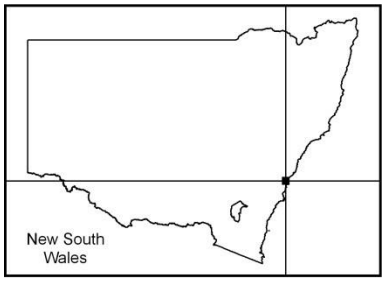
Office of Environment & Heritage
NSW National Parks & Wildlife Service

Plan of Management

Lane Cove National Park



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NSW National Parks and Wildlife Service

February 2016

This plan of management was adopted by the Minister for the Environment on 17 February 2016.

Acknowledgments

The NSW National Parks and Wildlife Service (NPWS) acknowledges that this park is in the traditional Country of the Guringai and Darug peoples.

NPWS gratefully acknowledges the efforts of the many Lane Cove National Park volunteers who continue to make significant contributions to wildlife and bushland conservation.

This plan of management was prepared by staff of the Valleys Area of NPWS, part of the Office of Environment and Heritage.

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

Front cover image: The Lane Cove River at the Lane Cove Boatshed (Photo: M Cooper/OEH).

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Foreword

Lane Cove National Park is located in the Sydney metropolitan area, approximately 11 kilometres from Sydney's central business district. It covers an area of 670 hectares, stretching along the Lane Cove River from the suburbs of Wahroonga and Thornleigh in the north-west to east Ryde in the south-east.

A public park was first established in the area in 1938. Since that time it has progressed through a number of management arrangements and name changes and has grown substantially in area. In 1992, it was reserved as a national park under the NSW *National Parks and Wildlife Act 1974*.

The park is renowned as a respite from city living. It is a place highly valued by the community for both occasional experiences such as picnics, social gatherings and bushwalks and for regular fitness-based activities such as walking, jogging and cycling. In addition to numerous day use areas, the park also has a popular tourist park providing nature-based accommodation and camping facilities.

The park protects important Sydney bushland and estuarine communities, providing a primary vegetation corridor linking many smaller urban bushland remnants and habitat for many native animal species. A number of rare and threatened native plants, animals and ecological communities are also present in the park.

Significant Aboriginal sites are located within the park, as are historic structures and locations connecting us with early use, settlement and recreation along the Lane Cove River.

The NSW *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for every national park in the state. Lane Cove National Park was previously subject to a plan adopted in 1998. A draft plan of management for Lane Cove National Park was placed on public exhibition between 12 October 2012 and 4 February 2013. The submissions received on the draft plan were carefully considered before the adoption of this plan.

This plan contains actions to protect our natural environment, enhance cultural and recreation opportunities, increase opportunities for people to look after their neighbourhood environments and foster opportunities for partnerships with Aboriginal people.

This plan of management establishes the scheme of operations for Lane Cove National Park. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, I cancel the provisions of the 1998 plan, and hereby adopt this plan of management.

Mark Speakman
Minister for the Environment

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1. Location, reservation and regional context

Lane Cove National Park ('the park') is located in the Sydney metropolitan area, approximately 11 kilometres from the Sydney central business district. It covers 670 hectares of reserved land along the edges of the Lane Cove River.

It stretches from Sugarloaf Point at East Ryde in the south, almost to Pennant Hills Road at Thornleigh in the north, a distance of approximately 16 kilometres along the Lane Cove River valley (see Map 1). The park includes the bed of the Lane Cove River from the Lane Cove weir above Fullers Bridge (Chatswood West) to De Burghs Bridge (Macquarie Park). In the Sugarloaf Point area, the park is reserved down to the mean low water mark, while the remainder of the park (excluding the section where the river bed is reserved) is reserved to the mean high water mark.

Lane Cove National Park was first opened to the public in 1938 under the management of a trust. From 1967 until 1976 it was known as Lane Cove River Park, after which it became Lane Cove River State Recreation Area. In 1992 it regained its original name of Lane Cove National Park.

Lane Cove National Park was previously subject to a plan of management adopted in 1998. Since 1998, a number of important areas have been added to the park. In 1999, more than 254 hectares of land in North Epping, Pennant Hills, Cheltenham and Thornleigh were transferred to the park and a further 30 hectares were added in 2007. Other lands added since 1998 include areas surrounding Browns Waterhole, Shrimptons Creek and Terrys Creek in the upper Lane Cove River valley and areas in East Ryde in the vicinity of Pages Creek, Magdala Road and Kittys Creek in the lower valley. These additions total over 300 hectares and provide important riparian buffer areas for the Lane Cove River as well as greatly enhancing the existing bushland corridor.

The park is surrounded by urban development and shares its boundaries with over 2000 residences. Lane Cove National Park protects the natural and scenic qualities of a major section of the Lane Cove River valley. Together with Berowra Valley National Park and Muogamarra Nature Reserve, the park is part of an almost continuous bushland link between Sydney Harbour and the Hawkesbury River. Many smaller bushland areas, mostly managed as reserves by local government, add to the bushland corridor and enhance the viability of the natural systems in each area.

Lane Cove National Park is within the geographical area of Ku-ring-gai Council, City of Ryde Council, Willoughby City Council and Hornsby Shire Council local government areas, Greater Sydney Local Land Services and the Metropolitan Local Aboriginal Land Council.

2. Management context

2.1 Legislative and policy framework

The management of national parks in New South Wales is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the NPW Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of NPWS.

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* may require assessment and mitigation of the environmental impacts 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* (EPBC Act) also applies in relation to actions that may impact threatened or migratory species listed under that Act.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, no operations may be undertaken within Lane Cove National Park except in accordance with this plan. This plan will also apply to any future additions to Lane Cove National Park. Should management strategies or works be proposed in future for the park or any additions that are not consistent with the plan, an amendment to the plan will be required.

2.2 Management purposes and principles

National parks are reserved under the NPW 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 and inspiration and sustainable visitor or tourist use.

Under section 30E of the NPW Act, national parks are managed to:

- 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.

2.3 Statement of significance

Lane Cove National Park is considered to be of significance for:

Biological values:

- The park protects important communities of bushland within the Sydney metropolitan area, being the largest and most biodiverse bushland area between the sandstone national parks in the north, south and west of Sydney.
- The park forms the south-east projection of an almost contiguous 35 kilometre bushland corridor to the Hawkesbury River and forms the spine for many smaller urban bushland remnants.
- The park contains a number of rare and threatened plants, animals and vegetation communities; and provides habitat for a variety of native animal species, including many that are no longer present in the area's smaller bushland remnants.

Aboriginal heritage:

- The park contains one of the largest undisturbed Aboriginal shelters in the region and a number of unusual engraving sites and midden areas.
- The park and Aboriginal sites and places within the Lane Cove River area are of significance to local Aboriginal communities.

Historic heritage:

- The park contains a number of historic structures and locations connected with early use and settlement along the Lane Cove River, as well as with early recreational use of the river.

Recreation:

- The park provides respite from city living and is highly valued by the community for both occasional experiences (such as bushwalks, picnics and social celebrations) and for regular, fitness-based activities close to home or work (such as walking, jogging and cycling).
- The park contains a tourist park, which is a very popular, nature-based accommodation and camping facility and is the closest facility of this type to the Sydney central business district.

2.4 Specific management directions

Lane Cove National Park will be managed to:

- promote visitor and community appreciation of the natural and cultural values of the park, in addition to its values as a recreation area
- conserve and restore habitat quality of the natural bush and maintain viable populations of wildlife in the park
- encourage cooperative arrangements to control water pollution, soil erosion, visual intrusions and weeds which are degrading the Lane Cove River catchment and the park environment
- provide increased opportunities for visitors to learn about the natural and cultural heritage of the park and the importance of remnant bushland in conserving native plant and animal communities within urban areas
- provide recreation opportunities in a bush setting that are compatible with the protection of the natural and cultural values of the park, complement those available

in other reserves within the local area, and encourage appreciation and enjoyment of the park

- provide accommodation and camping in a bush setting which demonstrates best-practice ecotourism principles
- encourage increased local community involvement in conservation and the management of bushland areas.

3. Values

This plan of management aims to conserve both natural and cultural values. The location, landforms and plant and animal communities of an area have determined how it has been used and valued. Both Aboriginal and non-Aboriginal people place values on natural areas, including aesthetic, social, spiritual and recreational values. These values may be attached to the landscape as a whole or to individual components, for example to 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 but their interrelationships are recognised.

3.1 Geology, landforms and hydrology

The Lane Cove River has cut down through a shale capping and the underlying Hawkesbury Sandstone to form a narrow, steep-sided valley. Lane Cove National Park is a predominantly natural break between the urban landscapes on both sides of the valley. The steep, forested slopes provide an attractive backdrop to the river and are a significant asset to Sydney. The feeling of being in the bushland valley is enhanced because, from the river, most of the ridgelines appear to be naturally vegetated even though they are not all within the park.

The major geological elements of the Lane Cove River valley are Hawkesbury Sandstone and the Wianamatta Group of sedimentary rocks, predominantly Ashfield shale. Hawkesbury Sandstone is a coarse-grained sedimentary rock consisting mainly of quartz particles, with smaller quantities of claystone grains. Hawkesbury Sandstone weathers to form thin, sandy soils with low water-retaining qualities. This soil type is common throughout the park and is located along the ridgelines and mid slopes of the valley. These nutrient-poor soils are highly erodible and hence are extremely susceptible to disturbance.

The Wianamatta Group, which consists of shales, conglomerates and sandstones, originally overlaid the Hawkesbury Sandstone. In the Lane Cove River valley these rocks have been deeply eroded over time, leaving exposed the lower strata almost exclusively derived of Hawkesbury Sandstone. Soils formed from the exposed shales along ridge tops are rich in clay and have relatively high nutrient content and water-retaining qualities. They are mainly found in the Macquarie Park, North Ryde and Fox Valley areas of the park. These high nutrient soils often support plant species and communities that are less common on lower nutrient soils and hence uncommon within the park as a whole.

A small area of the park near the Lane Cove River Tourist Park has soil derived from a mix of both parent materials. This transitional zone from Wianamatta shales to Hawkesbury Sandstone is called the Hammondville Association; Lucas Heights soil landscape (Chapman & Murphy 1989).

An outcrop of prismatised sandstone with a tessellated surface, known as Grants Castle occurs just north of De Burghs Bridge (see Map 1). The columnar jointing of the sandstone is the result of heating by a (probable) nearby igneous intrusion and then cooling, shrinkage and polygonal cracking (Martyn 1994).

As well as these naturally occurring soil associations, large quantities of imported fill and soil dredged from the river were used to construct the riverside picnic areas between Fullers Bridge and De Burghs Bridge. These relatively flat, grassed areas provide a contrast to the bushland ridges and slopes and make up less than 5 per cent of the total area of the park.

The head of Lane Cove River is in the Pennant Hills area from where it flows into the Parramatta River and Sydney Harbour. The river was originally tidal to De Burghs Bridge, however, the Lane Cove weir above Fullers Bridge now marks the tidal limit.

The Lane Cove River catchment covers approximately 9300 hectares. It consists of urban and industrial development and approximately 1500 hectares of bushland, 670 hectares of which are within Lane Cove National Park. The catchment is bounded on the eastern side by the Pacific Highway, and the western boundary extends well outside the park to the upper reaches of Terrys and Devlins creeks in Epping and Beecroft respectively. Within the Lane Cove River catchment there are 21 creeks which directly feed into the river within or upriver of the park. These are:

Avondale Creek
Blackbutt Creek
Blue Gum Creek
Buffalo Creek
Byles Creek
Carters Creek
College Creek
Coups Creek
De Burghs Creek
Devlins Creek
Kittys Creek
Little Blue Gum Creek
Mars Creek
Pages Creek
Porters Creek
Quarry Creek
Rudder Creek
Scout Creek
Shrimptons Creek
Terrys Creek
Twin Creek

A plan of management for the former Pennant Hills Park (Hornsby Shire Council 1986) identified a tributary of Byles Creek as being 'free from urban influence' and goes on further to say that 'it currently remains unaffected by deleterious substances' and that 'water quality and stream vegetation are both in pristine condition'. Results of Sydney Water Streamwatch monitoring over the years and the *Sydney Metropolitan Catchment Management Authority Waterways Health Strategy* (EarthTech 2007), have validated these findings. Some smaller tributaries that flow from the northern side of the Pennant Hills Management Trail into Lane Cove River and Scout Creek also exhibit similar qualities. All the other creeks in the upper valley area are deleteriously affected by the urban surrounds.

Issues

- The feeling of 'being in the bush' can be easily compromised by development of areas within and surrounding the park.
- Most of the soil in the park is highly erodible. Sheet erosion increases substantially wherever the vegetation is disturbed, and can be particularly severe following bushfires. Minor to severe gullying frequently occurs on unsealed roads and tracks.
- Although some creeks have high water quality, the ecological health of most creeks in the park has been adversely affected by development in the catchment area. Up to 40 per cent of the catchment surface area has been replaced by impervious surfaces, causing high rates of discharge during rain events. This has eroded creek channels so that stored sediment in the valley bottoms has been excavated and flushed through the system (EarthTech 2007).

Desired outcomes

- The geomorphological and scenic values of the national park are protected.
- Catchment values, water quality and ecological health of streams in the park are improved through appropriate stormwater amelioration works carried out in conjunction with adjoining land management authorities.

- Channel stability and the natural integrity of the pristine creeks and drainage channels contained within the park are improved, maintained and enhanced.

Management response

3.1.1 Ensure earthworks undertaken in the park do not impact areas of significant geology, do not cause further channel change, use geologically similar soils, and are designed and undertaken in a manner which minimises soil erosion and incorporates soil conservation principles.

3.1.2 Locate and design any management and visitor facilities to minimise their visual impact from public access roads and vantage points, and liaise with neighbours and land use authorities as needed to minimise the impact of adjacent land use on views from the main vantage points in the park.

3.1.3 Continue to work with local councils and other authorities to implement strategies outlined in plans prepared for the Lane Cove River catchment.

3.1.4 Preserve and enhance the pristine catchment values of the Byles Creek tributary and creeks of a similar nature by minimising vehicle and pedestrian access to these areas. Closing informal tracks will be a priority.

3.1.5 Continue to give a high priority to weed removal and re-establishment of a stable and strengthened plant community along creek lines.

3.1.6 Continue to undertake erosion control works, stormwater mitigation programs, and removal of any blockages along stream channels that may restrict flows or impact channel stability, for example, logs blocking the river upstream of the Browns Waterhole cycleway culvert.

3.1.7 Reduce the incidence, extent and severity of damage associated with visitor use and recreational activities by closing, redirecting or rehabilitating access roads and tracks that are contributing to the degradation of areas.

3.1.8 Continue to undertake best practice erosion control works across all aspects of park operations including facility construction and maintenance, revegetation, bush regeneration, bushfire hazard reduction activities and site remediation.

3.2 Native plants

The park includes a variety of vegetation communities, with 17 identified in one study by Urban Bushland Management Consultants (UBMC 2001). These include:

- small stands of Sydney blue gum (*Eucalyptus saligna*) forest along Blue Gum Creek and in isolated patches along the banks of the Lane Cove River
- blackbutt (*E. pilularis*), Sydney blue gum and turpentine (*Syncarpia glomulifera*) associations on the lower slopes and alluvial flats throughout the park
- turpentine and red mahogany (*E. resinifera*) forest, generally in the northern sections of the park
- woodlands, shrublands and heaths which include scribbly gums (*E. haemastoma* and *E. racemosa*), dwarf apple (*Angophora hispida*) and saw banksia (*Banksia serrata*) along the upper slopes and ridge lines
- open forests of Sydney red gum – smooth barked apple (*Angophora costata*), Sydney peppermint (*E. piperita*) and red bloodwood (*Corymbia gummifera*) on drier slopes, with red bloodwood giving way to other species on wetter slopes

- closed forest communities of black wattle (*Callicoma serratifolia*), blueberry ash (*Elaeocarpus reticulatus*), sweet pittosporum (*Pittosporum undulatum*), water gum (*Tristaniopsis laurina*), lilly pilly (*Acmena smithii*) and coachwood (*Ceratopetalum apetalum*) in moist gullies, creek lines and on south-westerly slopes
- casuarina woodlands along creeks and estuarine river banks *Casuarina glauca*, with isolated stands of *Allocasuarina littoralis* away from creek lines
- riparian vegetation communities including mangroves (*Avicennia marina* and *Aegiceras corniculatum*), saltmarshes and rushlands along the river banks below the weir.

Seven threatened plant communities are known to occur within the park (see Table 1) (OEH 2014a).

Table 1. Threatened ecological communities in Lane Cove National Park

Community name	**Location**	**Status ***	
		TSC Act	**EPBC Act**
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions	Kittys Creek, Buffalo Creek, Sugarloaf Point, Fairyland, and along the foreshore near River Ave (Chatswood West)	EEC	VEC
Duffys Forest Ecological Community in the Sydney Basin Bioregion	Below Woodridge Ave, between Malton Rd and Downes St (North Epping)	EEC	
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	Downstream of Pages Creek, between Magdala Rd and Epping Rd (East Ryde)	EEC	
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions	Along the foreshore below the Fairyland access track (Chatswood West) and along Pages Creek, Kittys Creek and Buffalo Creek (East Ryde)	EEC	
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	Near River Ave (Chatswood West)	EEC	
Sydney Turpentine-Ironbark Forest	Small remnant patches located in East Ryde, North Ryde, Thornleigh and Chatswood West	EEC	CEEC
Coastal Upland Swamp in the Sydney Basin Bioregion	Along Byles Creek (Pennant Hills)	EEC	EEC

* EEC = endangered ecological community; VEC = vulnerable ecological community; CEEC = critically endangered ecological community.

In addition, a number of plant communities present in the park are regionally significant, such as the coachwood rainforest, blue gum, blackbutt and turpentine communities and shale-capped ridge tops. These are now relatively uncommon in the Sydney region and are of high conservation value. The protection of the riparian vegetation — including casuarina woodlands, mangrove communities, saltmarsh and rushlands found along the park's

estuarine watercourses — is also critically important in maintaining river bank stability, fish breeding grounds and sea bird habitat.

Approximately 780 native plant species have been recorded from the Lane Cove River valley (Martyn 2010). Nine native plant species and one native plant population found within the park are listed as threatened under the TSC Act (see Table 2) (OEH 2014a).

Table 2. Threatened plant species recorded in Lane Cove National Park

Common name	Scientific name	Status	
		TSC Act	EPBC Act
Netted bottlebrush	*Callistemon linearifolius*	Vulnerable	Vulnerable
	Darwinia biflora	Vulnerable	Vulnerable
	Darwinia peduncularis	Vulnerable	
	Epacris purpurascens var. *purpurascens*	Vulnerable	
Bauer's midge orchid	*Genoplesium bauera*	Endangered	Endangered
	Leptospermum deanei	Vulnerable	Vulnerable
Deane's paperbark	*Melaleuca deanei*	Vulnerable	Vulnerable
	Pimelea curviflora var. *curviflora*	Vulnerable	Vulnerable
Black-eyed susan	*Tetratheca glandulosa*	Vulnerable	
Tadgell's bluebell	*Wahlenbergia multicaulis*	Endangered population	
	Angophora crassifolia	^	

^ Listed as a Rare or Threatened Australian Plant (ROTAP) (Briggs & Leigh 1996).

The park also contains several plant species that are considered uncommon in the local area (Kubiak 1983; Thomas & Benson 1985; Clarke & Benson 1987; Benson & Howell 1994; UBMC 2001). These species, which are becoming increasingly uncommon due to clearing of land for urban and industrial purposes, include:

- *Boronia serrulata* — found in heathland on moist sandy soils
- *Hibbertia nitida* — found in heath, woodland or forest on sandstone
- *Prostanthera howelliae* — associated with sandy laterites
- *Pultenaea scabra* var. *biloba* — mainly restricted to clay soils
- *Pultenaea viscosa* — associated with woodland communities on sandy soils
- *Lomandra fluviatilis* — associated with drainage lines
- *Prostanthera marifolia* — now presumed extinct within Lane Cove National Park.

Strategies for the recovery of threatened species, populations and ecological communities are set out in a statewide *Threatened Species Priorities Action Statement* (DECC 2007a). These strategies are currently prioritised and implemented through the Saving our Species program which aims to maximise the number of threatened species that can be secured in the wild in New South Wales for 100 years. The site-managed species *Darwinia biflora*,

Darwinia peduncularis and *Leptospermum deanei* currently have Saving our Species conservation projects within Lane Cove National Park (OEH 2013a). Individual recovery plans may also be prepared for threatened species to consider management needs in more detail (DEC 2004a).

Issues

- Urban development has led to an increase in runoff from developed areas, increasing soil erosion and nutrient levels and causing subsequent changes in soil acidity/alkalinity around boundary drainage lines and water courses. This has resulted in changes to vegetation.
- Past logging and farming and development in and around the park have resulted in changes to bushland, while construction of the weir led to changes in riparian vegetation.
- A reduction in the frequency and intensity of bushfires in the valley may have contributed to the increased occurrence of species such as sweet pittosporum, cheese tree (*Glochidion ferdinandi*) and blueberry ash in certain areas (e.g. Rose 1997). This change in fire frequency has possibly contributed to a decrease in the occurrence of woodland plant species reliant on fire for seed release and germination, although there is little quantitative evidence to validate this theory. Conversely, an outcome of increased public demand for more frequent burning may lead to adverse impacts on other plant populations and biodiversity (see Section 4.4).
- Maintenance of roads and management trails can adversely impact threatened plants.
- Without rehabilitation, degraded tracks and trails and unauthorised tracks created by cyclists and walkers may lead to further species decline.

Desired outcomes

- Native plants found in the park are conserved.
- Significant vegetation communities, species and populations are conserved.
- Vegetation structural diversity and habitat values are conserved, and are restored where subject to past disturbance.
- Vegetation adjoining the park is protected and its condition enhanced.

Management response

3.2.1 Ensure all activities undertaken in the park have minimal impact on native vegetation, and where there are unavoidable impacts, rehabilitate damage.

3.2.2 Implement relevant actions set out in the *Priorities Action Statement* and recovery plans. Continue to monitor the status of significant and threatened plant species, populations and communities to evaluate the success of management programs.

3.2.3 Undertake revegetation of small selected areas of the park with seed collected from within the park. Priority areas will include selected areas along River Avenue, the old model aircraft field in the northern section of the park, areas of major weed infestation, areas near De Burghs Bridge, areas to be closed to public use, and the edges of Little Blue Gum Creek.

3.2.4 Continue current weed control programs within the park that aim to conserve threatened ecological communities, species and populations or that address key threatening processes such as exotic vine control and the control of exotic grasses.

3.2.5 Continue to support ongoing volunteer programs and works programs that aim to conserve and enhance biodiversity throughout the park.

3.2.6 Liaise with other government departments responsible for maintaining infrastructure in Lane Cove National Park in relation to the protection of threatened native plants located near access trails, easements, pipes, cables and towers located in the park.

3.3 Native animals

Habitat isolation and fragmentation as well as urban and industrial development in the Lane Cove River valley have had a severe impact on the number and diversity of native animals within the valley. Habitat loss, predation by feral and domestic animals, road kills and weed infestation have meant that many previously common species are now rarely seen within the valley. However, Lane Cove National Park is still an important habitat for the remaining native animals found in the area. The park is also part of a larger wildlife corridor, linking bushland in central Sydney with the Hawkesbury–Nepean catchment. As such, it may be important for the long-term survival of otherwise isolated populations of animals, including invertebrates, frogs, fish, lizards and snakes, birds (in particular small bush birds, various species of owls, cuckoos and waterbirds) and certain mammals (in particular small mammals like *Antechinus* spp. and sugar gliders (*Petaurus breviceps*), and wallabies).

Since 2000 there has been a fox control program operating in the northern Sydney area, including the park and many surrounding council bushland reserves. Observations by park staff and local residents suggest that populations of some native species previously unseen for many years have been rejuvenated since the commencement of fox baiting. These species include the long-nosed bandicoot (*Perameles nasuta*), echidna (*Tachyglossus aculeatus*) and swamp wallaby (*Wallabia bicolor*). Over recent years, the Australian brush turkey's (*Alectura lathami*) home range has expanded further south into the park, which may also be due to the decrease in fox populations under this control program.

Eleven native animal species listed as endangered or vulnerable under the TSC Act are known to occur within the park as shown in Table 3.

Table 3. Threatened animals recorded in Lane Cove National Park

Common name	**Scientific name**	**Status**	
		TSC Act	**EPBC Act**
Frogs:			
Red-crowned toadlet	*Pseudophryne australis*	Vulnerable	
Birds:			
Australasian bittern	*Botaurus poiciloptilus*	Endangered	Endangered
Barking owl	*Ninox connivens*	Vulnerable	
Black bittern	*Ixobrychus flavicollis*	Vulnerable	
Cotton pygmy-goose	*Nettapus coromandelianus*	Endangered	Endangered
Gang-gang cockatoo	*Callocephalon fimbriatum*	Vulnerable	
Gang-gang cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	*Callocephalon fimbriatum* - endangered population	Endangered population	
Glossy black-cockatoo	*Calyptorhynchus lathami*	Vulnerable	

Common name	Scientific name	Status	
		TSC Act	EPBC Act
Powerful owl	*Ninox strenua*	Vulnerable	
Superb fruit-dove	*Ptilinopus superbus*	Vulnerable	
Mammals:			
Eastern bentwing-bat	*Miniopterus schreibersii oceanensis*	Vulnerable	
Eastern freetail-bat	*Mormopterus norfolkensis*	Vulnerable	
Grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable
Yellow-bellied sheathtail-bat	*Saccolaimus flaviventris*	Vulnerable	

Source: DEC 2004b; OEH 2014a.

All these threatened species and populations occur regularly and depend on the park, except for the cotton pygmy-goose which has been recorded sporadically and is outside its normal distribution range.

In addition, the remains of a greater glider (*Petauroides volans*) were found in canine scats during the vertebrate fauna survey of Lane Cove National Park in 2004 (DEC 2004b). The yellow-bellied glider (*Petaurus australis*), eastern pygmy-possum (*Cercartetus nanus*), spotted-tailed quoll (*Dasyurus maculatus*), platypus (*Ornithorhynchus anatinus*) and eastern broad-nosed bat (*Scotorepens orion*) have been recorded or reported either within the park or just outside the park in the last 10–15 years, although their current status within the park is unknown.

Strategies for the recovery of threatened species, populations and ecological communities are set out in a statewide *Threatened Species Priorities Action Statement* (DECC 2007a). These strategies are currently prioritised and implemented through the Saving our Species program which aims to maximise the number of threatened species that can be secured in the wild in New South Wales for 100 years (OEH 2013a). Individual recovery plans may also be prepared for threatened species to consider management needs in more detail.

Mammals

Native mammal species (other than threatened species) recorded in Lane Cove National Park over the last ten years (DEC 2004b) are shown in Table 4.

Table 4. Mammals other than threatened species recorded in Lane Cove National Park

Common name	Scientific name
Brown antechinus	*Antechinus stuartii*
Bush rat	*Rattus fuscipes*
Common brushtail possum	*Trichosurus vulpecula*
Common ringtail possum	*Pseudocheirus peregrinus*
Echidna	*Tachyglossus aculeatus*
Long-nosed bandicoot	*Perameles nasuta*

Common name	Scientific name
Sugar glider	*Petaurus breviceps*
Swamp wallaby	*Wallabia bicolor*
Water-rat	*Hydromys chrysogaster*
Micro-bats:	
Chocolate wattled bat	*Chalinolobus morio*
Gould's wattle bat	*Chalinolobus gouldii*
Little forest bat	*Vespadelus vulturnus*
Little mastiff-bat	*Mormopterus planiceps*
White-striped freetail-bat	*Tadarida australis*

Of particular importance in this group are a number of the micro-bats which are still relatively abundant in urban areas, namely white-striped freetail-bat, little mastiff-bat, chocolate wattled bat and little forest bat. The survival of these bats is dependent on retaining urban bushland corridors containing large trees and forested areas, particularly along creek lines (Basham 2005).

Birds

Lane Cove National Park provides a refuge within the Sydney metropolitan area for many native birds. A total of 143 species of birds (DEC 2004b) have been recorded within the park, a number comparable with many of the nearby larger sandstone parks that do not experience the same levels of fragmentation, edge effects and other urban influences. The high level of bird diversity is in part due to the variety of ecosystems or habitats that can be found within the park; each supporting their own assemblage of bird species. These diverse habitats include freshwater and estuarine complexes, sandstone woodland, wet sclerophyll forest and coachwood rainforest.

Native birds that inhabit the valley in relatively high numbers include:

- Understorey species such as the superb fairy wren (*Malurus cyaneus*), white-browed scrubwren (*Sericornis frontalis*), grey fantail (*Rhipidura albiscapa*), noisy miner (*Manorina melanocephala*), willie wagtail (*Rhipidura leucophrys*), spotted pardalote (*Pardalotus punctatus*) and eastern spinebill (*Acanthorhynchus tenuirostris*).
- Canopy species such as the kookaburra (*Dacelo novaeguineae*), eastern rosella (*Platycercus eximius*), crimson rosella (*P. elegans*), rainbow lorikeet (*Trichoglossus haematodus*), galah (*Cacatua roseicapilla*), powerful owl (*Ninox strenua*), pied currawong (*Strepera graculina*), raven (*Corvus coronoides*), magpie (*Gymnorhina tibicen*), sulphur-crested cockatoo (*Cacatua galerita*), long-billed corella (*Cacatua tenuirostris*) and little corella (*Cacatua pastinator*).
- Waterbirds including the Pacific black duck (*Anas superciliosa*), wood duck (*Chenonetta jubata*), chestnut teal (*Anas castanea*), dusky moorhen (*Gallinula tenebrosa*), Eurasian coot (*Fulica atra*) and cormorants (*Phalacrocorax* spp).

Other species recorded in the park include the azure kingfisher (*Alcedo azurea*), sacred kingfisher (*Todiramphus sanctus*) and forest kingfisher (*T. macleayii*), buff-banded rail (*Rallus philippensis*), boobook owl (*Ninox novaeseelandiae*) and white-faced heron (*Ardea novaehollandiae*).

Reptiles

Approximately 30 species of lizards and several snakes have been recorded in Lane Cove National Park. These include the southern leaf-tailed gecko (*Phyllurus platurus*), golden-crowned snake (*Cacophis squamulosus*), eastern brown snake (*Pseudonaja textilis*), red-bellied black snake (*Pseudechis porphyriacus*), diamond python (*Morelia spilota*), blind snake (*Ramphotyphlops nigrescens*), common scalyfoot (*Pygopus lepidopodus*) and the eastern blue-tongue lizard (*Tiliqua scincoides*). Both the eastern snake-necked turtle (*Chelodina longicollis*) and Murray turtle (*Emydura macquarii*) have also been recorded in the park.

Frogs

The many different microclimates and habitats found in the park provide habitat for a range of frogs. Approximately 17 species of frogs have been identified in the Lane Cove River catchment over the last few decades but it is not known whether all these species are still present within the area. Two threatened frog species have been recorded in the Lane Cove River valley: the red-crowned toadlet which is listed as vulnerable, and the green and golden bell frog (*Litoria aurea*) which is listed as endangered. However, only the red-crowned toadlet has been positively identified in a number of locations within the park, including below the University of Technology Sydney campus at Lindfield, near Bradfield Road at West Lindfield, below Khartoum Road in Ryde, near the De Burghs Bridge visitor entry station, and in several locations within the Pennant Hills section of the park. Many of the park's frogs may be under threat from changes to water quality and hydrology caused by urban and industrial development within the catchment.

Fish

Seven species of native fish have been recorded in the Lane Cove River and its tributaries within the park. These are the short-finned eel (*Anguilla australis*), long-finned eel (*Anguilla reinhardtii*), Australian bass (*Macquaria novemaculeata*), native minnow (*Galaxias maculatus*), Cox's gudgeon (*Gobiomorphus coxii*), striped gudgeon (*Gobiomorphus australis*) and Australian smelt (*Retropinna semoni*) (Martyn 1994). Most of these species are catadromous, that is, they live in freshwater but migrate to salt water to breed. Management of fish within the river is the responsibility of the NSW Department of Primary Industries (Fisheries NSW) under the *Fisheries Management Act 1994*.

Evidence from other east coast rivers suggests that installation of the Lane Cove Weir (see Map 2) may have had a detrimental effect on several native fish species found in the river. Weirs can act as artificial barriers to the migration of some species trying to reach their saltwater breeding grounds, although some fish can cross the park's weir at very high tides. As the weir possesses historic value and provides a valuable recreation resource, total removal was not a preferred option (see Section 4.1). As an alternative to this, a fish ladder was constructed in 1999 to assist the migration of Australian bass and other catadromous species to freshwater above the weir. The 2009 downstream extension of the fish ladder and upstream installation of water diversion infrastructure allow fish to access the fish ladder at times other than high tides and increase the volume of water entering the fish ladder.

Except for Australian bass, the park's native fish population levels and trends are uncertain. Annual surveys for Australian bass by anglers from the Bass Sydney Fishing Club show an apparent increase in recruitment since the installation of, and modifications to, a fish ladder on the Lane Cove River which bypasses the weir.

Issues

- Optimum fauna biodiversity in the park is dependent on managing pests, habitat fragmentation and habitat degradation (see Section 4).

- Research throughout Australia has shown that fox control appears to have resulted in a marked increase in native animals (Robley et al. 2004; Dexter & Murray 2009).
- Reduction of fox abundance through fox baiting programs needs to be ongoing to sustain recovery of the park's native fauna populations.
- Park management operations can potentially remove or degrade habitats that are essential to animals. Habitat requirements need to be considered and protection strategies put in place before works such as bush fire hazard reduction and weed control are undertaken.
- The effects of fire, particularly the major wildfires which burnt most of the park in 1994 and 2002, and post-fire predation by feral animals, is thought to have significantly reduced population levels of small mammal species, particularly in fire-affected areas.
- Despite the erection of signs, feeding of native and introduced birds, particularly ducks and sulphur-crested cockatoos, has continued. This encourages the continued presence of introduced species and may be harming native birds.
- Native fish are threatened by poor water quality and introduced fish species present in the Lane Cove River. Common carp (*Cyprinus carpio*) most likely constitute the greatest threat to native fish.
- Despite the fact that a fish ladder has been constructed, the weir still restricts fish passage between the estuarine and freshwater tracts of Lane Cove River.

Desired outcomes

- Populations of native animal species found in the park are conserved.
- Habitat and populations of threatened fauna species are protected and maintained.
- The park is managed to conserve its value as habitat for native fauna and as a wildlife corridor.
- The ongoing status of fauna populations within the park is known through wildlife surveys and research.

Management response

3.3.1 Care will be taken when maintaining tracks and roads within the park to ensure that there is minimal impact on threatened animals such as the red-crowned toadlet.

3.3.2 Herbicide use will be discouraged in areas identified as containing red-crowned toadlets, and as far as possible avoided in preferred or identified habitation sites.

3.3.3 Continue to undertake a fox baiting program throughout the park, and continue to encourage surrounding land managers, such as local councils, to continue fox control on their lands.

3.3.4 Undertake other measures as needed to assist protection of threatened fauna including implementation of priority actions set out in the *Priorities Action Statement* and any recovery plans prepared for species that occur in the park.

3.3.5 Encourage research into the habitat requirements, status, distribution and threats to native animals in the park, particularly uncommon and threatened species.

3.3.6 Liaise with other government departments responsible for maintaining infrastructure in Lane Cove National Park in relation to the protection of threatened fauna species located near access trails, easements, pipes, cables and towers located in the park.

3.3.7 Undertake fauna surveys in the park to determine the effectiveness of current pest control programs.

3.3.8 Continue to educate park visitors on the impacts of feeding animals (especially ducks), and other wildlife management issues such as dog walking.

3.4 Aboriginal heritage

Aboriginal communities have an association and connection to the land. The land, water, plants and animals within 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 from each other and need to be managed in an integrated manner across the landscape.

Lane Cove National Park lies within the Country of the Guringai and Darug peoples. Early European colonisers of the area reported several different groups or clans living in the Lane Cove River valley, including the Cameraygal to the east, the Walumedegal to the south and the Terramerragal to the north-west. The exact boundaries of these groups are not known, although it is thought that the Cameraygal traditional lands occupied the lower north shore of Sydney to the east of the Lane Cove River, whilst the Walumedegal lands were west of the Lane Cove River through Ryde to Parramatta, and the Terramerragal lands were in the north-west part of the valley towards Thornleigh and Pennant Hills (Lane Cove River SRA Trust 1990).

In February 1790 Lieutenant Clark, at the instigation of Governor Phillip, made a number of journeys up the Lane Cove River to establish good relations with Aboriginal communities. He visited an Aboriginal camp and shared their meal of mussels. Shortly after, however, relations between the Guringai people and the new arrivals deteriorated.

European settlement was devastating to the Aboriginal people living along the Lane Cove River. Land was cleared for farms and forests were cut down to provide fuel and building materials. Aboriginal people lost access to their camping and food gathering areas and were forced into neighbouring groups' Country. In the first decade of European settlement, at least two serious outbreaks of imported disease decimated the Aboriginal population (Lenehan 1987). By 1797 the Aboriginal community of the Lane Cove River valley were reported to be actively resisting the new settlers, and were responsible for burning a house and killing some hogs. 'Native raiders' were mentioned again in 1804 and 1809, but there are no later references to Aboriginal people living in the valley in the 19th century (Lane Cove River SRA Trust 1990).

Much evidence of Aboriginal occupation of the Lane Cove River valley has been lost due to the long history of European occupation and use of the valley for farming and recreation. The construction of the Lane Cove weir, which flooded much of the river banks, probably destroyed many Aboriginal sites, but there are still over 40 recorded Aboriginal sites including shelters, cave art, rock engravings, middens and grinding grooves.

A number of these sites are of state or regional scientific and cultural importance (Conyers 1990):

- two art sites:
  - one containing the only known sunburst motif in the Sydney region
  - the other the only known four-footed macropod engraving north of the harbour
- a shelter with an archaeological deposit.

Public visitation to Aboriginal sites within the park is not actively promoted due to the fragility of the sites and the sensitivities around interpretation. A number of sites in the park have

been heavily vandalised and covered with graffiti. Protection measures may be necessary, including removal of potentially damaging vegetation at some sites and consolidated interpretation planning for accessible sites such as engravings at Commandment Rock Picnic Area.

Lane Cove National Park falls within the area of the Metropolitan Local Aboriginal Land Council. The Metropolitan Local Aboriginal Land Council and other relevant groups and individuals connected to the land on which the park lies will continue to be consulted about matters likely to be of interest to the Aboriginal community. They will also be encouraged to become involved in managing the park's Aboriginal sites.

Issues

- Aboriginal sites near visitor access areas and public access tracks, especially in the vicinity of Commandment Rock Picnic Area, are vulnerable to disturbance by erosion, vehicle damage and people.
- Some engraving sites have been damaged and weathered.
- Aboriginal sites contained in the Pennant Hills additions to the park have not been validated by NPWS to date, nor have their management requirements been assessed.

Desired outcomes

- Aboriginal sites and places are protected from damage by human activities and vegetation.
- Aboriginal people are involved in the management and interpretation of Aboriginal cultural values in the park.
- All Aboriginal sites within the park are documented and regularly monitored and maintained.

Management response

3.4.1 Aboriginal sites in the park will be conserved and managed in consultation with the Metropolitan Local Aboriginal Land Council and other relevant Aboriginal community organisations and individuals.

3.4.2 Due to the fragility of most sites in the park, locations of Aboriginal sites will not generally be publicised.

3.4.3 Regular inspections of the park's Aboriginal sites will be undertaken, with the Metropolitan Local Aboriginal Land Council and other relevant Aboriginal community organisations invited to attend.

3.4.4 Surveys, inventory and research into Aboriginal occupation and use of the park will be encouraged. Priority will be given to site surveys of Fairyland, Fox Valley and the park area upstream of De Burghs Bridge including the Pennant Hills additions.

3.4.5 Investigate the possible remediation and conservation management of damaged or weathered engraving sites.

3.4.6 Investigate options for interpretation of publicly accessible sites such as Commandment Rock.

3.5 Historic heritage

Heritage places and landscapes are made up of living stories as well as connections to the past. These places and landscapes can include natural resources, objects, customs and traditions that individuals and communities have inherited from the past and wish to conserve

for current and future generations. Cultural heritage comprises places and items that may have historic, scientific, cultural, social, architectural, archaeological, natural or aesthetic significance. NPWS conserves the significant heritage features of all parks under its management.

The Lane Cove River valley was a rich source of timber for building the new colony in Port Jackson. Timber-getting first commenced in the area in 1805 and was well established in the valley by 1809. A government sawmill, worked by convicts, was established near the end of what is now Fiddens Wharf Road. Joseph Fidden, a former convict, was granted the right to transport timber from the sawmill down the river to Sydney. An area around the wharf was declared a Wharfage Reserve, from which no timber could be legally cut. Another settler, Richard Archbold, established a wharf near the end of Grosvenor Road and Hyndes Wharf was opposite the current Lane Cove Boatshed. Once the available timber along the river had been exhausted, logs from further inland were brought to these wharves by bullock teams. There is no remaining evidence of these wharves.

The first permanent settlement in the area was north of Blue Gum Creek where, in 1814, William Henry established a hut and vineyards on the present Fullers Park, calling it Millwood Farm. Other settlers followed Henry into the valley, gaining access to their properties from the river. Robert Baker established an orchard on what is now Bakers Flat (formerly The Pines) Picnic Area, and the Bakers kitchen building remains near the park works depot. The Schwartz family farmed the area upstream of Baker. Their home still stands in the park. North of De Burghs Bridge was an area occupied by the Brown family, after whom Browns Waterhole is named.

By 1871 Henry's property had been incorporated into a larger property by his grandson, Thomas Jenkins. The farm was a major supplier of fruit, which was transported by steamer to the city markets, and became a popular destination for picnickers who came up the river to buy fruit from the farm. The kitchen of the old Jenkins family homestead, reputedly built about 1860, still stands just north of the weir in an area known as Jenkins Hill Precinct. The homestead was destroyed by fire in 1940.

With the increasing popularity of the Lane Cove River for boating, the Swan family converted their riverside market garden on the Ryde side of the river into the 'Fairyland Pleasure Grounds'. Early last century it was extremely popular for group picnics and over the years a number of attractions were constructed, including swings, slides, a Ferris wheel, flying fox, cricket pitch, shelter sheds and a dance hall. Most of the recreation facilities were removed in the early 1970s although some structures still remain, including tracks, stone walls, the remains of the wharf and a tidal gate on the entrance to the creek, and a few trees such as Canary Island date palms. The aforementioned tidal gate has been blocked by silt causing waterlogging of low-lying areas upstream (see Section 4.1). Some artefacts from Fairyland, including crockery and brochures, are stored in various park buildings and other artefacts are held by the Ryde District Historical Society.

A large rock within the park has an engraving of the Fifth Commandment, reputedly carved in the late 1800s by Thomas Tunbridge, a nearby resident. Weathering and the passage of feet and cars over time have resulted in the engraving on Commandment Rock being barely decipherable. The rock is now protected from human damage by overhanging vegetation.

By the end of the 19th century, the remaining orchards in the area had deteriorated and there were public moves to acquire the foreshores of the river for a recreation reserve and to dam the river to 'beautify' it in a manner similar to Audley recreation area in The National Park (now known as Royal National Park). In 1925 the committee that was formed to investigate the proposal recommended that the whole of the river foreshore between Fig Tree Bridge and 'some distance above De Burghs Bridge' including 'so far as practicable all contiguous creeks, valleys, ravines and gorges' should be transferred to the Crown 'to reasonably

ensure the protection of the waterways against encroachment of pollution and retention of all the natural features of the valley for the purpose of an extensive National Park' (McLoughlin & Wyatt 1993).

Crown land adjoining the river was reserved from sale and planning for a park was undertaken. In 1937 work finally began on the construction of the weir and Riverside Drive as an unemployment relief project. On 29 October 1938, following completion of the weir, Lane Cove National Park was officially opened and the 125 hectare parkland handed over to trustees to manage. Work continued until 1940, with stone quarried from within the park used to construct the weir, Lane Cove Boatshed, ambulance room, Porters Bridge, entrance gates at Delhi Road and De Burghs Bridge, retaining walls and other facilities. Porters Bridge is a particularly impressive feature, with the concrete road surface supported on piers of ornamental stone with matching wing walls, parapet and end piers.

During the 1950s tidal flats along the river were filled with material dredged from the river to make picnic areas downstream of Fiddens Wharf, and over the following years a number of exotic trees were planted including poplars, pines, liquidambars, willows, China pear trees and coral trees. Max Allen Drive was constructed in the early 1960s as a NSW Local Government Engineers Association voluntary project. However, at that time it went past the weir rather than along its current alignment behind Jenkins Hall. More recently, Tunks Farm was added to the park, becoming the Tunks Hill picnic areas. The old barn, which had been used as a scout hall and two-up school since the demise of the farm, was converted to a picnic shelter. Another more recent addition, Browns Waterhole (added to the park in 2002), contains concrete gun emplacements from World War II. Former gun emplacements and practice ranges are also located at Blue Gum Creek and Fiddens Wharf.

The name of the park has varied over time. From 1938 until 1967, the park was called Lane Cove National Park and managed by trustees. Following the enactment of the National Parks and Wildlife Act in 1967, which established a National Parks and Wildlife Service to manage national parks in New South Wales, it was reserved as Lane Cove River Park on the basis that it was considered not sufficiently 'spacious' to be a national park. In 1976 it was reserved as Lane Cove River State Recreation Area following the establishment of state recreation areas under the Department of Lands. In 1992, following an assessment of all state recreation areas, the park was assessed as having important natural values and it was again reserved as Lane Cove National Park. At this time, NPWS took over management of the park from the trust.

A 1995 Historic Heritage Maintenance Study (Stacey & Johnstone 1995) identified 45 places in the park with historic fabric, many of which were visitor facilities and most of which were of low significance. Important structures identified in the study were Jenkins Kitchen, Bakers Cottage, Schwartz Cottage, Tunks Barn, Lane Cove Boatshed and the stone structures constructed in the 1930s. Bakers Cottage and Jenkins Kitchen are described by local historians as some of the earliest surviving European structures in the Ku-ring-gai area (McLoughlin & Wyatt 1993).

More recently, heritage impact statements were prepared for the Lane Cove Boatshed (Gordon Mackay & Logan 2001), Lane Cove weir (Sue Rosen & Associates 2007), Bakers Cottage (Sue Rosen & Associates 2008) and Jenkins Kitchen and Schwartz Cottage (Sue Rosen & Associates 2011). This resulted in subsequent restoration of these buildings and structures as well as raising further questions about past use of the area.

Some of the cultural heritage of the park is interpreted along the Heritage Walk, which stretches from Jenkins Hill to Fiddens Wharf Oval.

Issues

- Lane Cove National Park contains a number of significant historic buildings and structures which require ongoing maintenance and conservation.
- Various park's buildings and local historical societies hold relics and documents relating to past use of the park. These items should to be catalogued, displayed and interpreted. Sites suggested for such a display are Jenkins Kitchen and Jenkins Hall.

Desired outcomes

- Significant historic features are conserved and managed.
- Public appreciation and understanding of the cultural heritage significance of Lane Cove National Park is maintained or enhanced.

Management response

3.5.1 Conservation assessments including, where necessary, the preparation of conservation management plans or heritage action statements, will precede any works on a historic structure other than routine maintenance or urgent stabilisation work.

3.5.2 Factors likely to cause deterioration of the fabric of historic sites will be identified and remedial actions undertaken as necessary.

3.5.3 Signs interpreting the history of the area will be erected at Porters Bridge, near the weir and at other selected stonework areas. Additional cultural heritage information will also be provided at Jenkins Hill.

3.5.4 The artefacts and other heritage items of Fairyland will be catalogued, selected elements displayed, and a management agreement developed to cover the artefacts held by the Ryde District Historical Society.

3.5.5 Vegetation will be periodically removed from depression-era stonework along Riverside Drive to prevent its further deterioration.

3.5.6 Encourage further investigation into the history of the park, including the Baker family's use of the area.

3.5.7 Undertake conservation restoration works for heritage items in accordance with conservation management plans and heritage action statements.

3.5.8 Where practical and in keeping with the setting, picnic shelters and park furniture of historical significance will be maintained sympathetically within the park's historical context rather than replaced with new infrastructure.

3.6 Visitor use, recreation and education

Visitation

Visitor opportunities provided in national parks are generally those that are ecologically sustainable and directly contribute to the visitor's understanding and appreciation of the area. Lane Cove National Park provides these opportunities with park roads, walking tracks and a range of visitor facilities (e.g. picnic areas, shelters, barbecues, children's play equipment, kayak and canoe launching places, visitor information, tourist park accommodation and shared-use cycling trails) as shown on Map 1, Map 2 and Map 3.

Over recent years, Lane Cove National Park has received between 970,000 and 2.2 million visits each year (Roy Morgan Research 2015). Its location within greater Sydney — a global city of 4.76 million people as of June 2013 (ABS 2014) — and its long interface with residential areas makes it an important recreational area for many Sydney residents and Australian and overseas visitors.

The majority (85 per cent) of visitors to Lane Cove National Park are residents of the local government areas in which the park is located or people who live in adjacent local government areas (NPWS 2005). The population in the local government areas within which the park is situated was 412,961 in 2006 and increased by around 6 per cent to 436,538 in 2011. It is projected that the local population will continue to increase as part of the urban consolidation of Sydney (ABS 2011). Proportionally, the number of visits to the park made by tourists is far less than those made by Sydney residents (less than 1 per cent of visits to the park) (Veal 2006; Tourism Research Australia 2010).

NPWS aims to 'Encourage communities to enjoy their national parks and value their local environment' (OEH 2013b). The following considerations guide the application of this goal to Lane Cove National Park and this plan of management:

- Walking is the most popular physical activity undertaken by the people of New South Wales (39 per cent), visitors to NSW national parks (55 per cent) and visitors to Lane Cove National Park (61 per cent) (Australian Sports Commission 2011; Roy Morgan Research 2015; NPWS 2005).
- High levels of visitation occur in the park on weekends (particularly Sundays). The picnic and parking areas are regularly at maximum capacity during school holidays, public holidays and, in particular, family days such as Mother's Day.
- The park attracts a large number of family groups who enjoy the smaller areas that are screened by trees and shrubs and provide privacy and seclusion from other park users.
- The majority of park visitors use the developed recreation areas between De Burghs Bridge and Fullers Bridge for family picnics and barbecues. The area around the weir is particularly popular for families with young children. Walking, jogging, canoeing and cycling are also popular activities in this area of the park, with high participation from local residents and staff from the local business parks.

Public access

The main visitor area of Lane Cove National Park is served by local buses from Chatswood Railway Station, and can also be accessed on foot from the North Ryde and Macquarie Park railway stations, however, most park visitors arrive by car. There are park entrance gates (see Map 2) on Delhi Road and Lady Game Drive (both near Fullers Bridge) and on Lane Cove Road near De Burghs Bridge. The main vehicle access within the park is provided by two sealed roads: Riverside Drive and Max Allen Drive. These roads, together with small branch roads, provide vehicle access to the picnic areas along the eastern and western side of the river between De Burghs Bridge and Fullers Bridge. The roads are narrow and provide an intimate and enjoyable bushland driving experience. This narrowness and shared use with joggers, cyclists and walkers necessitates careful driving and giving way to other vehicles if required. A boardwalk between the weir and Spoonbill Picnic Area separates traffic and pedestrians, thus removing any potential conflict along this section of the road.

Vehicle access to the Lane Cove Tourist Park is via Plassey Road, Macquarie Park, a narrow sealed road that runs off Delhi Road. There is currently no motor vehicle access between the tourist park and Riverside Drive. Pedestrian access is provided to the tourist park via walking tracks originating from Scribbly Gums and Cottonwood Glen picnic areas. A bus stop and rail station on Delhi Road are located within 10 minutes walking distance from the tourist park and are accessed via Plassey Road. There is currently a need for an off-park footpath along this road to provide a safe passage for pedestrians.

There are a number of on-park visitor car parks, most of which provide parking for visitors using picnic areas located between De Burghs Bridge and Fullers Bridge. The small car park on Pittwater Road, East Ryde, provides access to walking tracks and the estuarine section of

the Lane Cove River at Sugarloaf Point. Fiddens Wharf Oval, which is currently leased to Ku-ring-gai Council for sporting events, also contains a small car park. There are currently no formal car parks within the national park upstream of De Burghs Bridge.

The northern and southern sections of the park are also accessible by bus, and the northern section is accessible on foot from Eastwood, Epping, Cheltenham, Pennant Hills and Thornleigh railway stations.

Lane Cove weir, Fairyland and Sugarloaf Point are also accessible by boat. No moorings are provided, however, small beaches at Sugarloaf Point and River Avenue are suitable for canoe and kayak launching.

Walking

There are two main walking tracks in the park (see Map 2). The Riverside Walk is a 4.8-kilometre walking route along the south-west bank of the river between the weir and De Burghs Bridge. It passes through many of the picnic areas adjacent to the river and varies between a boardwalk, a medium grade walking track and a rough hiking track.

The other main walking track is a 16.4 kilometre section of the Great North Walk which links Sydney and Newcastle (see Map 1). This walking route passes through Sugarloaf Point and Fairyland, crosses the river at the weir and runs up the north-east side of the river to De Burghs Bridge. It then follows the Lane Cove River Trail, eventually connecting to Thornleigh Oval via a walking track at the northernmost point of the valley. The route standard varies from easy to medium and hard in some areas, and the section between Kittys Creek and Buffalo Creek in East Ryde includes two boardwalks. Connecting tracks link to various points of interest along the way such as Sugarloaf Point, the Lane Cove River Tourist Park, Fiddens Wharf Oval, Browns Waterhole, City View Lookout, former model aircraft field, Whale Rock and Terrys Creek.

Walking tracks in the northern sections of the park, including Fox Valley, receive much lower visitation levels than those in the section of the park between Fullers Bridge and De Burghs Bridge. At Browns Waterhole and along Terrys Creek Track, interpretive signs have been installed in conjunction with the City of Ryde Council and Rotary. Many of the tracks in this section of the park link to Ku-ring-gai Council and Hornsby Shire Council tracks and trails.

Some walkways around the weir and Jenkins Hill are suitable for the mobility impaired and those with prams and strollers.

Picnicking

At present there are 33 formal, named picnic areas between De Burghs Bridge and Fullers Bridge (see Map 2). With the exception of Fern Valley, all these areas contain grassed picnic areas with barbecues and picnic tables. Fern Valley is managed as a walk-in picnic area without barbecue facilities. Seven picnic areas are able to be booked in advance by the public. Gas or electric barbecues are currently provided at Tunks Hill, Carter Creek, The Oaks, Heron Flat, Koonjeree, Moola and Casuarina Point picnic areas. The remainder of the 33 formal sites have wood-fuelled barbecues. Private gas or similar stoves are also permitted in the park. The formal picnic area at Jenkins Hill has children's play equipment. There are also eight informal picnic areas between De Burghs Bridge and Sugarloaf Point. Toilets are provided within close proximity of all picnic areas except Greens Flat, Wirrong Flat, Alfred Cook Flat, Fullers Park, Fern Valley, Bloodwoods and Sugarloaf Point.

In 2002 all toilets within the park except the Tunks Hill toilet block were connected to the sewer system. The Tunks Hill septic system was recently upgraded to a cellular absorption bed designed to maximise evapotranspiration and reduce nutrient loads.

Small, basic picnic sites are provided at Sugarloaf Point, Browns Waterhole and the end of Day Road, Cheltenham. These picnic sites are accessed by walking tracks. They provide picnic tables but no toilets or barbecues, and only limited parking nearby. They provide a low-key alternative to the more developed areas between De Burghs Bridge and Fullers Bridge.

Cycling

In accordance with NPWS policy and the NPWS *Sustainable Mountain Biking Strategy* (OEH 2011a), cycling is permitted on park roads and management trails. Cycling is popular along the two sealed park roads: Riverside Drive and Max Allen Drive. The park also includes a sealed shared-use (walkers and cyclists) track near Browns Waterhole which is part of a regional cycleway connecting Sydney's upper north shore with the northern suburbs. The river crossing at Browns Waterhole is a very popular commuter route that is sometimes impassable due to flooding. Near De Burghs Bridge, a sealed, shared-use management trail that runs under the bridge links Riverside Drive to the western side of Lane Cove Road in Macquarie Park (see Map 1).

Cycling also takes place along formed roads and management trails in the northern section of the park. This includes the mountain biking route known as the Pennant Hills West Pymble fire trail, which traverses the Pennant Hills Park Trail, a section of Lane Cove River Trail and part of the Gloucester to Ramsay Trail. To preserve the enjoyment and safety of walkers and to protect the natural environment, cycling on walking tracks and the creation of unauthorised bike tracks are not permitted within the park. The majority of the management trails in the park are located north of Gloucester Avenue, West Pymble (see Map 1). A network of unauthorised mountain bike tracks has also been created in this area of the park. These unauthorised tracks require closure and rehabilitation.

Horse riding

Horse riding is a popular recreational activity that has cultural associations for many Australians. The NPWS *Strategic Directions for Horse Riding in NSW National Parks* (OEH 2012a) provides a framework to improve riding opportunities in eight priority regions in New South Wales, including the NPWS Metropolitan North East Region. Horse riding opportunities in a number of national parks in the region are being progressed in accordance with the *Metropolitan North East Region Horse Riding Work Plan 2013* (OEH 2013c). However, Lane Cove National Park is not considered suitable for horse riding due to its narrow shape and the potential for the activity to disturb other users.

Water-based activities

The waters of the Lane Cove River are not within the park, although the bed of the river between the weir and De Burghs Bridge is part of the park. Activities undertaken on the river are managed by a range of other authorities, including NSW Roads and Maritime Services and Fisheries NSW as well as NPWS. NSW Roads and Maritime Services is responsible for ensuring safe and equitable navigation on NSW waterways, including those in and adjacent to national parks. The management of fish and fishing within New South Wales is the responsibility Fisheries NSW.

Swimming, formerly one of the more popular activities in the park in places such as Blue Hole and the formal picnic areas, is now not recommended in the Lane Cove River due to the large number of tree branches, rocks and other snags, and the high level of pollutants that may be washed into the river from upstream. Signs warning people of these dangers have been installed in key locations around the park.

Canoeing is undertaken on the river, both above and below the weir. Powerboats — excluding those for NPWS and Fisheries NSW management operations — are not permitted

above the weir. Below the weir, boats are currently limited by NSW Roads and Maritime Services to a maximum speed of 4 knots on those parts of the Lane Cove River adjoining the park. Bank erosion from boat wash is an ever increasing problem along this section of the river. The Lane Cove Boatshed and weir, and Greens Flat, Cottonwood Glen and Wirrong Flat picnic areas are all used for launching canoes and kayaks. Canoes, kayaks and row boats are available for hire by park visitors at the boatshed.

A cooperative management agreement between NPWS and Fisheries NSW has been implemented to protect native ducks and other native animals, fish stocks (particularly Australian bass) and aquatic habitat within the Lane Cove River, and to reduce conflicts between recreational users. This agreement provides for a prohibition on fishing from 50 metres below the weir to the Boatshed, including 'no fishing from the weir', and 'catch and release' only upstream of the Boatshed. General recreational fishing is permitted downstream of where Little Blue Gum Creek enters the Lane Cove River. Fishing clubs provide important feedback on the status of Australian bass in the river.

Camping and accommodation

The Lane Cove River Tourist Park, which is accessed from Plassey Road, is a very popular facility providing a nature-based camping or cabin experience 10 kilometres from the city centre. It contains 250 powered sites and 50 unpowered camping and caravan sites. The tourist park also contains 30 cabins rated at three and a half stars with sizes suitable for both families and couples, and all containing ensuites. A luxury pre-erected tent with private surrounds has introduced a 'glamping' experience for couples seeking a high level of comfort within a bushland setting. A series of pre-erected tents with bedding and linen have also been established for families who do not have their own tent or camp bedding, or those who are time poor. Other facilities include a swimming pool, shop, two camp kitchens, four amenity blocks, barbecues and a playground. The tourist park sells NPWS annual park entry passes and some smallgoods, and conducts environmental sustainability programs and talks for visitors and school groups. Bikes are available for guest hire. There is currently a need for a kiosk/cafe to provide meals and refreshments to guests during their stay.

In recognition of its leading role in tourism, Lane Cove River Tourist Park received many awards including Australian Tourism Industry recognition as the best caravan/tourist park in Australia (in 2008). The tourist park was awarded numerous national and international environmental awards including certification by global organisations such as Green Globe and Earth Check which validate carbon claims and sustainability initiatives. These awards were gained as a result of a range of carbon reduction and water saving initiatives within the tourist park.

NPWS has managed the tourist park since 1998. Those persons who occupied the park as long-term residents at this time were granted a non-transferable right to remain in residence. Currently there are eight long-term residents permitted to stay under this agreement. These people may not transfer their sites to another person and may only sell any improvements on the site on the basis that they are immediately removed from the tourist park. Apart from housing for operational requirements, further long-term residential tenancies will not be permitted.

Management of the impacts the tourist park facility has had on the wider park has included weed control, stormwater control and sewerage upgrades. Removal of rubbish, fill and infrastructure left by former tenants has improved the surrounds. The tourist park will continue to implement programs to mitigate these impacts.

Use of buildings and modified natural areas

There are a number of buildings and modified natural areas within Lane Cove National Park that are currently used or have the potential to be used for commercial operations, group activities, private functions or public events. These include:

- the recently renovated Jenkins Hall
- the historic Lane Cove Boatshed on the western side of the river
- the old administration building (previously a residence) on Jenkins Hill which is currently used as a staff office and as an office for volunteers
- the oval at Fiddens Wharf which is used for local sporting activities
- Schwartz Cottage which was previously used as staff accommodation — the cottage housed the first park ranger appointed by the trust in 1948, as well as later staff, but is currently unused
- The residence at 11 River Avenue which was previously used as staff accommodation.

The Jenkins Hill Precinct (see Map 3) incorporates the Lane Cove weir, the former Kukundi wildlife shelter and surrounds, Jenkins Hall, the historic Jenkins Kitchen, a toilet block and the old administration building This area was revitalised in 2006 as part of what was called the 'Weir Precinct' Masterplan project (DEC 2004c). It is proposed that the Jenkins Hill Precinct will function as the central hub for visitor services within the park. The intention for this area is to:

- provide an adaptable space to be used for natural and cultural heritage interpretative experiences while also distributing park information
- promote NPWS and volunteer programs
- provide facilities and amenities for staff
- provide active play facilities for children
- supply food and beverage services for all ages
- accommodate a learning and development centre for staff, volunteers and the public.

There may be a need for building extensions and additions within the Jenkins Hill Precinct to support lease operations within existing buildings.

The recently renovated Jenkins Hall (see Map 3) contains meeting/conference rooms and an area designed to be used as a cafe and takeaway food facility. Jenkins Hall and associated lawn areas and paved open spaces may be investigated for new adaptive uses to support sustainable visitor and tourist services including:

- restaurants, cafes, kiosks and other food outlets (including mobile 'cart style' facility)
- facilities to enable the hosting of conferences and functions
- educational facilities for natural heritage, cultural heritage or park management
- facilities and amenities for tourists and visitors
- events and exhibitions
- information centres and booking outlets.

Jenkins Kitchen (see Map 3) is a small historic building located close to Jenkins Hall. Jenkins Kitchen may be investigated for new adaptive uses to support sustainable visitor and tourist services including:

- facilities to enable activities for natural heritage management, cultural heritage management, park management or fire management to be carried out

- cafe and/or kiosk
- facilities and amenities for tourists and visitors.

The Kukundi area (see Map 3) was formerly used for the exhibition of native animals. It is now closed to the public and the remaining aviary is used by wildlife carers for the rehabilitation of wildlife. The Kukundi area may be investigated for new adaptive uses to support sustainable visitor and tourist services including:

- facilities to enable activities for natural heritage management, cultural heritage management, park management or fire management to be carried out, including educational and interpretative displays
- cafe and/or kiosk
- facilities for wildlife rehabilitation
- facilities to enable cultural activities to be carried out and provision of facilities for that purpose
- facilities and amenities for tourists and visitors.

The old administration building (see Map 3) on Jenkins Hill may be investigated for new adaptive uses to support sustainable visitor and tourist services including:

- educational facilities for natural heritage, cultural heritage or park management
- facilities and amenities for staff, tourists and visitors
- facilities to enable activities for natural heritage management, cultural heritage management, park management or fire management to be carried out.

The historic Lane Cove Boatshed (see Map 3) on the western side of the river is currently leased to a private operator who hires out row boats, pedal-boats, canoes, kayaks and mountain bikes; and sells basic takeaway food on weekends, public holidays and school holidays. The Boatshed may be investigated for new adaptive uses to support sustainable visitor and tourist services, appropriate uses being:

- facilities and amenities for tourists and visitors
- cafes, kiosks and other food outlets
- group picnics
- family and community functions.

Schwartz Cottage (see Map 3) and 11 River Avenue (see Map 2) may be investigated for new adaptive uses to support sustainable visitor and tourist services including:

- facilities to enable activities for natural heritage management, cultural heritage management, park management or fire management to be carried out
- short-term accommodation
- private functions
- commercial activities
- the provision of research facilities and activities for natural heritage and cultural heritage
- facilities to enable the hosting of conferences or functions
- facilities and amenities for staff, tourists and visitors.

The Lane Cove River Tourist Park (see Map 2) is located within Lane Cove National Park just above Scribbly Gums Picnic Area. It is currently managed by NPWS to provide accommodation, recreation and education for guests. The Lane Cove River Tourist Park may be investigated for the implementation of lease or licence arrangements to support

sustainable visitor and tourist services. The Lane Cove River Tourist Park may be leased or licensed for purposes including:

- accommodation
- restaurants, cafes, kiosks and other food outlets
- education facilities and services
- facilities and amenities for visitors and tourists
- facilities ancillary to facilities for visitors and tourists including retail outlets and facilities to enable the hosting of conferences and functions
- facilities to enable activities for natural heritage management, cultural heritage management, park management or fire management to be carried out.

Group activities are also popular in the park, with NPWS receiving requests from commercial, educational and community groups to hold walks, cycle tours, nature study activities, group picnics, community days, team building exercises and other activities in the park. These activities may be permitted depending on impact and subject to certain controls to minimise impacts on the park and other visitors. Preference will be given to nature-based activities that facilitate understanding and appreciation of the natural and cultural heritage values of the park, and applications will be assessed in accordance with relevant NPWS policies. All commercial activities require a licence and group activities involving more than 30 people require a written consent.

The modified natural areas and picnic shelters at Carter Creek, Cottonwood Glen, Commandment Rock, Tunks Hill, Casuarina Point and Haynes Flat picnic areas and Fiddens Wharf Oval may be booked for exclusive use. Activities involving the use of animals for children's rides, mechanical rides (such as Ferris wheels or trains) and jumping castles are not permitted, however, temporary structures such as marquees, catering trucks and generators may be permitted under the licence or consent.

The modified natural areas and bookable picnic areas may be licensed for exclusive use for the following purposes:

- group picnics
- family and community functions/events
- recreation and sporting activities consistent with park values and provision of temporary facilities for that purpose
- facilities to enable activities for natural heritage management, cultural heritage management, park management or fire management to be carried out, including educational and interpretative displays
- activities permitted under a commercial activity licence within the park, such as team-building activities.

All lessees, licensees and commercial operators must comply with environmental safeguards such as containment of pollutants including septic tank and stormwater runoff, the removal of introduced plants and animals, and the rehabilitation of any bushland disturbed by their operations or by their visitors. The lessee and licensee must also ensure that the provisions of relevant legislation governing national parks are complied with. Levels of commercial operations within the park will continue to be monitored and modified relative to the level of impact the operation may have.

Filming and photography

Filming and photography are undertaken regularly in the park by both commercial and non-commercial operators. Filming and photography consents are subject to the *Filming*

Approvals Act 2004 and relevant NPWS policies. Approval for filming and photography may contain conditions to minimise impacts on the park. Preference will be given to filming in modified areas where there will be no adverse impact on threatened species or ecological communities, or the natural environment.

Education, interpretation and community involvement

The popularity of Lane Cove National Park and its location within the Sydney metropolitan area make the park an ideal place for developing an understanding and appreciation of national parks and their cultural and natural values, especially for those people who may otherwise be unexposed to national parks. It also provides visitors with many examples of the issues affecting nature conservation within an urban area.

Interpretative signage currently exists at the following locations in the park:

- along Riverside Drive (near the Tunks Hill Picnic Area entrance road), the Heritage Walk and the Great North Walk at Sugarloaf Point and Fairyland
- at the Lady Game Drive entrance, the weir, Jenkins Kitchen, Bakers Cottage, Fiddens Wharf Oval, Kukundi and Terrys Creek
- between Carter Creek and Scribbly Gums picnic areas.

Current themes for interpretative and informative signage include historic and cultural heritage, biodiversity, threats (such as stormwater, pollution and pests), and maps of park facilities.

Kukundi was originally a small zoo established by the park trustees. Over the years it changed to a zoo displaying animals native to the area, and then moved towards a facility for the care of injured wildlife before their release back into the wild. Grey-headed flying-foxes were the last animals in permanent care at Kukundi. These animals were subject to frequent fungal infections stemming from poor light and ventilation of the area during the winter, and for the sake of their welfare they were subsequently transferred to a wildlife park in 2008. Since this time the area has been used by wildlife carers for the rehabilitation and care of orphaned, sick, abandoned and injured grey-headed flying-foxes, particularly as a crèche for rescued young where they can be reared and released safely into the wild.

Lane Cove National Park has a long history of community involvement. The park is used by university, school and technical college students for excursions, research and project work. Volunteer guides, including NPWS Discovery rangers, take occasional guided walks within the park. There is also a high level of community involvement in bush regeneration within the park. Community groups play an important role in education, park promotion and capacity building through conservation partnerships.

Issues

- A masterplan for the Jenkins Hill Precinct was prepared in 2004. However, despite the work achieved to date to implement the masterplan, there are still some outstanding issues that need to be reviewed. Issues of particular importance are those regarding usage of buildings and restoration of Jenkins Kitchen and the surrounding curtilage.
- The Delhi Road entrance to the park was redeveloped as part of a site restoration project undertaken following construction of the Epping to Chatswood rail tunnel. The width of the road adjacent to the vehicle entry station has proven to be too narrow, resulting in damage to the entrance station and poor sight lines that could compromise the safety of visitors. The redesign of the car park in this area is necessary, as the current car park does not have the capacity to cope with the larger groups using this area.

- There is currently a moderate level of bike riding off roads and formed management trails. This can lead to erosion, creation of unauthorised tracks and conflict with walkers, and there are ongoing costs associated with trail maintenance. There is also some local community interest in extending the network of bike trails in the park.
- There is interest in creating a walking link between the Riverside Walk and the Great North Walk, with an alternate crossing to De Burghs Bridge.
- Safer walking access is required between the tourist park and Delhi Road.
- The 200-metre long boardwalk on the Riverside Walk near the weir raises expectations of a facilitated walking experience but disappoints by ending abruptly at a dirt path in a picnic area.
- There are a number of informal walking tracks created by people wanting a shorter route between places or across the park, leading to confusion for other walkers, damage to bushland, and disturbance of wildlife.
- Horses occasionally cross the park at Browns Waterhole, however, there is no legal way for horses to access the park in this area due to prohibitions on horses on lands adjoining the park.
- Sections of the river bank in the picnic areas along Max Allen Drive have been undermined by the river.
- A number of small picnic areas require relatively high levels of maintenance but are little used. Other picnic areas would be used more often if they were broken up into smaller, family-sized areas.
- The visual amenity of the park can sometimes be compromised by built structures such as toilets and car parks. Some screening of these areas is required through the planting of appropriate vegetation.
- The playground at Jenkins Hill needs to be improved to provide a greater variety of play facilities and interpretation. Play equipment is also provided at the tourist park.
- Play equipment is provided in many local parks, such as at Buffalo Creek Reserve at East Ryde and Bicentennial Park at West Pymble, and consequently, large amounts of play equipment are not considered necessary within the park. However, playgrounds can provide natural and cultural heritage interpretation through play.
- Wood barbecues near the bush can cause wildfires, and the removal of dead wood and dead trees (for example by people scavenging for wood in the surrounding bush) has been listed as a key threatening process under the TSC Act (NSW SC 2003). Charcoal or heat bead stoves create fire risks and risks to public safety when disposed of in the park.
- There is an interest in creating an all-weather cycling/pedestrian crossing at Browns Waterhole, as the current crossing is subject to flooding.
- Canoe launching is popular from the picnic areas along River Avenue but parking can create a problem on this narrow street. Facilities to allow launching of trailerable boats would increase this problem, as well as increase conflicts between powered and unpowered boats on this section of the river. However, there is a demand for a small car park and launching facility for recreational canoeists.
- Canoe launching is also popular at the weir, and Cottonwood Glen Picnic Area via an informal boat ramp. Launching facilities in these areas are of poor quality and could compromise visitor safety.
- There is a demand for additional low-impact, environmentally sustainable camping in the park.

- Commercial and large group activities can potentially interfere with the peace and tranquillity sought by other park visitors.
- The use of generators, amplified music and other sound generating devices may disturb park visitors and native wildlife.
- Improved signage to explain the natural and cultural features of the park and an interpretive walk have been requested by many visitors. Directional signs and information also need to be upgraded to assist visitors in finding their way around the park.

Desired outcomes

- Visitor use is appropriate to the purposes of national parks and is ecologically sustainable.
- Visitor opportunities provided in the park respond to current and expected recreational demand and encourage a diversity of park visitors.
- Visitor opportunities and information encourage appreciation of the natural and cultural values of the park.
- Facilities are designed and managed to provide an enjoyable visitor experience whilst minimising visitor impacts and conflicts.
- Visitor and tourist facilities adopt environmentally sustainable and low resource use practices.
- Opportunities are available for the public to participate in park management, thus strengthening support for ongoing park protection.

Management response

3.6.1 Investigate options for the future use of facilities and buildings in the Jenkins Hill Precinct and along Max Allen Drive.

3.6.2 Permit public vehicles only on the public access roads shown on Maps 1 and 2 (labelled as 'Park Road – Sealed') in this plan.

3.6.3 Erect flat-topped speed humps, speed limit signs and signs warning of cyclists and walkers sharing the roads at strategic locations along Riverside Drive (in consultation with the NSW Roads and Maritime Services traffic committee) and Max Allen Drive.

3.6.4 Stabilise the sections of the river bank along Max Allen Drive that have been undermined by the river.

3.6.5 Permit bicycles on park roads, shared-use cycleways and management trails within the park (see Maps 1 and 2) but not on walking tracks.

3.6.6 Contribute to planning for a cross-tenure, integrated cycling network including linking to train stations to allow for a more continuous bike riding circuit.

3.6.7 Continue to prohibit horse riding in the park.

3.6.8 In high usage areas, maintain picnic areas and provide additional picnic facilities, shelters and barbecues as necessary.

3.6.9 Maintain Sugarloaf Point and the other walk-in picnic areas as small, basic areas with limited facilities, where fires are not permitted and visitors remove their rubbish.

3.6.10 Assess small and informal picnic areas and selectively close, and if appropriate rehabilitate rarely used areas.

3.6.11 Undertake planting of local species to screen parking areas, toilets and other buildings, and in some of the larger picnic areas to break up the areas into smaller areas.

3.6.12 Monitor the efficiency of the absorption trench system at Tunks Hill with a long-term view of incorporating it into the sewerage system.

3.6.13 Progressively install gas or electric barbecues to replace wood barbecues. Priority will be given to those areas that are available for booking and the high use picnic areas near the weir.

3.6.14 Permit the use of personal gas or similar portable stoves and manage the use of heat bead and charcoal stoves more effectively through signage, education and interpretation programs.

3.6.15 Maintain the existing children's play equipment at the Lane Cove River Tourist Park for its safe operational life. In the longer term, this conventional playground will move towards an adventure-style, low maintenance facility that is consistent with the national park experience.

3.6.16 Provide additional play equipment at Jenkins Hill to add variety and increase consistency with conservation principles of national parks.

3.6.17 Retain the walking tracks shown on Maps 1 and 2 and if required undertake some minor re-routing for environmental protection.

3.6.18 Close and rehabilitate informal tracks that are not part of the walking track system and unauthorised bike tracks.

3.6.19 Continue to install directional and information signs where needed, including along the Great North Walk, through Fairyland and along the Riverside Walk.

3.6.20 Investigate the feasibility of providing a pedestrian link between the Great North Walk and the Riverside Walk without the need to cross De Burghs Bridge, and the feasibility of a walk linking Macquarie University to the Great North Walk, encompassing an all-weather crossing at Browns Waterhole.

3.6.21 Upgrade the section of Riverside Walk between the boardwalk and the Lane Cove Boatshed to provide a short walk with wheelchair and pram access.

3.6.22 Continue to liaise with NSW Department of Primary Industries (Lands) in relation to the maintenance and management of the Great North Walk.

3.6.23 Lease the Lane Cove Boatshed for one or more of the purposes listed in Section 3.6 of this plan of management.

3.6.24 Liaise with City of Ryde Council and Roads and Maritime Services to construct a footpath between Lane Cove River Tourist Park and the Delhi Road bus stop and railway station.

3.6.25 Continue to prohibit power boats above the weir, except for park or waterway management purposes.

3.6.26 Continue to liaise with waterways authorities to ensure 4 knot zone limits are regulated downstream of the weir.

3.6.27 Investigate the option of providing off-street parking for cars launching canoes along River Avenue, West Chatswood.

3.6.28 Investigate the construction of small launching facilities for canoes and other small, non-trailerable, non-motorised boats near Casuarina Flat and Wirrong Flat picnic areas on River Avenue, and at Cottonwood Glen Picnic Area.

3.6.29 Continue to maintain the tourist park as an ecotourism and sustainable facility providing camping, caravan sites, cabin accommodation, interpretation and food for guests, including potentially a kiosk/cafe. Any leases of the tourist park will be for one or more of those purposes listed in Section 3.6 of this plan of management. Assess

the need for additional cabins but do not allow any additional buildings or vans to be used for long-term tenancy.

3.6.30 Generators may be used in the tourist park without consent subject to booking conditions.

3.6.31 Assess Scribbly Gums Picnic Area with a view to providing walk-in camping in temporary and fixed tents under the management of the Lane Cove River Tourist Park.

3.6.32 New buildings, building extensions and additions may be constructed within the Jenkins Hill Precinct to support lease operations within existing buildings. Any new buildings or structures are to be located within the Jenkins Hill Precinct boundary shown on Map 3.

3.6.33 Investigate the use of Schwartz Cottage and 11 River Avenue for one or more of those purposes listed in Section 3.6 of this plan of management.

3.6.34 Ensure that detrimental impacts along the tourist park/bushland interface are being monitored and mitigated, including liaison with regulators.

3.6.35 Investigate potential uses for Jenkins Kitchen that are consistent with maintaining its cultural heritage value. These may include using or leasing it for one or more of those purposes listed in Section 3.6 of this plan of management.

3.6.36 Investigate utilising Jenkins Hall for one or more of those purposes listed in Section 3.6 of this plan of management. If part of it is leased as a cafe, the cafe will have set standard trading hours with the ability to hold functions and events, with prior management approval, within and outside of standard trading hours. A gate will be installed along Max Allen Drive to restrict after-hours vehicle access.

3.6.37 Group activities may be permitted depending on impact and subject to certain controls to minimise impacts on the park and other visitors. Preference will be given to nature-based activities that facilitate understanding and appreciation of the natural and cultural heritage values of the park, and applications will be assessed in accordance with relevant NPWS policies. All commercial activities will require a licence, and group activities involving more than 30 people require a written consent.

3.6.38 The use of generators, amplified music or other sound generating devices is prohibited within Lane Cove National Park (excepting the tourist park) without prior written NPWS consent.

3.6.39 Assess applications for filming and photography and prescribe conditions to minimise impacts on park values as per NPWS policy. Filming will not be permitted in threatened ecological communities or near threatened species or populations.

3.6.40 Emphasise the following themes in interpretation programs:

- the need for ongoing protection of the environment
- the value of bush regeneration work
- the problems of urban pressures such as weeds, fire and stormwater
- the need for coordinated catchment protection
- the history of human occupation and use of the valley
- changes which have occurred in use of the area over time
- environmental sustainability.

3.6.41 Increase opportunities at Jenkins Hall for interpretation, sales and general park information.

3.6.42 Investigate potential future options for Kukundi that fall under one or more of those uses listed in Section 3.6 of this plan of management or revegetate the area. Retain the flight aviary for the rehabilitation of sick or injured native animals, subject to ongoing maintenance requirements, but there will be no long-term holding of animals. Remove unnecessary buildings and infrastructure.

3.6.43 Continue to support community involvement in the park, particularly involvement in bush regeneration programs, guided walks, educational activities and catchment management programs.

3.6.44 Replace the current fishing signs and 'swimming is not advisable' signs with upgraded signs.

3.6.45 Monitor visitor levels, satisfaction and impacts of recreational use, and take action to minimise impacts as necessary.

3.6.46 Investigate the feasibility of modifying the section of Riverside Drive at Delhi Road entrance to provide for more parking and safer passage through the entrance station.

3.6.47 Stabilise the concrete slipway and foreshore located at Lane Cove Boatshed.

3.6.48 Install signage to direct overflow vehicles from the Delhi Road entrance to The Oaks car park.

3.6.49 Investigate the potential use of the Alfred Cook Flat Picnic Area for additional car parking to meet future demand.

3.6.50 Assess all existing amenities blocks throughout the park and develop a program of works to upgrade, replace or close them based on maintenance requirements and usage.

3.6.51 Investigate the future use of the old administration building for one or more of those purposes listed in Section 3.6 of this plan of management.

4. Threats

4.1 Pollution and runoff

Lane Cove River and its tributaries have undergone substantial degradation from their natural state due to the high levels of urban and industrial development along both sides of the valley. Development in the catchment area has mostly been confined to the surrounding ridge tops where up to 40 per cent of the surface area has been replaced by impervious surfaces, which in turn cause high rates of discharge during stormwater events. The stormwater runoff from suburban properties, gardens and roads together with wet-weather discharge from sewerage systems along the river, creeks and drainage lines have resulted in poor water quality. These waterways have extremely high faecal coliform counts, algal growth, reduced oxygen levels, high sediment loads, high nutrient loads and high levels of gross pollutants. These problems are worse during times of heavy rain, but even during times of moderate rainfall, large volumes of stormwater carry high loads of pollutants into the river. The exception is a tributary of Byles Creek (see Section 3.1).

The effects of the pollution are compounded by the many introduced water plants and introduced fish species now found in the river. These introduced plants, especially dense waterweed (*Egeria densa*), contribute to a reduction in the circulation of water during low flow periods and may increase the growth of algae by increasing dissolved oxygen levels in the river. This is thought to in turn affect the native fish species found in the river by favouring introduced species, such as carp, which prefer slower flowing and warmer water bodies.

The building of the weir near Fullers Bridge during the early 1930s changed the Lane Cove River between the weir and De Burghs Bridge from a saltwater tidal system to freshwater. This in turn increased sediment build up above the weir and increased the levels of salt-intolerant weed species along the riverbanks. At the same time, the weir acted as an energy dissipater and sediment trap that has to some extent protected lower sections of the valley from the damaging effects of flooding and the build up of sediment. During the construction of the fishway in 1999, the removal of the weir was considered as part of the planning process, but it was decided that its removal would create as many problems as it would solve. The structural integrity of the weir is doubtful, as it is over 70 years old, and it may need to be redeveloped or removed in the future. Any such redevelopment will take into account the impacts of the weir on flooding as well as other environmental, heritage, social and economic considerations.

The creek that runs from Delhi Road flows through the old Fairyland Pleasure Grounds site and out to the Lane Cove River. It has been blocked by accretion of sediment at the old historic sandstone tidal gate which was once a part of a saline bathing area at the pleasure grounds. This siltation is causing the transformation of a terrestrial woodland community to a freshwater wetland. This community is not well represented in the park and any decision to remove the blockage should involve careful consideration.

Increased sedimentation in the waterways also causes mangrove encroachment in saltmarsh areas.

NPWS is a member of the Lane Cove River Estuary Management Committee and supports catchment management initiatives. The park benefits from local council initiatives to fund projects and apply conditions on development applications to alleviate stormwater, sediment and weed invasion arising from urban and industrial developments along park boundaries and in the valley's upper catchment. NPWS also supports local council efforts to reduce sedimentation, nutrient levels and gross pollutants in the river by controlling runoff from existing gardens, golf courses, ovals, roads, rubbish tips and other land uses.

In addition, NPWS has supported Macquarie University geomorphology students who have undertaken stormwater and sedimentation alleviation measures in many drainage lines running into the park. This has included the hardening of drainage channels and installation of low-cost sediment ponds, energy dissipaters and gross pollutant traps. Continued evaluation and extension of these projects is considered essential if long-term solutions to the valley's stormwater and pollution is to occur.

Desired outcomes

- Human-induced soil erosion in the park is minimised and disturbed areas are rehabilitated.
- The catchment values, water quality and ecological health of streams in the park are maintained or improved wherever possible.
- Environmental, social and ecological values of the weir are better understood.

Management response

4.1.1 Design and undertake all works in the park in a manner that minimises soil erosion and water pollution.

4.1.2 Avoid altering natural drainage patterns, and undertake control of erosion and restoration of natural drainage where it has been altered by human activity.

4.1.3 Continue the installation of water quality improvement devices such as sediment basins and pollution traps at key sites around the park such as stormwater outlets.

4.1.4 Undertake erosion control and stabilisation work along the Great North Walk and Riverside Walk.

4.1.5 Formalise and stabilise, or close and revegetate informal tracks formed by people making their own routes near the picnic areas.

4.1.6 Continue to work with local councils and other authorities to facilitate the development and implementation of strategies to improve the water quality of the Lane Cove River. Cooperation will be sought to control runoff from gardens, golf courses, ovals, roads, rubbish tips and other developments, to upgrade the sewerage systems in the catchment to reduce the incidence of sewage overflowing into the river and to reduce sedimentation, nutrient levels and gross pollutants within the catchment.

4.1.7 Develop agreements and liaise with neighbouring land managers in relation to installation of stormwater mitigation devices, and locate them outside the park where possible.

4.1.8 Erect interpretive signs near the weir explaining the need for total catchment management of the Lane Cove River.

4.1.9 Continue and expand active engagement with universities, schools and volunteers in water pollution research, monitoring, mitigation and nutrient removal projects in the Lane Cove River catchment.

4.1.10 Should the weir become severely damaged or destroyed, the environmental, heritage, social and economic costs and benefits of replacing it with a new weir will be assessed.

4.1.11 Investigate the feasibility of removing sediment accretions at the historic Fairyland tidal gate.

4.1.12 Implement strategies to minimise the impact of mangrove encroachment on the Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions threatened ecological community in East Ryde.

4.2 Weeds and pathogens

Weeds

A weed is defined in this plan as any plant species not native to Lane Cove National Park. Weeds within the park and on adjoining land are of concern because they have the potential to have detrimental effects on ecological values and can spread to and from neighbouring land.

The disturbance of natural ecosystems has led to an increase in the spread of weeds in the park. In addition, impacts from the urban areas surrounding the park are continually contributing to weed invasion through processes such as dumping of garden waste, weed seeds spreading from surrounding properties, nutrient-laden stormwater runoff, animals spreading weed fruits, and sewerage overflows. These contribute to the ongoing degradation of the park's remnant vegetation communities and a possible loss in biodiversity.

The major weed species adversely affecting native plants and animals and ecological communities within the park are listed in Table 5.

Table 5. Major weeds in Lane Cove National Park

Common name	Scientific name
Alligator weed	*Alternanthera philoxeroides*
Asthma weed / pellitory	*Parietaria judaica*
Balloon vine	*Cardiospermum grandiflorum*
Bathurst / Noogoora / cockle burrs	*Xanthium* species
Blackberry	*Rubus fruticosus* aggregate
Blue grass / tussock paspalum	*Paspalum quadrifarium*
Bridal creeper	*Asparagus asparagoides*
Camphor laurel	*Cinnamomum camphora*
Cape ivy	*Delairea odorata*
Cat's claw creeper	*Macfadyena unguis-cati*
Climbing asparagus fern	*Asparagus plumosus*
Coastal morning glory	*Ipomoea cairica*
Crofton weed	*Ageratina adenophora*
Giant reed / elephant grass	*Arundo donax*
Green cestrum	*Cestrum parqui*
Ground asparagus fern	*Asparagus aethiopicus*
Lantana	*Lantana* camara
Large-leaved privet	*Ligustrum lucidum*
Ludwigia species:	
Long-leaved willow primrose	*Ludwigia longifolia*

Common name	Scientific name
Red ludwigia	*Ludwigia repens*
Water primrose / ludwigia	*Ludwigia peruviana*
Madeira vine	*Anredera cordifolia*
Mistflower	*Ageratina riparia*
Montpellier broom	*Genista monspessulana*
Morning glory	*Ipomoea indica*
Mother-of-millions	*Bryophyllum* species & hybrids
Moth vine	*Araujia sericifera*
Ochna	*Ochna serrulata*
Pampas grass	*Cortaderia selloana*
Pineapple weed	*Eryngium pandanifolium*
Senna	*Senna pendula*
Small-leaved privet	*Ligustrum sinense*
St John's wort	*Hypericum perforatum*
Trad	*Tradescantia fluminensis*
Turkey rhubarb	*Acetosa sagittata*

Most high intensity weed infestations within the park are found along urban–park interface boundaries, drainage lines and along the banks of the Lane Cove River. Small populations of weeds such as pampas grass, rhus tree (*Toxicodendron succedaneum*), ludwigia species, alligator weed, blue grass / tussock paspalum, St John's wort and Montpellier broom are usually found in isolated clumps which, once identified, make target weeding and other control measures an achievable task. Weed mapping is ongoing, to monitor weed spread and to evaluate the effectiveness of control. All the above species and most species in Table 5 are listed as noxious weeds under the *Noxious Weeds Act 1993* for the local government areas within which the park is located. The Noxious Weeds Act places an obligation on public authorities to control noxious weeds on land they occupy to the extent necessary to prevent such weeds spreading to adjoining lands.

Some of the weeds present in the park are of national significance, namely alligator weed, Madeira vine, ground asparagus fern, bridal creeper, climbing asparagus fern, lantana, Montpellier broom, blackberry and boneseed (*Chrysanthemoides monilifera* subsp. *monilifera*) (OEH 2012b).

In addition to plants which have entered the park from nearby gardens, a number of introduced plants found in the park were deliberately planted as part of gardens that pre-date the reservation of the park or as ornamental plantings in picnic areas. These include camphor laurel, Canary Island date palm (*Phoenix canariensis*), poplar (*Populus nigra* 'Italica'), liquidambar (*Liquidambar styraciflua*), jacaranda (*Jacaranda mimosifolia*), *Celtis* species, willow (*Salix babylonica*), coral tree (*Erythrina* x *sykesii*), radiata pine (*Pinus radiata*) and Chinese elm tree (*Ulmus parvifolia*). Although some introduced plants may be of historic

significance (see Section 3.5), many have spread from their original locations into bushland areas of the park.

The severity and scale of the January 1994 bushfires, in the park and surrounding bushland, contributed to a substantial increase in the level of weed infestation in the park. This was mainly due to the opening up of the understorey by fire, combined with the higher nutrient levels found along bushland boundaries and watercourses from urban stormwater and runoff. These conditions favoured introduced plant species which are adapted to high levels of disturbance and high-nutrient soils.

The Friends of Lane Cove National Park was established following the 1994 bushfire, marking the commencement of a large, community-based bush regeneration program to control and reduce weed levels within the park. There are currently over 200 volunteers working in approximately 28 groups on weed control and bush regeneration in the park. Corporate volunteer groups and NSW Technical and Further Education Commission students also assist with weeding and larger scale revegetation programs.

The 'Lane Cove National Park Weed Management Action Plan 2010–2015' (NPWS 2009) identifies priorities and strategies for weed control and includes the volunteer bush regeneration program.

Current NPWS staff weed control consists of hand weeding and herbicide control in both high use areas and bushland areas. Major work has recently been undertaken to remove weeds, stabilise and revegetate the following locations in the park: the area below the works depot, along the riparian areas between the weir and Fern Valley Picnic Area, along Lady Game Drive, the north-eastern side of De Burghs Bridge, Comenarra Parkway (Lorna Pass), River Avenue and around the recently redeveloped Jenkins Hill Precinct. Target spraying and weeding has also taken place for specific weed species such as blue grass / tussock paspalum, pampas grass, ludwigia and blackberry. In the short term, staff will focus on sites near the picnic areas and on small isolated occurrences of weeds where eradication of weeds has a high likelihood of success. Following this, and in conjunction with volunteer groups and bush regeneration contractors, priority will be given to the upper sections of the park's drainage lines.

There are likely to be changes in the relative contribution of staff, volunteers and contractors to the park's weed control and bush regeneration program. Sustained works will be programmed for higher priority weed control and bushland restoration sites as guided by the NPWS *Regional Pest Management Strategy 2012–17, Metropolitan North East Region – A new approach for reducing impacts on native species and park neighbours* (OEH 2012b). NPWS prepares regional pest management strategies which identify pest species across that region's parks and priorities for control, including actions listed in the *Priorities Action Statement* (see Sections 3.2 and 3.3), threat abatement plans, and other strategies such as the *NSW Biodiversity Priorities for Widespread Weeds* (DPI & OEH 2011) and the NSW Biosecurity Strategy (DPI 2013).

The NPWS regional pest management strategy (OEH 2012b) identifies pest species and priority programs for this park. The overriding objective of the pest management strategy is to minimise 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- or pest-specific plans or strategies need to be developed to provide a more detailed approach.

Fungal pathogens

The fungal pathogens — root rot fungus or cinnamon fungus (*Phytophthora cinnamomi*) and myrtle rust (*Uredo rangelii*) — currently pose a direct threat to biodiversity in the park.

Phytophthora flourishes in mild conditions and high moisture contents. 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 bike riding, bushwalking, road construction, bush regeneration, four-wheel driving, fire break management, revegetation activities and the planting of diseased nursery stock. Species of scribbly gum (*Eucalyptus haemastoma*) and (*E. 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 locations around the park (Suddaby & Lieu 2008).

Myrtle rust is a serious pathogen 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 park.

Phytophthora and myrtle rust hygiene protocols will be implemented across the 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 2011b).

Desired outcomes

- The impact of weeds on native plants and animals and ecosystems is minimised.
- The distribution of phytophthora root rot fungus is better understood and its spread is minimised.
- All treated weed infestations and bush regeneration sites are monitored and maintained with follow-up treatment as necessary.
- Volunteers, community groups and educational institutions are supported through on-ground supervision, advice and assistance with project management and education programs.

Management response

4.2.1 Manage introduced plants in accordance with the priorities and control methods outlined in the NPWS regional pest management strategy and in association, as far as possible, with neighbouring landholders.

4.2.2 Priority will be given to the removal of introduced species which:

- threaten the survival or integrity of threatened ecological communities, populations and species, or locally uncommon plant communities and species
- have been identified as a key threatening process under the TSC Act
- are highly invasive of undisturbed native plant communities
- have the potential to spread rapidly to undisturbed areas.

4.2.3 Continue to consult with adjacent landholders in relation to the construction of stormwater mitigation devices at key outlet points around the park to control the causes of weed infestation.

4.2.4 Consider retention of native animal habitat when undertaking weed control programs that involve extensive vegetation removal.

4.2.5 Monitor all treated weed infestations and bush regeneration sites and follow up as necessary.

4.2.6 Include bush regeneration or weed control in all park works, including prescribed burning activities, where there is the potential for weed spread.

4.2.7 Seek the cooperation of local councils, land management authorities and neighbours to implement complementary weed control programs in adjacent bushland or in areas that are identified as park weed sources.

4.2.8 Implement the park's Weed Management Action Plan 2010–2015, including any updates to the weed management plan resulting from periodic revisions of the NPWS regional pest management strategy.

4.2.9 Continue to support and encourage the Friends of Lane Cove National Park in volunteer Bushcare programs in and around the park.

4.2.10 Incorporate best practice guidelines for controlling the spread of phytophthora and myrtle rust into all relevant work programs.

4.2.11 Regularly monitor for the presence of phytophthora or myrtle rust to determine their distribution around the park.

4.2.12 Continue pest control programs, using best practice techniques, undertaken by staff, volunteers and contractors in priority areas.

4.3 Introduced animals

An introduced animal is defined in this plan as any animal species not native to the area. Introduced animals within Lane Cove National Park and on adjoining land are of concern because they have the potential to have detrimental effects on native animal communities through competition for resources, predation, disturbance and transmission of diseases. Introduced animals can also negatively affect native vegetation.

Introduced animals in Lane Cove National Park have had a profound effect on the native animal populations. The combined pressure from predation by introduced carnivores and competition with exotic herbivores has seen the decline in a number of native mammals and the possible local extinction of several species since Europeans arrived in the area.

Introduced mammals currently known to be present in the park are the European red fox (*Vulpes vulpes*), cat (*Felis catus*), dog (*Canis familiaris*), European rabbit (*Oryctolagus cuniculus*), black rat (*Rattus rattus*), brown rat (*Rattus norvegicus*) and house mouse (*Mus musculus*). The park is particularly affected by foxes, feral cats, domestic cats and domestic dogs.

Domestic cats and dogs disturb wildlife and can affect their feeding and breeding, as well as posing a direct threat to small native animals. Their presence can also diminish the visitor experience. Native fauna and important wildlife corridors are being impacted by continued illegal dog walking within areas of the park. Leashed and unleashed dogs are an ongoing issue in the mown picnic areas and along boundaries on the urban interface including River Avenue, West Chatswood.

Predation by the European red fox has been identified as a key threatening process under the TSC Act and EPBC Act (NSW SC 1998; TSSC 2000). Foxes have been implicated in the decline of many species of native fauna, especially medium-sized ground mammals and semi-arboreal mammals (Dexter & Murray 2009). Since 2000 the park has been included in the Sydney North Regional Fox Baiting Program, with twice-yearly baiting at approximately 45 bait stations throughout the park. Observations by park staff and local residents have indicated that the abundance of native mammals within the park, such as bandicoots and

wallabies, has increased dramatically since the commencement of the fox baiting program. The European red fox is designated a 'high profile pest' in the NPWS Metropolitan North East Regional Pest Management Strategy (OEH 2012b).

Occasional, targeted cat trapping is undertaken within the park, mainly in response to staff or neighbour observations of cats roaming within specific areas. A small-scale rabbit control program has been undertaken in the park in recent years. Controlling foxes and cats is being prioritised to avoid increased predation of native animals as rabbit numbers decline following the introduction of biological rabbit controls.

Introduced bird species found in the park include the common mynah (*Acridotheres tristis*), red-whiskered bulbul (*Pycnonotus jocosus*), mallard (*Anas platyrhynchos*), goose (*Anser anser*), domestic pigeon (*Columba livia*) and spotted turtle-dove (*Streptopelia chinensis*). These species displace native birds by competition for habitat, nesting sites and food resources. Mallards are commonly dumped in the park and interbreed with native ducks, resulting in hybrid individuals and the loss of the genetic integrity of the native species. Introduced ducks and geese are removed at regular intervals, however, little can be done to control other introduced birds as they are common throughout the Sydney region.

Some Australian bird species that are a long way from their natural range are found in the park. These include long-billed corellas (*Cacatua tenuirostris*), little corellas (*Cacatua sanguinea*) and sulphur-crested cockatoos (*Cacatua galerita*). These birds, are well suited to urban environments and tend to displace local native species.

Introduced fish species include the Common carp (*Cyprinus carpio*), plague minnow (*Gambusia holbrooki*) and goldfish (*Carassius auratus*). Carp are considered to be the greatest threat to native fish in the river and possible carp control methods are being investigated.

Desired outcomes

- Introduced animals are controlled.
- Control programs are implemented in association with adjoining landholders to maximise their effectiveness.
- Public understanding and appreciation of the park's native animals is increased.

Management response

4.3.1 Prepare and implement a park pest control works program consistent with the control techniques and priorities outlined in the regional pest management strategy.

4.3.2 Continue to implement the fox baiting program at least twice per year throughout the park subject to a positive increase in biodiversity.

4.3.3 Continue to remove geese, ducks and any other introduced animals released in the park.

4.3.4 Work with NSW Department of Primary Industries (Fisheries NSW) to investigate methods to remove carp from above the weir.

4.3.5 Develop a community education program to increase awareness of the problems of domestic animals in the park.

4.3.6 In association with adjacent land managers, continue to support and participate in an integrated feral animal control program.

4.3.7 Continue to enforce the NPW Regulation as necessary, in relation to the prohibition on dogs and other domestic animals in the park.

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

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 TSC Act (NSW SC 2000b).

A separate fire management strategy has been prepared for Lane Cove National Park (DEC 2006). The fire management strategy outlines the recent fire history of the park; key assets within and adjoining the park including sites of natural and cultural heritage value; fire management zones such as asset protection zones; and fire control advantages such as management trails, watercourses and moist gullies. Hazard reduction programs, ecological burning proposals and management trail work proposals are submitted annually to the Hunters Hill, Ryde, Lane Cove, Willoughby or Hornsby/Ku-ring-gai bush fire management committees as appropriate.

The geographic location and climate of Lane Cove National Park, the bushfire potential and the large number of residential park neighbours, means that fire management must focus on fire hazard reduction. Prescribed burning is undertaken in areas of the park deemed to be of high risk because of topographic considerations, aspect, fuel loads or proximity to developments. Fire protection measures within proposed new developments adjacent to the park are contained in *Planning for Bushfire Protection* (RFS 2006). Owners of adjacent existing developments may undertake measures to reduce the risk of bush fire in accordance with the *Rural Fires Act 1997* and any codes or standards under that Act.

Desired outcomes

- Fire regimes are appropriate for long-term maintenance of the park's plant and animal communities.
- Bushfire mitigation measures contribute to the cooperative protection of persons and property on or immediately adjacent to the park.
- Aboriginal sites, historic places and culturally significant features are afforded protection from damage by bushfires and fire suppression activities.

Management response

4.4.1 Manage fire in Lane Cove National Park in accordance with the park's fire management strategy.

4.4.2 Contain all wildfires in either as short a time period as possible or to achieve greatest conservation outcomes.

4.4.3 Seek effective fire protection measures within all proposed new developments adjacent to the park in accordance with *Planning for Bushfire Protection*, and encourage the involvement of park neighbours in cooperative fuel management works where appropriate.

4.4.4 As far as possible, manage visitor activities to limit human-caused bushfires within the park. This may require closing the park to public use during periods of extreme

fire danger or when weather conditions and fuel conditions present fire control problems.

4.4.5 Utilise prescribed burning to assist weed control and for approved experimental purposes where the results demonstrate direct benefits to park management.

4.4.6 Where necessary, incorporate both pre-fire and post-fire weeding in prescribed burning activities.

4.4.7 Aim to exclude fire from riparian zones, closed forest and mangrove communities and maintain an appropriate diversity of age classes in open forest, woodland, tall scrubland and sedgeland communities found in the park.

4.4.8 Use natural fire advantages and strategic control lines to control fires where possible.

4.4.9 Construct temporary wildfire control lines and tracks if necessary for fire control or other emergency operations. Rehabilitate all new tracks or areas disturbed by fire suppression activities as soon as possible after each emergency.

4.4.10 Maintain close contact with the NSW Rural Fire Service, NSW Fire and Rescue, bush fire management committees, local police units and local councils to facilitate a coordinated approach to fire planning and firefighting both within the park and in the valley as a whole.

4.4.11 Conduct research into the effects of fire on weed establishment and spread and the effectiveness of prescribed burning as a weed management tool.

4.4.12 Encourage appropriate fire regimes and practices for management of native species.

4.4.13 Continue to manage fire management trails according to best practice guidelines for routine maintenance and soil conservation.

4.5 Isolation and fragmentation

The area surrounding Lane Cove National Park has been extensively cleared and developed, resulting in a high loss of biodiversity and fragmentation of habitat in the region (Martyn 1994; Douglas 1997). Continuing development of small areas of bushland in the vicinity of the park, and incursions along bush edges are exacerbating this problem. Long-term conservation of biodiversity depends on the protection, enhancement and connection of remaining habitat across the landscape, incorporating vegetation remnants on both public and private lands. Nearby vegetated areas contribute to the habitat values of the park and provide ecological corridors to other vegetated areas. Maintaining the integrity of the remaining habitat within the park and, where possible, linking this to adjacent areas of vegetation is important to the long-term viability of the park's biological values.

The Lane Cove River valley forms the core of a viable and regionally significant bushland habitat corridor. The management of the corridor and its core habitat components for nature conservation is important for sustaining resident, migratory, nomadic and vagrant species. Lack of connectivity currently causes barriers to the dispersal of native plant and animal species, and has already resulted in a number of local extinctions in the catchment. To prevent further local extinctions, the habitat corridor, and in particular the core areas of the upper catchment, must be conserved.

Desired outcomes

- The biodiversity of the park and the Lane Cove River catchment is maintained and increased.
- Strategic additions to the park are investigated and pursued.

Management response

4.5.1 Continue liaison with public and private land managers to identify and formalise potential new strategic additions to the park and achieve consistent management objectives for the bushland corridor. Targeted areas will be those that provide long-term connectivity and enhance biodiversity.

4.5.2 Liaise with neighbours, catchment management authorities and other agencies to encourage retention of native vegetation and improvement of vegetation condition adjacent to the park.

4.5.3 Continue to review and assess the impacts of any new developments adjoining park boundaries with an aim to minimise the impacts of edge effects and fragmentation on biodiversity, and to preserve the visual amenity of park.

4.5.4 Encourage protection of areas of bushland adjacent to the park through methods such as voluntary conservation agreements, working closely with local councils and engaging with planning committees.

4.5.5 Assess the long-term viability, restoration and management needs of the riparian corridor located within the park between the weir and Sugarloaf Point.

4.6 Climate change

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

The latest information on projected changes to climate are from the NSW and ACT Regional Climate Modelling (NARClim) project (OEH 2014b). The climate projections for 2020–2039 are described as 'near future'; and projections for 2060–2079 are described as 'far future.' The snapshot shown in Table 6 is for the Metropolitan Sydney Region which includes Lane Cove National Park (OEH 2014b).

Table 6: Metropolitan Sydney climate change snapshot

Projected temperature changes	
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**
Projected rainfall changes	
Rainfall is projected to **decrease** in spring and winter	Rainfall is projected to **increase** in summer and autumn
Projected Forest Fire Danger Index changes	
Average fire weather is projected to **increase** in spring in the far future	Severe fire weather days are projected to **increase** in summer and spring in the far future

Source: OEH 2014b

The projected increases in temperature, number of hot days and severe fire weather days (OEH 2014b) are likely to influence bushfire frequency and intensity across the Metropolitan Sydney Region and result in an earlier start to the bushfire season (DECCW 2010). Higher rainfalls in summer and autumn are likely to accelerate all forms of soil erosion across the region and increase runoff at these times of year which, in turn, is likely to impact the stormwater system and, where capacity is reached, cause flooding (DECCW 2010).

Climate change may significantly affect biodiversity by changing the size of populations and the distribution of species, and altering the geographical extent and species composition of habitats and ecosystems. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates.

If climate change results in wetter summer and autumn seasons and warmer temperatures, as predicted for the Sydney region, it may lead to a greater virulence of *Phytophthora cinnamomi* and potential expansion of its current range (DECC 2007b). As discussed in Section 4.2, phytophthora root rot fungus has the potential to have an adverse impact on biodiversity resulting in species decline. Monitoring to determine distribution and measures to prevent its spread need to be put in place, particularly given the potential for climate change to exacerbate its impact (Suddaby & Lieu 2008).

Projections for sea level rise along the NSW coast are for a rise relative to 1990 mean sea levels of up to 40 centimetres by 2050 and 90 centimetres by 2100 (DECCW 2010). Sea level rise is a gradual process and will have medium- to long-term impacts. It will impact coastal land and foreshore land around estuaries, bays and harbours, increasing the tidal inundation of foreshore land and structures. Low-lying areas along Lane Cove River estuary will be most at risk, especially threatened ecological communities such as Coastal Saltmarsh and Swamp Oak Floodplain Forest. Visitor sites such as picnic areas and Sugarloaf Point are expected to be affected.

Programs to reduce the pressures arising from other threats, such as habitat fragmentation, invasive species, bushfires, pollution and urban expansion, will help reduce the severity of the effects of climate change.

Desired outcome

- The impacts of climate change on natural systems are minimised and managed.

Management response

4.6.1 Continue existing fire, pest and weed management and bushland restoration programs and adapt where required to minimise climate change–induced threats.

4.6.2 Investigate the potential impact that climate change is likely to have on the distribution and virulence of *Phytophthora cinnamomi*, and incorporate the results of the investigation into future operations and management programs.

4.6.3 Assess the likely impacts of sea level rise on the park's values and infrastructure using regional climate change projections, and implement strategies to minimise impacts.

5. Management operations and other uses

In order to protect park values, provide opportunities for visitors and facilitate management operations, it is important to build and maintain appropriate infrastructure. Infrastructure may also be provided on the park by other authorities or for other purposes authorised under the NPW Act.

Lane Cove National Park has an irregular and disjointed boundary. Visitors and neighbours are often unaware of the actual location of the park boundary, resulting in management issues such as encroachment.

There are two major roads within the park. Riverside Drive — which follows the river from the entrance gate near Fullers Bridge on Delhi Road up to the De Burghs Bridge entrance on Lane Cove Road — is designated as a public road and hence is maintained by Roads and Maritime Services. Riverside Drive provides access to all the picnic areas situated on the Ryde side of the river. Max Allen Drive — which services the eastern side of the park up to the Thistlethwaites Picnic Area — is designated a park road and is maintained by NPWS. This road also provides access to the park works depot and two park houses. To control vandalism and antisocial behaviour, the park is closed to privately owned motorised vehicles at night.

Both sides of the river are linked by the Lane Cove weir at the lower end of the park. The weir was constructed during the 1930s and has been progressively deteriorating since that time. Due to its narrow width and structural condition, the weir is currently only open to use by NPWS vehicles, and cyclists and pedestrians.

Sections of the Great North Walk run through the park. The track is generally maintained by NSW Department of Primary Industries (Lands) although minor work, such as trimming of vegetation and minor erosion control, are undertaken by park staff.

The park also contains a number of management trails that primarily serve as fire breaks and provide access for fire management (Map 1). A management trail provides access from the works depot to the picnic areas and to Bradfield Road. There is some illegal use of these trails by motor vehicles and trail bikes which causes damage to the trails and increases maintenance costs.

The park has a number of buildings that are used wholly or partly for park management purposes. These are Jenkins Hall and the old administration building (which are both located in the Jenkins Hill Precinct), the works depot and the Lane Cove River Tourist Park office (see Map 2 and Map 3). Residential buildings include Foremans Cottage and Schwartz Cottage near the works depot, De Burghs Cottage on Riverside Drive, a house at number 11 River Avenue and a house in the tourist park. Of these, Foremans Cottage and De Burghs Cottage are currently used as NPWS staff residences. Schwartz Cottage and 11 River Avenue may be investigated for new adaptive uses to support sustainable visitor and tourist services (see Section 3.6). The works depot is in poor condition and is currently in need of a major upgrade.

There are several sewerage lines, powerlines, water lines and water mains traversing the park. Killara Golf Club has a licence to pump water from the river through an on-park pipeline and other NSW Government utilities have some formal easements for their pipes, towers and overhead cables as well as rights of access to service their on-park infrastructure according to current protocols and agreements in place with NPWS. Legal arrangements are required to formalise those services and access requirements not already covered by a licence, agreement or easement and to minimise impacts. Due to the narrow configuration and small size of the park, any further such developments in the park are generally considered inappropriate. No proposals relating to new utility services or other easements will be

approved unless it can be demonstrated there is a direct benefit to the park's core values and no practical alternatives are available.

Desired outcomes

- Management facilities adequately serve park management needs and have acceptable environmental impact.
- Existing non-park infrastructure is managed to minimise impacts on cultural, natural and recreational values.

Management response

5.1.1 Erect signs where necessary to designate park boundaries.

5.1.2 Continue to close the park to vehicular traffic at night.

5.1.3 Negotiate management agreements with utility infrastructure providers and apply conditions contained in memoranda of understanding and protocols currently in place to cover sewerage lines, water mains and powerlines that cross the park.

5.1.4 Maintain the management trails shown on Maps 1 and 2 in this plan and restrict vehicular use to park management purposes. Close and revegetate other vehicle tracks that are not part of the management trail or vehicle access system.

5.1.5 Maintain regular liaison with the NSW Roads and Maritime Services in relation to park management issues along Riverside Drive.

5.1.6 Undertake an upgrade of the park works depot including the workshop building.

6. Implementation

This plan of management establishes a scheme of operations for Lane Cove National Park. Implementation of this plan will be undertaken within the annual programs of the NPWS Metropolitan North East Region and other relevant OEH sections.

Identified activities for implementation are listed in Table 6. Relative priorities are allocated against each activity as follows:

High priority activities are imperative to achieve the objectives and desired outcomes of this plan. They must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.

Medium priority activities are those that are necessary to achieve the objectives and desired outcomes but are not urgent.

Low priority activities are desirable to achieve management objectives and desired outcomes but can wait until resources become available.

Ongoing is for activities that are undertaken on an annual basis or statements of management intent that will direct the management response if an issue arises.

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

Table 7. Summary of management responses

Section	Management response	Priority
3.1 Geology, landforms and hydrology		
3.1.1	Ensure earthworks undertaken in the park do not impact areas of significant geology, do not cause further channel change, use geologically similar soils, and are designed and undertaken in a manner which minimises soil erosion and incorporates soil conservation principles.	Ongoing
3.1.2	Locate and design any management and visitor facilities to minimise their visual impact from public access roads and vantage points, and liaise with neighbours and land use authorities as needed to minimise the impact of adjacent land use on views from the main vantage points in the park.	Ongoing
3.1.3	Continue to work with local councils and other authorities to implement strategies outlined in plans prepared for the Lane Cove River Catchment.	Ongoing
3.1.4	Preserve and enhance the pristine catchment values of the Byles Creek tributary and creeks of a similar nature by minimising vehicle and pedestrian access to these areas. Closing informal tracks will be a priority.	High
3.1.5	Continue to give a high priority to weed removal and re-establishment of a stable and strengthened plant community along creek lines.	High
3.1.6	Continue to undertake erosion control works, stormwater mitigation programs and to remove any blockages along stream channels that may restrict flows or impact channel stability e.g. logs blocking the river upstream of the Browns Waterhole cycleway culvert.	High
3.1.7	Reduce the incidence, extent and severity of damage associated with visitor use and recreational activities by closing, redirecting or	High

Section	Management response	Priority
	rehabilitating access roads and tracks that are contributing to the degradation of areas.	
3.1.8	Continue to undertake best practice erosion control works across all aspects of park operations including facility construction and maintenance, revegetation, bush regeneration, bushfire hazard reduction activities and site remediation.	High
3.2 Native plants		
3.2.1	Ensure all activities undertaken in the park have minimal impact on native vegetation, and where there are unavoidable impacts, rehabilitate damage.	Ongoing
3.2.2	Implement relevant actions set out in the *Priorities Action Statement* and recovery plans. Continue to monitor the status of significant and threatened plant species, populations and communities to evaluate the success of management programs.	High
3.2.3	Undertake revegetation of small selected areas of the park with seed collected from within the park. Priority areas will include selected areas along River Avenue, the old model aircraft field in the northern section of the park, areas of major weed infestation, areas near De Burghs Bridge, areas to be closed to public use, and the edges of Little Blue Gum Creek.	Medium
3.2.4	Continue current weed control programs within the park that aim to conserve threatened ecological communities, species and populations or that address key threatening processes such as exotic vine control and the control of exotic grasses.	High/ Ongoing
3.2.5	Continue to support ongoing volunteer programs and works programs that aim to conserve and enhance biodiversity throughout the park.	High/ Ongoing
3.2.6	Liaise with other government departments responsible for maintaining infrastructure in Lane Cove National Park in relation to the protection of threatened native plants located near access trails, easements, pipes, cables and towers located in the park.	High/ Ongoing
3.3 Native animals		
3.3.1	Care will be taken when maintaining tracks and roads within the park to ensure that there is minimal impact on threatened animals such as the red-crowned toadlet.	Ongoing
3.3.2	Herbicide use will be discouraged in areas identified as containing red-crowned toadlets, and as far as possible avoided in preferred or identified habitation sites.	Ongoing
3.3.3	Continue to undertake a fox baiting program throughout the park, and continue to encourage surrounding land managers, such as local councils, to continue fox control on their lands.	High/ Ongoing
3.3.4	Undertake other measures as needed to assist protection of threatened fauna including implementation of priority actions set out in the *Priorities Action Statement* and any recovery plans prepared for species that occur in the park.	Ongoing

Section	Management response	Priority
3.3.5	Encourage research into the habitat requirements, status and distribution of native animals in the park, particularly uncommon and threatened species.	Medium
3.3.6	Liaise with other government departments responsible for maintaining infrastructure in Lane Cove National Park in relation to the protection of threatened fauna species located near access trails, easements, pipes, cables and towers located in the park.	Ongoing
3.3.7	Undertake fauna surveys in the park to determine the effectiveness of current pest control programs.	Medium
3.3.8	Continue to educate park users on the impacts of feeding animals (especially ducks), and other wildlife management issues such as dog walking.	Ongoing
3.4 Aboriginal heritage		
3.4.1	Aboriginal sites in the park will be conserved and managed in consultation with the Metropolitan Local Aboriginal Land Council and other relevant Aboriginal community organisations and individuals.	Ongoing
3.4.2	Due to the fragility of most sites in the park, locations of Aboriginal sites will not generally be publicised.	Ongoing
3.4.3	Regular inspections of the park's Aboriginal sites will be undertaken, with the Metropolitan Local Aboriginal Land Council and other relevant Aboriginal community organisations invited to attend.	Ongoing
3.4.4	Surveys, inventory and research into Aboriginal occupation and use of the park will be encouraged. Priority will be given to site surveys of Fairyland, Fox Valley and the park area upstream of De Burghs Bridge including the Pennant Hills additions.	High
3.4.5	Investigate the possible remediation and conservation management of damaged or weathered engraving sites.	Low
3.4.6	Investigate options for interpretation of publicly accessible sites such as Commandment Rock.	Medium
3.5 Historic heritage		
3.5.1	Conservation assessments including, where necessary, the preparation of conservation plans or heritage action statements, will precede any works on a historic structure other than routine maintenance or urgent stabilisation work.	Ongoing
3.5.2	Factors likely to cause deterioration of the fabric of historic sites will be identified and remedial actions undertaken as necessary.	High
3.5.3	Signs interpreting the history of the area will be erected at Porters Bridge, near the weir and at other selected stonework areas. Additional cultural heritage information will also be provided at Jenkins Hill.	Medium
3.5.4	The artefacts and other heritage items of Fairyland will be catalogued, selected elements displayed, and a management agreement developed to cover the artefacts held by the Ryde District Historical Society.	Medium

Section	Management response	Priority
3.5.5	Vegetation will be periodically removed from depression-era stone work along Riverside Drive to prevent its further deterioration.	High
3.5.6	Encourage further investigation into the history of the park, including the Baker family's use of the area.	Low
3.5.7	Undertake conservation restoration works for heritage items in accordance with conservation management plans and heritage action statements.	High
3.5.8	Where practical and in keeping with the setting, picnic shelters and park furniture will be maintained sympathetically within the park's historical context rather than replaced with new infrastructure.	Ongoing
3.6 Visitor use, recreation and education		
3.6.1	Investigate options for the future use of facilities and buildings in the Jenkins Hill Precinct and along Max Allen Drive.	High
3.6.2	Permit public vehicles only on the public access roads shown on Maps 1 and 2 (labelled as 'Park Road – Sealed') in this plan.	Ongoing
3.6.3	Erect flat-topped speed humps, speed limit signs and signs warning of cyclists and walkers sharing the roads at strategic locations along Riverside Drive (in consultation with the NSW Roads and Maritime Services traffic committee) and Max Allen Drive.	High
3.6.4	Stabilise the sections of the river bank along Max Allen Drive that have been undermined by the river.	High
3.6.5	Permit bicycles on sealed park roads, shared-use cycleways and management trails within the park (see Maps 1 and 2) but not on walking tracks.	Ongoing
3.6.6	Contribute to planning for a cross-tenure, integrated cycling network including linking to train stations to allow for a more continuous bike riding circuit.	Medium
3.6.7	Continue to prohibit horse riding in the park.	Ongoing
3.6.8	In high usage areas, maintain picnic areas and provide additional picnic facilities, shelters and barbecues as necessary.	High
3.6.9	Maintain Sugarloaf Point and the other walk-in picnic areas as small, basic areas with limited facilities, where fires are not permitted and visitors remove their rubbish.	Ongoing
3.6.10	Assess small and informal picnic areas and selectively close, and if appropriate rehabilitate rarely used areas.	Low
3.6.11	Undertake planting of local species to screen parking areas, toilets and other buildings, and in some of the larger picnic areas to break up the areas into smaller areas.	Medium
3.6.12	Monitor the efficiency of the absorption trench system at Tunks Hill with a long-term view of incorporating it into the sewerage system.	Medium

Section	Management response	Priority
3.6.13	Progressively install gas or electric barbecues to replace wood barbecues. Priority will be given to those areas that are available for booking and the high use picnic areas near the weir.	Medium
3.6.14	Permit the use of personal gas or similar portable stoves and manage the use of heat bead and charcoal stoves more effectively through signage, education and interpretation programs.	Ongoing
3.6.15	Maintain the existing children's play equipment at the Lane Cove River Tourist Park for its safe operational life. In the longer term this conventional playground will move towards an adventure-style, low maintenance facility that is consistent with the national park experience.	Low
3.6.16	Provide additional play equipment at Jenkins Hill to add variety and increase consistency with conservation principles of national parks.	High
3.6.17	Retain the walking tracks shown on Maps 1 and 2 and if required undertake some minor re-routing for environmental protection.	High
3.6.18	Close and rehabilitate informal tracks that are not part of the walking track system and unauthorised bike tracks.	High
3.6.19	Continue to install directional and information signs where needed, including along the Great North Walk, through Fairyland and along the Riverside Walk.	Medium
3.6.20	Investigate the feasibility of providing a pedestrian link between the Great North Walk and the Riverside Walk without the need to cross De Burghs Bridge, and the feasibility of a walk linking Macquarie University to the Great North Walk, encompassing an all-weather crossing at Browns Waterhole	Medium
3.6.21	Upgrade the section of Riverside Walk between the boardwalk and the Lane Cove Boatshed to provide a short walk with wheelchair and pram access.	Medium
3.6.22	Continue to liaise with NSW Department of Primary Industries (Lands) in relation to the maintenance and management of the Great North Walk.	Ongoing
3.6.23	Lease the Lane Cove Boatshed for one or more of the purposes listed in Section 3.6 of this plan of management.	High
3.6.24	Liaise with City of Ryde Council and Roads and Maritime Services to construct a footpath between Lane Cove River Tourist Park and the Delhi Road bus stop and railway station.	High
3.6.25	Continue to prohibit power boats above the weir, except for park or waterway management purposes.	Ongoing
3.6.26	Continue to liaise with waterways authorities to ensure 4 knot zone limits are regulated downstream of the weir.	Ongoing
3.2.27	Investigate the option of providing off-street parking for cars launching canoes along River Avenue, West Chatswood.	Low
3.6.28	Investigate the construction of small launching facilities for canoes and other small, non-trailerable, non-motorised boats near Casuarina Flat and	Low

Section	Management response	Priority
	Wirrong Flat picnic areas on River Avenue, and at Cottonwood Glen Picnic Area.	
3.6.29	Continue to maintain the tourist park as an ecotourism and sustainable facility providing camping, caravan sites, cabin accommodation, interpretation and food for guests, including potentially a kiosk/cafe. Any leases of the tourist park will be for one or more of those purposes listed in Section 3.6 of this plan of management. Assess the need for additional cabins but do not allow any additional buildings or vans to be used for long-term tenancy.	Ongoing
3.6.30	Generators may be used in the tourist park without consent subject to conditions.	Ongoing
3.6.31	Assess Scribbly Gums Picnic Area with a view to providing walk-in camping in temporary and fixed tents under the management of the Lane Cove River Tourist Park.	Low
3.6.32	New buildings, building extensions and additions may be constructed within the Jenkins Hill Precinct to support lease operations within existing buildings. Any new buildings or structures are to be located within the Jenkins Hill Precinct boundary shown on Map 3.	Medium
3.6.33	Investigate the use of Schwartz Cottage and 11 River Avenue for one or more of those purposes listed in Section 3.6 of this plan of management.	Ongoing
3.6.34	Ensure that detrimental impacts along the tourist park/bushland interface are being monitored and mitigated, including liaison with regulators.	Ongoing
3.6.35	Investigate potential uses for Jenkins Kitchen that are consistent with maintaining its cultural heritage value. These may include using or leasing it for one or more of those purposes listed in Section 3.6 of this plan of management.	Ongoing
3.6.36	Investigate utilising Jenkins Hall for one or more of those purposes listed in Section 3.6 of this plan of management. If part of it is leased as a cafe, the cafe will have set standard trading hours with the ability to hold functions and events, with prior management approval, within and outside of standard trading hours. A gate will be installed along Max Allen Drive to restrict after-hours vehicle access.	Ongoing
3.6.37	Group activities may be permitted depending on impact and subject to certain controls to minimise impacts on the park and other visitors. Preference will be given to nature-based activities that facilitate understanding and appreciation of the natural and cultural heritage values of the park, and applications will be assessed in accordance with relevant NPWS policies. All commercial activities will require a licence, and group activities involving more than 30 people require a written consent.	Ongoing
3.6.38	The use of generators, amplified music or other sound generating devices is prohibited within Lane Cove National Park (excepting the tourist park) without prior written NPWS consent.	Ongoing
3.6.39	Assess applications for filming and photography and prescribe conditions to minimise impacts on park values as per NPWS policy. Filming will not be permitted in threatened ecological communities or near threatened species or populations.	Ongoing

Section	Management response	Priority
3.6.40	Emphasise the following themes in interpretation programs: – the need for ongoing protection of the environment – the value of bush regeneration work – the problems of urban pressures such as weeds, fire and stormwater – the need for coordinated catchment protection – the history of human occupation and use of the valley – changes which have occurred in use of the area over time – environmental sustainability.	Ongoing
3.6.41	Increase opportunities at Jenkins Hall for interpretation, sales and general park information.	Medium
3.6.42	Investigate potential future options for Kukundi that fall under one or more of those uses listed in Section 3.6 of this plan of management or revegetate the area. Retain the flight aviary for the rehabilitation of sick or injured native animals, subject to ongoing maintenance requirements, but there will be no long-term holding of animals. Remove unnecessary buildings and infrastructure.	High
3.6.43	Continue to support community involvement in the park, particularly involvement in bush regeneration programs, guided walks, educational activities and catchment management programs.	Ongoing
3.6.44	Replace and upgrade the current fishing signs and ‘swimming is not advisable’ signs.	Medium
3.6.45	Monitor visitor levels, satisfaction and impacts of recreational use, and take action to minimise impacts as necessary.	Ongoing
3.6.46	Investigate the feasibility of modifying the section of Riverside Drive at Delhi Road entrance to provide for more parking and safer passage through the entrance station.	High
3.6.47	Stabilise the concrete slipway and foreshore located at Lane Cove Boatshed.	High
3.6.48	Install signage to direct overflow vehicles from the Delhi Road entrance to The Oaks car park.	Medium
3.6.49	Investigate the potential use of the Alfred Cook Flat Picnic Area for additional car parking to meet future demand.	Medium
3.6.50	Assess all existing amenities blocks throughout the park and develop a program of works to upgrade, replace or close them based on maintenance requirements and usage.	High
3.6.51	Investigate the future use of the old administration building for one or more of those purposes listed in Section 3.6 of this plan of management.	Medium
4.1 Pollution and runoff		
4.1.1	Design and undertake all works in a manner that minimises soil erosion and water pollution.	Ongoing

Section	Management response	Priority
4.1.2	Avoid altering natural drainage patterns, and undertake control of erosion and restoration of natural drainage where it has been altered by human activity.	Ongoing
4.1.3	Continue the installation of water quality improvement devices such as sediment basins and pollution traps at key sites around the park such as stormwater outlets.	High
4.1.4	Undertake erosion control and stabilisation work along the Great North Walk and Riverside Walk.	Ongoing
4.1.5	Formalise and stabilise, or close and revegetate informal tracks formed by people making their own routes near the picnic areas.	Medium
4.1.6	Continue to work with local councils and other authorities to facilitate the development and implementation of strategies to improve the water quality of the Lane Cove River. Cooperation will be sought to control runoff from gardens, golf courses, ovals, roads, rubbish tips and other developments, to upgrade the sewerage systems in the catchment to reduce the incidence of sewage overflowing into the river and to reduce sedimentation, nutrient levels and gross pollutants within the catchment.	High/ Ongoing
4.1.7	Develop agreements and liaise with neighbouring land managers in relation to installation of stormwater mitigation devices, and locate them outside the park where possible.	High
4.1.8	Erect interpretive signs near the weir explaining the need for total catchment management of the Lane Cove River.	Low
4.1.9	Continue and expand active engagement with universities, schools and volunteers in water pollution research, monitoring, mitigation and nutrient removal projects in the Lane Cove River catchment.	Ongoing
4.1.10	Should the weir become severely damaged or destroyed, the environmental, heritage, social and economic costs and benefits of replacing it with a new weir will be assessed.	Ongoing
4.1.11	Investigate the feasibility of removing sediment accretions at the historic Fairyland tidal gate.	Medium
4.1.12	Implement strategies to minimise the impact of mangrove encroachment on the Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions threatened ecological community in East Ryde.	High
4.2 Weeds		
4.2.1	Manage introduced plants in accordance with the priorities and control methods outlined in the NPWS regional pest management strategy and in association, as far as possible, with neighbouring landholders.	High
4.2.2	Priority will be given to the removal of introduced species which: – threaten the survival or integrity of threatened ecological communities, populations and species, or locally uncommon plant communities and species – have been identified as a key threatening process under the TSC Act	Ongoing

Section	Management response	Priority
	– are highly invasive of undisturbed native plant communities – have the potential to spread rapidly to undisturbed areas.	
4.2.3	Continue to consult with adjacent landholders in relation to the construction stormwater mitigation devices at key outlet points around the park to control the causes of weed infestation.	Ongoing
4.2.4	Consider retention of native animal habitat when undertaking weed control programs that involve extensive vegetation removal.	Ongoing
4.2.5	Monitor all treated weed infestations and bush regeneration sites and follow up as necessary.	High
4.2.6	Include bush regeneration or weed control in all park works, including prescribed burning activities, where there is the potential for weed spread.	Ongoing
4.2.7	Seek the cooperation of local councils, land management authorities and neighbours to implement complementary weed control programs in adjacent bushland or in areas that are identified as park weed sources.	Ongoing
4.2.8	Implement the park's Weed Management Action Plan 2010–2015, including any updates to the weed management plan resulting from periodic revisions of the NPWS regional pest management strategy.	High
4.2.9	Continue to support and encourage the Friends of Lane Cove National Park in volunteer Bushcare programs in and around the park.	High/ Ongoing
4.2.10	Incorporate best practice guidelines for controlling the spread of phytophthora and myrtle rust into all relevant work programs.	Ongoing
4.2.11	Regularly monitor for the presence of Phytophthora and myrtle rust to determine its distribution around the park.	Ongoing
4.2.12	Continue pest control programs, using best practice techniques, undertaken by staff, volunteers and contractors in priority areas.	Ongoing
4.3 Introduced animals		
4.3.1	Prepare and implement a park pest control works program consistent with the control techniques and priorities outlined in the regional pest management strategy.	Ongoing
4.3.2	Continue to implement the fox baiting program at least twice per year throughout the park subject to a positive increase in biodiversity.	High/ Ongoing
4.3.3	Continue to remove geese, ducks and any other introduced animals released in the park.	Ongoing
4.3.4	Work with NSW Department of Primary Industries (Fisheries NSW) to investigate methods to remove carp from above the weir.	Low
4.3.5	Develop a community education program to increase awareness of the problems of domestic animals in the park.	Medium
4.3.6	In association with adjacent land managers, continue to support and participate in an integrated feral animal control program.	High

Section	Management response	Priority
4.3.7	Continue to enforce the NPW Regulation as necessary, in relation to the prohibition on dogs and other domestic animals in the park.	High
4.4 Fire		
4.4.1	Manage fire in Lane Cove National Park in accordance with the park's fire management strategy.	Ongoing
4.4.2	Contain all wildfires in either as short a time period as possible or to achieve greatest conservation outcomes.	Ongoing
4.4.3	Seek effective fire protection measures within all proposed new developments adjacent to the park in accordance with *Planning for Bushfire Protection,* and encourage the involvement of park neighbours in cooperative fuel management works where appropriate.	Ongoing
4.4.4	As far as possible, manage visitor activities to limit human-caused bushfires within the park. This may require closing the park to public use during periods of extreme fire danger or when weather conditions and fuel conditions are such as to present fire control problems.	Ongoing
4.4.5	Utilise prescribed burning to assist weed control and for approved experimental purposes where the results demonstrate direct benefits to park management.	Ongoing
4.4.6	Where necessary, incorporate both pre-fire and post-fire weeding in prescribed burning activities.	Ongoing
4.4.7	Aim to exclude fire from riparian zones, closed forest and mangrove communities and maintain an appropriate diversity of age classes in open forest, woodland, tall scrubland and sedgeland communities found in the park.	High/ Ongoing
4.4.8	Use natural fire advantages and strategic control lines to control fires where possible.	Ongoing
4.4.9	Construct temporary wildfire control lines and tracks if necessary for fire control or other emergency operations. Rehabilitate all new tracks or areas disturbed by fire suppression activities as soon as possible after each emergency.	Ongoing
4.4.10	Maintain close contact with the NSW Rural Fire Service, NSW Fire and Rescue, bush fire management committees, local police units and local councils to facilitate a coordinated approach to fire planning and firefighting both within the park and in the valley as a whole.	Ongoing
4.4.11	Conduct research into the effects of fire on weed establishment and spread and the effectiveness of prescribed burning as a weed management tool,	Medium
4.4.12	Encourage appropriate fire regimes and practices for management of native species.	Ongoing
4.4.13	Continue to manage fire management trails according to best practice guidelines for routine maintenance and soil conservation.	Ongoing

Section	Management response	Priority
4.5 Isolation and fragmentation		
4.5.1	Continue liaison with public and private land managers to identify and formalise potential new strategic additions to the park and achieve consistent management objectives for the bushland corridor. Targeted areas will be those that provide long-term connectivity and enhance biodiversity.	Medium
4.5.2	Liaise with neighbours, catchment management authorities and other agencies to encourage retention of native vegetation and improvement of vegetation condition adjacent to the park.	Ongoing
4.5.3	Continue to review and assess the impacts of any new developments adjoining park boundaries with an aim to minimise the impacts of edge effects and fragmentation on biodiversity, and to preserve the visual amenity of park.	Ongoing
4.5.4	Encourage protection of areas of bushland adjacent to the park through methods such as voluntary conservation agreements, working closely with local councils and engaging with planning committees.	Ongoing
4.5.5	Assess the long-term viability, restoration and management needs of the riparian corridor located within the park between the weir and Sugarloaf Point.	Medium
4.6 Climate change		
4.6.1	Continue existing fire, pest and weed management and bushland restoration programs and adapt where required to minimise climate change–induced threats.	Ongoing
4.6.2	Investigate the potential impact that climate change is likely to have on the distribution and virulence of *Phytophthora cinnamomi*, and incorporate the results of the investigation into future operations and management programs.	Medium
4.6.3	Assess the likely impacts of sea level rise on the park's values and infrastructure using regional climate change projections and implement strategies to minimise impacts.	Medium
5.0 Management and operations		
5.1.1	Erect signs where necessary to designate park boundaries.	Low
5.1.2	Continue to close the park to vehicular traffic at night.	Ongoing
5.1.3	Negotiate management agreements with utility infrastructure providers and apply conditions contained in memoranda of understanding and protocols currently in place to cover sewerage lines, water mains and powerlines that cross the park.	High
5.1.4	Maintain the management trails shown on Maps 1 and 2 in this plan and restrict vehicular use to park management purposes. Close and revegetate other vehicle tracks that are not part of the management trail or vehicle access system.	Ongoing
5.1.5	Maintain regular liaison with the NSW Roads and Maritime Services in relation to park management issues along Riverside Drive.	Ongoing

Section	Management response	Priority
5.1.6	Undertake an upgrade of the park works depot including the workshop building.	High

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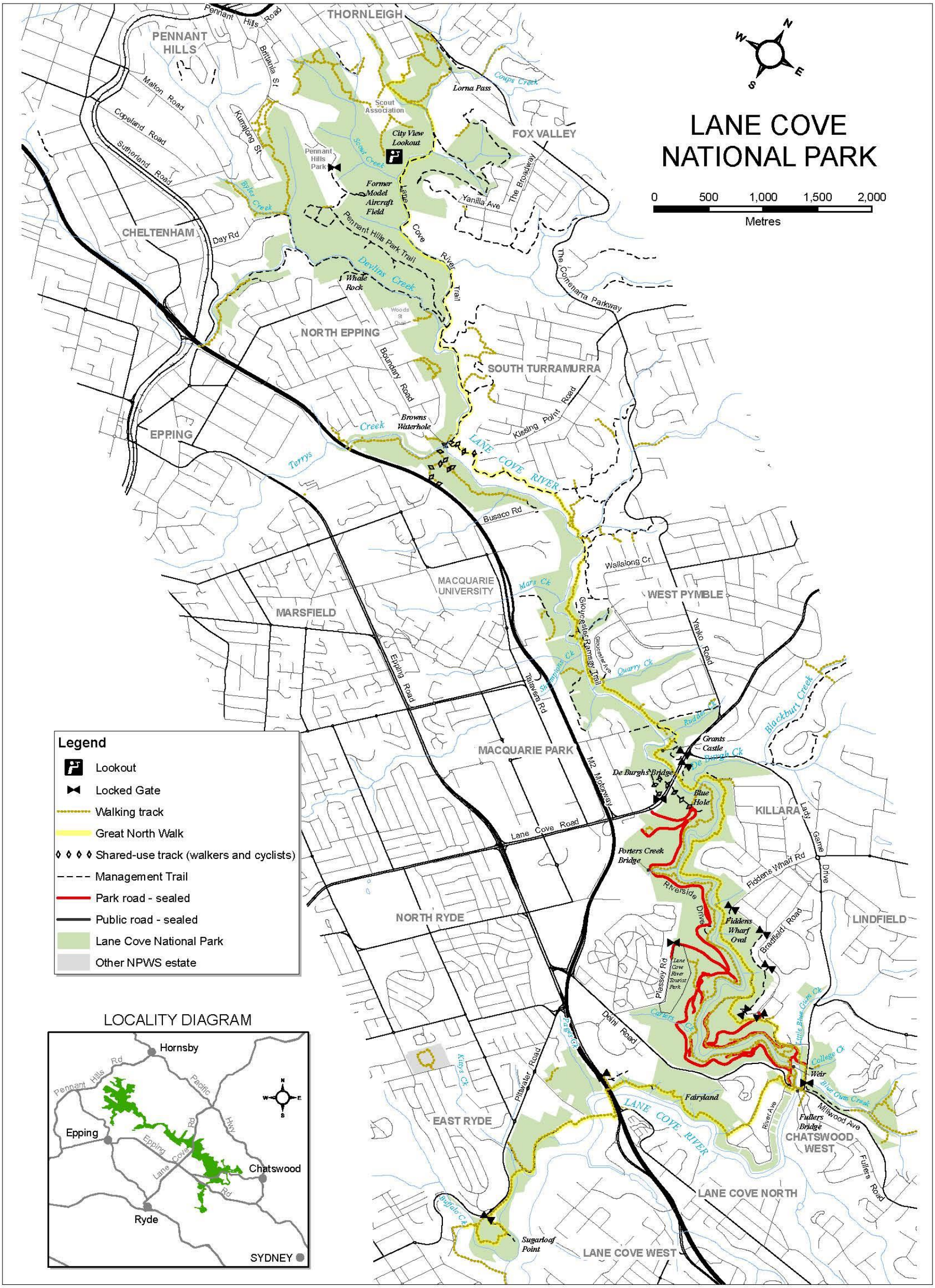
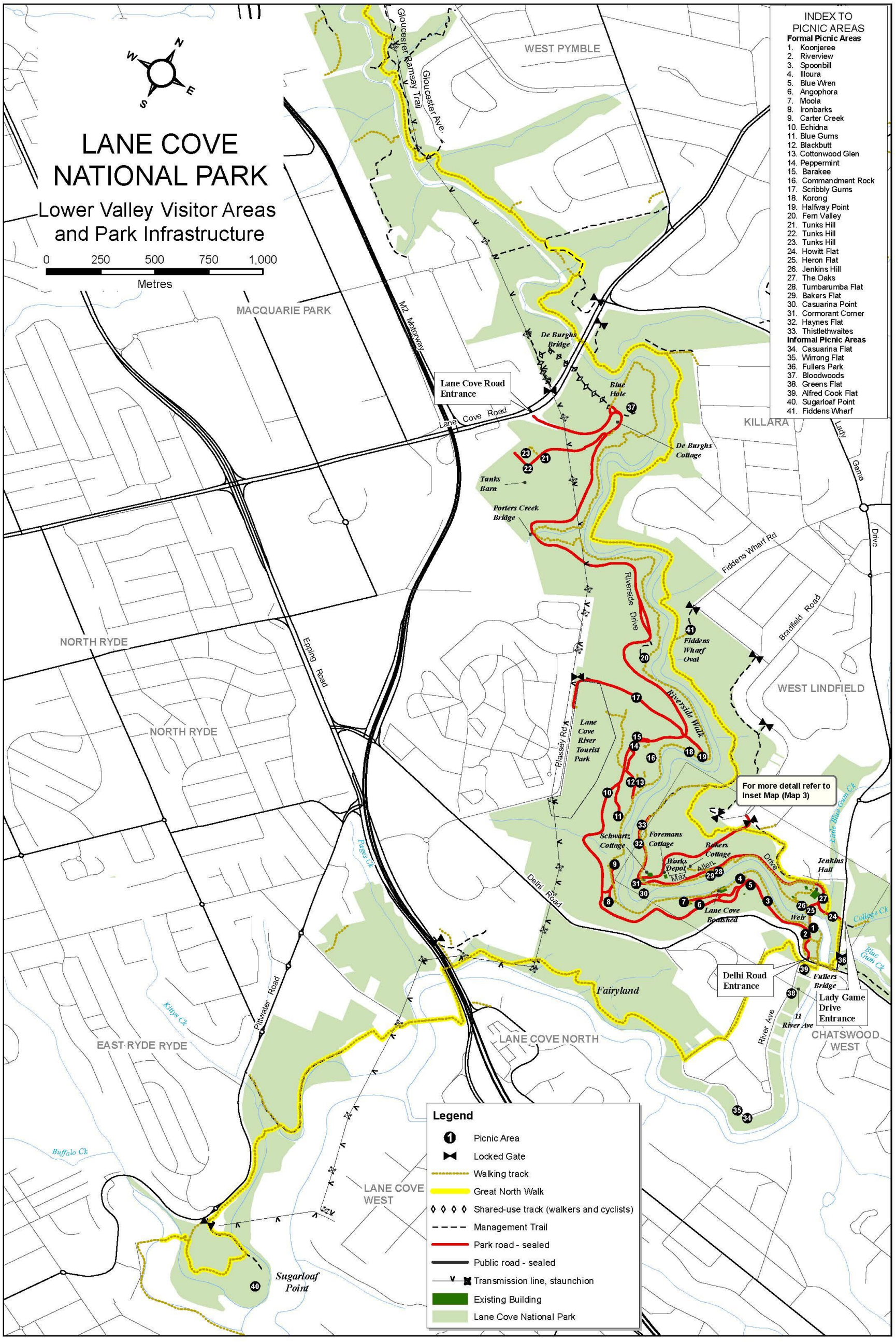
MAPS

Map 1: Lane Cove National Park and locality map



Map 2: Lower valley visitor areas and park infrastructure



Map 3: Inset Map - Lower valley visitor areas and park infrastructure (Map 2)