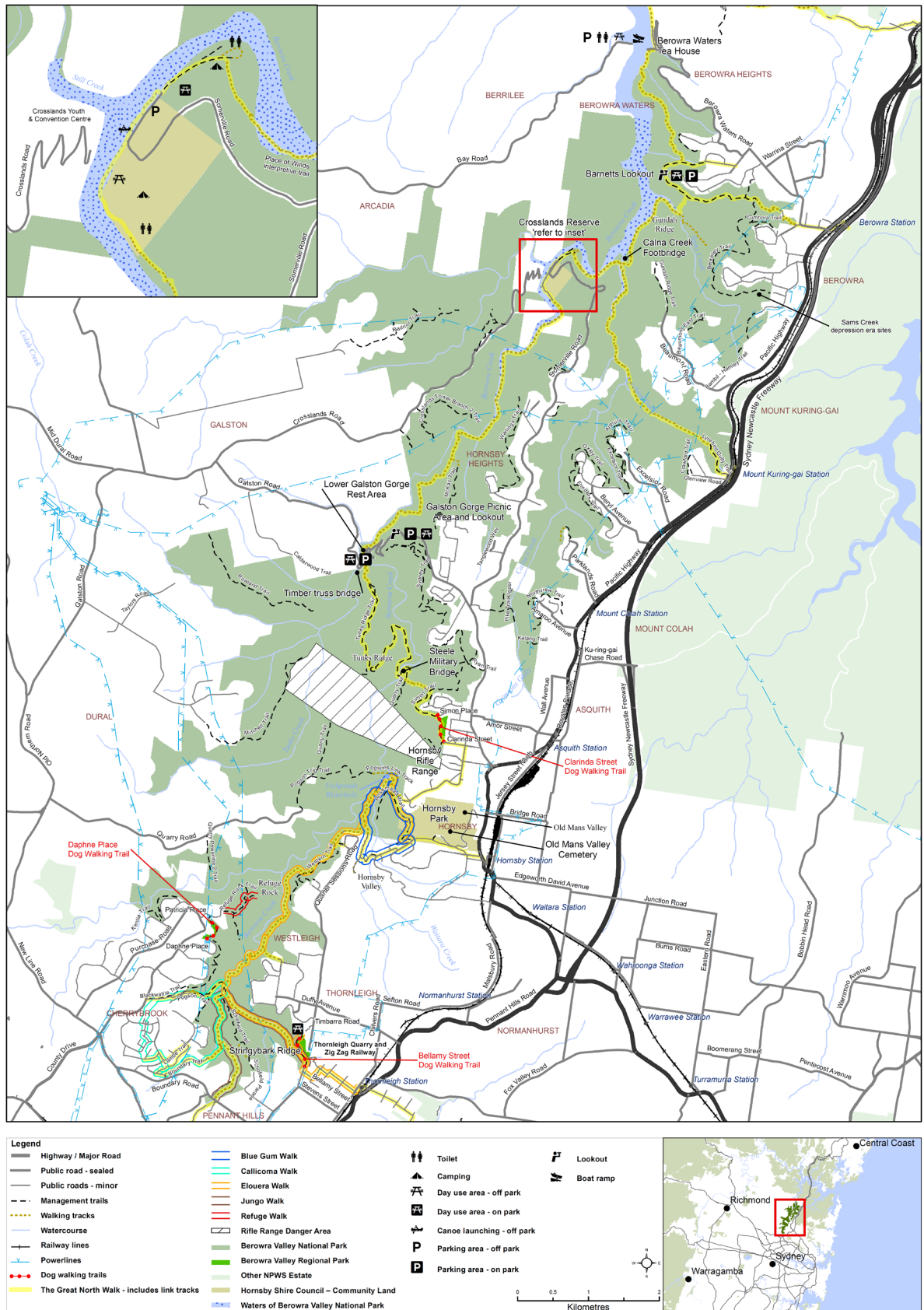
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# Acknowledgements

This plan of management was prepared by staff of the NSW National Parks and Wildlife Service (NPWS).

NPWS acknowledges that Berowra Valley National Park and Berowra Valley Regional Park are in the Country of Aboriginal custodians who continue to maintain a connection and care for the lands in the national park and regional park.

For additional information or any inquiries about Berowra Valley National Park or Berowra Valley Regional Park or this plan of management, contact NPWS at the Valleys Area Office, Lady Game Drive, Chatswood West NSW 2067 or by telephone on (02) 8448 0400.



**Figure 1** Map of Berowra Valley National Park and Berowra Valley Regional Park

# 1. Introduction

## 1.1 Location, reservation and regional setting

Features	Description
Location	<p>Berowra Valley National Park and Berowra Valley Regional Park (referred to as ‘the parks’ in this plan) are located approximately 20 kilometres to the north-west of Sydney in New South Wales. The parks are cared for by Aboriginal custodians who maintain a connection to and obligation to care for the parks and surrounding lands.</p> <p>The 2 parks in this plan have been grouped under the one plan due to their close biogeographical association. Berowra Valley National Park forms the predominant portion (see Figure 1).</p>
Area	<p>Berowra Valley National Park covers 3,876 hectares of natural bushland in the Berowra Creek catchment. The national park also includes the bed of Berowra Creek upstream of where the park is located on both sides of the creek (see Figure 1). Berowra Valley Regional Park consists of 3 separate portions covering 9 hectares and includes 3 management trails where on-leash dog walking is permitted (the ‘Dog Walking Trail’ labels on Figure 1 indicate the location of the 3 portions of regional park).</p>
Reservation date	<p>Berowra Valley Regional Park was reserved on 27 March 1998. Berowra Valley National Park was reserved on 10 September 2012.</p>
Previous tenure	<p>The parks were previously Crown reserves. Part of their area formed the 640-hectare Elouera Bushland Natural Park, which was reserved in 1964. In response to increased community concern over the development of bushland areas in the Hornsby Shire, additional lands were acquired and, in 1987, reserved for public recreation and the study and preservation of native plants and animals (Reserve No. 100092). The park then came to be known as Berowra Valley Bushland Park.</p> <p>Berowra Valley Bushland Park was reserved under the <i>National Parks and Wildlife Act 1974</i> in 1998 as Berowra Valley Regional Park. It was formally opened by the NSW Minister for the Environment on 23 November 1998. In response to a long-running community campaign and in recognition of the park’s high conservation value, 3,876 hectares of Berowra Valley Regional Park was reclassified as national park in 2012, with 9 hectares remaining as Berowra Valley Regional Park. Berowra Valley National Park was formally opened by the NSW Minister for the Environment on 17 November 2012.</p>
<b>Regional context</b>	
Biogeographic region	<p>The parks are part of the Sydney Basin Bioregion, which lies on the central east coast of New South Wales. The Sydney Basin Bioregion occupies about 4.53% of New South Wales and is one of 2 bioregions contained wholly within the state (DPE 2021d).</p>
Surrounding land use	<p>The predominant land use outside and adjacent to the parks is residential development, with low to medium-density housing to the east and south of the parks, and small rural holdings to the west. To the east, the parks are bounded by the suburbs of Berowra, Mount Kuring-gai, Mount Colah, Asquith, Hornsby, Normanhurst, Westleigh and Thornleigh, and Ku-ring-gai Chase National Park. To the south, the parks are bounded by Pennant Hills and are in close proximity to Lane Cove National Park. To the north, the national park is bounded by Berowra Waters and Crown land, which separates it from Muogamarra Nature Reserve and Marramarra National Park.</p>



Features	Description
Other authorities	Berowra Valley National Park and Berowra Valley Regional Park are in the areas of Hornsby Shire Council, Greater Sydney Local Land Services and the Metropolitan Local Aboriginal Land Council.

## 1.2 Statement of significance

The parks are significant because of their natural and cultural values, including:

### Landscape and catchment values

The parks are a predominately natural bushland landscape that straddles large sections of the Berowra Creek catchment from Pennant Hills in the south to Berowra Waters in the north. The parks are situated on the Hornsby Plateau. The most characteristic geological feature of the parks is Galston Gorge, which can be seen from the plateau. This gorge directs Berowra Creek and its tributaries into the Hawkesbury River at Bar Island. The landscape and catchment significance of the parks is discussed further in Section 3.1.

### Geological values

Hornsby Plateau is part of a larger geological structure of the Sydney Basin. The Hornsby Plateau is dominated by Hawkesbury Sandstone. These soils are predominately infertile and highly erodible, creating a set of highly variable conditions which have served to enhance biodiversity in the parks. The geological significance of the parks is discussed further in Section 3.1.

### Biological values

The parks protect a wealth of plant and animal species, and are home to extensive areas of woodland, open forest, rainforest, mangroves, heath, saltmarsh and sandstone swamps. The parks are known to contain at least 18 distinct vegetation communities, including 7 threatened ecological communities. Additionally, at least 16 threatened plant species, and many regionally and locally significant plant species are found in the parks.

This diverse range of vegetation communities provides a variety of habitats for a large number of animal species. More than 230 vertebrate animal species have been found in the parks (Friends of Berowra Valley 2004), including 20 threatened animal species. A number of other threatened species are considered to be likely inhabitants or users of the parks. The biological significance of the parks is discussed further in Sections 3.2 and 3.3.

### Aboriginal heritage

The parks contain 69 recorded sites of Aboriginal heritage value, including artwork, rock engravings, artefacts and habitation sites. The Aboriginal heritage significance of the parks is discussed further in Section 3.4.

### Historic heritage

There are a number of historic sites and items of local heritage significance in the parks. These include Sams Creek depression-era sites, Berowra Waters Tea House, and Thornleigh Quarry and Zig Zag Railway remains. A small section of the national park to the south of Boundary Road, Pennant Hills, falls within the Beecroft–Cheltenham Heritage Conservation Area (Hornsby Shire Council 2013).

There are also a number of heritage items and sites, of both state and local significance, adjacent to the parks. State significant items are a single-lane timber truss bridge along Galston Road in Galston Gorge and Old Mans Valley Cemetery. The historic heritage of the parks is discussed further in Section 3.5.

## **Recreation and tourism**

The parks provide respite from city living and are highly valued by the community for individual and group activities. Many people use the parks for occasional experiences such as bushwalks and picnics; for regular fitness-based activities such as walking, canoeing and cycling; or for simply relaxing in a bushland setting. Use of the parks often increases on weekends, with picnics and bushwalking being popular activities.

Crosslands Reserve is the main visitor precinct in the parks, catering for a variety of active and passive day use recreation activities as well as camping. As the population of Sydney continues to grow, so too will the importance of the parks as recreation areas in a natural bushland setting. The Great North Walk traverses the parks and is a major drawcard for visitors.

The parks benefit from the involvement of a large number of community volunteer groups. These volunteer groups carry out vital activities, contributing significantly to the parks' recreation and conservation values. The recreation and tourism significance of the parks is discussed further in Section 3.6.

## **Research and education**

The scientific community extensively uses the parks. Research organisations use the natural bushland primarily for ecological research, placing emphasis on the biodiversity values of the parks. The research and education significance of the parks is discussed further in Section 3.7.

## 2. Management context

### 2.1 Legislative and policy framework

The management of national parks and regional parks in New South Wales is in the context of a legislative and policy framework, primarily the National Parks and Wildlife Act and Regulation, the *Biodiversity Conservation Act 2016* and the policies of the NSW National Parks and Wildlife Service (NPWS).

Other legislation, strategies and international agreements may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* may require the assessment of environmental impact of works proposed in this plan. The NSW *Heritage Act 1977* may apply to the excavation of known archaeological sites or sites with potential to contain historical archaeological relics. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* may apply in relation to actions that impact matters of national environmental significance, such as migratory and threatened species listed under that Act.

A plan of management is a statutory document under the National Parks and Wildlife Act. Once the Minister has adopted a plan, the plan must be carried out and no operations may be undertaken in relation to the lands to which the plan applies unless the operations are in accordance with the plan. This plan will also apply to any future additions to the parks. Should management strategies or works be proposed in future that are not consistent with this plan, an amendment to the plan will be required.

### 2.2 Management purposes and principles

#### National parks

National parks are reserved under the National Parks and Wildlife Act to protect and conserve areas containing outstanding or representative ecosystems, natural or cultural features or landscapes or phenomena that provide opportunities for public appreciation, inspiration and sustainable visitor or tourist use and enjoyment.

Under section 30E of the Act, national parks are managed in accordance with the following management principles:

- conserve biodiversity, maintain ecosystem functions, protect geological and geomorphological features and natural phenomena and maintain natural landscapes
- conserve places, objects, features and landscapes of cultural value
- protect the ecological integrity of one or more ecosystems for present and future generations
- promote public appreciation and understanding of the park's natural and cultural values
- provide for sustainable visitor or tourist use and enjoyment that is compatible with conservation of natural and cultural values
- provide for sustainable use (including adaptive re-use) of any buildings or structures or modified natural areas having regard to conservation of natural and cultural values
- provide for appropriate research and monitoring.

The primary purpose of national parks is to conserve nature and cultural heritage. Opportunities are provided for appropriate visitor use in a manner that does not damage conservation values.

## Regional parks

Regional parks are reserved under the National Parks and Wildlife Act to protect and conserve areas in a natural or modified landscape that are suitable for public recreation and enjoyment.

Under section 30H of the Act, regional parks are managed in accordance with the following management principles:

- provide opportunities for recreation and enjoyment in natural or modified landscapes
- identify, interpret, manage and conserve the park so as to maintain and enhance significant landscape values
- conserve natural and cultural values
- promote public appreciation and understanding of the park's natural and cultural values
- provide for sustainable visitor or tourist use and enjoyment that is compatible with conservation of natural and cultural values
- provide for sustainable use (including adaptive re-use) of any buildings or structures or modified natural areas having regard to conservation of natural and cultural values.

Regional parks are established for the purpose of providing recreational opportunities while protecting natural, cultural and landscape values.

## 2.3 Specific management directions

In addition to the general principles for the management of national parks and regional parks (see Section 2.2), the following specific management directions apply to the management of the parks:

- promote visitor and community appreciation and enjoyment of the natural and cultural values of the parks
- conserve and restore the habitat quality of natural bushland and maintain viable populations of wildlife in the parks
- implement the strategic priorities of the *Biodiversity Conservation Program*, including actions at priority management sites and areas for threatened species, populations and ecological communities in the parks
- continue to liaise with Hornsby Shire Council and Greater Sydney Local Land Services regarding management of various aspects of the parks, including Crosslands Reserve and the Berowra Creek catchment regarding the protection of habitats and water quality
- undertake fire and pest management to increase the parks' ability to cope with future disturbances, including climate change
- continue to conserve and interpret Aboriginal sites and historic features in the parks.

## 3. Values

This plan aims to conserve the natural, cultural and educational values of the parks. The location, landforms and plant and animal communities of an area have determined how it has been used and valued by both Aboriginal and non-Aboriginal people. These values may be attached to the landscape as a whole or to individual components, for example plant and animal species used by Aboriginal people. To make the document clear and easy to use, various aspects of natural heritage, cultural heritage, threats and ongoing use are dealt with individually in this plan, but their interrelationships are recognised.

### 3.1 Geology, landscape and hydrology

The parks are characterised by an array of contrasting landforms. The parks are situated on the Hornsby Plateau, which is part of the geological structure known as the Sydney Basin. The landscape consists of a dissected sandstone plateau with a predominantly north–south orientation.

The most characteristic geological feature of the parks is Galston Gorge. This gorge directs Berowra Creek and its tributaries into the Hawkesbury River at Bar Island.

Heavily eroded sandstone ridges skirt Berowra Creek and its tributaries, often featuring wind-blown caves, exfoliated rock ledges and cliff faces. Mid slopes are mostly steep and characterised by ephemeral creeks and large sandstone boulders on shallow soils. The elevations in the parks range from 1–225 metres Australian Height Datum (AHD). Protection of the high scenic quality of the ridge lines found in the parks is a priority, particularly from vantage points such as Bernetts Lookout, Galston Gorge and Crosslands Reserve.

The parks are made up of a number of different geologies, including Hawkesbury Sandstone, Holocene quartz sands, as well as Wianamatta Group Ashfield Shale formations and a volcanic diatreme. Volcanic diatremes or volcanic rock outcrops are a relatively uncommon geology found where hot magma has risen into horizontal sedimentary layers that contain groundwater (Roots n.d.). A small number of diatremes occur at Hornsby as a complex system of small intrusive dykes usually no more than 3 metres wide (Hornsby Shire Council 2006a). Volcanic diatremes have greater soil fertility than many other geologies.

Soil landscapes in the parks are dominated by the Hawkesbury landscape, consisting of rugged, rolling to very steep hills on Hawkesbury Sandstone (Chapman & Murphy 1989). A number of other soil landscapes have been identified within or in close proximity to the parks. The soil landscapes in the parks are highly erodible and create a number of management challenges in the parks, particularly in relation to soil erosion.

There is a strong correlation between the types of vegetation found in the parks and the underlying rocks because different kinds of rock weather to form various drainage patterns, topography and soil types. These geological factors, combined with climate, fire regime and historical biogeography, are key factors contributing to the vegetation communities found in the parks today (Friends of Berowra Valley 2004).

Berowra Creek is an important hydrological feature of the parks, winding its way from Pennant Hills in the south to Berowra Waters in the north, before eventually flowing into the Hawkesbury River estuary.

The parks are part of the Berowra Creek tidal river subcatchment. Most of the lower reaches of the Berowra Creek subcatchment are located in Marramarra National Park and Muogamarra Nature Reserve, with a portion of the upper reaches located in Berowra Valley National Park. The headwaters drain through areas of rural and urban development and 2 sewage treatment plants discharge into waterways of the Berowra subcatchment: one on

Waitara Creek in West Hornsby, and the other on Calna Creek in Hornsby Heights. Water quality in the subcatchment is generally poor (Hawkesbury Nepean CMA 2007).

The *Lower Hawkesbury Estuary Management Plan* (Hornsby Shire Council 2008a) has been prepared to reduce the urban impacts on the catchment and to maintain and improve catchment health and water quality.

Information regarding the geologies and landscapes found in the parks is contained in Appendix A.

## Issues

- The long and irregular shape of the parks provides particular management challenges in relation to the lengthy urban–park interface, including but not limited to encroachment, illegal tree removal and runoff from urban areas into the parks.
- Urban and industrial development and other land uses along escarpments at the urban–park interface have the potential to impact the high scenic quality of the ridge lines. This is particularly the case from vantage points such as Barnetts Lookout, Galston Gorge and Crosslands Reserve. Protection of this high scenic quality is an important issue for the parks.
- The highly erodible nature of the parks' soils indicates a need for management planning and practices to minimise soil erosion. A number of identified causes of soil erosion are present in the parks. One cause is water runoff from compacted areas such as management trails, walking tracks, roads and the urbanised surrounds. Vehicle usage along management trails, and natural events such as fire and rainfall also contribute to soil erosion.
- The parks are located in the Berowra Creek subcatchment. Berowra Creek is a major subcatchment of the Hawkesbury River. Runoff from surrounding urban and rural land uses, and the discharge of 2 sewage treatment plants into the Berowra Creek subcatchment have a significant impact on water quality in the parks. Total catchment management requires collaborative action by all statutory authorities and the broader community working together to reduce stormwater-borne pollution.

## Desired outcomes

- Significant geological and landscape features are protected from disturbance.
- Human-induced soil erosion is minimised.
- Integration of park management with the management of the Berowra Creek catchment is achieved.
- Catchment values and the water quality and ecological health of Berowra Creek and its tributaries are improved.
- Bushland and waterways are protected from degradation and pollution from urban runoff.
- The high scenic values of the parks are maintained and impacts from surrounding land uses are minimised.
- Actions in the Lower Hawkesbury Estuary Management Plan are implemented.

## Management response

- 3.1.1 Work with land-use planning and consent and determining authorities to mitigate any impacts of local developments on the parks' values.
- 3.1.2 Manage pest species, fire, roads and trails and other land uses to minimise soil erosion and maintain and encourage protective vegetation cover.
- 3.1.3 Liaise with Hornsby Shire Council, Sydney Water, Greater Sydney Local Land Services and other statutory authorities to protect, monitor and improve water quality in the Berowra Creek subcatchment.
- 3.1.4 Pursue collaborative management with other land-use management and consent authorities to protect identified escarpments and areas of high scenic quality.
- 3.1.5 Identify all significant geological and landscape features in the parks to ensure they are protected from any future development works.

## 3.2 Native plants

More than 500 vascular plant species have been recorded in the parks. These species are found in 18 separate vegetation communities, ranging from formations found on the alluvial flats such as mangroves and saltmarsh, to tall open forests in the moist gullies, and woodlands and heath at higher elevations (Friends of Berowra Valley 2004). Descriptions of each of these vegetation communities are provided in Appendix B.

Seven threatened ecological communities listed under the Biodiversity Conservation Act have been identified in the parks (Smith & Smith 2008), including 2 critically endangered ecological communities (CEEC) and 5 endangered ecological communities (EEC). These are:

- Blue Gum High Forest CEEC (OEH 2004a)
  - A 1.7-hectare area of Blue Gum Shale Forest, a type of Blue Gum High Forest, is found in the national park at the southernmost point near Boundary Road and Kitchener Road, Cherrybrook. Another type of Blue Gum High Forest is Blue Gum Diatrema Forest, found on the volcanic diatrema (see Section 3.1) in the national park near Rosemead Road, Hornsby.
- Shale Sandstone Transition Forest CEEC (NSW SC 2014)
  - A 0.15-hectare area of Shale Sandstone Transition Forest is located in the regional park near Lynrob Place, Thornleigh. With further investigation, there is potential for several other small areas of this vegetation community to be found in the parks.
- River-flat Eucalypt Forest EEC (NSW SC 2011a)
  - This community is found in the national park as Rough-barked Apple River-flat Forest. It is found along the alluvial flats of Berowra Creek around Crosslands Reserve.
- Duffys Forest Ecological Community EEC (OEH 2004b)
  - Duffys Forest is found on ridges and plateaus on Hawkesbury Sandstone where there is a shale influence. It is found towards the edge of the national park near Carters Road, Dural.
- Swamp Oak Floodplain Forest EEC (NSW SC 2004)
  - This community is found on the alluvial floodplains of Berowra Creek as far upstream as Crosslands Reserve.
- Coastal Upland Swamp EEC (OEH 2012a)
  - This community is known as Rock Platform Heath in the national park. A small patch is found in the national park near Crosslands Road, Galston, and also on the

western side of the Quarry Trail, south of the Rifle Range Danger Area (see Section 4.4).

- Coastal Saltmarsh EEC (NSW SC 2011b)
  - This community is found on the alluvial floodplains of Berowra Creek as far upstream as Crosslands Reserve.

At least 16 threatened plant species listed under the Biodiversity Conservation Act occur in the parks. Many of these species are also threatened at the national level, as listed under the Environment Protection and Biodiversity Conservation Act. Some of these species are locally endemic, including *Persoonia mollis* subsp. *maxima* and *Ancistrachne maidenii*. Other species and communities are regionally significant (Coombes 1995).

Table 1 lists threatened plant species recorded in the parks. For a description of threatened plant species in the parks and their habitat see Appendix C.

**Table 1 Threatened plant species recorded in the parks**

Common name	Scientific name	BC Act Status*	EPBC Act Status*
Bynoe's wattle	<i>Acacia bynoeana</i>	E	V
	<i>Ancistrachne maidenii</i>	V	
Netted bottle brush	<i>Callistemon linearifolius</i>	V	
	<i>Darwinia biflora</i>	V	V
	<i>Darwinia peduncularis</i>	V	
	<i>Epacris purpurascens</i> var. <i>purpurascens</i>	V	
Camfield's stringybark	<i>Eucalyptus camfieldii</i>	V	V
Tangled bedstraw	<i>Galium australe</i>	E	
Bauer's midge orchid	<i>Genoplesium baueri</i>	E	E
Narrow-leaf finger fern	<i>Grammitis stenophylla</i>	E	
	<i>Hibbertia superans</i>	E	
	<i>Lasiopetalum joyceae</i>	V	V
	<i>Leptospermum deanei</i>	V	V
Deane's paperbark	<i>Melaleuca deanei</i>	V	V
	<i>Persoonia mollis</i> subsp. <i>maxima</i>	E	E
	<i>Tetratheca glandulosa</i>	V	

Source: BioNet, accessed 2017 at [www.bionet.nsw.gov.au/](http://www.bionet.nsw.gov.au/).

\* BC Act = Biodiversity Conservation Act (NSW); EPBC Act = Environment Protection and Biodiversity Conservation Act; V = vulnerable; E = endangered.

A number of other plant species listed under the Biodiversity Conservation Act have been recorded within close proximity to the parks and may potentially be found in the parks. These species include nodding geebung (*Persoonia nutans*), hairy geebung (*Persoonia hirsuta*), and magenta lilly pilly (*Syzygium paniculatum*) (Hornsby Shire Council 2006a).

Strategies for the conservation of threatened species, populations and ecological communities have been set out in a statewide *Biodiversity Conservation Program* (OEH 2016). Actions listed in each of these strategies are prioritised and implemented through the *Saving our Species* program, which aims to maximise the number of threatened species that are secured in the wild in New South Wales for 100 years (DPE 2021c).



The following Saving our Species priority management sites have been identified in the parks:

- River-flat Eucalypt Forest
- Swamp Oak Floodplain Forest
- Coastal Saltmarsh.

The NPWS threatened species (zero extinctions) framework (DPIE 2021) outlines a series of actions designed to secure and restore threatened species populations, specifically to prevent extinctions on the national park estate and to stabilise or improve the on-park trajectory of all threatened species. Actions under the framework include declaration of assets of intergenerational significance and preparation of conservation action plans to guide management and monitoring of declared assets. Assets of intergenerational significance may include individual species, sites or populations and communities of native plants.

The Commonwealth may prepare recovery plans for nationally listed threatened species under the *Environment Protection and Biodiversity Conservation Act 1999*. If prepared, these plans apply to nationally listed threatened species occurring in the parks.

## Issues

The Biodiversity Conservation Act lists the key threatening processes affecting threatened plant species, populations and ecological communities listed under the Act. Threats to the threatened plant species in the park (listed in Table 1) vary depending on the particular species, however, common threats that occur in the parks include:

- habitat loss and degradation through vegetation clearing, urban and industrial development, and track and trail maintenance
- low population numbers at sites
- current or potential land management practices that do not support conservation
- exposure to pollution, exotic pathogen infection and weed invasion
- illegal rubbish dumping
- inappropriate fire regimes
- climate change
- impacts from recreational assets such as poorly designed and constructed walking tracks.

The parks provide an important natural landscape in Australia's largest city. They play a critical role in the ongoing conservation of significant plants and ecological communities, and in the protection and maintenance of the habitat and populations of threatened plant species.

To support effective ongoing management, information on the parks' native plants requires updating over time.

## Desired outcomes

- The diversity of native plant species and ecological communities is conserved.
- Negative impacts on threatened plant species are minimised.
- Habitats for, and populations of, all threatened plant species are protected and maintained.
- Structural diversity and habitat qualities are restored in degraded areas.

## Management response

- 3.2.1 Implement relevant actions in the Biodiversity Conservation Program, recovery plans and conservation action plans for the threatened native plant species, populations and ecological communities present in the parks.
- 3.2.2 Consider the long-term impacts on vegetation communities and plant populations from management programs such as fire and asset management activities.
- 3.2.3 Support bushland restoration programs in the parks.
- 3.2.4 Preserve and enhance local biodiversity through planting locally indigenous species, and only using local species in revegetation and landscape works.
- 3.2.5 Promote the parks' native vegetation values to the community.
- 3.2.6 Undertake targeted or comprehensive plant surveys in the parks.

## 3.3 Native animals

The rich diversity of habitats in the parks, including plant communities, rock features and water, provide high-quality habitat for many native animals, including a number of threatened species. Over 230 vertebrate animal species have been recorded in the parks, including 185 birds, 38 reptiles, 19 mammals and 14 frog species (Friends of Berowra Valley 2004). Of these, 20 species are listed as threatened under the Biodiversity Conservation Act. Some are also threatened at the national level and are listed under the Environment Protection and Biodiversity Conservation Act. The Adam's emerald dragonfly is listed as threatened under the *Fisheries Management Act 1994*. Many of the animals are residents of the parks, while some are seasonal or occasional visitors.

The number of recorded vertebrate species is small compared to the likely number of invertebrate animal, moss, lichen, fungus and bacterial species found in the parks. The total number of all species is not known, however, it could be more than 5,000 species. These species are vital to ecosystem processes such as nutrient recycling, energy flow, pollination and seed dispersal (Friends of Berowra Valley 2004).

Table 2 lists threatened animal species recorded in the parks. For a description of the parks' threatened animals and their habitats see Appendix D.

**Table 2 Threatened animal species recorded in the parks**

Common name	Scientific name	BC Act Status*	EPBC Act Status*
<b>Invertebrate</b>			
Adam's emerald dragonfly †	<i>Archaeophya adamsi</i>		
<b>Frogs and reptiles</b>			
Giant burrowing frog	<i>Heleioporus australiacus</i>	V	V
Red-crowned toadlet	<i>Pseudophryne australis</i>	V	
Rosenberg's goanna or heath monitor	<i>Varanus rosenbergi</i>	V	
<b>Birds</b>			
Barking owl	<i>Ninox connivens</i>	V	
Dusky woodswallow	<i>Artamus cyanopterus cyanopterus</i>	V	

Common name	Scientific name	BC Act Status*	EPBC Act Status*
Gang-gang cockatoo population in the Hornsby and Ku-ring-gai local government areas	<i>Callocephalon fimbriatum</i>	EP	
Glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	V	
Little eagle	<i>Hieraaetus morphnoides</i>	V	
Masked owl	<i>Tyto novaehollandiae</i>	V	
Powerful owl	<i>Ninox strenua</i>	V	
Spotted-tailed quoll	<i>Dasyurus maculatus</i>	V	E
Turquoise parrot	<i>Neophema pulchella</i>	V	
Varied sittella	<i>Daphoenositta chrysoptera</i>	V	
White-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	V	
<b>Mammals</b>			
Eastern coastal freetail-bat	<i>Mormopterus norfolkensis</i>	V	
Eastern false pipistrelle	<i>Falsistrellus tasmaniensis</i>	V	
Grey-headed flying-fox	<i>Pteropus poliocephalus</i>	V	V
Large bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V	
Little bentwing-bat	<i>Miniopterus australis</i>	V	
Yellow-bellied sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V	

Source: BioNet, accessed 2017 [www.bionet.nsw.gov.au/](http://www.bionet.nsw.gov.au/).

\* BC Act = Biodiversity Conservation Act (NSW); EPBC Act = Environment Protection and Biodiversity Conservation Act; V = vulnerable; E = endangered; EP = endangered population.

Animal surveys undertaken by Hornsby Shire Council in 2008–09 in the area surrounding the parks recorded several other native animal species listed as vulnerable under the Biodiversity Conservation Act (Hornsby Shire Council 2006a, 2010).

A targeted survey of the southern brown bandicoot (eastern) (*Isoodon obesulus obesulus*) was conducted in the parks in 2008. While this survey did not record the presence of this threatened bandicoot in the parks, the parks are still considered to be a potential habitat for the species.

It is possible that the threatened animal species listed in Table 3 may also reside in or visit the parks.

**Table 3 Threatened animal species potentially occurring in the parks**

Common name	Scientific name	BC Act status	EPBC Act status
Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	V	
Little lorikeet	<i>Glossopsitta pusilla</i>	V	
Regent honeyeater	<i>Anthochaera phrygia</i>	CE	CE
Southern brown bandicoot (eastern)	<i>Isoodon obesulus obesulus</i>	E	E
Superb fruit-dove	<i>Ptilinopus superbus</i>	V	

Source: Hornsby Shire Council 2006a, 2010.

BC Act = Biodiversity Conservation Act (NSW); EPBC Act = Environment Protection and Biodiversity Conservation Act; V = vulnerable; E = endangered; CE = critically endangered.

As for plants, strategies for the conservation of threatened animal species and populations have been set out in a statewide *Biodiversity Conservation Program* (OEH 2016). Actions listed in each of these strategies are prioritised and implemented through the *Saving our Species* program, which aims to maximise the number of threatened species that are secured in the wild in New South Wales for 100 years (OEH 2013).

Similarly, native animal populations or individual species may be declared as assets of generational significance. Once declared a conservation action plan will be prepared to guide management and monitoring of these species or populations.

The Commonwealth may prepare recovery plans for nationally listed threatened species under the *Environment Protection and Biodiversity Conservation Act 1999*. If prepared, these plans apply to nationally listed threatened species occurring in the parks.

## Issues

Threats to the threatened animal species known or potentially occurring in the parks vary (Table 2 and Table 3), depending on the particular species. However, common threats that occur in the parks include:

- habitat loss, degradation or modification through urban, agricultural and industrial development
- pollution, including reduction in water quality
- removal of habitat elements including bush rock, fallen timber and hollow-bearing trees
- climate change
- disease
- inappropriate fire regimes
- moving vehicles
- predation by cats, dogs and foxes.

The parks are an important natural landscape in Australia's largest city. They play a critical role in conserving the significant animal species and threatened animal populations that live in and around the parks' boundaries.

To support effective ongoing management, information on the parks' native animals requires updating over time.

## Desired outcomes

- The diversity of native animal species is conserved.
- Negative impacts on threatened animal species are minimised.
- Habitats for, and populations of, all threatened animal species are protected and maintained.
- Structural diversity and habitat qualities are restored in degraded areas.

## Management response

- 3.3.1 Implement relevant actions in the Biodiversity Conservation Program, recovery plans and conservation action plans for threatened native animal species and populations occurring in the parks.
- 3.3.2 Monitor the distribution and abundance of threatened and significant animal species.
- 3.3.3 Consider long-term impacts on native animal populations and their habitats in park management programs.
- 3.3.4 Undertake targeted or comprehensive animal surveys in the parks.

## 3.4 Aboriginal heritage and culture

The land, water, plants and animals in a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. Aboriginal communities associate natural resources with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge, kinship systems and strengthening social bonds. Aboriginal heritage and connection to nature are inseparable and need to be managed in an integrated manner across the landscape.

Aboriginal sites are places with evidence of Aboriginal occupation or that are related to other aspects of Aboriginal culture. They are important as evidence of Aboriginal history and as part of the culture of local Aboriginal people. The parks and their surroundings have contributed significantly to the understanding of Aboriginal history in the Sydney area. Berowra Creek, which runs through Berowra Valley National Park, was considered a natural boundary between Aboriginal groups; and it is thought that the area formed a point of contact between Aboriginal people. It is believed this contact was generally friendly and was for the purposes of marriage, trade and ceremony (Friends of Berowra Valley 2004).

Berowra Creek and its surrounding bushland would have been an attractive area for Aboriginal people, offering an abundance of food and resources, shelter in caves and supplies of freshwater. Aboriginal occupation and intensive use of the area is evident from the abundance and variety of sites remaining in the catchment. An Aboriginal heritage study, undertaken for Hornsby Shire Council in 1996, identified 235 known or recorded Aboriginal heritage sites in the entire Hornsby Local Government Area (Koettig 1996).

While the oral history of the area's use by Aboriginal people is limited, the parks contain approximately 69 recorded sites of Aboriginal heritage. Many of the recorded sites are located towards the southern and northern boundaries of the parks in valleys, rock shelters and open rock platforms (Koettig 1996). It is likely there are many more sites of Aboriginal heritage significance located throughout the parks that are yet to be identified and recorded. The presence and types of sites that have been recorded suggest the area may have been used for purposes such as hunting, trading and ceremonies.

Examples of Aboriginal sites found in the parks include:

- grinding grooves
- shelters with art, including hand stencils and charcoal drawings, and potential archaeological deposits
- engravings on rock outcrops
- shell middens

While the NSW Government has legal responsibility for protecting Aboriginal sites and places, NPWS acknowledges the right of Aboriginal people to make decisions about their own heritage. Aboriginal communities will be consulted and involved in the management of Aboriginal sites, places and related issues, and in the promotion and presentation of Aboriginal culture and heritage.

There are a number of native title claims over areas of the parks, which are yet to be determined. The Metropolitan Local Aboriginal Land Council is the main representative body supporting traditional custodians.

## **Issues**

- Failure to recognise Aboriginal historical sites in the past has led to destruction through development, while some preserved sites have been wilfully or ignorantly damaged.
- Natural processes such as inclement weather, fire, weeds and pest animals are common threats to Aboriginal sites.
- Protection of Aboriginal sites is attainable by using careful management procedures. Sensitive areas need to be identified and managed in accordance with the heritage values of the site.

## **Desired outcomes**

- Relationships with Metropolitan Local Aboriginal Land Council and other interested Aboriginal groups are strengthened.
- Significant Aboriginal places and values are identified and protected.
- Aboriginal people are involved in the management of Aboriginal cultural values.
- Impacts on Aboriginal heritage values are minimised.
- Understanding of the parks' Aboriginal cultural values is improved.

## **Management response**

- 3.4.1 Build and maintain a working relationship with the Metropolitan Local Aboriginal Land Council and with other interested Aboriginal community groups and organisations in identifying, recording and managing Aboriginal heritage.
- 3.4.2 Manage Aboriginal heritage (including promotion, education and protection) in consultation with Metropolitan Local Aboriginal Land Council and other interested Aboriginal community groups and organisations.
- 3.4.3 Undertake an archaeological survey and cultural assessment prior to all works that have the potential to impact Aboriginal sites or values.
- 3.4.4 Encourage further research into the Aboriginal cultural heritage values of the parks.
- 3.4.5 Inspect and document the condition of recorded Aboriginal heritage sites every 3 years and undertake protective works as necessary.

### 3.5 Historic heritage

Heritage places and landscapes are made up of living stories as well as connections to the past. They can include natural resources, objects, customs and traditions that individuals and communities have inherited and wish to conserve for current and future generations. Cultural heritage comprises places and items that may have historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance. NPWS conserves significant heritage features in the parks it manages.

Berowra Valley National Park and Berowra Valley Regional Park contain a variety of sites and items of historic heritage significance. These items include Berowra Waters Tea House, Steele Military Bridge, Crosslands Reserve, Thornleigh Quarry and Zig Zag Railway, an old bullock track, depression-era settlements and the remains of former land uses, including abattoirs, grazing, and shale extraction and quarrying.

The land in and surrounding the parks has a long history of European settlement and use. In 1819, the timber industry secured a timber-getting lease in Hornsby Valley which saw logging in the area for over 100 years. A sawmill located above Hornsby Valley operated during this time and timber was winched up the valley by railway (Hornsby Shire Council 2006b).

Around 1856, Matthew Charlton acquired 17 hectares of land along Berowra Creek near Crosslands Reserve. Here, he built sailing vessels and felled and split local she-oaks, supplying roofing shingles for buildings around Sydney. Charlton also cut and sold stone and was responsible for pioneering a cart road through Galston Gorge to Galston (Friends of Berowra Valley 2004).

In 1860, Burton Crosland (later Crossland) was appointed caretaker of Matthew Charlton's property on Berowra Creek, later purchasing some of this land for himself and eventually owning land on both sides of the creek. Crosland/Crossland built a house on the flat land, planted an orchard, and constructed a track up to Somerville Road (Hornsby Shire Council 2006b).

By 1885, steam launches made pleasure trips from Sydney up to Berowra. The Crosslands' boat *White Cloud* also made regular trips, and by the early 1900s Crosslands had become a popular picnic area (Hornsby Shire Council 2006b). Channels and wharves were constructed at Crosslands to assist the boat-building trade and the export of stone and timber from the area. During the threat of invasion from Japanese forces in March 1942, 2,000 small boats were impounded at Crosslands as a safe haven. However, in the same month, the biggest flood of the 20th century in Berowra Creek destroyed all the boats (Hornsby Shire Council 2006b).

In the 1880s, a quarry operated off Bellamy Street, Thornleigh. The quarry provided ballast for construction of the northern railway in 1886. Remains of the quarry and traces of the Zig Zag Railway, which connected the quarry to the main railway line, can still be found in the parks today (Hornsby Shire Council 1990). Interpretive signage documenting the historic values of Thornleigh Quarry and Zig Zag Railway has been installed at the site. Thornleigh Quarry and Zig Zag Railway is listed as an item of local heritage significance (Hornsby Shire Council 2013).

The single-lane, wooden truss bridge spanning Tunks Creek in Galston Gorge was the original link between orchard growers to the west of the gorge and the main northern railway line in the late 1800s. The bridge allowed for the growth of this region to the west of the gorge as a holiday retreat from 'city life' (Hornsby Shire Council 1990). This bridge is still in use as part of Galston Road and is sited within a road reserve managed by Roads and Maritime Services. It is listed on the NSW State Heritage Register as being of state significance (RTA 2011) and is maintained to protect its heritage value. The bridge originally

had a partner over Berowra Creek, however, this has since been replaced by a concrete bridge.

Berowra Creek kiosk, also known as Berowra Waters Tea House, was built in the 1920s to accommodate fishing pursuits and, later, other general leisure activities in the area (Joffe 1987). The tea house is considered to be an integral part of Berowra Waters' history and is listed as an item of local heritage significance (Hornsby Shire Council 2013).

The national park near Sams Creek, Berowra, contains 3 depression-era sites with relics. These are estimated to have been built between 1931 and 1933 and are listed together as an archaeological site of local significance (Hornsby Shire Council 2013). The sites are important to a short but extreme phase of national economic history, being The Great Depression. They also have a strong association with itinerant workers and camps of unemployed people on the fringes of settlement (Hornsby Shire Council 2008b).

Surrounded by bushland that links to Berowra Valley National Park in Old Mans Valley, Hornsby, is the Higgins Family Cemetery. The Old Mans Valley Cemetery (as it is also known) is of state heritage significance for its rarity as one of the few fully conserved family cemeteries in New South Wales and possibly the only one. It is also of state significance for the social value that this high state of conservation represents (Heritage NSW n.d.).

Through the 1920s and 1930s, development continued in the area, and conservationist John Tipper noticed plant and animal life which were rare elsewhere. In 1934, Tipper leased 250 hectares and later this expanded to 1,200 hectares of Muogamarra Sanctuary (now Muogamarra Nature Reserve).

By the 1950s and 1960s, there was considerable concern about the development of bushland areas in Hornsby Shire, including a proposal to mine sand at Crosslands (Friends of Berowra Valley 2004). In response to community concerns, 640 hectares of bushland was reserved as Elouera Bushland Natural Park in 1964 for public recreation and the study and preservation of native plants and animals. Additional lands were added to the park in 1987. In 1998, following further land additions, the area was reserved under the National Parks and Wildlife Act as Berowra Valley Regional Park. In September 2012, following a long-running community campaign and in recognition of the park's outstanding representative ecosystems, natural and cultural features and landscape, 3,876 hectares of Berowra Valley Regional Park were reclassified as national park.

In 1964 and 1965, a Steele Military Bridge (named after Major General Sir Clive Steele) across Berowra Creek on the Quarry Trail was installed. It replaced a log bridge that provided access from Hornsby to Dural for firefighting vehicles. The Steele bridges were designed for use in the Second World War South West Pacific campaign, and after extensive use the Australian Army sold off its stock of Steele bridges in the early 1950s. Today it is rare to find an intact example of a Steele bridge, with only 3 or 4 such bridges still in use in New South Wales (Friends of Berowra Valley 2004).

One of the most iconic bushwalks in New South Wales, the Great North Walk, is a 250-kilometre walking route linking Sydney city with the Hunter Valley. The Great North Walk was constructed as a celebration of Australia's Bicentenary in 1988. A total of 21.2 kilometres of the Great North Walk traverses the parks (see Figure 1), and the bushwalk is a popular activity for visitors.

Interpretation of historic values is critical to the ongoing protection and appreciation of these values by park visitors. Interpretation of the parks' historic values is undertaken by NPWS through the publication of information brochures, onsite signage and web-based information. Guided walks are delivered by NPWS Discovery volunteers and Hornsby Shire Council. The NSW Heritage Office, Hornsby Shire Council, Friends of Berowra Valley, historical societies and other similar groups also interpret the parks' historic values.



## Issues

- Vandalism, natural processes such as inclement weather, fire, weeds and pest animals, together with limits to knowledge about historic heritage values, are the most common threats to conservation of the parks' historic heritage values. These factors challenge the effective management of historic heritage.
- The challenges of managing threats to the parks' historic heritage need to be met through appropriate conservation and management and through interpretation that encourages community understanding.

## Desired outcomes

- Negative impacts on historic heritage values are minimised.
- Understanding of the parks' cultural values is improved.
- Significant historic features are appropriately conserved and managed.
- Historical features are interpreted in a way which encourages an understanding and appreciation of the parks' historic heritage.

## Management response

- 3.5.1 Manage identified historic heritage sites according to their significance and potential impacts on the site.
- 3.5.2 Prepare a heritage assessment for Thornleigh Quarry and Zig Zag Railway route and Berowra Waters Tea House.

## 3.6 Visitor use

NPWS parks provide a range of opportunities for recreation and tourism including opportunities for relaxation and renewal, as well as appropriate active pursuits. NPWS aims to balance opportunities for visitors to enjoy, experience and appreciate parks with conserving and protecting their natural and cultural heritage values.

NPWS aims to develop a greater and more diverse constituency for parks and conservation by encouraging existing park visitors to spend more time in parks and making park experiences more accessible and attractive to a wider range of people (DECC 2008).

The parks are located in the Hornsby Local Government Area which had an estimated resident population of 150,752 in 2018 (Hornsby Shire Council 2018). Hornsby Shire Council is part of the Northern Sydney Regional Organisation of Councils, an organisation that also covers the Willoughby, Ryde, Lane Cove, Ku-ring-gai, North Sydney and Hunters Hill local government areas. In 2018 the estimated resident population of the Northern Sydney region was 644,027, and it is growing at around 1.5% each year (NSROC 2018).

The position of the parks in both Australia's most populated city and a region experiencing strong population growth means that visitation by local and regional populations is expected to increase.

The parks provide opportunities for visitation in a natural escarpment and valley setting, which includes a vast array of contrasting landforms such as highly scenic ridge lines, a deep gorge and meandering creek with its tributaries, and sandstone caves. Most visitor activity in the national park is concentrated at Crosslands Reserve, Barnetts Lookout and Galston Gorge.

A major public use of the parks is for picnics and barbecues followed by a walk. The main focus of such activities is currently at Crosslands Reserve. High levels of visitation occur on

weekends, during school holidays, and on public holidays and family days such as Mother's Day.

A mix of recreational activities takes place or is provided for in the parks, ranging from trail-based activities (e.g. bushwalking and cycling) through to picnicking, camping, nature appreciation, photography, visual art and scenic viewing. These activities are facilitated and supported by the provision of walking tracks and management trails, built visitor infrastructure and services, directional and other signage, guided tours, walks and talks and various promotional channels and materials. Providers and facilitators of recreation opportunities in the parks include NPWS and other NSW Government bodies, Hornsby Shire Council, community organisations and private operators.

In Berowra Valley Regional Park, a popular recreational activity is on-leash dog walking on designated management trails (see Figure 1).

## **Day use areas**

The location of the parks and the facilities they provide makes them popular recreation areas for both local residents and visitors coming from further afield. The parks cater for individual day use recreation through to organised group events subject to activity consent for those activities involving 40 or more participants. Berowra Valley National Park contains a number of areas which cater for the passive recreational needs of visitors, including people with accessibility difficulties. Currently, there is no food outlet operating in the parks, although such facilities are provided in a number of nearby locations.

## **Crosslands Reserve**

Crosslands Reserve is the central visitor precinct in the parks, covering around 19 hectares of land at the end of Somerville Road in Hornsby Heights. The majority of the reserve is dominated by extensive lawn areas of introduced grasses and scattered mature eucalypts and other tree species. While the reserve's riverside flats have been extensively cleared and modified, the bushland-covered rocky hillslopes and mangrove-lined banks of Berowra Creek provide an attractive natural backdrop to the main recreation areas. Visitors acknowledge this natural bushland backdrop and setting as a major part of the area's character and appeal (Hornsby Shire Council 2006b).

Crosslands Reserve provides a range of day use visitor facilities. These include picnic tables, barbecues, toilets, playgrounds, sealed paths for children's cycling, viewing platforms, watercraft launching facilities, short walking tracks, a mangrove boardwalk, and a flat, sealed path which allows for greater accessibility to day use visitor facilities in and around the reserve. While the site is currently not serviced by public transport, it is accessible by a well-maintained road and large areas are available for parking.

The reserve is the venue for a number of educational and organised activities and community-based and commercial outdoor education activities. Recreation and tour groups also visit the reserve. The Great North Walk, which bisects Crosslands Reserve's lowlands, and Crosslands Youth and Convention Centre on the opposite bank of Berowra Creek outside the park, add additional dimensions to the area's appeal and visitor use (Hornsby Shire Council 2006b).

Crosslands Reserve consists of 2 land tenures:

- freehold title classified as community land which is owned and managed by Hornsby Shire Council
- land reserved as Berowra Valley National Park under the National Parks and Wildlife Act.

In 2006, a master plan for the whole of Crosslands Reserve was adopted by Hornsby Shire Council (Hornsby Shire Council 2006b). The master plan provides Hornsby Shire Council and NPWS with a planned approach to future development, use and management of the reserve to improve the quality of visitor experiences while protecting the area's natural, cultural and scenic values. In accordance with the master plan, recreational facilities have been enhanced and the water supply and sewerage system was upgraded in 2010. Implementation of the master plan is ongoing.

### **Barnetts Lookout**

Barnetts Lookout, off Barnetts Road, Berowra Heights, is a popular visitor precinct. It includes a playground, picnic tables and seats, and a well-developed wheelchair-accessible pathway to the lookout. Parking is readily available however, no toilet facilities are provided as the precinct is designed for short stays of up to 2 hours. Barnetts Lookout is a popular location for wedding ceremonies due to the attractive water and bushland views.

### **Galston Gorge**

Two areas in Galston Gorge (on Galston Road) provide landscaped picnic areas and car parking facilities. The Lower Galston Gorge Rest Area provides a pick-up and drop-off point for bushwalkers using the Great North Walk, as well as seats and parking for passive recreation. Galston Gorge Picnic Area and Lookout provides a picnic table, seating and parking in a landscaped setting. While both areas only cater for small numbers at one time due to their limited size, they provide valuable additions to the recreational opportunities of the parks. Both areas provide disabled parking, flat, sealed access suitable for wheelchairs, and seating and tables overlooking areas of high scenic quality.

### **Stringybark Ridge**

There are currently no formalised recreational facilities in the southern and western sections of the parks. Stringybark Ridge, off Schofield Parade, Pennant Hills, in the southernmost end of Berowra Valley National Park, has been identified as a potential area for one or more of the following activities and the provision of facilities for these purposes:

- activities of a passive or nature-based recreational, educational or cultural type (such as walking, track or trail connections, picnicking and informal gatherings)
- camping areas to facilitate access to the Great North Walk
- community or group activities.

These activities and facilities, together with opportunities for vegetation protection and restoration, will be considered during development of a precinct plan for Stringybark Ridge.

There are 2 sites at Stringybark Ridge which have been assessed as meeting the definition of a 'modified natural area' under the National Parks and Wildlife Act. The sites are adjacent to Schofield Trail north of Schofield Road and have been maintained as cleared areas for at least 50 years. These sites will be managed consistent with the requirements for modified natural areas under the National Parks and Wildlife Act.

The provision of sporting facilities at Stringybark Ridge was considered during the development of this plan. While this proposal has not progressed, community-based uses for this site may be considered following further community consultation and as part of more detailed planning for this precinct.

## Outside the parks

Other parks managed by NPWS, together with parks managed by other authorities (such as Hornsby Shire Council) and private operators, provide opportunities for a range of recreational activities in the region. Recreational opportunities that are available on nearby public land include bushwalking, cycling, picnicking, organised sports, swimming, tennis, mountain biking and skateboarding.

## Camping

Provision of camping areas in NPWS parks is an important element in visitor enjoyment and appreciation. Camping is a popular activity in the national park, and ranges from overnight stops for users of the Great North Walk to occasional car-based camping and group camping at Crosslands Reserve. The proximity to railway stations makes it an ideal destination for walk-in lightweight camping for visitors. The peak times for camping are school holidays, weekends and public holidays.

Camping is currently permitted at Crosslands Reserve, Lyrebird Gully and Tunks Ridge.

Crosslands Reserve is a designated camping area with supporting facilities and is used by a variety of community groups, such as Scouts Australia, for large camping events and by smaller, independent camping groups. Camping is mostly concentrated on the edge of the creek and under the trees at the south-west end of the reserve. Car-based camping is restricted to Crosslands Reserve to avoid potential conflict with day use visitation in other parts of the park. Hornsby Shire Council manages camping at the reserve. Camping fees apply at Crosslands Reserve.

Lyrebird Gully is a small-scale, bush camping area with no supporting facilities.

A strategic investigation of camping needs across the national park will be undertaken, including opportunities to support access to the Great North Walk. The investigation will consider the management of existing authorised and unauthorised camping areas, including potential closure and restoration, measures to reduce environmental risk, and potential additional camping options. One possible location for a new camping site is Stringybark Ridge.

There are no opportunities for camping in Berowra Valley Regional Park due to its small size.

## Bushwalking

Walking is the most popular physical activity undertaken by the NSW population (34%) and by visitors to NSW national parks (55%) (ASC 2010; Roy Morgan Research 2015). Bushwalking allows visitors to be in close contact with the environment and can increase understanding and enjoyment of parks and the environment generally. There are also significant health benefits associated with walking in a natural environment compared to that of an urban area. Research indicates that walking in bushland areas has beneficial health effects on immune system function and stress levels as well as heart health and blood pressure (HPPH Central 2013).

The parks provide a range of bushwalking opportunities with varying degrees of social interaction, physical challenge and self-reliance in a number of environmental settings. The highly scenic bushland and well-developed walking routes attract local, regional and international bushwalkers. Extensive works to provide bushwalking routes and facilities at track and trail heads (such as toilets, signage, water and picnic tables) have made the parks a major focus for bushwalking activities in the Sydney region. Popular bushwalking routes include Jungo Walk, Callicoma Walk, Refuge Walk, Elouera Walk and Blue Gum Walk (see

Figure 1). These are promoted by various organisations (e.g. Friends of Berowra Valley [n.d.] and Hornsby Shire Council [2022b.]).

The Great North Walk traverses the parks (see Figure 1). Initially constructed as a celebration of Australia’s Bicentenary in 1988, it is estimated that more than 40,000 visitors use the Great North Walk annually. The 250-kilometre walk begins in Sydney city and makes its way to Newcastle through a diverse range of natural habitats as well as rural and urban settings.

Part of the Great North Walk formerly traversed the Hornsby Rifle Range Danger Area (see Section 4.4). For safety reasons, an alternative route has been provided to avoid traversing this location. This alternative route diverts the Great North Walk around the eastern border of the rifle range and national park, through surrounding suburban streets in Hornsby. Recently, a new section of walking track has been built to link the Great North Walk to Dural. This new section of track, called Pogsons Link Track, connects the Great North Walk at Fishponds Waterhole to Dural via Pogson Trig Trail and then Quarry Trail.

Three walking routes, all located in Berowra Valley Regional Park, provide the opportunity for leashed dog walking. These are listed in Table 4 and shown on Figure 1 (see ‘Dog Walking Trail’ labels).

**Table 4 Leashed dog walking routes in Berowra Valley Regional Park**

Dog walking route	General description
Bellamy Street Dog Walking Trail	Leashed dog walking permitted on Bellamy Trail between Bellamy Street and Timbarra Road, Thornleigh
Daphne Place Dog Walking Trail	Leashed dog walking permitted on Patricia Trail between Tuscan Way (end Daphne Place) and Patricia Place, Cherrybrook
Clarinda Street Dog Walking Trail	Leashed dog walking permitted on Clarinda Trail between Clarinda Street and Simon Place, Hornsby

## Cycling

Cycling, including mountain biking, is a popular and healthy recreational activity which can raise awareness, appreciation and understanding of the natural environment. There is demand for this recreational activity in national parks. NPWS seeks to provide a diversity of cycling experiences that suit a variety of people, including families with children, road cyclists and mountain biking enthusiasts.

The parks currently provide cycling opportunities for all levels of experience, from flatter areas suitable for less-experienced riders and families, to long and somewhat steeper management trails offering challenging opportunities for more experienced riders.

Cycling is permitted along designated management trails and public roads (see Figure 1). Cycling is not permitted on walking tracks. Cycling levels in the parks reflect the activity’s status as one of the more popular recreation pursuits in recent years.

NPWS is committed to providing quality mountain biking experiences in selected parks consistent with relevant NPWS cycling policies and strategies.

Planning and consultation for new mountain bike opportunities in northern Sydney commenced in 2009. Under this project, NPWS assessed a number of parks in northern Sydney to determine their suitability for the potential construction of a mountain bike track. Parks were assessed against a standard set of criteria, and 3 potential mountain bike route options were identified, including one at Stringybark Ridge. After further assessment, construction of a mountain bike track in Garigal National Park was the preferred option.

The neighbouring Ku-ring-gai and Hornsby councils have constructed purpose-built mountain bike tracks offering varying degrees of experience in close proximity to the parks.

NPWS continues to engage with a range of stakeholders and other land managers with regard to mountain bike issues and opportunities at a landscape and cross-tenure level across the northern Sydney region.

## **Water-based activities**

The national park includes the bed and waters of Berowra Creek upstream of where the park is located on both sides of the creek (see Figure 1).

Canoeing, kayaking and fishing are undertaken on Berowra Creek and its tributaries. Canoeing and kayaking allow visitors to appreciate and enjoy the national park from the water. There is a kayak launching facility available at Crosslands Reserve.

Some visitors to the national park choose to swim in Berowra Creek at Crosslands Reserve. Hornsby Shire Council has undertaken a water quality monitoring program across the local government area since 1994, including monitoring at several sites in the parks. Based on monitoring data, NPWS does not recommend swimming in the national park after heavy rainfall in the catchment because contaminated stormwater may impact water quality (Hornsby Shire Council 2022a).

## **Adventure recreation**

An emerging adventure recreation activity in the national park is rock climbing, however, geocaching and abseiling are also known to occur in the national park.

Rock climbing is focused on a number of rock walls located around Gundah Ridge, Mount Kuring-gai. Rock climbing is authorised at Gundah Ridge, subject to the following:

- the safety of participants continues to be the responsibility of participants and their companions
- NPWS written consent is required for groups of 10 or more, or via licence for all commercial rock climbing activities
- management measures, including restrictions on access to rock walls at Gundah Ridge, may be applied based on a consideration of safety or environmental risk
- for safety reasons and only if required, rock climbers are permitted to install replacement bolts (i.e. to replace existing degraded bolts) in rock walls at Gundah Ridge without NPWS consent
- apart from the replacement of bolts at authorised locations (above), new bolts may only be installed with written NPWS consent.

Abseiling, rock climbing and geocaching activities may be permitted elsewhere in the parks following consideration and approval, in the form of written NPWS consent. In approving such activities, NPWS will have regard to relevant NPWS policies, including risk and visitor safety policies (e.g. DPE 2021b, e).

NPWS will liaise with rock climbing groups to develop a code of conduct and guidelines for rock climbing in the national park. This will include consideration of management requirements for specific locations in the park, taking account of risk factors, this may include identifying high impact areas where bolts should be removed and sensitive areas where bolts may be prohibited, as well as limits on access where necessary to mitigate risk.

## **Horse riding**

Horse riding is a popular recreational activity that has cultural associations for many Australians (OEH 2012c).

Berowra Valley National Park and Regional Park, however, are not considered suitable for horse riding due to their narrow shape and the potential for the activity to impact other track and trail users.

## **Group and guided activities**

Organised large-group activities and commercially guided activities can provide opportunities for people who would otherwise not be able to experience the parks. These activities can also promote environmental understanding and support for conservation. Large groups can, however, have an environmental impact and can restrict opportunities for independent visitors and campers.

Non-commercial, large-scale organised group activities involving 40 or more participants require consent under the National Parks and Wildlife Regulation. Organised group activities of a commercial nature, including competitions, require a licence under the National Parks and Wildlife Regulation regardless of the number of participants. All activities must be consistent with the management principles that apply to the parks (see Section 2.2) and be compatible with the natural and cultural heritage values of the parks. Applications will be assessed in accordance with relevant NPWS policies and procedures.

Organised large-group activities occur at Crosslands Reserve, including camping and educational activities run by schools, church groups, Scouts Australia, Girl Guides Australia and other organisations.

Several commercial tourism operators are licensed to operate in the parks. The operators are licensed to undertake a wide range of activities, including guided bushwalks, kayaking tours, camping, cycling tours, rock climbing, abseiling and outdoor education activities.

## **Leasing and licensing**

Berowra Waters Tea House (see Figure 1) was previously subject to a commercial lease for use as a restaurant and kiosk. Although currently not leased, NPWS will investigate adaptive re-use options for the tea house for purposes consistent with the NPW Act and management principles that apply to national parks (see Section 2.2).

Opportunities to further enhance visitor and tourist experiences in the parks will be investigated.

## **Filming and photography**

Filming and photography are undertaken regularly in the parks by both commercial and non-commercial operators. Commercial filming and photography applications are approved under the *Filming Approvals Act 2004*, in accordance with the NPWS *Filming and Photography Policy* (DPE 2021a) and with regard to other relevant NPWS policies. Approval for commercial filming and photography may contain conditions to minimise impacts on the parks.

## Issues

### Day use areas

- Recreation is an important focus for the parks, and it is anticipated that visitation demand will continue to grow as the population of the surrounding region increases.
- Barnetts Lookout is a highly developed visitor precinct. It is not proposed that other visitor day use areas in the parks be developed to the same extent as Barnetts Lookout, as similar facilities are well-provided in local government reserves.
- Stringybark Ridge, in the southernmost section of the national park, has been identified as a potential site for recreational, educational or cultural activities. Other potential options for the site include camping areas to support use of the Great North Walk and/or an area for community group activities. Careful site planning can enable such activities to occur at the site while providing vegetation protection and restoration opportunities.
- One of the most significant visitor attractions in the parks is the Great North Walk. It traverses the length of Berowra Valley National Park and 2 of the dog walking trails in the regional park. NPWS does not have responsibility for the management and maintenance of the Great North Walk, including bridges such as the Calna Creek Footbridge.
- Hornsby Rifle Range, including its Rifle Range Danger Area, is more or less encompassed by the national park (see Section 4.4 and Figure 1). For safety reasons, there is no public access from the parks into the Rifle Range Danger Area.
- Extensive works to provide bushwalking routes and facilities at track and trail heads have made the parks a major focus for bushwalking activities in the Sydney region. The maintenance of these facilities is an ongoing activity for NPWS.

### Camping

- A strategic investigation of camping needs will be undertaken across the parks, including opportunities to support access to the Great North Walk such as at Stringybark Ridge.
- NPWS will need to continue to manage unauthorised camping and implement measures to reduce environmental risks.

### Cycling

- Closure of public access through the Hornsby Rifle Range Danger Area has affected cycling opportunities and connections.

### Bushwalking

- Currently, bushwalking routes in the parks are not subject to a classification system. To improve visitor understanding of the level of difficulty and length of walking routes, NPWS will implement a classification system for bushwalking routes in the parks. It will be consistent with the Australian Standard for walking tracks (*AS 2156.1-2001 Walking tracks – Classification and signage*) and the NPWS *Walking Tracks Policy* (DPE 2021f).
- There is an ongoing issue with unauthorised track formation in the parks, mostly associated with recreational uses such as bushwalking, cycling and rock climbing. This increases the fragmentation of the parks and has a negative impact on park values through increased erosion, loss of individual plants and potential damage to Aboriginal sites. NPWS will actively close unauthorised tracks.



### **Adventure recreation**

- Adventure activities such as rock climbing, abseiling and geocaching often involve the exposure of participants to risks inherent in a natural environment, such as falling and floods. Participants in adventure recreation activities need to accept responsibility for their own safety.
- Effective management of the potential impacts of rock climbing is necessary to allow this activity to continue while ensuring an adequate level of protection for the parks' values. Impacts from rock climbing activities may include damage to native plants, damage to rock faces by bolts, and the creation of tracks around the cliffs. Effective management can be achieved through communication and education programs with the rock climbing community and formal regulation of activities where required. NPWS will work with rock climbing groups to prepare a code of conduct and guidelines for rock climbing in the parks.
- It is not practical for NPWS to carry out installation or certification of rock climbing bolts installed in the parks. Responsibility for ensuring the safety of fixed anchor points prior to use rests with the people participating in these activities.
- The safety of people undertaking adventure activities will continue to be the responsibility of participants and their companions.
- Management measures, including restrictions on access to some locations and removal of bolts, may need to be applied in some cases based on a consideration of safety and environmental risk.
- NPWS will apply relevant risk management policies and record risk assessments and treatments in the visitor safety risk register.

### **Group and guided activities**

- Organised, large-group activities occur in the parks at Crosslands Reserve. Barnett's Lookout is a popular location for wedding ceremonies. Organised group activities involving 40 or more participants require written consent from NPWS.

### **Leasing and licensing**

- Although not currently leased, adaptive re-use options for the Berowra Waters Tea House will be investigated.

### **Other**

- Additional development at Berowra Waters may potentially affect parking in the precinct. NPWS will work in consultation with Hornsby Shire Council and Berowra Waters residents to minimise any potential effects.
- Unauthorised use of trail bikes in the parks is prohibited. Trail bikes disturb the enjoyment of other park visitors, compromise visitor safety and have a negative impact on park values.

### **Desired outcomes**

- Visitor use is appropriate and ecologically sustainable.
- The diversity of visitor opportunities encourages appreciation and awareness of the parks' values and their conservation.
- Negative impacts of visitors on the parks' values are minimised.

- Facilities and activities are planned and managed to provide a satisfying visitor experience and minimise impacts.
- Organised, large-group activities have minimal impacts on the parks' natural and cultural values and other visitors.
- Organised, large-group and guided activities facilitate a quality experience for participants, enhancing their understanding and appreciation of the natural and cultural values of the parks.
- Leased or licensed facilities or land support the protection of the parks' natural and cultural values.

## **Management response**

- 3.6.1 Provide and promote a range of opportunities for both active and passive recreation in the parks, catering to a range of interests and abilities.
- 3.6.2 Consider access for mobility-impaired visitors in the development and redevelopment of visitor precincts.
- 3.6.3 Install signage to identify bushwalking routes, difficulty levels and length. All bushwalking routes shall be classified consistent with the Australian Standard for walking tracks (AS 2156.1-2001) and the NPWS Walking Tracks Policy. Any unauthorised tracks will be closed.
- 3.6.4 Continue the prioritised upgrade and maintenance of tracks, trails and facilities using methods which are compatible with the soil and topography of the parks. Tracks and trails may be realigned, or new sections developed, where there is a clear and demonstrable need based on safety, cultural or environmental concerns along existing access routes.
- 3.6.5 Allow leashed dogs on designated dog walking routes in Berowra Valley Regional Park. Designated routes will be signposted. Continued use will depend on the results of monitoring for environmental impacts. Designated routes are (see Figure 1):
  - Bellamy Street Dog Walking Trail – Timbarra Trail between Bellamy Street and Timbarra Road, Thornleigh
  - Daphne Place Dog Walking Trail – Patricia Trail between Tuscan Way (end Daphne Place) and Patricia Place, Cherrybrook
  - Clarinda Street Dog Walking Trail – Clarinda Trail between Clarinda Street and Simon Place, Hornsby.
- 3.6.6 Do not permit horse riding in the parks.
- 3.6.7 Permit cycling on designated management trails and public roads.
- 3.6.8 Investigate and enable, where appropriate, future opportunities for mountain bike access as part of ongoing discussions with stakeholders and other land managers regarding cross-tenure options across the northern Sydney region. Any new construction will be with a focus on linking cross-tenure mountain biking opportunities.
- 3.6.9 Do not permit cycling on designated walking tracks in the parks.
- 3.6.10 Maintain picnic areas and provide additional picnic facilities, shelters and barbecues as necessary where viable.
- 3.6.11 Manage any additional development in the Berowra Waters precinct in consultation with Hornsby Shire Council and Berowra Waters residents in order to minimise any additional effects of parking.

- 3.6.12 Collaborate with Hornsby Shire Council regarding the future development, use and management of Crosslands Reserve.
- 3.6.13 Allow visitors to light fires only in authorised fireplaces.
- 3.6.14 Manage the Lower Galston Gorge Rest Area and the Galston Gorge Picnic Area and Lookout as picnic areas for small numbers of visitors at one time.
- 3.6.15 Prepare a precinct plan for Stringybark Ridge to examine opportunities for future use and vegetation restoration as discussed in Section 3.6.
- 3.6.16 Allow public vehicles on the parks' public access roads and car parking areas shown on Figure 1). Vehicle and public access arrangements for Stringybark Ridge will be determined as part of the precinct plan discussed in Section 3.6, and Figure 1 may then be revised at this specific location to reflect the precinct plan.
- 3.6.17 Permit camping in designated areas at Crosslands Reserve, Lyrebird Gully and Tunks Ridge subject to a strategic investigation of camping needs.
- 3.6.18 Undertake a strategic investigation of camping needs and opportunities, including management of unauthorised camping and supporting access to the Great North Walk, such as camping at Stringybark Ridge, as discussed in Section 3.6.
- 3.6.19 Allow access to the fire pit area at Crosslands Reserve for group use via the same booking system currently in use and managed by Hornsby Shire Council. Manage unauthorised use of the fire pit area.
- 3.6.20 Allow rock climbing at Gundah Ridge, Mount Kuring-gai, subject to the requirements listed in Section 3.6 of this plan of management.
- 3.6.21 Communicate with rock climbers and regulate rock climbing activities where required to manage the potential impacts of rock climbing on park values. Apply management measures, including restrictions on access to some locations and removal of bolts, where required, based on a consideration of safety and environmental risk.
- 3.6.22 Work with rock climbing groups to prepare and implement a code of conduct and guidelines for rock climbing in the parks.
- 3.6.23 Install appropriate educational and warning signage regarding rock climbing at key locations.
- 3.6.24 Consider providing consent for rock climbing (where required – see 3.6.21), abseiling and geocaching in the parks where:
  - the NPWS Visitor Safety Policy and other relevant codes of conduct and guidelines have been considered
  - visitor conflicts and any potential environmental impacts are minimised
- 3.6.25 Do not permit dogs in Berowra Valley National Park, including Crosslands Reserve.
  - the safety of other park visitors is assured
  - the safety of participants continues to be the responsibility of participants and their companions.
- 3.6.26 Assess applications for commercial filming and photography and prescribe conditions to minimise impacts on park values according to NPWS policy.
- 3.6.27 Prohibit filming where it may impact threatened species, threatened ecological communities or historic and culturally significant sites.
- 3.6.28 Consider issuing a lease for the buildings and respective purposes listed in Section 3.6.

- 3.6.29 Ensure all leases and licences in the parks are authorised in accordance with the provisions of Part 12 of the National Parks and Wildlife Act.
- 3.6.30 Investigate opportunities to further enhance visitor and tourist experiences in the parks.
- 3.6.31 Consider operating leases for compatible recreational uses of the parks.
- 3.6.32 Prohibit unauthorised use of trail bikes in the parks.

## 3.7 Interpretation, education and community involvement

The popularity of the parks and their location in the Sydney metropolitan region makes them an ideal place for developing an understanding and appreciation of national parks and their cultural and natural values. This is especially the case for those people who may otherwise be unexposed to national parks or natural bushland settings. It also provides visitors with many examples of the issues affecting nature conservation in an urban area.

Interpretation assists the protection of natural and cultural heritage, promotes support for conservation, and increases the enjoyment and satisfaction of visitors. Minimal interpretive signage currently exists in the parks at key visitation precincts, including Barnett's Lookout, Galston Gorge Picnic Area and Lookout, and Crosslands Reserve. However, significant interpretation information is available on a range of websites. These include the NPWS visitor website, the Friends of Berowra Valley website and Hornsby Shire Council's website.

The parks have a long history of community involvement. There is a high level of community involvement in bush regeneration and other activities in the parks. Activities include rubbish removal, education, park promotion, data collection and capacity building through conservation partnerships. Hornsby Shire Council manages approximately 43 Bushcare groups in or adjacent to the parks. These groups play an important role in weed control and rehabilitation of native vegetation.

NPWS Discovery Rangers and Hornsby Shire Council guides take occasional guided walks in the parks. The parks are also used by university, school and technical college students for excursions, research and monitoring exercises, and project work.

### Issues

- Communication channels available for interpretation and education are diverse and ever-changing. Changes in technology present opportunities for NPWS to reach different demographics through new communication channels.
- Current interpretive signage provides basic information about the parks. Improved interpretive signage is required to explain the natural and cultural features of the parks to improve visitors' understanding of the parks' many values.
- Phone and computer apps are an excellent way to communicate interpretive and educational information to park visitors.
- Signs in the parks that have not already been replaced need to be replaced or amended to reflect the national park status.
- The *Crosslands Reserve Park Masterplan* (Hornsby Shire Council 2006b) discusses interpretive themes and signage as well as interpretive opportunities for the reserve.
- Research should be subject to the NPWS policies concerning the granting of permits, conduct of research and the communication of results.

## Desired outcomes

- Information provision and education facilitates widespread community understanding and appreciation of the parks' natural and cultural values.
- The parks are useful educational resources for local schools and community organisations.

## Management response

- 3.7.1 Support and assist educational use of the parks by schools, community groups and individuals through the provision of information and programs such as walks, talks and tours, and web-based products.
- 3.7.2 Support community involvement in the parks, particularly involvement in bush regeneration programs and catchment management programs.
- 3.7.3 Recognise community projects through the provision of awards, signs at project sites, and nomination for achievement awards in broader community recognition schemes.
- 3.7.4 Develop a prospectus of suitable projects that community groups can undertake in the parks.
- 3.7.5 Replace signage in the parks to reflect the updated national park status.
- 3.7.6 Involve Aboriginal community groups in the development of material and programs for interpretation of Aboriginal culture.
- 3.7.7 Undertake research to provide information about the parks' natural and cultural heritage and human use in order to inform park management.
- 3.7.8 Encourage birdwatchers and similar groups to pass on information gathered in the parks.
- 3.7.9 Permit access by researchers to areas or trails not normally accessible by the public only if the value of the research justifies such access.
- 3.7.10 Promote the following as priorities for research in the parks:
  - the distribution, status and management requirements of threatened plant and animal communities
  - methods to control and manage pests
  - water catchment protection
  - recreational use patterns and preferences and the impact of different activities on natural and cultural resources
  - the distribution, significance and conservation requirements of Aboriginal sites and historic places
  - appropriate indicators to monitor the effects of climate change.

## 4. Threats

### 4.1 Pests

Pest species are defined in this plan as any plant, animal or fungal species that is not native to the parks. Pests have negative environmental, economic and social impacts; and they are commonly introduced species. Pests can have impacts across the range of park values, including impacts on biodiversity, cultural heritage, and catchment and scenic values.

The *Biosecurity Act 2015* and its regulations provide specific legal requirements for the response, management and control of biosecurity risks, including weeds (which includes fungi), and pest animals. These requirements apply equally to public land and private land. Under this framework, Local Land Services (LLS) has prepared regional strategic weed management plans and regional strategic pest animal management plans for each of its 11 regions, including the Greater Sydney Region: *Greater Sydney Regional Strategic Weed Management Plan* (GS LLS 2017) and *Greater Sydney Regional Strategic Pest Management Plan* (GS LLS 2018).

The LLS plans identify priority weeds and pest animals in each of the regions, plus the appropriate management response for the region (i.e. prevention/alert, eradication, containment or asset protection).

The NPWS pest management strategy for the Metropolitan North East Region (OEH 2012b) identifies pest species and priority programs for these parks. The overriding objective of the pest management strategy is to minimise the adverse impacts of introduced species on biodiversity and other park and community values while complying with legislative responsibilities. The strategy also identifies where other site-specific or pest-specific plans or strategies need to be developed to provide a more detailed approach. Reactive programs may also be undertaken in cooperation with neighbouring land managers in response to emerging issues.

There is an ongoing need to update knowledge on the distribution and abundance of introduced species that are found in the parks, together with the assets they affect. This knowledge is needed to inform the development and implementation of effective pest control programs for priority sites described in the regional pest management strategy. Significant pest species recorded in the parks are listed in Table 5.

**Table 5 Significant pest species recorded in the parks**

Common name	Scientific name	Comment
<b>Weeds</b>		
Agave, mother of millions <sup>D</sup>	<i>Agave</i> sp., <i>Bryophyllum delagoense</i>	Located around the urban interface and creek catchments
Crofton weed <sup>D</sup>	<i>Ageratina adenophora</i>	Populations around the urban interface and creek catchments
Whisky grass <sup>D</sup>	<i>Andropogon virginicus</i>	Located around the urban interface and disturbed areas such as visitor precincts
Ground asparagus fern <sup>A B C</sup>	<i>Asparagus aethiopicus</i>	Located around the urban interface, creek catchments and disturbed areas such as visitor precincts
Bridal creeper <sup>A B</sup>	<i>Asparagus asparagoides</i>	Isolated populations restricted to a small geographic area of the parks

Common name	Scientific name	Comment
Boneseed (class 1) <sup>A B</sup>	<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	Located on ridge tops and around the urban interface
Veldt grass, African love grass <sup>D</sup>	<i>Ehrharta</i> sp., <i>Eragrostis curvula</i>	Located around the urban interface and creek catchments
Lantana <sup>A B</sup>	<i>Lantana camara</i>	Widespread throughout the parks with high impact
Privet <sup>D</sup>	<i>Ligustrum</i> spp.	Located around the urban interface and in proximity to disturbed areas such as visitor precincts
Japanese honeysuckle <sup>D</sup>	<i>Lonicera japonica</i>	Located around the urban interface, creek catchments and disturbed areas such as visitor precincts
Cats claw creeper <sup>A</sup> <sup>B C</sup>	<i>Macfadyena unguis-cati</i>	Located around the urban interface and creek catchments
Kikuyu <sup>D</sup>	<i>Pennisetum clandestinum</i>	Located around the urban interface, creek catchments and tributaries
Blackberry <sup>A B</sup>	<i>Rubus fruticosus</i> agg.	Located around the urban interface, creek catchments and disturbed areas such as visitor precincts
Parramatta grass	<i>Sporobolus africanus</i>	Located around the urban interface
Trad <sup>D</sup>	<i>Tradescantia fluminensis</i>	Located around the urban interface and creek catchments
<b>Pest animals</b>		
Black rat	<i>Rattus rattus</i>	Isolated populations generally restricted to the urban interface. Risk to native animals through competition for food, shelter and other resources
Carp	<i>Cyprinus carpio</i>	Found in Berowra Creek. Risk to native animals through predation, competition for food, shelter and other resources
Cat <sup>E</sup>	<i>Felis catus</i>	Populations located around the urban interface. Risk to native animals through predation, competition for food, shelter and other resources
Feral chicken	<i>Gallus gallus domesticus</i>	Isolated populations restricted to Galston Gorge. Risk to native animals through competition for food, shelter and other resources and potential for the introduction of bird diseases
Plague minnow (Mosquito fish)	<i>Gambusia holbrooki</i>	Populations in Berowra Creek and tributaries. Risk to native animals through predation, competition for food, shelter and other resources
Rabbit <sup>E</sup>	<i>Oryctolagus cuniculus</i>	Scattered populations throughout the parks. Risk to native animals through competition for food, shelter and other resources
Red fox <sup>E</sup>	<i>Vulpes vulpes</i>	Populations located across the parks. Risk to native animals through predation, competition for food, shelter and other resources

<sup>A</sup> Weed of National Significance.

<sup>B</sup> State level priority weed (Greater Sydney LLS 2017).

<sup>C</sup> Regional priority weed (Greater Sydney LLS 2017).

<sup>D</sup> Other weed of regional concern (Greater Sydney LLS 2017).

<sup>E</sup> Regional priority pest animal (Greater Sydney LLS 2018).

## Weeds

As is the case with many urban bushland parks, weed invasion in the parks is a major problem. Weed invasion varies between vegetation communities, however, populations of troublesome species are primarily restricted to drainage lines and the boundaries adjoining urban areas.

Stormwater runoff is one of the major influences on weed dispersal throughout the parks and runoff from surrounding properties has had a major influence on the density of weeds in the parks.

Illegal rubbish dumping is another major source of weed invasion. Dumped lawn clippings and garden rubbish are particularly rich sources of weed seeds and cuttings. The very nature of many weed species means they are able to rapidly establish from such sources and invade native bushland where they can quickly out-compete native species. Not only do weeds impact native plants in the parks, but they also have an indirect effect on native animals by reducing and altering their natural habitat. Some of the significant weeds impacting the parks' values and assets (including threatened plant species) are listed in Table 5.

At present, Hornsby Shire Council and NPWS carry out bush regeneration programs in and adjacent to the parks. Most regeneration work is undertaken on the periphery of the parks at the urban interface. Regeneration refers to the natural recovery of the natural integrity of native vegetation following disturbance or degradation (AHC 2002). Bushcare groups managed by Hornsby Shire Council play an important role in the removal and control of weeds and the rehabilitation of native vegetation in the parks.

## Pest animals

Due to the parks' close proximity to urban areas of Sydney and small rural landholdings to the north-west, a number of introduced and feral animal species are present and have become established in the parks. The more significant feral animal species found in the parks are identified in Table 5.

Pests animals, in particular cats, foxes and rabbits, are identified as having an impact on the native plants and animals found in the parks (see Sections 3.2 and 3.3) as well as the Aboriginal heritage and historic heritage values of the parks (see Sections 3.4 and 3.5).

## Pathogens

The soil-borne pathogen *Phytophthora cinnamomi* and the plant fungal disease known as myrtle rust (caused by *Uredo rangelii*) currently pose a direct threat to biodiversity in the parks. *Phytophthora* flourishes in soil with high moisture content. It can invade and destroy the root systems of susceptible plant species with symptoms usually present in periods of drought or plant stress. *Phytophthora* can be spread by activities such as cycling, bushwalking, road construction, bush regeneration, 4-wheel driving, fire break management, revegetation activities and the planting of diseased nursery stock. Species of scribbly gum (*Eucalyptus haemastoma* and *Eucalyptus racemosa*) and grass trees (*Xanthorrhoea arborea*) have so far shown a marked susceptibility to the pathogen. Preliminary sampling by the Royal Botanic Gardens has revealed some infected areas in the Hawkesbury Nepean catchment area (Suddaby & Lieu 2008).

Myrtle rust is a serious disease which can affect plants belonging to the Myrtaceae family. When severely infected, young plants and new growth may become stunted and, in the worst case, die. To date, it has not been detected in the parks, possibly because the 2 most commonly affected plants, scrub turpentine (*Rhodamnia rubescens*) and native guava (*Rhodomyrtus psidioides*), are not known to occur in the parks.



Phytophthora and myrtle rust hygiene protocols are being implemented across NPWS Metropolitan North East Region in keeping with a risk-based approach and as per the Botanic Gardens Trust's *Phytophthora Dieback Best Practice Management Guidelines* (Suddaby & Lieu 2008) and *Management Plan for Myrtle Rust on the National Parks Estate* (OEH 2011).

## Desired outcomes

- Negative impacts of pests on the parks' values are prioritised and minimised.
- The distribution of phytophthora, a soil-borne pathogen, is better understood and its spread in the parks is minimised.
- Prioritised pest programs are committed to, including monitoring and appropriate levels of maintenance.
- Volunteers, community groups and educational institutions are supported through on-ground supervision, advice, basic training and assistance with project management and education programs.

## Management response

- 4.1.1 Manage pest species in accordance with relevant pest management strategies.
- 4.1.2 Survey the parks to determine the presence and extent of pest species and identify biodiversity most at risk.
- 4.1.3 Seek the cooperation of neighbours in implementing pest control programs. Undertake control in cooperation with Bushcare groups, Hornsby Shire Council, Greater Sydney Local Land Services, Sydney North Weeds Committee, Sydney North Vertebrate Pest Committee 1 and other neighbouring land managers.
- 4.1.4 Record and report state-level and regional-level priority weeds and Weeds of National Significance. Prioritise weeds and undertake a risk and feasibility assessment.
- 4.1.5 Control new outbreaks of weed species in a timely manner.
- 4.1.6 Implement threat abatement plan and Biodiversity Conservation Program actions for pest species in the parks.
- 4.1.7 Incorporate best practice guidelines for controlling the spread of phytophthora and myrtle rust into all relevant work programs.
- 4.1.8 Monitor for the presence of phytophthora and myrtle rust to determine their distribution in and around the parks.
- 4.1.9 Implement prioritised pest control programs using best practice techniques, undertaken by staff, volunteers and contractors in priority areas.

## 4.2 Fire

The primary objectives of NPWS fire management are to protect life, property, community assets and cultural heritage from the adverse impacts of fire, while also managing fire regimes in parks to maintain and enhance biodiversity. NPWS also assists in developing fire management practices that contribute to conserving biodiversity and cultural heritage across

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<sup>1</sup> Formerly the Urban Feral Animal Action Group

the landscape and implements cooperative and coordinated fire management arrangements with other fire authorities, neighbours and the community (OEH 2013).

Fire is a natural feature of many environments and is essential for the survival of some plant communities. However, inappropriate fire regimes can lead to loss of particular plant and animal species and communities, and high-frequency fires have been listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2000b).

Owing to the combination of climate, topography and vegetation, the Sydney region is one of the most bushfire-prone areas in the world. Periodically, every 5 to 12 years, drought conditions combine with hot, dry, north-westerly to south-westerly air streams to produce the potential for high-intensity, uncontrollable bushfires. Although bushfires may occur at any time of the year, the highest probability occurs in December and January.

NPWS fire history records for the parks date back to the 1989–90 season. Records and mapping before this date are predominantly anecdotal, with accuracy varying accordingly. Anecdotal information is available from the Rural Fire Service back to the 1960s. Some areas of the parks have experienced a high frequency of unplanned fires, while some areas have not had a recorded fire. Significant fires in the parks in 1968 and 1977 burnt tracts of bushland from Mount Kuring-gai to Crosslands Reserve.

During the 1980s, a number of small fires occurred along the eastern edge of Berowra Valley. Since then, unplanned fires have occurred in 1990 (Berowra); 1991 (Hornsby Heights); 1993 (Cherrybrook); 1994 (adjacent to Westleigh); 2000 (Old Mans Valley); 2003 (Berowra); 2004 (Taylors Road, Refuge Rock and Galston Gorge); 2005 (Tanglewood Way and Galston Gorge); 2006 (Crosslands); 2009 (Crosslands and Beaumont Road); and 2012 (Quarry Trail and Crosslands Road). Most bushfires have been started by human activities, in particular arson. Lightning has not been a significant cause of fire ignitions.

The parks contain many advantages for fire management including well-formed roads, management trails and steep valleys and creek lines which assist in containing fires. Berowra Creek also serves as a natural barrier in containing and directing fires on either side of the gorge. The rugged and remote nature of some sections of the parks can aid the spread of fire, however, it appears that past fire management practices have been effective in containing fire. The construction of many management trails in the 1970s and 1980s has assisted this greatly.

Urban development in the past has occurred along ridge tops and then gradually spread downslope, often with very little regard to the bushfire hazards intrinsic to these areas. As a result, the parks are largely bound by extensive areas of urban and rural interface, including the suburbs of Berowra Heights, Berowra Waters, Berowra, Mount Kuring-gai, Mount Colah, Asquith, Hornsby Heights, Hornsby, Normanhurst, Westleigh, Thornleigh, Pennant Hills, Cherrybrook, Dural, Galston, Arcadia and Berrilee.

NPWS is the fire authority responsible for the parks under the *Rural Fires Act 1997*. NPWS, the Rural Fire Service, and Fire and Rescue NSW, through Hornsby Ku-ring-gai Bush Fire Management Committee, jointly manage fire suppression activities in the parks and the schedule of hazard reduction activities. Other cooperative arrangements include fire planning, fuel management and information sharing. Hazard reduction programs, ecological burning proposals and management trail works are submitted annually to Hornsby Ku-ring-gai Bush Fire Management Committee.

A fire management strategy which defines the NPWS fire management approach for the parks has been prepared (OEH 2017). This outlines the recent fire history of the parks, key assets within and adjoining the parks (including sites of natural and cultural heritage value), fire management zones and fire management advantages such as management trails. It also contains fire regime guidelines for conservation of the parks' vegetation communities.

The strategy outlines the following as key fire issues for the parks:

- Bushfires do and will continue to occur in the parks owing to the combination of vegetation, climate, unplanned human-caused ignitions and occasional lightning strikes.
- Suspected arson is a major cause of bushfires in the parks.
- There is a large number of community assets within and adjacent to the parks that have been threatened or damaged in the past as a result of bushfires.
- A large proportion of existing assets and property do not conform to Australian Standards for both building construction and the establishment and maintenance of asset protection zones on private property.
- The ability of neighbouring residents to prepare for and take appropriate action during a bushfire is highly variable.
- During the bushfire danger period, many visitors to the parks may be located in areas surrounded by highly flammable vegetation and where escape from a bushfire would be slow or difficult.
- The parks conserve natural and cultural heritage values that are vulnerable to inappropriate fire regimes and fire management activities.

### **Desired outcomes**

- Negative impacts of fire on life, property and the environment, including Aboriginal sites, historic places and culturally significant features, are minimised.
- The potential for spread of bushfires on, from or into the parks is minimised.
- Fire regimes are appropriate for conservation of native plant and animal communities.

### **Management response**

4.2.1 Implement the parks' fire management strategy.

## **4.3 Climate change**

Human-induced climate change is listed as a key threatening process under the Biodiversity Conservation Act (NSW SC 2000a) and the associated loss of habitat is listed under the Environment Protection and Biodiversity Conservation Act (TSSC 2001).

The following is a snapshot of the predicted changes to climate for Metropolitan Sydney (OEH 2014):

- maximum temperatures are projected to **increase** in the near future\* by 0.3–1.0°C
- maximum temperatures are projected to **increase** in the far future by 1.6–2.5°C
- minimum temperatures are projected to **increase** in the near future by 0.4–0.8°C
- minimum temperatures are projected to **increase** in the far future by 1.4–2.5°C
- the number of hot days (i.e. >35°C) will **increase**
- the number of cold nights (i.e. <2°C) will **decrease**
- rainfall is projected to **decrease** in spring and winter
- rainfall is projected to **increase** in summer and autumn
- average fire weather is projected to **increase** in spring
- severe fire weather days are projected to **increase** in summer and spring.

The projected increases in temperature, number of hot days and severe fire weather days are likely to influence bushfire frequency and intensity across the Metropolitan Sydney region and result in an earlier start to the bushfire season. Higher rainfall in summer and autumn are likely to accelerate all forms of soil erosion across the region and increase runoff at these times of year.

Climate change may significantly affect biodiversity by changing the size of populations and the distribution of species, modifying species composition, and altering the geographical extent of habitats and ecosystems. The potential impact of climate change specifically on the parks is difficult to assess since it depends on the compounding effects of other pressures, particularly barriers to migration and pressure from pests. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates.

Given the state's high vulnerability to projected climate change, it is important that appropriate actions are taken to ensure effective adaptation is possible in a changing environment. Programs to reduce the pressures arising from other threats, such as habitat fragmentation, invasive species, bushfires and pollution, will help reduce the severity of the effects of climate change.

## **Desired outcomes**

- The effects of climate change on natural systems are reduced.

## **Management response**

- 4.3.1 Continue existing fire, pest and weed management programs to increase the parks' ability to cope with future disturbances, including climate change and visitor management.
- 4.3.2 Encourage research into appropriate indicators to monitor the effects of climate change, including sea level rise.

## 4.4 Boundary management

### Neighbour relations

The large size and linear shape of the parks creates an extensive boundary over which issues of neighbour relations become very important for effective park management. Resolution of issues such as encroachments, rubbish dumping, urban interface effects, park access and boundary rationalisation are best achieved with a high degree of involvement and cooperation of park neighbours.

### Land acquisition

The parks are bounded by urban, rural and other types of development and a variety of land uses are undertaken along the boundaries. Areas of medium- to high-density housing, small rural holdings, vacant Crown land and council-owned land bordering the parks present a number of challenges to park management.

The highly convoluted boundaries also present a significant challenge to park management. The effects of the large number of residential properties bordering the parks, urban edge effects such as weeds and pest animals (see Section 4.1) and high boundary-to-area ratios contribute to ongoing management challenges. The acquisition of appropriate lands adjoining the parks would serve conservation or recreation purposes and rationalise boundaries.

### Rifle range

Hornsby Rifle Range is more or less encompassed by the national park (see Figure 1). The rifle range is on Crown land that stretches from suburban Hornsby in the east to Dural in the west. The rifle range includes a Rifle Range Danger Area, also referred to as an exclusion zone or safety template. Hornsby Rifle Range (including its Range Danger Area) operates under a licence issued to North Shore Regional Target Shooting Complex Management Association.

In response to safety considerations, sections of the Great North Walk that traversed the Rifle Range Danger Area have been rerouted. There is no public access from the parks into the Range Danger Area.

NPWS will, in conjunction with relevant agencies and North Shore Regional Target Shooting Complex Management Association, seek to manage safety for park visitors in accordance with relevant NPWS visitor safety and risk management policy and procedures.

NPWS will engage with relevant authorities to ensure access to management trail sections that traverse the Rifle Range Danger Area.

### Desired outcomes

- The integrity of park boundaries is maintained.
- Park boundaries are rationalised where opportunities to acquire land arise.
- Areas on the boundaries of the parks are managed to minimise threats to the parks.
- Management of the Hornsby Rifle Range Danger Area is compatible with the management principles that apply to the neighbouring national park (see Section 2.2).
- Visitor safety in and around the Hornsby Rifle Range Danger Area is upheld.

## **Management response**

- 4.4.1 Work with relevant land-use consent authorities for neighbouring lands to:
- define and map the national park and Crown land boundaries
  - ensure neighbour activities do not compromise NPWS’s ability to protect the parks’ values in accordance with the management principles for national parks and regional parks
  - rationalise park boundaries when opportunities arise.
- 4.4.2 Prepare and implement a reserve access strategy to secure park access for public use and management purposes.
- 4.4.3 Identify and seek to correct boundary errors, boundary encroachments and proposed boundary adjustments (under section 188C of the National Parks and Wildlife Act) as identified in the reserve access strategy.

## 5. Management operations and other uses

In order to protect the parks' values, provide opportunities for visitors and facilitate management operations, it is important to build and maintain various types of infrastructure. Infrastructure may also be provided within the park by other authorities or for other purposes authorised under the National Parks and Wildlife Act.

### 5.1 Access and park management facilities

Galston Road, where it traverses Galston Gorge, is the main road that bisects the park. The road winds steeply down into Galston Gorge from Hornsby Heights, crossing Berowra Creek via a dual-lane bridge and Tunks Creek via a single-lane bridge. Galston Road then makes its way up the western side of the valley towards Galston.

Galston Road is designated as a public road and provides access to 2 day use visitor areas: Lower Galston Gorge Rest Area and Galston Gorge Picnic Area and Lookout (see Section 3.6). Access to the Great North Walk is provided off Galston Road via Lower Galston Gorge Rest Area.

Somerville Road provides access to Crosslands Reserve, the main visitor precinct in the national park. The Great North Walk can also be accessed via Somerville Road at Crosslands Reserve. Somerville Road is designated as a public road and is maintained by Hornsby Shire Council.

The management trail system traversing the parks (see Figure 1) is primarily maintained for fire management purposes in accordance with the parks' fire management strategy (see Section 4.2).

Management trails are also available for bushwalking and cycling (see Section 3.6).

Sections of the Great North Walk also run through the parks (see Section 3.6).

#### Desired outcomes

- Management trails adequately serve management needs and have minimal impact.
- Public roads and the Great North Walk are maintained to minimise impacts on the parks.

#### Management response

- 5.1.1 Maintain the management trails identified in Figure 1.
- 5.1.2 Liaise with relevant state agencies and Hornsby Shire Council regarding park management issues along public roads that neighbour or bisect the parks.
- 5.1.3 Liaise with relevant land management agencies regarding management, funding and maintenance of the sections of the Great North Walk located in the parks.

### 5.2 Non-NPWS uses and operations

A number of state and regional authorities currently occupy or use land reserved as Berowra Valley National Park or Berowra Valley Regional Park for public utilities or access to public utilities. Public utilities include overhead electricity transmission and telecommunication lines, sewage pumping stations and associated sewer pipes and service trails. Hornsby Shire Council has constructed and maintains a series of stormwater quality improvement

devices within the parks which aim to conserve water quality and manage stormwater impacts in and around the parks.

There are a number of legislative Acts and current protocols and agreements which cover the facilities in the parks that are managed by other authorities.

## **Issues**

- The presence of transmission lines and telecommunication towers in and around the parks has a visual impact that can detract from the natural values of the parks.
- Vegetation trimming beneath transmission lines is a legal requirement and part of ongoing management of this infrastructure.
- Licences or easements are required to formalise those services and access requirements not already covered by a licence, agreement or easement and to minimise impacts.

## **Desired outcomes**

- Non-NPWS related uses and activities are managed to minimise impacts on park values.
- Transmission lines in the parks are managed in accordance with consents and protocols.

## **Management response**

- 5.2.1 Ensure all non-NPWS uses and occupancies of NPWS land are authorised in accordance with Part 12 of the National Parks and Wildlife Act.
- 5.2.2 Liaise with the relevant authority regarding transmission line access and maintenance needs in accordance with the protocols.



## 6. Implementation

This plan of management establishes a scheme of operations for the parks.

Activities identified in the plan are listed in Table 6. Relative priorities are allocated against each activity as follows:

- **High priority** activities are imperative to achieve the plan's objectives and desired outcomes, and must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.
- **Medium priority** activities are necessary to achieve the objectives and desired outcomes but are not urgent.
- **Low priority** activities are desirable to achieve the objectives and desired outcomes but can wait until resources become available.
- **Ongoing** activities are undertaken on a regular basis or in response to an issue that arises.

This plan of management does not have a specific term and will stay in force until amended or replaced in accordance with the National Parks and Wildlife Act.

**Table 6 List of management responses**

Ref.	Management response	Priority
<b>3.1</b>	<b>Geology, landscape and hydrology</b>	
3.1.1	Work with land-use planning and consent and determining authorities to mitigate any impacts of local developments on the parks' values.	Ongoing
3.1.2	Manage pest species, fire, roads and trails and other land uses to minimise soil erosion and maintain and encourage protective vegetation cover.	Ongoing
3.1.3	Liaise with Hornsby Shire Council, Sydney Water, Greater Sydney Local Land Services and other statutory authorities to protect, monitor and improve water quality in the Berowra Creek subcatchment.	Ongoing
3.1.4	Pursue collaborative management with other land-use management and consent authorities to protect identified escarpments and areas of high scenic quality.	Medium
3.1.5	Identify all significant geological and landscape features in the parks to ensure they are protected from any future development works.	Medium
<b>3.2</b>	<b>Native plants</b>	
3.2.1	Implement relevant actions in the <i>Biodiversity Conservation Program</i> , recovery plans and conservation action plans for the threatened native plant species, populations and ecological communities present in the parks.	High
3.2.2	Consider the long-term impacts on vegetation communities and plant populations from management programs such as fire and asset management activities.	Ongoing
3.2.3	Support bushland restoration programs in the parks.	Ongoing
3.2.4	Preserve and enhance local biodiversity through planting locally indigenous species, and only using local species in revegetation and landscape works.	Ongoing
3.2.5	Promote the parks' native vegetation values to the community.	Ongoing
3.2.6	Undertake targeted or comprehensive plant surveys in the parks.	Medium

Ref.	Management response	Priority
<b>3.3</b>	<b>Native animals</b>	
3.3.1	Implement relevant actions in the <i>Biodiversity Conservation Program</i> , recovery plans and conservation action plans for threatened native animal species and populations occurring in the parks.	High
3.3.2	Monitor the distribution and abundance of threatened and significant animal species.	Ongoing
3.3.3	Consider long-term impacts on native animal populations and their habitats in park management programs.	Ongoing
3.3.4	Undertake targeted or comprehensive animal surveys in the parks.	Medium
<b>3.4</b>	<b>Aboriginal heritage and culture</b>	
3.4.1	Build and maintain working relationships with Metropolitan Local Aboriginal Land Council and with other interested Aboriginal community groups in identifying, recording and managing Aboriginal heritage.	Ongoing
3.4.2	Manage Aboriginal heritage (including promotion, education and protection) in consultation with Metropolitan Local Aboriginal Land Council and other interested Aboriginal community groups.	Ongoing
3.4.3	Undertake an archaeological survey and cultural assessment prior to all works that have the potential to impact Aboriginal sites or values.	Ongoing
3.4.4	Encourage further research into the Aboriginal cultural heritage values of the parks.	Medium
3.4.5	Inspect and document the condition of recorded Aboriginal heritage sites every 3 years and undertake protective works as necessary.	Ongoing
<b>3.5</b>	<b>Historic heritage</b>	
3.5.1	Manage identified historic heritage sites according to their significance and potential impacts on the site.	Ongoing
3.5.2	Prepare a heritage assessment for Thornleigh Quarry and Zig Zag Railway route and Berowra Waters Tea House.	Low
<b>3.6</b>	<b>Visitor use</b>	
3.6.1	Provide and promote a range of opportunities for both active and passive recreation in the parks, catering to a range of interests and abilities.	High
3.6.2	Consider access for mobility-impaired visitors in the development and redevelopment of visitor precincts.	Ongoing
3.6.3	Install signage to identify bushwalking routes, difficulty levels and length. All bushwalking routes shall be classified consistent with the Australian Standard for walking tracks (AS 2156.1-2001) and the NPWS <i>Walking Tracks Policy</i> . Any unauthorised tracks will be closed.	Medium
3.6.4	Continue the prioritised upgrade and maintenance of tracks, trails and facilities using methods which are compatible with the soil and topography of the parks. Tracks and trails may be realigned, or new sections developed, where there is a clear and demonstrable need based on safety, cultural or environmental concerns along existing access routes.	Ongoing
3.6.5	Allow leashed dogs on designated dog walking trails in Berowra Valley Regional Park. Designated routes will be signposted. Continued use will depend on the results of monitoring for environmental impacts. Designated trails are (see Figure 1): Bellamy Street Dog Walking Trail – Timbara Trail between Bellamy Street and Timbarra Road, Thornleigh	Ongoing

Ref.	Management response	Priority
	Daphne Place Dog Walking Trail – Patricia Trail between Tuscan Way (end Daphne Place) and Patricia Place, Cherrybrook Clarinda Street Dog Walking Trail – Clarinda Trail between Clarinda Street and Simon Place, Hornsby	
3.6.6	Do not permit dogs in Berowra Valley National Park, including Crosslands Reserve.	Ongoing
3.6.7	Do not permit horse riding in the parks.	Ongoing
3.6.8	Permit cycling on designated management trails and public roads.	Ongoing
3.6.9	Investigate and enable, where appropriate, future opportunities for mountain bike access as part of ongoing discussions with stakeholders and other land managers regarding cross-tenure options across the northern Sydney region. Any new construction will be with a focus on linking cross-tenure mountain biking opportunities.	Ongoing
3.6.10	Do not permit cycling on designated walking tracks in the parks.	Ongoing
3.6.11	Maintain picnic areas and provide additional picnic facilities, shelters and barbecues as necessary where viable.	Ongoing
3.6.12	Manage any additional development in the Berowra Waters precinct in consultation with Hornsby Shire Council and Berowra Waters residents in order to minimise any additional effects of parking.	Ongoing
3.6.13	Collaborate with Hornsby Shire Council regarding the future development, use and management of Crosslands Reserve	Ongoing
3.6.14	Allow visitors to light fires only in authorised fireplaces.	Ongoing
3.6.15	Manage the Lower Galston Gorge Rest Area and the Galston Gorge Picnic Area and Lookout as picnic areas for small numbers of visitors at one time.	Ongoing
3.6.16	Prepare a precinct plan for Stringybark Ridge to examine opportunities for future use and vegetation restoration as discussed in Section 3.6.	High
3.6.17	Allow public vehicles on the parks' public access roads and carparking areas shown on Figure 1. Vehicle and public access arrangements for Stringybark Ridge will be determined as part of the precinct plan discussed in Section 3.6, and Figure 1 may then be revised at this specific location to reflect the precinct plan.	Ongoing
3.6.18	Permit camping in designated areas at Crosslands Reserve, Lyrebird Gully and Tunks Ridge subject to a strategic investigation of camping needs.	Ongoing
3.6.19	Undertake a strategic investigation of camping needs and opportunities, including management of unauthorised camping and supporting access to the Great North Walk, such as camping at Stringybark Ridge, as discussed in Section 3.6.	Medium
3.6.20	Allow access to the fire pit area at Crosslands Reserve for group use via the same booking system currently in use and managed by Hornsby Shire Council. Manage unauthorised use of the fire pit area.	Ongoing
3.6.21	Allow rock climbing at Gundah Ridge, Mount Kuring-gai, subject to the requirements listed in Section 3.6 of this plan of management.	Ongoing
3.6.22	Communicate and work with rock climbers to manage rock climbing activities where required to manage the potential impacts of rock climbing on park values. Apply management measures, including restrictions on access to some locations and removal of bolts, where required, based on a consideration of safety and environmental risk.	Ongoing

Ref.	Management response	Priority
3.6.23	Work with rock climbing groups to prepare and implement a code of conduct and guidelines for rock climbing in the parks.	High
3.6.24	Install appropriate educational and warning signage regarding rock climbing at key locations.	High
3.6.25	Consider providing consent for rock climbing (where required – see 3.6.21), abseiling and geocaching in the parks where: <ul style="list-style-type: none"> <li>the NPWS <i>Visitor Safety Policy</i> and other relevant codes of conduct and guidelines have been considered</li> <li>visitor conflicts and any potential environmental impacts are minimised</li> <li>the safety of other park visitors is assured</li> <li>the safety of participants continues to be the responsibility of participants and their companions.</li> </ul>	Ongoing
3.6.26	Assess applications for commercial filming and photography and prescribe conditions to minimise impacts on park values according to NPWS policy.	Ongoing
3.6.27	Prohibit filming where it may impact threatened species, threatened ecological communities or historic and culturally significant sites.	Ongoing
3.6.28	Consider issuing a lease for the buildings and respective purposes listed in Section 3.6.	Ongoing
3.6.29	Ensure all leases and licences in the parks are authorised in accordance with the provisions of Part 12 of the National Parks and Wildlife Act..	Ongoing
3.6.30	Investigate opportunities to further enhance visitor and tourist experiences in the parks.	Ongoing
3.6.31	Consider operating leases for compatible recreational uses of the parks.	Ongoing
3.6.32	Prohibit unauthorised use of trail bikes in the parks.	Ongoing
<b>3.7</b>	<b>Interpretation, education and community involvement</b>	
3.7.1	Support and assist educational use of the parks by schools, community groups and individuals through the provision of information and programs such as walks, talks and tours, and web-based products.	Medium
3.7.2	Support community involvement in the parks, particularly involvement in bush regeneration programs and catchment management programs.	Ongoing
3.7.3	Recognise community projects through provision of awards, signs at project sites, and nomination for achievement awards in broader community recognition schemes.	Medium
3.7.4	Develop a prospectus of suitable projects that community groups can undertake in the parks.	Medium
3.7.5	Replace signage in the park to reflect the updated national park status.	High
3.7.6	Involve Aboriginal community groups in development of material and programs for interpretation of Aboriginal culture.	Ongoing
3.7.7	Undertake research to provide information about the parks' natural and cultural heritage and human use in order to inform park management.	Ongoing
3.7.8	Encourage birdwatchers and similar groups to pass on information gathered in the parks.	Medium
3.7.9	Permit access by researchers to areas or trails not normally accessible by the public only if the value of the research justifies such access.	Ongoing
3.7.10	Promote the following as priorities for research in the parks:	Ongoing

Ref.	Management response	Priority
	<ul style="list-style-type: none"> <li>the distribution, status and management requirements of threatened plant and animal communities</li> <li>methods to control and manage pests</li> <li>water catchment protection</li> <li>recreational use patterns and preferences and the impact of different activities on natural and cultural resources</li> <li>the distribution, significance and conservation requirements of Aboriginal sites and historic places</li> <li>appropriate indicators to monitor the effects of climate change.</li> </ul>	
<b>4.1</b>	<b>Pests</b>	
4.1.1	Manage pest species in accordance with relevant pest management strategies.	High
4.1.2	Survey the parks to determine the presence and extent of pest species and identify biodiversity most at risk.	Ongoing
4.1.3	Seek the cooperation of neighbours in implementing pest control programs. Undertake control in cooperation with Bushcare groups, Hornsby Shire Council, Greater Sydney Local Land Services, Sydney North Weeds Committee, Sydney North Vertebrate Pest Committee and other neighbouring land managers.	High
4.1.4	Record and report state-level and regional-level priority weeds and Weeds of National Significance. Prioritise weeds and undertake a risk and feasibility assessment.	High
4.1.5	Control new outbreaks of weed species in a timely manner.	Ongoing
4.1.6	Implement threat abatement plan and <i>Biodiversity Conservation Program</i> actions for pest species in the parks.	High
4.1.7	Incorporate best practice guidelines for controlling the spread of phytophthora and myrtle rust into all relevant work programs.	Ongoing
4.1.8	Monitor for the presence of phytophthora and myrtle rust to determine their distribution in and around the parks.	Ongoing
4.1.9	Implement prioritised pest control programs using best practice techniques, undertaken by staff, volunteers and contractors in priority areas.	Ongoing
<b>4.2</b>	<b>Fire management</b>	
4.2.1	Implement the parks' fire management strategy.	Ongoing
<b>4.3</b>	<b>Climate change</b>	
4.3.1	Continue existing fire, pest and weed management programs to increase the parks' ability to cope with future disturbances, including climate change and visitor management.	Ongoing
4.3.2	Encourage research into appropriate indicators to monitor the effects of climate change, including sea level rise.	Ongoing
<b>4.4</b>	<b>Boundary management</b>	
4.4.1	Work with relevant land-use consent authorities for neighbouring lands to: <ul style="list-style-type: none"> <li>define and map the national park and Crown land boundaries</li> <li>ensure neighbour activities do not compromise NPWS's ability to protect the parks' values in accordance with the management principles for national parks and regional parks</li> <li>rationalise park boundaries when opportunities arise.</li> </ul>	Ongoing
4.4.2	Prepare and implement a reserve access strategy to secure park access for public use and management purposes.	High

Ref.	Management response	Priority
4.4.3	Identify and seek to correct boundary errors, boundary encroachments and proposed boundary adjustments ((under section 188C of the National Parks and Wildlife Act) as identified in the reserve access strategy.	High
<b>5.1</b>	<b>Access and park management facilities</b>	
5.1.1	Maintain the management trails identified in Figure 1.	Ongoing
5.1.2	Liaise with relevant state agencies and Hornsby Shire Council regarding park management issues along public roads that neighbour or bisect the parks.	Ongoing
5.1.3	Liaise with relevant land management agencies regarding funding and maintenance of the sections of the Great North Walk located in the parks.	Ongoing
<b>5.2</b>	<b>Non-NPWS uses and operations</b>	
5.2.1	Ensure all non-NPWS uses and occupancies of NPWS land are authorised in accordance with Part 12 of the National Parks and Wildlife Act.	High
5.2.2	Liaise with the relevant authority regarding transmission line access and maintenance needs in accordance with the protocols.	Ongoing

## Appendix A: Geology and soil landscapes of the parks

Soil landscape	Geology	Topography	Vegetation
Deep Creek	Holocene silty to peaty quartz sand, silt and clay with ferruginous and humic cementation in places.	Flooded river valleys infilled with alluvium and surrounded by steep to precipitous Hawkesbury Sandstone slopes.	Partially cleared tall open woodland, weed-infested tall open forest (wet sclerophyll forest) and closed forest (rainforest).
Faulconbridge	Hawkesbury Sandstone of medium- to coarse-grained quartz sandstone with minor shale and laminate lenses.	Level to gently undulating broad crests and ridges on plateau surfaces.	Partially cleared low eucalypt woodland with a dry sclerophyll shrub understorey.
Glenorie	Underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations. Ashfield Shale comprised of laminate and dark grey shale. Bringelly Shale consists of shale, calcareous claystone, laminate, fine- to medium-grained lithic-quartz sandstone.	Low rolling and steep hills. Narrow ridges, hillcrests and valleys.	Extensively cleared tall open forest (wet sclerophyll forest).
GyMEA	Hawkesbury Sandstone which is a medium- to coarse-grained quartz sandstone with minor shale and laminate lenses.	Undulating to rolling low hills. Broad, convex crests, moderately inclined side slopes with wide benches, localised rock outcrops on low broken scarps.	Original dry sclerophyll woodland and open forest now extensively cleared. Low, dry sclerophyll open woodland dominates ridges and upper slopes.
Hawkesbury	Hawkesbury Sandstone consisting of medium- to coarse-grained quartz sandstone with minor shale and laminate lenses.	Rugged, rolling to very steep hills. Narrow crests and ridges, narrow incised valleys, steep sided slopes with rocky benches, broken scarps and boulders.	Mostly uncleared open woodland (dry sclerophyll) with pockets of tall open forest and closed forest (rainforest).
Lambert	Hawkesbury Sandstone consisting of medium- to coarse-grained quartz sandstone with minor shale and laminate lenses.	Undulating to rolling low hills. Broad ridges, gently to moderately inclined slopes, wide rock benches with low broken scarps, small hanging valleys and areas of poor drainage.	Predominately uncleared open and closed heathlands and scrublands, with patches of low eucalypt woodland. Heathlands and scrublands often exposed to strong winds. Shallow, poorly drained soils fluctuate between saturated and dry.

Soil landscape	Geology	Topography	Vegetation
			Bushfires frequent. Isolated lines and patches of trees occasionally associated with crevices.
Lucas Heights	Mittagong Formation – interbedded shale, laminate and fine- to medium-grained quartz sandstone.	Gently undulating plateau, with level to gently inclined slope gradients.	Extensive to completely cleared low, eucalypt open forest and low eucalypt woodland with sclerophyll shrub understorey.
Oxford Falls	Hawkesbury Sandstone consisting of medium- to coarse-grained quartz sandstone with minor shale and laminate lenses.	Hanging valleys with gently to moderately inclined slopes. Occasional broad benches and broken scarps, valley floors are relatively wide, gently inclined and often poorly drained.	Considerable radiation in vegetation landscape depends on drainage. Low, dry sclerophyll woodland on better-drained slopes. Closed scrub and heathland on poorly drained areas and swampy valley floors. Tall eucalypt open woodland with dry sclerophyll understorey on well-drained valley floors.



## Appendix B: Vegetation communities in the parks

Vegetation community	Area* (ha)	Area (% of park)	Dominant species	Determining ecological and environmental factors
Open forest	2,198.4	57.4	<i>Eucalyptus piperita</i> , <i>Angophora costata</i>	Hawkesbury Sandstone Soils
Tall open forest	448.1	11.7	<i>E. pilularis</i> , <i>Angophora costata</i> , <i>Syncarpia glomulifera</i>	Fertile soils
Woodland	436.6	11.4	<i>E. racemosa</i> , <i>Corymbia gummifera</i> , <i>Angophora costata</i>	Ridge tops on Hawkesbury Sandstone soils with lateritic influence
Woodland	187.7	4.9	<i>E. gummifera</i> , <i>E. haemastoma</i> , <i>E. oblonga</i>	Hawkesbury Sandstone soils
Low open woodland	176.2	4.6	<i>E. haemastoma</i> , <i>Angophora hispida</i> , <i>Banksia ericifolia</i>	Hawkesbury Sandstone soils
Warm temperate rainforest	76.6	2.0	<i>Tristaniopsis laurina</i> , <i>Ceratopetalum apetalum</i>	Fertile soils
Woodland	53.6	1.4	<i>E. punctata</i> , <i>Corymbia gummifera</i> , <i>E. haemastoma</i>	Hawkesbury Sandstone soils
Woodland	19.2	0.5	<i>E. sieberi</i> , <i>Corymbia gummifera</i> , <i>E. haemastoma</i>	Hawkesbury Sandstone soils
Mangroves	7.7	0.2	<i>Avicennia marina</i>	Hawkesbury River communities
Closed forest	7.7	0.2	<i>Avicennia glauca</i>	Hawkesbury River communities
Rock platform heath	3.8	0.1	<i>Banksia ericifolia</i> , <i>Angophora hispida</i> , <i>Baeckea brevifolia</i>	Exposed Hawkesbury Sandstone scarps
Open forest	3.8	0.1	<i>Angophora bakeri</i> , <i>E. piperita</i>	Hawkesbury Sandstone soils
Tall open forest	3.8	0.01	<i>Angophora floribunda</i> , <i>E. pilularis</i>	Hawkesbury River communities
Open forest	3.4	0.09	<i>E. saligna</i>	Fertile soils
Saltmarsh	3.4	0.09	<i>Juncus kraussii</i>	Hawkesbury River communities
Sandstone swamp	1.9	0.05	<i>Banksia oblongifolia</i> , <i>Schoenus brevifolius</i> , <i>Baeckea imbricata</i>	Upland depressions on Hawkesbury Sandstone
Tall open forest	1.9	0.05	<i>E. pilularis</i> , <i>E. saligna</i> , <i>E. paniculata</i>	Fertile soils

Vegetation community	Area* (ha)	Area (% of park)	Dominant species	Determining ecological and environmental factors
Other	199.5	5.21	Various e.g. water, unknown vegetation	-

Source: Smith & Smith 2008

\* Note: Area calculated via geographical information system and may differ from reserved area of the parks.

## Appendix 3: Threatened plants in the parks

Species	Description	Habitat
<i>Acacia bynoeana</i>	A semi-prostrate shrub to a metre high with shiny, stiff and narrow leaves. The single flower heads, on short hairy stems, appear anytime from September to March. Its seedpods are mature from September to January.	Occurs in heath or dry sclerophyll forest on sandy soils.
<i>Ancistrachne maidenii</i>	A scrambling perennial grass to 50 cm tall.	Usually found on mid to lower slopes, associated with the Narrabeen Group soils, found near ephemeral creeks in the vicinity of the Hawkesbury River and tributaries.
<i>Callistemon linearifolius</i>	A 3–4 m tall shrub, with red ‘bottlebrush’ flowers.	Grows in dry sclerophyll forest on the coast and adjacent ranges.
<i>Darwinia biflora</i>	A small understorey shrub to 80 cm tall (mostly below 50 cm tall). Small green flowers with red bracteoles and in pairs.	Occurs in woodland, open forest or shrub heath on the edge of weathered shale-capped ridges, where these integrate with Hawkesbury Sandstone.
<i>Darwinia peduncularis</i>	Spreading shrub to 1.5 m tall, with young red stems and blue-green leaves.	Grows in woodland on or near rocky outcrops, located on or near sandstone ridge tops or creeks.
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	Erect stiff prickly shrub 50–150 cm high. White to pink flowers along much of the branchlet.	Found on both clay-capped ridges and near creeks in sandstone terrain. Likes damp places. Strongly associated with endangered Turpentine Ironbark Forest and Shale/Sandstone Transition Forest.
<i>Eucalyptus camfieldii</i>	A mallee or small tree 2–8 m tall. Juvenile leaves are heart-shaped or circular and adult leaves are broad and lance-shaped.	Grows in shrub heath and woodland on poorly drained sandy soils on sandstone ridge tops and plateaus.
<i>Galium australe</i>	A straggling and intertwining herb with weak, hairy stems to 60 cm long.	Found in moist gullies of tall forest, <i>Eucalyptus tereticornis</i> forest, coastal <i>Banksia</i> shrubland, and <i>Allocasuarina nana</i> heathland.
<i>Genoplesium baueri</i>	Terrestrial herb, 6–15 cm high, fleshy, brittle yellowish-green or reddish.	Grows in sparse sclerophyll forest and moss gardens over sandstone.
<i>Grammitis stenophylla</i>	A little fern, growing in small colonies, with hanging or erect fronds.	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.
<i>Hibbertia superans</i>	A low spreading shrub to 30 cm high. It has few to many weak, twisted stems and branches, covered with long shaggy hairs	Found on sandstone ridgetops often near the shale/sandstone boundary. Occurs in both open woodland and heathland, and

Species	Description	Habitat
	when young, becoming more densely hairy with longer hairs wearing off.	appears to prefer open disturbed areas, such as tracksides.
<i>Lasiopetalum joyceae</i>	An erect and open shrub up to 2 m tall. Leaves are linear and densely covered underneath with rusty coloured star-hairs.	Found on ridge tops and upper slopes on or near the shale/sandstone transition in heath, open shrub woodland and open forest.
<i>Leptospermum deanei</i>	A slender leaf shrub, up to 5 m tall with bark peeling in long strips.	Occurs in open forest on foot slopes above the fringe of riparian (creek line) vegetation.
<i>Melaleuca deanei</i>	Medium shrub 1–3 m tall with rough papery bark. Flowers are creamy yellow.	Grows in wet heath on sandstone, or associated with hanging swamps in open heath and woodland on ridge tops or upper slopes.
<i>Persoonia mollis</i> subsp. <i>maxima</i>	A medium to tall and spreading shrub, 2–6 m high, with hairy young leaves. Flowers are yellow and covered in copper-coloured hairs.	A rare species which occurs mainly in sandstone vegetation communities. It is restricted to the deep dissected sheltered gullies on the Hornsby Plateau.
<i>Tetratheca glandulosa</i>	A low spreading shrub 10–50 cm tall with multiple sprawling stems, with stiff hairs on the leaves (toothed margins) and the flower sepals and stalk. Flowers are pink and have 4 petals.	Grows in heath and scrub to woodlands and open forest on ridge tops and upper slopes, in areas of shale/sandstone transition habitat.

Source: BioNet, accessed 2017 at [www.bionet.nsw.gov.au/](http://www.bionet.nsw.gov.au/).

## Appendix 4: Threatened animals in the parks

Name	Description	Habitat
<b>Invertebrates</b>		
Adam's emerald dragonfly <i>Archaeophya adamsi</i>	Listed under Schedule 4 of the <i>Fisheries Management Act 1994</i> as a vulnerable species.	Found only in small streams such as Tunks Creek.
<b>Amphibians</b>		
Red-crowned toadlet <i>Pseudophryne australis</i>	Small ground-dwelling frog 20–25 mm in length. Dark brown to black with prominent red markings on crown and lower back.	Mid to upper slopes in open woodland and heath communities. Prefers permanently moist soaks or areas of dense ground vegetation or litter along or near headwater streambeds.
Giant burrowing frog <i>Heleioporus australiacus</i>	A large plump and warty ground frog reaching up to 100 mm in total length. These frogs are coloured steely blue-grey to black. Tadpoles are large up to 5 cm in length.	Small headwater ephemeral and permanent drainage lines with water quality unaffected by urban runoff. Prefers sandstone ridge top woodland, open forests and heath, and may be associated with hanging swamps.
<b>Reptiles</b>		
Rosenberg's goanna or heath monitor <i>Varanus rosenbergi</i>	Dark grey above finely spotted in yellow or white with blackish cross-bands from the neck to the end of the tail and with a pale-edge facial stripe. Average length 90 cm.	Heath and woodland vegetation in areas where rocky outcrops are present for shelter.
<b>Birds</b>		
Dusky woodswallow <i>Artamus cyanopterus cyanopterus</i>	Medium-sized bird, mostly smoky blue-grey, dusky brown or grey in colour, with white tail-tips and a white streak along the wing edge.	Woodlands and dry open sclerophyll forest, usually dominated by eucalypts. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests.
Gang-gang cockatoo <i>Callocephalon fimbriatum</i> (endangered population)	Dark grey cockatoo, 33–36 cm in length. Feathers are distinctively squarish on the ends. Males have a bright red head and crest. Females have a grey head and crest, and the scalloped margins of females' breast feathers are reddish pink.	Occurs in a variety of forest and woodland types. Usually frequents forested areas with old-growth attributes required for nesting and roosting purposes. Also utilises less heavily timbered woodlands and urban fringe areas to forage.
Glossy black-cockatoo <i>Calyptorhynchus lathami</i>	Small brown-black cockatoo with 2 bright red markings under tail. Female differs from male in having yellow patches on	Forest and woodlands containing she-oaks for feeding including black she-oak ( <i>Allocasuarina littoralis</i> ), and forest oak ( <i>Allocasuarina</i> )

Name	Description	Habitat
	head/neck and orange-red tail markings.	<i>torulosa</i> ). Requires large tree hollows for nesting.
Varied sittella <i>Daphoenositta chrysoptera</i>	A small (10 cm) songbird with a sharp, slightly upturned bill, short tail, barred undertail, and yellow eyes and feet.	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and <i>Acacia</i> woodland.
White-bellied sea-eagle <i>Haliaeetus leucogaster</i>	A large eagle (length 75–85 cm, wingspan 180–220 cm). Adults are white with grey back, rump, wings and base of tail. Immature birds brown with lighter markings.	Distributed around the Australian coastline. May be solitary or live in pairs or small family groups, with habitat being large trees in mature open forest, gallery forest or woodland.
Little eagle <i>Hieraaetus morphnoides</i>	Two colour forms: pale brown with an obscure underwing pattern, or dark brown on the upperparts and pale underneath, with a rusty head and a distinctive underwing pattern of rufous leading edge, pale 'M' marking and black-barred wingtips.	Occupies open eucalypt forest, woodland or open woodland. She-oak or <i>Acacia</i> woodlands and riparian woodlands of interior New South Wales are also used.
Turquoise parrot <i>Neophema pulchella</i>	Small grass-green parrot with turquoise, yellow and red markings.	Eucalypt woodlands and open forests. Forages on the ground in grass areas, sheltering in trees and dense vegetation. Permanent water is also favoured. Breeds in tree hollows or stumps.
Powerful owl <i>Ninox strenua</i>	Large boobook-like owl, grey to brown with distinctive broad V-shaped markings on a pale breast.	Open forest and woodlands with a foraging range of 600–1,000 ha. Roosts in dense foliage along creek lines. Preys on arboreal mammals, including possums.
Barking owl <i>Ninox connivens</i>	A medium-sized owl similar to a boobook, but more robust. Dark streaks and large white spots on the wings.	Open forest and woodlands with a territorial range greater than 100 ha. Roosts in dense foliage along creek lines. Preys on arboreal mammals and birds.
Masked owl <i>Tyto novaehollandiae</i>	Large white or creamy-breasted owl with brown above the prominent facial disk.	Open forest and woodlands, preferring deep gullies for nesting in large tree hollows. Preys on terrestrial mammals, especially rodents. Foraging range similar to powerful owl.
<b>Mammals</b>		
Spotted-tailed quoll <i>Dasyurus maculatus</i>	A cat-sized carnivorous marsupial with rufous brown to dark brown fur above covered by white spots of varying sizes. The fur underneath is a pale brown to cream.	Variety of habitats. Core habitat is open forest in deep gullies. Suitable den sites are hollow logs, tree hollows, rock outcrops or caves.
Eastern false pipistrelle	Relatively large bat with a head-body length of about 65 mm and	Prefers moist habitats, with trees taller than 20 m. Generally roosts in

Name	Description	Habitat
<i>Falsistrellus tasmaniensis</i>	weighs up to 28 grams. It is dark to reddish-brown above and paler grey on its underside. It has long slender ears set well back on the head and some sparse hair on the nose.	eucalypt hollows, but has also been found under loose bark on trees or in buildings.
Little bentwing-bat <i>Miniopterus australis</i>	Small dark chocolate-brown insectivorous bats with a body length of about 45 mm. The tip of the wing is formed by a particularly long joint of the third finger, folded back and bent under the wing while the bat is at rest.	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, <i>Melaleuca</i> swamps, dense coastal forests and banksia scrub. Roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings.
Eastern bentwing-bat <i>Miniopterus schreibersii oceanensis</i>	An insectivorous bat with blackish to red-brown fur and a high-crowned head.	Broad range of habitats such as rainforest, wet gully forest, open forest and open woodland. Roosts primarily in caves or artificial habitats such as stormwater drains.
Eastern freetail-bat <i>Mormopterus norfolkensis</i>	Has dark brown to reddish-brown fur on the back and is slightly paler below. Like other freetail-bats it has a long (3–4 cm) bare tail protruding from the tail membrane.	Occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in man-made structures.
Grey-headed flying-fox <i>Pteropus poliocephalus</i>	The largest Australian bat, with a head and body length of 23–29 cm, dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. Wingspan can be up to 1 m.	Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.
Yellow-bellied sheath-tail-bat <i>Saccolaimus flaviventris</i>	A very distinctive, large, insectivorous bat up to 87 mm long. It has long, narrow wings, a glossy, jet-black back, and a white to yellow belly extending to the shoulders and just behind the ear.	Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Roosts singly or in groups of up to 6, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.

Source: BioNet, accessed 2017 at [www.bionet.nsw.gov.au/](http://www.bionet.nsw.gov.au/).

## References

- AHC (Australian Heritage Commission) (2002) *Australian natural heritage charter: for the conservation of places of natural heritage significance* 2nd edn., AHC in association with the Australian Committee for the International Union for Conservation of Nature, Canberra.
- ASC (Australian Sports Commission) (2010) *Exercise, recreation and sport survey (ERASS)*, 2010 state tables for New South Wales, Clearinghouse for Sport website.
- Chapman AG & Murphy CL (1989) *Soil landscapes of Sydney 1:100 000 sheet*, Soil Conservation Service of NSW, Sydney.
- Coombes D (1995) *Rare and threatened fauna and flora survey of Berowra Valley Bushland Park*, unpublished internal document, Hornsby Shire Council, Hornsby.
- DECC (Department of Environment and Climate Change) (2008) *New South Wales taskforce on tourism and national parks – final report* [PDF], DECC, NSW, Sydney.
- DPE (Department of Planning and Environment) (2021a) *Filming and photography policy*, DPE website.
- DPE (2021b) *Geocaching policy*, DPE website.
- DPE (2021c), *Saving our Species program*, DPE website.
- DPE (2021d) *Sydney basin bioregion*, Department of Planning and Environment website.
- DPE (2021e) *Visitor safety policy*, DPE website.
- DPE (2021f) *Walking tracks policy*, DPE website.
- DPIE (Department of Planning, Industry and Environment) (2021) *Zero extinctions – national parks as a stronghold for threatened species recovery* [PDF], DPIE, NSW, Sydney
- Friends of Berowra Valley (2004) *A Guide to Berowra Valley Regional Park* [PDF], Friends of Berowra Valley Inc., Hornsby.
- Friends of Berowra Valley (n.d.)  
<http://friendsberowravalleynationalpark.com.au/html/bushwalks.html>Bushwalks Friends of Berowra Valley Inc. website.
- GS LLS (Greater Sydney Local Land Services) (2017) *Greater Sydney regional strategic weed management plan 2017–2022* [PDF] prepared in partnership with the Greater Sydney Regional Weed Committee and published by Greater Sydney Local Land Services.
- GS LLS 2018, *Greater Sydney regional strategic pest animal management plan 2018–2023* [PDF], Greater Sydney Local Land Services.
- Hawkesbury Nepean CMA (2007) *Hawkesbury Nepean River health strategy volume 2*, Berowra creek subcatchment, pp.11–14, Hawkesbury Nepean Catchment Management Authority, Goulburn.
- Heritage NSW (n.d.) *Old Man’s Valley Cemetery – item details*, *State Heritage Inventory* website, listing number 01764.
- Hornsby Shire Council (1990) Berowra Valley bushland park draft plan of management stage 1: the establishment of guidelines, Parks and Gardens Branch, Hornsby Shire Council, Sydney.
- Hornsby Shire Council (2006a) *Hornsby Shire Biodiversity Conservation Strategy 2006* [PDF] Hornsby Shire Council, Sydney.
- Hornsby Shire Council (2006b) *Crosslands Reserve park masterplan* [PDF], prepared for Hornsby Shire Council by Phillips Marler and Gondwana Consulting.



- Hornsby Shire Council (2008a) *Lower Hawkesbury Estuary Management Plan [PDF]*, Hornsby Shire Council, Sydney.
- Hornsby Shire Council (2008b) *Hornsby Shire heritage review stage 4, volume 4 of 4, part B: review of items [PDF]*, prepared for Hornsby Shire Council by Landarc Pty Ltd in association with Patrick O’Carrigan and partners.
- Hornsby Shire Council (2010) *Fauna survey program*, Hornsby Shire Council, Sydney.
- Hornsby Shire Council (2018) *Hornsby Shire population highlights*, Hornsby Shire Council website.
- Hornsby Shire Council (2013) <http://www.hornsby.nsw.gov.au/property/development-applications/hornsby-local-environment-plan>*Hornsby Local Environmental Plan 2013*, Hornsby Shire Council website.
- Hornsby Shire Council (2022a.) *Water Quality*, Hornsby Shire Council website.
- Hornsby Shire Council (2022b.) *Bushland tracks and trails*, Hornsby Shire Council website.
- HPHP Central (Healthy Parks Healthy People Central) (2013) *Where you walk matters*, Healthy Parks Healthy People Central website, Parks Victoria, accessed 4 March 2016.
- Joffe M (1987) ‘Australia’s first hire boat fleet’, extract from *Yarns and photos: beautiful old Berowra and Hornsby to the Hawkesbury*, Sandstone Press, Berowra Heights, extract published by Berowra Waters Marina.
- Koettig M (1996) Hornsby Shire Aboriginal heritage study – volumes 1 and 2, Hornsby Shire Council, Sydney.
- NSROC (Northern Sydney Regional Organisation of Councils) (2018) *NSROC Region population*, Northern Sydney Regional Organisation of Councils website, accessed 2018.
- NSW SC (NSW Scientific Committee) (2000a) *Anthropogenic climate change – key threatening process listing – final determination*, Department of Planning and Environment website.
- NSW SC (2000b) *High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition – key threatening process listing – final determination*, Department of Planning and Environment website.
- NSW SC (2004) *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions – endangered ecological community listing – final determination*, Department of Planning and Environment website.
- NSW SC (2011a) *River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions – endangered ecological community – final determination*, Department of Planning and Environment website.
- NSW SC (2011b) *Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions: endangered ecological community listing – final determination*, Department of Planning and Environment website.
- NSW SC (2014) *Shale sandstone transition forest in the Sydney Basin Bioregion – critically endangered ecological community – final determination*, Department of Planning and Environment website.
- OEH (Office of Environment and Heritage) (2004a) *Blue gum high forest in the Sydney Basin Bioregion – profile*, OEH website.
- OEH (2004b) *Duffys forest ecological community in the Sydney Basin Bioregion – profile*, OEH website.
- OEH (2011) *Management plan for myrtle rust on the national parks estate [PDF]*, Office of Environment and Heritage, Sydney.

OEH (2012a) Coastal upland swamp in the Sydney basin bioregion – profile, Office of Environment and Heritage website.

OEH (2012b) Regional pest management strategy 2012–2017, Metro North East Region: a new approach for reducing impacts on native species and park neighbours, Office of Environment and Heritage, Sydney.

OEH (2012c) 'Strategic directions for horse riding in NSW national parks', Office of Environment and Heritage, Sydney.

OEH (2013a) 'Living with fire in NSW national parks: a strategy for managing bushfires in national parks and reserves 2012–2021', revised edition, Office of Environment and Heritage, Sydney.

OEH (2014) 'Metropolitan Sydney: Climate change snapshot', Office of Environment and Heritage, Sydney.

OEH (2015) NSW BioNet [website], accessed 2015.

OEH (2017) 'Berowra Valley National and Regional Parks and Dural Nature Reserve Fire Management Strategy', Office of Environment and Heritage, Sydney.

Roots D (n.d.) 'Volcanic Explosions – Hornsby diatreme', Friends of Berowra Valley, Hornsby.

Roy Morgan Research (2015) Annual Visits to PWG managed parks in New South Wales [PDF], report prepared for the Office of Environment and Heritage, Sydney.

RTA (Roads and Traffic Authority) (2011) Timber truss road bridges – a strategic approach to conservation [PDF], NSW Roads and Traffic Authority, Sydney.

Smith P and Smith J (2008) Native vegetation communities of Hornsby Shire 2008 update [PDF], report prepared for Hornsby Shire Council, Sydney.

Suddaby T and Lieu E (2008) Best practice management guidelines for Phytophthora cinnamomi within the Sydney Metropolitan catchment management authority area, a report for the Botanic Gardens Trust (BGT) contracted and funded by the Sydney Metropolitan Catchment Management Authority.

TSSC (Threatened Species Scientific Committee) (2001) Commonwealth listing advice on Loss of climate habitat caused by anthropogenic emissions of greenhouse gases – listing advice and information sheet, Australian Department of Agriculture, Water and the Environment website.