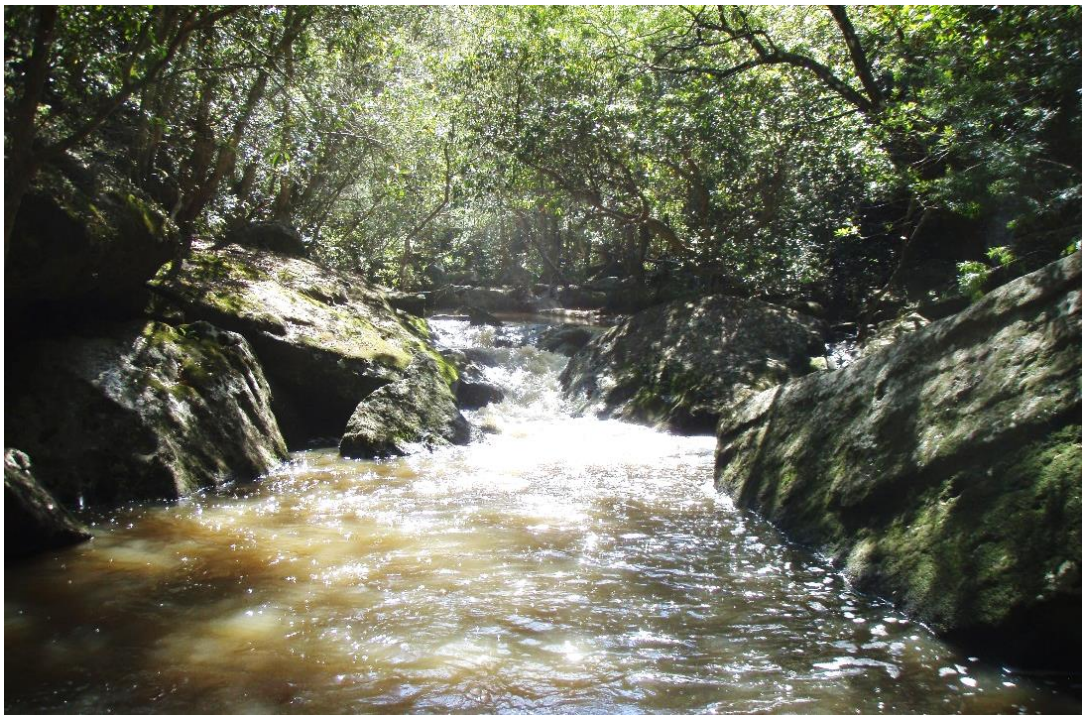


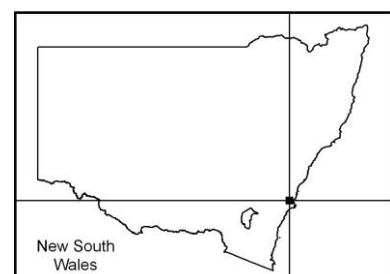


**NSW National Parks
& Wildlife Service**
Office of Environment & Heritage

Plan of Management



Bomaderry Creek Regional Park



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This plan of management was adopted by the Minister for the Environment on 20 October 2016.

Acknowledgments

NPWS acknowledges this park is in the traditional Country of the Dharawal Aboriginal People.

This plan of management was prepared by staff of the South Coast Region of the NSW National Parks and Wildlife Service (NPWS), part of OEH.

Valuable information and ideas were contributed to the planning process by the South Coast Region Advisory Committee and by members of the local community.

For additional information or enquiries about any aspect of the plan, contact the NPWS South Coast Region Office at 55 Graham Street Nowra (PO Box 707 Nowra 2541) or by phone on (02) 4423 2170.

Front cover: Bomaderry Creek gorge (NPWS Nowra Area).

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Foreword

Bomaderry Creek Regional Park is located between the urban centres of North Nowra and Bomaderry on the south coast of New South Wales. The 82 hectare park was reserved in 2002 and forms part of a larger bushland area known locally as the Bomaderry Creek bushland.

Bomaderry Creek Regional Park is rich in biodiversity. It protects a number of threatened animals and plants including the endangered Bomaderry zieria. The population of Albatross mallee in the park has been listed as an endangered population. The park and surrounding bushland are of high Aboriginal heritage significance and the local Aboriginal community has retained strong cultural associations with the park.

The NSW *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each regional park. A draft plan of management for Bomaderry Creek Regional Park was placed on public exhibition from 25 October 2013 to 3 February 2014. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to protect our natural environment, including protection of threatened species and communities, targeted threatened species fauna surveys, control of pest plants and animals, and fire management to protect both biodiversity and the community. The plan also provides opportunities for scenic viewing, bushwalking, leashed dog walking and picnicking.

This plan of management establishes the scheme of operations for Bomaderry Creek Regional Park. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.



Mark Speakman
Minister for the Environment

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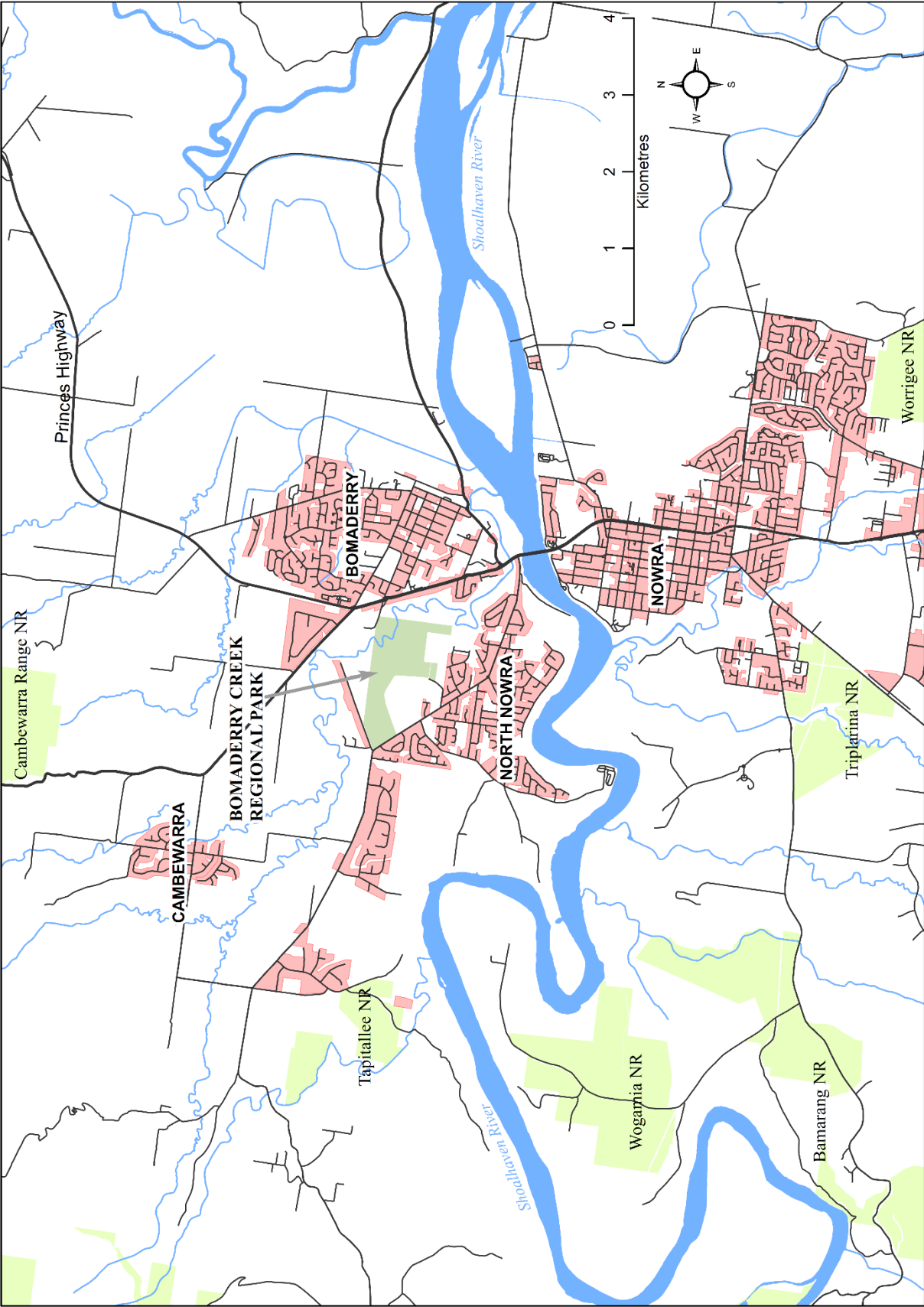
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Figure 1: Regional Location



1. Introduction

1.1 Location, reservation and regional setting

Features	Description
Bomaderry Creek Regional Park	
Location	Bomaderry Creek Regional Park is located in the south coast of New South Wales, north of the Shoalhaven River. The park straddles Bomaderry Creek between the residential areas of North Nowra and Bomaderry (see Figure 1).
Area	82 hectares
Reservation date	December 2002
Previous tenure	Formerly Crown land
Regional context	
Biogeographic region	In the Illawarra subregion of the Sydney Basin Bioregion. Forms part of a larger 230 hectare area known locally as the Bomaderry Creek bushland. The park is one of several conservation reserves sampling the forest ecosystems located around Nowra, the closest being Tapitallee Nature Reserve 3 kilometres to the west (see Figure 1).
Surrounding land use	In addition to the park, the Bomaderry Creek bushland includes land owned by Shoalhaven City Council, Crown land granted to the Nowra Local Aboriginal Land Council, Crown land adjacent to Bomaderry Creek between the River Oak Crossing and the Princes Highway, and privately owned land. Some of this bushland is zoned R1 General Residential in the Shoalhaven Local Environment Plan 2014 (see Figure 2). Other land adjacent to the park includes residential properties to the south, semirural properties to the north-west and a former landfill site to the south-east.
Other authorities	The park is within the areas of Shoalhaven City Council, South East Local Land Services and Nowra Local Aboriginal Land Council.

Construction of a North Nowra Link Road may occur in the vicinity of West Cambewarra Road. Should a road proceed, it may require revocation of a narrow strip of the park along its north-west edge (see Section 4.3).

1.2 Statement of significance

Bomaderry Creek Regional Park is a special place, with significant biodiversity, cultural heritage, scenic and recreation values.

Biological and catchment values

The park has the following important natural values:

- It contains populations of the endangered plant Bomaderry zieria, a species known to occur only within the park and immediately adjacent bushland.

- It contains populations of three other threatened species: the endangered guinea flower, the vulnerable Albatross mallee and Bauer's midge orchid. Albatross mallee plants in the park and adjacent to the park have been listed as an endangered population.
- It also contains several rare plants, including the net-veined wattle, *Leptospermum sejunctum*, the low growing sub-shrub *Rulingia hermanniifolia* and the regionally rare erect multi-stemmed sub-shrub *Dampiera scottiana*.
- It protects habitat for at least six threatened animal species: the yellow-bellied glider, glossy black-cockatoo, masked owl, square-tailed kite, varied sittella and southern myotis.

Aboriginal heritage values

The park is in the traditional area of the south coast Aboriginal people of the Dharawal language group.

The park and wider Bomaderry Creek bushland are of high archaeological and Aboriginal heritage significance (Boot 2001). Archaeological surveys have revealed a large number of Aboriginal sites in the broader Bomaderry Creek bushland, including nine sites in the park, three rock shelters associated with the creek and six open artefact scatters. A number of other sites are located immediately outside the park. The Bomaderry Creek area provided shelter, food and other values to Aboriginal people.

The local Aboriginal community continued to use the area following European settlement and has retained strong cultural associations with it. The site is historically linked to the former Bomaderry Aboriginal Children's Home that is now owned by the Nowra Local Aboriginal Land Council.

Landscape values

Bomaderry Creek gorge is small but beautiful and provides a sense of isolation from nearby urban development. It is flanked by sandstone cliffs and features huge slabs of fallen rock, overhangs, pools, cascades and moist forests. There are excellent scenic views of the gorge from several viewpoints within and adjacent to the park.

The rainforests within the gorge and taller forests above the gorge in the south-east of the park are very attractive, while the drier open forests on the plateau feature wildflowers during late winter to spring.

Recreation, tourism and educational values

The park's walking tracks provide opportunities to enjoy the beautiful Bomaderry Creek gorge, in conjunction with tracks on adjacent council land. Its location, close to residential areas and the Princes Highway, makes the park highly accessible for local residents and tourists.

Because of its diverse vegetation communities, well displayed geomorphology and Aboriginal cultural values, the park is a valuable educational resource for local schools.

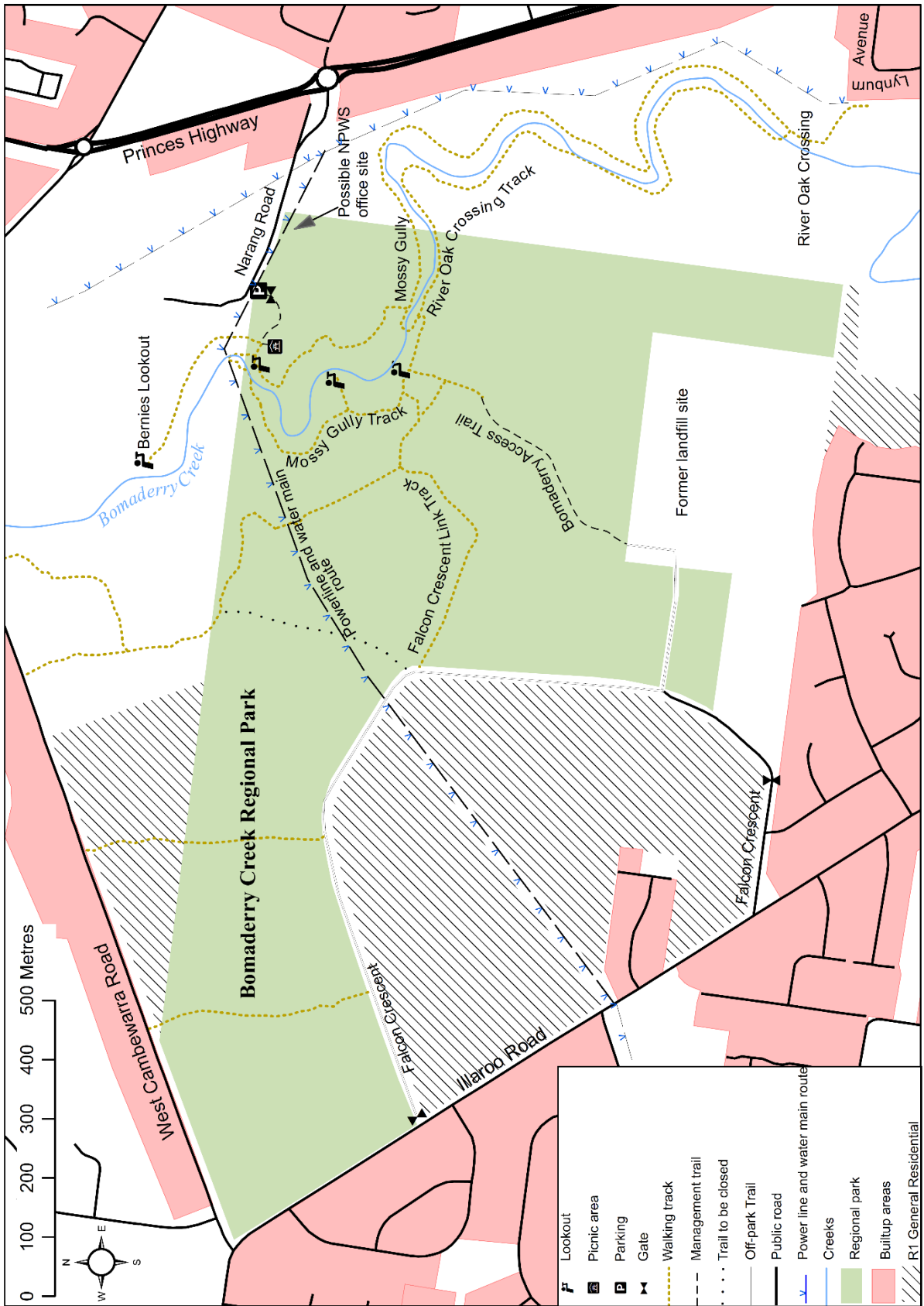
1.3 History of community action

The reservation of Bomaderry Creek Regional Park in December 2002 followed a lengthy campaign to protect Bomaderry Creek bushland by individuals and community groups. These included the former Shoalhaven Conservation Society, the Australian Conservation Foundation (Shoalhaven), Friends of Bomaderry Creek and Bomaderry Creek Landcare. The campaign was mounted in response to a proposal to construct a link road through the centre of the bushland between Bomaderry and North Nowra (Leatch 1997; Barratt 2006).

The issue galvanised individuals and community groups to undertake research, management and interpretive actions to better understand, protect and promote the bushland's values. This included research and monitoring of threatened species, fire and management planning, regenerating bushland, installing visitor facilities, conducting guided walks and producing interpretive signs and booklets.

Community interest in the park and the surrounding bushland remains high, with a number of groups still actively engaged in volunteer work. The history of the reservation of the park demonstrates how dedicated and well-researched community action can lead to the protection of our natural and cultural heritage, and contribute to contemporary management.

Figure 2: Bomaderry Creek Regional Park



2. Management context

2.1 Legislative and policy framework

The management of regional parks in New South Wales is in the context of the legislative and policy framework of NPWS, primarily the *National Parks and Wildlife Act 1974*, the *National Parks and Wildlife Regulation 2009*, the *Threatened Species Conservation Act 1995* and NPWS policies.

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

A plan of management is a statutory document under the *National Parks and Wildlife Act*. Once the Minister has adopted a plan, the plan must be carried out and no operations may be undertaken within the area covered except in accordance with the plan. This plan will also apply to any future additions to the regional park. Should management strategies or works be proposed in the future that are not consistent with the plan, an amendment to the plan will be required.

2.2 Management purposes and principles

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

Under the *National Parks and Wildlife Act* (section 30H), regional parks are managed to:

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

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

2.3 Specific management directions

The park forms part of the larger bushland area known locally as the Bomaderry Creek bushland. Management of the park will be viewed within the context of this broader Bomaderry Creek bushland.

The park will continue to be managed to provide walking, picnicking and environmental education opportunities. The picnic area has been re-designed and refurbished and the gorge walking track (Mossy Gully Track) has been upgraded. Leashed dog walking will be permitted on management trails, walking tracks and along the powerline – water main route. Cycling will be permitted on management trails and along the powerline – water main route but these are short and provide limited opportunities.

In addition to the general principles for protective management of regional parks, management of Bomaderry Creek Regional Park will focus on rehabilitating significant past disturbance and ongoing threats to the area. The park is crossed by several trails and tracks and a powerline – water main route, it contains an extensive former gravel extraction area and a separate gravel storage site, and is subject to recreational vehicle use and illegal car- and rubbish-dumping.

Initial rehabilitation works have been undertaken at the gravel extraction and storage areas. These sites are now relatively stable but will need ongoing works to limit unauthorised access and to control weeds. The plan of management also provides for closure of an unnecessary vehicle trail, control of off-road motorbike riding and possible protection works for threatened species and Aboriginal sites, in addition to management of fire, weeds and pests.

Opportunities for vehicle use, camping and horse riding will not be provided given the small size of the park.

The possibility of constructing an NPWS information outlet and regional office on part of the former gravel storage site will be investigated.

3. Values

This plan aims to conserve both natural and cultural values of the park. The location, landforms and plant and animal communities of this area have determined how it has been used and valued by Aboriginal and non-Aboriginal people. 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 Geodiversity

Geodiversity is the natural diversity of rocks, minerals, fossils, soils and landforms, and the processes that have shaped these features over time.

The park's principal landform feature is Bomaderry Creek. The creek has created a meandering, cliff-lined gorge, characterised by benched sandstone outcrops and large slabs of fallen rock. The gorge becomes increasingly deep downstream through the park and adjacent council land, reaching depths of up to 30 metres. Above the gorge, the park landscape is dominated by more level topography. The elevation of the park ranges from almost 60 metres above sea level on the plateau to less than 20 metres within the gorge.

Permian-age rocks of the southern Sydney basin, principally Berry Siltstone and Nowra Sandstone, form the underlying geology of the park. Berry Siltstone occurs on the plateau areas and is a bluish grey to light grey siltstone. The gorge has formed within Nowra Sandstone, a coarse-grained sedimentary rock.

Soils in the park consist primarily of shallow sands and fine sandy to silty loams over sandstone and siltstone. Berry Siltstone produces reasonably deep soils while Nowra Sandstone weathers to sandy and rocky soils of varying depth. The park's topsoils are hardsetting and their erodibility is low, however, the subsoils are prone to erosion and become very unstable when the topsoil is removed (Hazelton 1992).

The gorge has high scenic value (see Section 1.3), but much of the plateau area has been disturbed by previous land uses and trail formation.

Issues

- The park has suffered extensive past disturbance and continues to be affected by illegal vehicle use and rubbish dumping along the trails and around the boundaries. The picnic area is located in a former sandstone quarry.
- A former gravel stockpile site is located in the north-east corner of the park. Initial rehabilitation works have occurred, however, further rehabilitation works are required.
- A former gravel extraction area is located in the southern part of the park. This has a network of clearings and trails over approximately 3 hectares as a result of informal use as a motocross site. Fencing has been undertaken to prevent vehicle access and allow natural revegetation.
- Land upstream from the Bomaderry Creek bushland has been largely cleared for agriculture. Water quality monitoring by Shoalhaven City Council rates the quality of water entering the park as generally medium or good but there are episodic spikes in faecal coliform, total phosphorous and total nitrogen levels (SCC 2012).
- A former landfill site is located immediately south of the park. Shoalhaven City Council installed two groundwater monitoring wells in the park in 2005 as a requirement of the environmental protection licence, to monitor the potential movement of leachate and other pollutants via groundwater flows. The landfill has

been capped and the council has applied to the NSW Environment Protection Authority (EPA) to surrender the licence. Once a certified statement of completion has been received from the EPA there will be no further environmental monitoring obligations.

- Additional access and runoff control may be needed following redevelopment of the adjoining former landfill site for playing fields or other purposes.
- Sediment input into Bomaderry Creek from unsealed trails, walking tracks and the gravel extraction site may adversely affect water quality. Some erosion is also occurring as a result of illegal vehicle use.
- Proposed road and residential development adjacent to the park (see Section 4.3) are likely to affect water quality and scenic values.

Desired outcomes

- The park's significant geomorphological features and scenic values are protected, particularly along Bomaderry Creek gorge.
- Human-induced soil erosion in the park is minimised and disturbed areas are rehabilitated.
- Water quality and stream habitat values are maintained and where possible improved.

Management response

- 3.1.1 Design and undertake all works in a manner that minimises soil erosion and water pollution.
- 3.1.2 Undertake appropriate erosion and sediment control measures on trails and tracks and where soil loss is being accelerated by human activity or is threatening significant habitats or other park values.
- 3.1.3 Continue with rehabilitation works at the former stockpile site in the north-east of the park and the former gravel extraction site in the southern part of the park.
- 3.1.4 Liaise with NSW Department of Primary Industries – Lands, Shoalhaven City Council, Endeavour Energy and Shoalhaven Water to prevent unauthorised vehicle access into the park from other land tenures.
- 3.1.5 Work closely with local police and Shoalhaven City Council to address car and rubbish dumping activities.
- 3.1.6 Liaise with Shoalhaven City Council and other relevant authorities and organisations to mitigate the impact of land use and development on the water quality of Bomaderry Creek. This should include seeking the protection and enhancement of the riparian corridor upstream of the park, and management of urban runoff to minimise nutrient input and weed infestation.
- 3.1.7 Liaise with Shoalhaven City Council regarding monitoring of groundwater flows from the adjoining former landfill site and seek to enter into a maintenance and access agreement for the monitoring wells, if required, that includes provision for data sharing.
- 3.1.8 Monitor results from Shoalhaven City Council water quality testing on Bomaderry Creek upstream of the park, and liaise with council if any concerns arise.
- 3.1.9 Protect the high scenic value of the Bomaderry Creek gorge through appropriate location and design of visitor and park management facilities.

3.1.10 Liaise as needed with land-use authorities to seek to minimise as far as possible the visual impacts of future residential or other development on the park.

3.2 Native plants and animals

The vegetation communities and native animal habitats of the park are diverse, particularly for such a small area.

Vegetation communities

Eight vegetation communities have been identified within the park (Thomas et al. 2000). These also occur in the wider Bomaderry Creek bushland (Barratt 1998).

Moist forest complex is found in the Bomaderry Creek gorge where suitable conditions occur, including moist higher nutrient soils and protection from heat, wind and fire. The complex has four sub communities:

- warm temperate rainforest dominated by coachwood (*Ceratopetalum apetalum*)
- dry rainforest dominated by grey myrtle (*Backhousia myrtifolia*)
- tall open forest comprising spotted gum (*Corymbia maculata*), southern blue gum (*Eucalyptus saligna* x *E. botryoides*) and turpentine (*Syncarpia glomulifera*)
- water gum (*Tristaniopsis laurina*) low closed forest, occurring amongst the rocks in the stream channel, along with river oak (*Casuarina cunninghamiana*).

Red Bloodwood – Grey Gum – Blue-leaved Stringybark Forest/Woodland dominates the rocky upper margins of the gorge where the soils are relatively shallow. Dominant tree species are red bloodwood (*Corymbia gummifera*), grey gum (*E. punctata*) and blue-leaved stringybark (*E. agglomerata*). This community typically has a relatively open shrub layer and in places a dense ground cover of mat rushes and sedges dominated by *Lomandra* species. It is the primary habitat for the rare and threatened plant species found within the park including the endangered Bomaderry zieria, the vulnerable Albatross mallee (*E. langleyi*) and the rare net-veined wattle (*Acacia subtilinervis*), the small shrub *Leptospermum sejunctum*, and *Rulingia hermanniifolia*.

Within and adjacent to the above community are areas of Kunzea Shrubland and Wet Heath/Sedgeland. The Kunzea Shrubland is dominated by white tick bush (*Kunzea ambigua*) and the rare *Leptospermum sejunctum*, and occurs amongst rock outcrops on shallow dry soils. The wet heath/sedgeland is found on soils with impeded drainage and is dominated by species that prefer swampy to moist soil conditions including thyme honey-myrtle (*Melaleuca thymifolia*) and prickly tea-tree (*Leptospermum juniperinum*). These two communities combine with the Red Bloodwood – Grey Gum – Blue-leaved Stringybark Forest/Woodland community to form a complex intermingling of scrub, wet heath, sedgeland and woodland habitat.

Scribbly Gum – Red Bloodwood Forest/Woodland is the dominant vegetation community on the level plateau topography of the park where the soils are deeper but drier. In addition to scribbly gum (*E. sclerophylla*) and red bloodwood, tree species in this community include spotted gum, Illawarra stringybark (*E. imitans*), yertchuk (*E. consideriana*) and black sheoak (*Allocasuarina littoralis*). The community typically has a dense and diverse understorey of sclerophyllous shrubs including *banksia*, *persoonia* and *hakea* species. The endangered Bomaderry zieria and the regionally rare *Dampiera scottiana* occur within this community.

White Stringybark – Sheoak Forest occurs in the park in two small pockets on soils with higher clay content. The largest pocket is in the north-west corner of the park and a smaller block is located on the eastern side of the former gravel extraction area in the south of the park. Dominant tree species within this community include white stringybark (*E. globoidea*), black sheoak, red mahogany (*E. scias*), blue-leaved stringybark and rough-barked apple

(*Angophora floribunda*). The endangered Bomaderry zieria also occurs within this community.

An area of almost pure black sheoak occurs in a narrow band in the north-west sector of the park. Black sheoak provides habitat and food for the threatened glossy black-cockatoo.

A small pocket of Grey Gum – Yertchuk – Scribbly Gum Forest occurs in the south of the park, adjacent to the western edge of the former landfill site (see Figure 2). This community is notable for its unusual combination of tree species.

Rare or threatened plants

Four species listed as threatened under the *Threatened Species Conservation Act* occur within the park: the vulnerable Albatross mallee, and the endangered Bauer's midge orchid (*Genoplesium baueri*), guinea flower (*Hibbertia stricta* subsp. *furcatula*) and Bomaderry zieria. The park also supports the Albatross mallee endangered population. Bomaderry zieria and Bauer's midge orchid are listed as endangered and Albatross mallee is listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act*.

Bomaderry zieria generally occurs on skeletal sandy soil amongst sandstone boulders in shrubby open forest, woodland or closed scrub (DECC 2009b). It occurs only within the Bomaderry Creek bushland, principally within the park and adjacent land owned by Shoalhaven City Council. It is thought that the species spreads by root suckers (DECCW 2010b) rather than setting seed, however, further research is required to confirm this. A management study (Barratt 2014) noted that the species has suffered significant population declines since 1997 and sets out a number of recommendations for the species.

Albatross mallee occurs on poorly drained, shallow, sandy soils on sandstone in the east of the park, in the Red Bloodwood – Grey Gum – Stringybark Woodland (DECC 2009a; NSW SC 2010). The Albatross mallee plants in the park are part of the endangered population *Eucalyptus langleyi* north of the Shoalhaven River in the Shoalhaven Local Government Area. This is a small population consisting of fragmented stands within the park and adjacent land owned by Shoalhaven City Council. It occurs at a lower altitude than other stands of the species and the population has significantly declined in recent years.

Stands of Albatross mallee often occur with guinea flower (Mills 2010). Guinea flower is found in woodland and heathland on sandstone soils, usually on gently sloping gully sides and often amongst rocks (Mills 2014). Bauer's midge orchid has been recorded in open forest areas on the western side of the gorge.

Three other species listed as Rare or Threatened Australian Plants (ROTAPs) by Briggs and Leigh (1996) occur within the park: net-veined wattle is co-dominant with tick bush (*Kunzea ambigua*) in the Kunzea Shrubland; *Leptospermum sejunctum* is found in the north-east and far south-east of the park in the Kunzea Shrubland; and *Rulingia hermanniifolia* occurs within the Red Bloodwood – Grey Gum – Stringybark Forest/Woodland that fringes the gorge.

The regionally rare *Dampiera scottiana* is found in the scribbly gum woodland. Mills (1999), cited in the former Department of Conservation and Land Management Land Assessment for Bomaderry Creek (DCLM n.d.), recommended this species for ROTAP listing.

Animals

The diversity of vegetation communities and rocky and freshwater habitats in the park gives rise to a diverse assemblage of animals. A large number of animals have been recorded in the area (Murphy 1997; BCBWG 2001): 123 birds, 20 mammals, 19 reptiles, 18 estuarine and freshwater fish (including the Australian bass [*Macquaria novemaculeata*]), and 10 frogs. Given the diversity of available habitat, there is potential for the park and the broader

Bomaderry Creek bushland to contain a more diverse suite of native animals than those already recorded.

Six species listed as threatened under the *Threatened Species Conservation Act* have been recorded within the park. These are the vulnerable glossy black-cockatoo (*Calyptorhynchus lathami*), square-tailed kite (*Lophoictinia isura*), masked owl (*Tyto novaehollandiae*), varied sittella (*Daphoenositta chrysoptera*), yellow-bellied glider (*Petaurus australis*) and southern myotis (*Myotis macropus*).

Several additional threatened species have been recorded close to the park and are likely to occur within it: the vulnerable giant burrowing frog (*Heleioporus australiacus*), grey-headed flying-fox (*Pteropus poliocephalus*), spotted-tailed quoll (*Dasyurus maculatus*), eastern pygmy-possum (*Cercartetus nanus*), gang-gang cockatoo (*Callocephalon fimbriatum*), powerful owl (*Ninox strenua*) and sooty owl (*Tyto tenebricosa*). The park also contains suitable habitat for several other threatened species including the endangered broad-headed snake (*Hoplocephalus bungaroides*), smoky mouse (*Pseudomys fumeus*), regent honeyeater (*Anthochaera phrygia*) and swift parrot (*Lathamus discolor*) as well as the regionally significant little red flying-fox (*Pteropus scapulatus*). Future surveys may confirm the presence of these and other species within the park.

A grey-headed flying-fox camp is located outside the park, but within the Bomaderry Creek bushland area. The camp is used seasonally between October and March which coincides with important stages in the species' breeding cycle. Grey-headed flying-fox are listed as vulnerable under the Threatened Species Conservation Act and the Commonwealth Environment Protection and Biodiversity Conservation Act. The camp is considered to be an important population necessary for the species' long-term survival and recovery (DoE 2013). The Bomaderry Creek bushland is considered to be habitat that is critical to the survival of the species (DECCW 2009).

Threatened Species Priorities Action Statement

Strategies for the recovery of threatened species, populations and ecological communities have been set out in a statewide *Threatened Species Priorities Action Statement* (DECC 2007). These actions 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.

High priority recovery actions for Bomaderry zieria include protection from pedestrian traffic, ensuring powerline – water main maintenance activities avoid adversely impacting the species, and undertaking research to determine the effects of burning intensity and frequency. Other relevant high priority actions for the park include identifying and mapping key breeding and foraging habitat for glossy black-cockatoos; protecting hollow-bearing trees, moist forest and riparian vegetation for the masked owl and southern myotis; and liaising with agencies and utility providers with respect to potential impacts of yellow-bellied glider habitat isolation resulting from linear clearing for infrastructure. For all the threatened species, it is vital for sufficient areas of habitat to be retained locally.

Issues

- Significant plant species and animal habitat are threatened by off-road trail bike riding (Section 3.1), weeds and dumping of garden waste (Section 4.1) and inappropriate fire regimes (Section 4.2).
- Proposed residential development adjacent to the park is likely to significantly affect the park's plant and animal communities through reduction in habitat and increased disturbance (Section 4.3).

- Specific conservation actions are needed for the threatened Bomaderry zieria and Albatross mallee. Some protective track and trail relocation has been undertaken but plants adjacent to the picnic area are being disturbed by continual reopening of an informal walking track shortcut.

Desired outcomes

- The full range of native plant and animal species and communities found in the park is conserved.
- Vegetation structural diversity and habitat values are conserved and are restored where subject to past disturbance.
- The habitat and populations of all rare or threatened flora and fauna species are protected and maintained.

Management response

- 3.2.1 Undertake targeted animal surveys to check for additional threatened species including the giant burrowing frog and broad-headed snake.
- 3.2.2 Undertake plant surveys to determine the distribution of and management requirements for Bauer's midge orchid and guinea flower within the park.
- 3.2.3 Establish a monitoring program for Bomaderry zieria and undertake other actions for the species set out in Barratt (2014), the *Threatened Species Priorities Action Statement* and the national recovery plan. In particular:
 - protect any plants being affected by pedestrian traffic, including providing an alternative walking track, if feasible, to enable closure of the informal track near the picnic area
 - liaise with Endeavour Energy and Shoalhaven Water to ensure utility maintenance activities do not damage Bomaderry zieria
 - promote and encourage research to determine the mechanism by which Bomaderry zieria is reproducing and undertake experimental burning to determine the impacts of burning on Bomaderry zieria (see Section 4.2).
- 3.2.4 Implement relevant recovery actions in the *Priorities Action Statement* for threatened species, populations and communities occurring in the park.
- 3.2.5 Continue to work with adjacent land managers to protect Bomaderry Creek bushland habitat and its threatened species populations.

3.3 Cultural heritage

Cultural heritage comprises places and items that may have historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance.

Aboriginal heritage

South Coast Aboriginal people of the Dharawal language group occupied the area incorporating Bomaderry Creek Regional Park. Use of the area commenced at least 2000 years ago and has continued to the present day. The creek and surrounding areas were sources of shelter, food and water and provided a place to cool off in the summer.

Nine Aboriginal sites have been formally recorded within the park but more are reported to exist, including burials and healing plants (Graham Moore pers. comm.). The recorded sites are three shelters with occupation deposit and six open artefact scatters. Additional recorded Aboriginal sites occur nearby, including rock shelters with art or occupation deposit, artefact scatters and axe grinding grooves. The concentration and variety of sites indicates the

importance of the Bomaderry Creek area to Aboriginal people. There is potential for further survey to reveal more sites within the park and wider area, particularly along the cliff lines and creek.

Aboriginal people continued to camp, fish and gather food and medicine from the Bomaderry Creek area following European settlement and local Elders have reported they hid along the creek as children, in fear of being taken away from their families by government authorities. Aboriginal children from the nearby Bomaderry Aboriginal Children's Home played in the area until the home's closure in the 1970s. The creek area thus has strong contemporary social and cultural value for local Aboriginal families.

While the NSW Government has legal responsibility for the protection of Aboriginal sites and places, it acknowledges the right of Aboriginal people to make decisions about their own heritage. It is NPWS policy that Aboriginal communities be consulted and involved in the management of Aboriginal sites, places and related issues and the promotion and presentation of Aboriginal culture and history. Members of the local community have been involved in the development of interpretive material for the park (see Section 3.4).

When planning and carrying out works that may impact Aboriginal cultural heritage, NPWS will apply the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010a).

Post 1788 history

The park area was formerly used for gravel extraction, utility provision, small-scale timber getting and recreation, however, there are no known historic heritage places located within the park.

The Bomaderry Creek weir, built in 1938 to provide Bomaderry's first reliable water supply, is located on the park boundary. The weir became obsolete in the early 1970s when a pipeline was installed to transport water to Bomaderry and Shoalhaven Heads from the Shoalhaven River. The weir pond then became a popular swimming hole until 1998 when a small section of the weir was removed to facilitate the upstream movement of fish, especially Australian bass (Barratt 2000; Barratt et al. 2001).

Members of the local community were involved in development of the gorge walk and interpretive material from the early 1980s (Barratt 1998).

Issues

- Walking tracks are located on or close to some of the Aboriginal sites in the park and these sites have therefore been subject to, or are potentially vulnerable to, disturbance. Unfortunately the relocation of a track affecting one of the rock shelter deposits is not feasible. The shelter is affected by floodwaters (Boot 2001; Clarke 2006).
- The access trail for the powerline – water main is located on one of the open artefact scatters. Past erosion and application of road base have further disturbed the site (Boot 2001).

Desired outcomes

- Significant cultural places are protected from damage by human activities.
- Aboriginal people are involved in management of Aboriginal cultural values in the park.

Management response

3.3.1 Manage Aboriginal heritage in consultation with relevant Aboriginal community organisations and individuals including traditional custodial families.

- 3.3.2 Monitor the condition of the recorded Aboriginal sites. Undertake protective works where feasible, to prevent further damage from recreational and management activities.
- 3.3.3 Support additional archaeological survey and research in the park including investigation of the shelter affected by the walking track and floodwaters.
- 3.3.4 Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact historic sites and places.
- 3.3.5 Apply the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* before undertaking any works with the potential to impact on Aboriginal sites and places.
- 3.3.6 Do not publicise the location of Aboriginal sites and places without the prior agreement of relevant Aboriginal community organisations.
- 3.3.7 Work cooperatively with Shoalhaven City Council to assess the heritage values of the Bomaderry Creek weir and implement any priority actions.

3.4 Recreation and education

The park is visited primarily by locals from North Nowra, Bomaderry and nearby towns and villages. Access is generally from the Princes Highway along Narang Road, Bomaderry, or from Falcon Crescent, North Nowra. The park can also be accessed by walking tracks from West Cambewarra Road, North Nowra, and from the River Oak Crossing Track via Lynburn Avenue, Bomaderry. There is no public vehicle access within the park.

The primary focus of most visitor activities is picnicking, visiting the lookouts or bushwalking in Bomaderry Creek gorge. Walking also takes place along a network of tracks on the plateau. Dog walking is permitted on tracks and trails, as long as dogs are on leashes. Other activities undertaken in the park include a small amount of cycling west of Bomaderry Creek and some rock climbing and paddling/swimming in the creek.

It is estimated that approximately 12,000–15,000 people visit the park annually. This is expected to increase as urban development in the surrounding area continues and if the park is signposted from the Princes Highway.

Provision for ongoing visitor use has been considered in a regional context. Public land managed by NPWS and other authorities in the broader area provides diverse opportunities for a range of recreation activities. Seven Mile Beach, Bugong, Morton and Jervis Bay national parks and Morton State Conservation Area offer picnicking and walking opportunities. Nearby Crown reserves along the Shoalhaven River at Ben's Walk, the Grotto and Bangalee Reserve also provide walking and/or picnicking facilities. Vehicle-based camping facilities in a bush setting are provided by NPWS at Yalwal in Morton National Park and by Water NSW in Kangaroo Valley. There are also privately owned camping areas on the southern side of the Shoalhaven River, and caravan parks at Nowra, Kangaroo Valley and along the coast.

Visitor opportunities provided in regional parks should be sustainable and compatible with the conservation of natural and cultural values. In Bomaderry Creek Regional Park it will be particularly important to avoid further habitat fragmentation and if possible reduce disturbance of the significant vegetation communities and plant and animal species. Regional parks should also promote understanding and appreciation of park values.

Because of the small size of the park and its proximity to urban areas, a key focus is to provide visitor opportunities for local residents to enjoy the bushland setting. A potentially important secondary role is tourism since the park is close to the Princes Highway.

Picnicking

The main visitor facility in the park is the picnic area located in a former sandstone quarry adjacent to Narang Road. An upgrade of the picnic area to provide gas barbecues, new tables and renovations to the toilet block was completed in 2006 and innovative educational features were installed (see below).

A small car park has been constructed adjacent to Narang Road approximately 100 metres from the picnic area. This location maximises the space available for the picnic area within the former quarry, improves the aesthetic values of the picnic area and reduces vandalism. Public access to the picnic area is by foot along a short management trail from the carpark.

Assisted disabled access is available to the picnic area and to an adjacent lookout.

Walking

A network of walking tracks and management trails and the powerline – water main route provide opportunities for short and medium length walks through the park and enable visitors to experience a variety of forest and riverine environments. Tracks, trails and the powerline – water main route are shown on Figure 2.

The main walking track — Mossy Gully Track — begins at the picnic area and is a 1-kilometre loop walk along both sides of the gorge. This track has been upgraded to include metal stairs and walkways, new lookout fencing, seating and directional signs. It has also been rerouted in several places to minimise risks to visitors and to protect threatened species including *Bomaderry zieria*. A high level pedestrian bridge above the one-in-one-hundred year flood level has been installed at the Mossy Gully crossing.

A short section of the Mossy Gully Track is located outside the park's northern boundary on land managed by Shoalhaven City Council. The Mossy Gully Track also connects with two tracks located mainly on council land: a longer loop walk along Bomaderry Creek south of Mossy Gully (the River Oak Crossing Track) and a short return walk to Bernie's Lookout north of the park. Short sections of these tracks are in the park.

There are several walking tracks in the plateau area of the park – the Falcon Crescent Link Track, tracks leading into the park from residential land along West Cambewarra Road, and a short track that connects the Mossy Gully Track to the Bomaderry Access Trail, to facilitate track maintenance work. Walkers can also use the Bomaderry Access Trail and the powerline – water main route.

Education and information

Provision of information about the park's visitor opportunities and conservation values assists the protection of natural and cultural heritage, encourages support for conservation and increases visitor enjoyment and satisfaction. Interpretive signs have been placed along the Mossy Gully Track loop walk to provide information about natural values.

A children's educational play facility featuring large sandstone gumnuts and stepping stones has been installed in the picnic area.

NPWS has worked with the local Aboriginal community to develop a cultural heritage display for the picnic area. A mural tells the story of Bomaderry Creek from creation times to the present, including its use as a hiding place for Aboriginal children during the period of the Stolen Generation (Section 3.3). Interpretation of the mural would enable its many layers of meaning to be recognised and understood.

The Bomaderry Creek bushland has been recognised as a valuable outdoor educational resource since the late 1970s (BCBWG 2001). Several local schools utilise the park and surrounding bushland as a teaching resource.

Local community members have produced a booklet explaining the area's vegetation, conservation values and walking opportunities (Barratt et al. 2001).

There is potential to construct an NPWS information outlet in conjunction with possible development of a regional office on part of the former gravel storage site off Narang Road (see Figure 2). This site is only 250 metres from the Princes Highway and could provide information about parks in the wider south coast region for locals and tourists, as well as highlighting the values and recreation opportunities of Bomaderry Creek Regional Park. Any proposal would be subject to environmental and financial assessment (see Section 5).

Tourism

The park's easy access from the highway, scenic beauty and Aboriginal cultural values give it high potential for promotion to tourists. It could be a short stop while travelling or a destination in itself, in conjunction with the longer River Oak Crossing bushwalk through adjacent council-owned land.

The park could be used to provide guided walks and cultural tours in partnership with the Aboriginal community. The mural in the picnic area is a special and unusual feature and could be a central focus for visitors participating in tours.

Dog walking, cycling, horse riding and swimming

The park is a popular place for local residents to walk their dogs. This is an acceptable activity within a regional park as long as dogs are kept on leashes at all times to minimise disturbance to other visitors and native animals. Dogs are not permitted in picnic areas or children's play areas.

Some cycling currently occurs on trails and tracks west of Bomaderry Creek. Cycling is not appropriate on walking tracks because of the potential risks to walkers. In accordance with NPWS policy and the *Sustainable Mountain Biking Strategy* (OEH 2011) cycling is permitted on management trails and along the powerline – water main route. However, these short trails provide only minimal cycling opportunities.

Horse riding is a popular recreational activity that has cultural associations for many Australians. Horse riding is not known to occur in the park. The park is not suitable for this activity given its small size and lack of through trails or connections with other land more suitable for horse riding.

Most swimming and other water activities in the park occur downstream or upstream, where there is easier access to Bomaderry Creek. The creek is not a particularly safe place to swim because of its variable flows, slippery rocks and murky water. Swimming will not be promoted as an activity in the park.

Rock climbing

Rock climbing occurs within the wider Bomaderry Creek bushland on cliffs along the gorge. There are no known published climbs in the park but a small amount of climbing occurs. The level of use of the park for climbing and its associated impacts are currently low but climbing can potentially have significant impacts on certain types of Aboriginal sites and other conservation values. Rock climbing should be monitored and, where necessary, regulated to ensure impacts on cultural sites and the environment, or conflicts with walkers and other visitors, are minimised. Rock climbing is an inherently dangerous activity and it is necessary for participants to accept responsibility for their own safety.

Camping

No camping sites are located in the park. Its small size and urban location make it unsuitable for the provision of camping opportunities.

Trail bike riding

Unauthorised trail bike riding occurs within the park on formed trails, walking tracks and in the bush. Off-road trail bike riding can cause damage to threatened plants, habitat fragmentation, erosion and weed invasion and is not an appropriate activity in a conservation reserve. It also causes nuisance and noise for other visitors and nearby residents. Trail bike riding is not permitted on NPWS walking tracks or on management trails because of environmental impacts and potential safety conflicts with walkers and cyclists.

Community involvement

There is strong local community interest in the park and wider bushland area. Community organisations, including the Bomaderry Creek Landcare Group and the Friends of Bomaderry Creek, are advocates for conservation of the regional park and the Bomaderry Creek bushland and have expressed interest in being consulted and continuing to be involved in park management. These organisations voluntarily conduct conservation works such as bush regeneration.

Local Aboriginal community members have strong associations with the park and adjacent bushland, particularly people who spent part of their childhood at the former Bomaderry Aboriginal Children's Home. NPWS will continue to consult with the Aboriginal community about management of the park.

It will continue to be important to inform neighbours and local residents about management activities such as fire hazard reduction and pest management programs in the park. Their involvement in cooperative clean-ups and other activities may also be appropriate.

Issues

- The park's tracks provide an important recreational opportunity for local residents, however, the relatively high density of tracks causes habitat fragmentation and potentially other impacts such as erosion and weed introduction. One of the tracks crossing the powerline – water main route east of Falcon Crescent is considered unnecessary and should be closed to reduce track density (see Figure 2).
- The three tracks across the plateau from West Cambewarra Road may need to be closed if the North Nowra Link Road is constructed in this location and access is cut off or becomes unsafe.
- While there is a bridge across Bomaderry Creek at the southern end of the Mossy Gully Track, the northern crossing is via rocks in the creek bed and so the track is closed when water levels rise. The gorge is much wider in this location, making provision of a bridge difficult.
- The gorge walking tracks extend onto adjacent land managed by Shoalhaven City Council.
- There are opportunities to increase use of the park for environmental education, and for tourism focused on Aboriginal cultural heritage.
- Interpretation of the picnic area mural is needed.
- Off-road trail bike riding and vandalism affect the park's recreational values.
- Recreational values are likely to be affected by additional residential development adjacent to the park, because of reduced sense of naturalness and isolation, and increased impacts on tracks and other values.

Desired outcomes

- Low-key visitor opportunities focused on the park's natural and cultural values are available and provide a satisfying visitor experience.
- Access to the Mossy Gully Track is available at all water levels.
- Tourism awareness and use of the park is increased.
- The park is a useful educational resource for local schools and community organisations.
- Visitor use is ecologically sustainable.
- There is widespread community understanding and appreciation of the park's natural and cultural values, particularly an improved understanding of Aboriginal values.
- Neighbours, relevant community organisations and interested community members are informed about, and involved in, park protection and management activities where appropriate.

Management response

- 3.4.1 Maintain the picnic area facilities and continue to provide associated car parking.
- 3.4.2 Manage the Mossy Gully Track as the premier walking track within the park. Maintain the small section of the track that extends beyond the northern park boundary in consultation with Shoalhaven City Council.
- 3.4.3 Investigate the feasibility of providing access at all water levels at the northern crossing over Bomaderry Creek.
- 3.4.4 Maintain those sections of the River Oak Crossing Track and the track to Bernies Lookout that are within the park. Liaise with Shoalhaven City Council regarding management of the two tracks.
- 3.4.5 Close and rehabilitate the track that crosses under the powerline from Falcon Crescent, as shown on Figure 2.
- 3.4.6 Maintain other existing walking tracks on the plateau as shown on Figure 2, but keep the need for them under review. Work with Shoalhaven City Council to determine if any tracks from West Cambewarra Road will need to be closed or rerouted if cut off or made unsafe by any development of the North Nowra Link Road in this location.
- 3.4.7 Encourage understanding and appreciation of the natural and cultural values of the park and surrounding Bomaderry Creek bushland through Discovery programs and interpretive signs or information at the picnic area and along the Mossy Gully Track. Include information about:
 - geology and geomorphology
 - significant plant and animal species and vegetation communities
 - Aboriginal heritage values and associations with the area, including the stories and relationships depicted in the mural, as desired by the Aboriginal community
 - recreational opportunities.
- 3.4.8 Involve the local Aboriginal community in the development of any material and programs for interpretation of Aboriginal culture.
- 3.4.9 Allow school, community and commercial tours and activities subject to:

- environmental impacts being acceptable and use being confined to formalised tracks
 - limits on group size and frequency of use if necessary to minimise environmental impacts and conflict with other users
 - a licence for commercial use.
- 3.4.10 Encourage use of the park for Aboriginal cultural tours conducted by local Aboriginal people.
- 3.4.11 Work cooperatively with Shoalhaven City Council to inform the local community about the values of the park and the Bomaderry Creek bushland.
- 3.4.12 Allow dog walking on management trails, walking tracks and along the powerline – water main route, but not in the picnic area. Dogs must be leashed at all times.
- 3.4.13 Allow cycling only on management trails and the powerline – water main route.
- 3.4.14 Do not allow camping and horse riding in the park.
- 3.4.15 Prohibit wood fires. Allow gas or similar stoves and barbecues in the picnic area, subject to normal fire restrictions.
- 3.4.16 Allow rock climbing in suitable locations in the park, subject to the following restrictions:
- climbing will not be permitted on Aboriginal rock shelters or where it could cause unacceptable impacts on walking tracks or risks to walker safety
 - climbing groups must be no larger than eight participants and commercial climbing will not be permitted
 - the safety of rock climbers will be the responsibility of participants and their companions
 - the impacts of rock climbing will be monitored and it may be further regulated if needed, in conjunction with user groups.
- 3.4.17 Work closely with local police and Shoalhaven City Council to address unauthorised trail bike use.
- 3.4.18 Work with neighbours and other agencies to discourage and combat vandalism. Install security cameras or other measures as needed.
- 3.4.19 Apply to the NSW Government Tourist Attraction Signposting Assessment Committee to develop and install tourist information signs on the Princes Highway.
- 3.4.20 Work collaboratively with relevant community organisations, interested individuals, the Nowra Local Aboriginal Land Council and neighbouring land managers in the management of the park and surrounding bushland.

4. Threats

4.1 Pests

An introduced species is defined in this plan as any plant or animal species not native to the park. Introduced species can have detrimental effects on ecological values and can also spread to and from neighbouring land. Weeds have the potential to outcompete native plant species, reduce biodiversity and reduce the habitat value of native bushland. They may also affect threatened species such as Bomaderry zieria.

Weeds in the park predominantly occur within and adjacent to areas that have been subjected to disturbance, such as the former landfill site, gravel extraction and stockpile sites, the urban fringe and along Bomaderry Creek.

Key threatening processes under the *Threatened Species Conservation Act* include:

- invasion, establishment and spread of lantana (NSW SC 2006b)
- invasion of native plant communities by exotic perennial grasses (NSW SC 2003)
- invasion and establishment of exotic vines and scramblers (NSW SC 2006a).

A significant number of the 58 weed species identified within the park contribute to these key threatening processes. These weeds include lantana (*Lantana camara*), pampas grass (*Cortaderia selloana*) and exotic vines and scramblers such as asparagus fern (*Asparagus aethiopicus*), Japanese honeysuckle (*Lonicera japonica*), madeira vine (*Anredera cordifolia*), morning glory (*Ipomoea indica*), moth plant (*Araujia sericifera*), passionfruit vine (*Passiflora* spp.), cape ivy (*Delairea odorata*), trad (*Tradescantia fluminensis*) and bluebell creeper (*Sollya heterophylla*). Other significant environmental weeds occurring in the park include privet (*Ligustrum* spp.), tree of heaven (*Ailanthus altissima*), cassia (*Senna* spp.), blackberry (*Rubus fruticosus* agg.), cotoneaster (*Cotoneaster glaucophyllus*), mother of millions (*Bryophyllum delagoense*) and firethorn (*Pyracantha* spp.).

A weed management plan was prepared for the park in 2004 (Bush and Landcare Services 2004) and is being implemented. The park is also subject to the NPWS South Coast Regional Pest Management Strategy (see below). Works conducted over recent years have mainly targeted priority species such as tree of heaven, madeira vine, mother of millions, pampas grass, lantana and asparagus fern in the vicinity of the picnic area and the former gravel stockpile site.

As well as weed control work undertaken by NPWS, community volunteers from the Bomaderry Creek Landcare/Bushcare Group and the Friends of Bomaderry Creek have been undertaking extremely valuable weed control and bush regeneration works in the park and in adjoining bushland areas. A survey by Bomaderry Creek Landcare/Bushcare of bushland areas adjacent to the park found extensive weed infestations, with more than 70 per cent coverage by weeds in some areas (Barratt 2008). A particular concern was extensive infestations of mother of millions. Nearby areas will be an ongoing source of reinfestation of the park unless the weeds can be brought under control.

Dumping of garden waste is a major source of weed invasion. Lawn clippings and other garden waste are a rich source of weed species, and their seeds and cuttings can quickly establish and invade the surrounding bushland. Rubbish dumping, including garden waste, occurs on a regular basis along the western boundary of the park and is likely to increase if further residential development occurs west of Falcon Crescent.

Predators such as foxes (*Vulpes vulpes*), dogs (*Canis lupus* subsp.) and cats (*Felis catus*) are likely to occur in the park and may have a significant impact on native animals, though are unlikely to affect most of the park's threatened species. Rabbits (*Oryctolagus cuniculus*)

are known to occur in and around the picnic area and have been controlled as needed. Rabbits have been identified as a threat to Bomaderry zieria (DECCW 2010b) and predation by feral cats, predation by European foxes and competition and grazing by rabbits are all listed as key threatening processes under the *Threatened Species Conservation Act* (NSW SC 2000b; NSW SC 1998; NSW SC 2002).

Under the *Threatened Species Conservation Act*, a *Priorities Action Statement* to promote the abatement of key threatening processes has been prepared. It outlines the broad strategies and detailed priority actions to manage key threatening processes. Threat abatement plans may also be prepared for key threatening processes, as has been done for fox predation.

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*, threat abatement plans, and other strategies such as the *NSW Biodiversity Priorities for Widespread Weeds* (NSW DPI & OEH 2011) and the *NSW Biosecurity Strategy 2013–2021* (DPI 2013).

The NPWS regional pest management strategy for South Coast Region (OEH 2012) 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.

Desired outcome

- The impact of introduced species on native plants and animals is minimised.

Management response

- 4.1.1 Control weeds in accordance with the park weed management plan and the regional pest management strategy. Prioritise weed control in areas of threatened species habitat. Focus on identified priority species. Control outbreaks of new and emerging weeds quickly to prevent them from becoming established.
- 4.1.2 Seek the cooperation of other authorities, especially Shoalhaven City Council, in implementing weed management programs adjacent to the park.
- 4.1.3 Continue to encourage and support community organisations and neighbours participating in bush regeneration and pest control programs within the park and surrounding bushland.
- 4.1.4 As far as possible, close waste dumping access points and control associated weeds.
- 4.1.5 Monitor the presence, extent and abundance of introduced animal species. If necessary develop and implement programs for control of introduced animal species, in the context of the regional pest management strategy.
- 4.1.6 Raise community awareness, as needed, of the potential adverse impacts on park values of unleashed dogs, roaming cats and dumping of garden waste and lawn clippings.

4.2 Fire

Fire is a natural feature of the environment and is essential to the survival of some plant and animal communities. Fire can also endanger park visitors and neighbours, and inappropriate fire frequency or intensity can damage natural and cultural heritage. 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 2013b).

Fire history

Records of recent fire history within the park indicate that nearly 20 fires have occurred since the park was established in December 2002. The fires have ranged in size from less than 1 hectare to approximately 13 hectares and were mainly the result of arson. Prior to reservation of the park, more than 60 per cent of the Bomaderry Creek bushland was impacted by arson between October 1996 and early 1998 (SCC & DLWC 1998). Larger fires, generally greater than 5 hectares, which have impacted on the park have included fires in 2005, 2006 and 2012.

The frequency of wildfire in the park is a significant factor to consider when determining prescribed burning and other hazard reduction activities or when burning for ecological response.

Ecological requirements

Bushfire regimes are a major determinant of the distribution and abundance of plants and animals. They also affect nutrient cycles, erosion patterns and hydrological regimes. Ecological research suggests that variability of fire intervals and area burnt is important for conserving floristic and habitat diversity and that most plant species require infrequent fires of moderate to high intensity to achieve regeneration. A variable fire frequency of between 7 and 30 years is generally appropriate for the most widespread forests and woodlands of the park.

Rainforests should never be burnt and the rare and threatened plants occurring in the park may need special fire management consideration. Although Bomaderry zieria resprouts after fire, too-frequent burning may exhaust the reserves of the plants and cause local extinction, particularly if rainfall between fire events is low. Some senescence has been noted where the plants are overtopped by tea tree and kunzea vegetation, indicating that a fire may be beneficial to reduce competition for resources (DECCW 2010b). More research into the fire management needs of this species is needed.

The frequent arson within the park appears to have resulted in some areas being burned more frequently than is indicated for the maintenance of biodiversity. This could have had adverse impacts upon particular threatened species or resulted in species loss and the promotion of more fire prone vegetation in parts of the landscape.

Strategies and cooperative arrangements

Under the *Rural Fires Act 1997* NPWS is a fire authority and is responsible for controlling fires in the park and ensuring they do not cause damage to other land or property. An important component of NPWS fire management obligations is participation in local cooperative fire management arrangements, including implementation of Bush Fire Risk Management Plans developed by District Bush Fire Management Committees. NPWS is a member of the Shoalhaven Bush Fire Management Committee, as is the NSW Fire Brigade which is responsible for fire suppression in the Nowra–Bomaderry urban area including Bomaderry Creek Regional Park.

A fire management strategy has been prepared for the park (NPWS 2006). The strategy is underpinned by two primary objectives: protection of life and property and maintenance of biodiversity. It identifies bushfire threats and provides guidelines for the conservation of significant plants and animals and cultural features. The strategy also outlines NPWS commitments in meeting its obligations to limit the spread of fire from the park. Strategic fire advantage zones have been identified to protect urban areas to the north, south and west of the park. There is a heritage management zone over the remainder of the park in which priority is given to the protection of natural and cultural heritage. Successful implementation of the strategy will contribute to mutually cooperative arrangements that enhance the protection of life, property and assets on adjoining lands and within the park.

Desired outcomes

- Fire regimes are appropriate for long-term maintenance of the park's plant and animal communities and for its threatened species and populations.
- The occurrence and effects of unplanned bushfires caused by human activity are minimised.
- Bushfire mitigation measures contribute to the cooperative protection of life, property and community assets on or immediately adjacent to the park.
- Aboriginal sites and culturally significant features are protected from damage by bushfires and fire suppression activities.

Management response

- 4.2.1 Implement the fire management strategy for the park and update as required.
- 4.2.2 Use prescribed burns and other means to achieve fuel management as needed in strategic areas and to achieve a variety of fire regimes that maintain fire thresholds for each vegetation community. Where appropriate, carry out fuel management in cooperation with neighbours for mutual protection.
- 4.2.3 Limit the use of heavy machinery for fire suppression and avoid its use in areas of threatened plant species habitat or cultural features. Rehabilitate areas disturbed by fire suppression operations as soon as practical after fire.
- 4.2.4 Monitor the fire response of significant plant species and communities in the park.
- 4.2.5 Participate in research to determine the effects of burning intensity and frequency on the survival and spread of *Bomaderry zieria* while managing the overall impact of fire to avoid high frequency wildfires on the population.
- 4.2.6 As far as possible, manage visitor activities to limit unplanned human-caused bushfires within the park. This may include closing the park to public use during periods of extreme fire danger.
- 4.2.7 Continue to actively participate in the Shoalhaven Bush Fire Management Committee. Maintain close contact and cooperation with neighbours and the NSW Fire Brigade.

4.3 Isolation and climate change

As mentioned in earlier sections of the plan, the park forms part of the broader Bomaderry Creek bushland, most of which is council land or Crown land granted to the Nowra Local Aboriginal Land Council. The wider bushland has significant habitat and threatened species values and helps ensure the viability of the small, regional park.

The *Shoalhaven Local Environmental Plan 2014* (NSW Government 2014) provides for most of the land along the Bomaderry Creek gorge to be zoned for environmental conservation, but other bushland to the north, west and south of the park is zoned for residential development. Development of these areas could significantly reduce the viability of some threatened species populations in the park through loss of habitat and have other detrimental impacts on the park. NPWS will liaise with land use planning authorities with the aim of reducing the potential impacts as far as possible should these areas be developed in future.

A new road linking North Nowra and Bomaderry, the North Nowra Link Road, may be constructed at the West Cambewarra Road end of the park. This may require revocation of a road corridor along the northern edge of the park (JBA Planning 2011, Planning Assessment Commission 2012). For revocation to occur, the public value of the road will need to outweigh conservation loss and cultural impacts.

Climate change

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

The latest information on projected changes to climate are from the NSW and ACT Regional Climate Modelling (NARClIM) project (OEH 2014). 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 1 is for the Illawarra Region which includes Bomaderry Creek Regional Park (OEH 2014).

Table 1: Illawarra climate change snapshot

Projected temperature changes	
Maximum temperatures are projected to increase in the near future by 0.4–0.9°C	Maximum temperatures are projected to increase in the far future by 1.6–2.3°C
Minimum temperatures are projected to increase in the near future by 0.4–0.7°C	Minimum temperatures are projected to increase in the far future by 1.5–2.4°C
The number of hot days will increase	The number of cold nights will decrease
Projected rainfall changes	
Rainfall is projected to decrease in 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	Severe fire weather is projected to increase in summer and spring in the far future

Source: OEH 2014.

The projected increases in temperature, number of hot days and severe fire weather days (OEH 2014) are likely to influence bushfire frequency and intensity across the Illawarra Region and result in an earlier start to the bushfire season. 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 2010c). It is also likely that erosive rainfall events will negatively impact water quality in creeks and streams.

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. For example, the restricted distributions of Bomaderry zieria and the Albatross mallee endangered population make them vulnerable to events such as drought.

The specific impacts of climate change on the park are difficult to assess since they will depend on the compounding effects of other pressures, particularly barriers to migration and pressure from weeds and feral animals.

Bomaderry Creek Regional Park may be particularly vulnerable to the effects of climate change because of its small size and the pressures posed by future adjacent urban development. Programs to reduce pressures arising from habitat loss, fragmentation and introduced species will help reduce the severity of the effects of climate change on native species.

Desired outcomes

- Habitat linkages within the park and with other areas of the Bomaderry Creek bushland are maintained.
- The impacts of proposed development are minimised.
- The impacts of climate change on natural systems are minimised.

Management response

- 4.3.1 Liaise with Shoalhaven City Council, neighbours and South East Local Land Services to minimise as far as possible the ecological impacts of adjacent residential development on the park and encourage retention of areas of native vegetation, including habitat and riparian corridors.
- 4.3.2 Liaise with Shoalhaven City Council in relation to minimising the impacts on the park should the North Nowra Link Road be constructed.
- 4.3.3 Continue existing fire, pest and weed management programs and adapt where required to minimise climate change-induced threats.

5. Management operations and other uses

Two short vehicle trails in the park are maintained by NPWS for management purposes such as visitor facility maintenance, fire suppression and pest control (see Figure 2). One of these is a trail providing pedestrian and management access from Narang Road to the picnic area. Bomaderry Access Trail, in the southern part of the park, provides access for walking track maintenance and rehabilitation of the former gravel extraction area. Both management trails are gated to prevent unauthorised vehicle access.

As mentioned in Section 3.4, there is potential to construct an NPWS regional office and information outlet on disturbed land in the north-east corner of the park (the former gravel storage site). Environmental and financial assessment would be needed, to determine whether construction of an office in the park would be appropriate.

As previously stated, a 33 kilovolt powerline and a water main cross the centre of the park. The clearing along this route forms a barrier to wildlife movement, has high visual impact and facilitates unauthorised vehicle access. It is used for walking and cycling but will need to be kept as narrow as possible to minimise impacts.

As mentioned in Section 3.1, Shoalhaven City Council installed two groundwater monitoring wells in the park immediately north of the former North Nowra landfill site, to monitor leachate and other pollutants. Access to the wells is by foot from the park boundary. Section 3.1 provides for development of a maintenance and access agreement if required.

Desired outcomes

- Management facilities adequately serve management needs and have acceptable environmental impact.
- Non-park uses have minimal impact on natural and cultural heritage values.

Management response

- 5.1.1 Maintain the management trails shown on Figure 2.
- 5.1.2 Liaise with Endeavour Energy and Shoalhaven Water regarding maintenance of the powerline – water main route to limit impacts on threatened species and cultural heritage values, minimise erosion potential and limit unauthorised access.
- 5.1.3 Investigate the potential for constructing an NPWS information outlet and regional office on disturbed land in the north-east of the park. If it is decided to proceed, keep the area and visual impact of the building to a minimum and include sustainability design principles as far as possible.

6. Implementation

This plan establishes a scheme of operations for the park. Implementation of this plan will be undertaken within the annual program of the NPWS South Coast Region.

Identified activities for implementation are listed in the table below. Relative priorities are allocated against each activity as follows:

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

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

Plan section and management response		Priority
3.1 Geodiversity		
3.1.1	Design and undertake all works in a manner that minimises soil erosion and water pollution.	Ongoing
3.1.2	Undertake appropriate erosion and sediment control measures on trails and tracks and where erosion is being accelerated by human activity or is threatening significant habitats or other park values.	Ongoing
3.1.3	Continue with rehabilitation works at the former stockpile site in the north-east of the park and the former gravel extraction site in the southern part of the park.	Medium
3.1.4	Liaise with NSW Department of Primary Industries – Lands, Shoalhaven City Council, Endeavour Energy and Shoalhaven Water to prevent unauthorised vehicle access into the park from other land tenures.	Medium
3.1.5	Work closely with local police and Shoalhaven City Council to address car and rubbish dumping activities.	Ongoing
3.1.6	Liaise with Shoalhaven City Council and other relevant authorities and organisations to mitigate the impact of land use and development on the water quality of Bomaderry Creek. This should include seeking the protection and enhancement of the riparian corridor upstream of the park, and management of urban runoff to minimise nutrient input and weed infestation.	Ongoing
3.1.7	Liaise with Shoalhaven City Council regarding monitoring of groundwater flows from the former landfill site and seek to enter into a maintenance and access agreement for the monitoring wells, if required, that includes provision for data sharing.	Medium
3.1.8	Monitor results from Shoalhaven City Council water quality testing on Bomaderry Creek upstream of the park, and liaise with council if any concerns arise.	Ongoing

Plan section and management response		Priority
3.1.9	Protect the high scenic value of the Bomaderry Creek gorge through appropriate location and design of visitor and park management facilities.	Ongoing
3.1.10	Liaise as needed with land-use authorities to seek to minimise as far as possible the visual impacts of future residential or other development on the park.	Ongoing
3.2 Native plants and animals		
3.2.1	Undertake targeted animal surveys to check for additional threatened species including the giant burrowing frog and broad-headed snake.	Low
3.2.2	Undertake plant surveys to determine the distribution of and management requirements for Bauer's midge orchid and guinea flower within the park.	Medium
3.2.3	Establish a monitoring program for Bomaderry zieria and undertake other actions for the species set out in Barratt (2014), the <i>Threatened Species Priorities Action Statement</i> and the national recovery plan. In particular: <ul style="list-style-type: none"> – protect any plants being affected by pedestrian traffic, including providing an alternative walking track, if feasible, to enable closure of the informal track near the picnic area – liaise with Endeavour Energy and Shoalhaven Water to ensure utility maintenance activities do not damage Bomaderry zieria – promote and encourage research to determine the mechanism by which Bomaderry zieria is reproducing and undertake experimental burning to determine the impacts of burning on Bomaderry zieria (see Section 4.2). 	High
3.2.4	Implement relevant recovery actions in the <i>Priorities Action Statement</i> for threatened species, populations and communities occurring in the park.	Medium
3.2.5	Continue to work with adjacent land managers to protect Bomaderry Creek bushland habitat and its threatened species populations.	Medium
3.3 Cultural heritage		
3.3.1	Manage Aboriginal heritage in consultation with relevant Aboriginal community organisations and individuals including traditional custodial families.	Ongoing
3.3.2	Monitor the condition of the recorded Aboriginal sites. Undertake protective works where feasible, to prevent further damage from recreational and management activities.	High
3.3.3	Support additional archaeological survey and research in the park including investigation of the shelter affected by the walking track and floodwaters.	Ongoing
3.3.4	Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact on historic sites and places.	Ongoing
3.3.5	Apply the <i>Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales</i> before undertaking any works with the potential to impact on Aboriginal sites and places.	Ongoing
3.3.6	Do not publicise the location of Aboriginal sites and places without prior agreement of the relevant Aboriginal community organisations.	Ongoing
3.3.7	Work cooperatively with Shoalhaven City Council to assess the heritage values of the Bomaderry Creek weir and implement any priority actions.	Medium

Plan section and management response		Priority
3.4 Recreation and education		
3.4.1	Maintain the picnic area facilities and continue to provide associated car parking.	High
3.4.2	Manage the Mossy Gully Track as the premier walking track within the park. Maintain the small section of the track that extends beyond the northern boundary of the park in consultation with Shoalhaven City Council.	High
3.4.3	Investigate the feasibility of providing access at all water levels at the northern crossing over Bomaderry Creek.	Low
3.4.4	Maintain those sections of the River Oak Crossing Track and the track to Bernie's Lookout that are within the park. Liaise with Shoalhaven City Council regarding management of the two tracks.	Medium
3.4.5	Close and rehabilitate the track that crosses under the powerline from Falcon Crescent, as shown on Figure 2.	Medium
3.4.6	Maintain other existing walking tracks on the plateau as shown on Figure 2, but keep the need for them under review. Work with Shoalhaven City Council to determine if any tracks from West Cambewarra Road will need to be closed or rerouted if cut off or made unsafe by any development of the North Nowra Link Road in this location.	Medium
3.4.7	Encourage understanding and appreciation of the natural and cultural values of the park and surrounding Bomaderry Creek bushland through Discovery programs and interpretation signs or information at the picnic area and along the Mossy Gully Track. Include information about: <ul style="list-style-type: none"> – geology and geomorphology – significant plant and animal species and vegetation communities – Aboriginal heritage values and associations with the area, including the stories and relationships depicted in the mural, as desired by the Aboriginal community – recreational opportunities. 	Ongoing
3.4.8	Involve the local Aboriginal community in the development of any material and programs for interpretation of Aboriginal culture.	Ongoing
3.4.9	Allow school, community and commercial tours and activities subject to: <ul style="list-style-type: none"> – environmental impacts being acceptable and use being confined to formalised tracks – limits on group size and frequency of use if necessary to minimise environmental impacts and conflict with other users – a licence for commercial use. 	Ongoing
3.4.10	Encourage use of the park for Aboriginal cultural tours conducted by local Aboriginal people.	Ongoing
3.4.11	Work cooperatively with Shoalhaven City Council to inform the local community about the values of the park and the Bomaderry Creek bushland.	Low
3.4.12	Allow dog walking on management trails, walking tracks and along the powerline – water main route but not in the picnic area. Dogs must be leashed at all times.	Ongoing
3.4.13	Allow cycling only on management trails and the powerline – water main route.	Ongoing

Plan section and management response		Priority
3.4.14	Do not allow camping and horse riding in the park.	Ongoing
3.4.15	Prohibit wood fires. Allow gas or similar stoves and barbecues in the picnic area, subject to normal fire restrictions.	Ongoing
3.4.16	Allow rock climbing in suitable locations in the park, subject to the following restrictions: <ul style="list-style-type: none"> – climbing will not be permitted on Aboriginal rock shelters or where it could cause unacceptable impacts on walking tracks or risks to walker safety – climbing groups must be no larger than eight participants and commercial climbing will not be permitted – the safety of rock climbers will be the responsibility of participants and their companions – the impacts of rock climbing will be monitored and it may be further regulated if needed, in conjunction with user groups. 	Ongoing
3.4.17	Work closely with local police and Shoalhaven City Council to address unauthorised trail bike use.	Ongoing
3.4.18	Work with neighbours and other agencies to discourage and combat vandalism. Install security cameras or other measures as needed.	Ongoing
3.4.19	Apply to the NSW Government Tourist Attraction Signposting Assessment Committee to develop and install tourist information signs on the Princes Highway.	Medium
3.4.20	Work collaboratively with relevant community organisations, interested individuals the Nowra Local Aboriginal Land Council and neighbouring land managers in the management of the park and surrounding bushland.	High
4.1 Pests		
4.1.1	Control weeds in accordance with the park weed management plan and the regional pest management strategy. Prioritise weed control in areas of threatened species habitat. Focus on identified priority species. Control outbreaks of new and emerging weeds quickly to prevent them from becoming established.	High
4.1.2	Seek the cooperation of other authorities, especially Shoalhaven City Council, in implementing weed management programs adjacent to the park.	Medium
4.1.3	Continue to encourage and support community organisations and neighbours participating in bush regeneration and pest control programs within the park and surrounding bushland.	Medium
4.1.4	As far as possible, close waste dumping access points and control associated weeds.	Medium
4.1.5	Monitor the presence, extent and abundance of introduced animal species. If necessary develop and implement programs for control of introduced animal species, in the context of the regional pest management strategy.	High
4.1.6	Raise community awareness as needed of the potential adverse impacts on park values of unleashed dogs, roaming cats and dumping of garden waste and lawn clippings.	Medium
4.2 Fire		
4.2.1	Implement the fire management strategy for the park and update as required.	High

Plan section and management response		Priority
4.2.2	Use prescribed burns and other means to achieve fuel management as needed in strategic areas and to achieve a variety of fire regimes that maintain fire thresholds for each vegetation community. Where appropriate, carry out fuel management in cooperation with neighbours for mutual protection.	High
4.2.3	Limit the use of heavy machinery for fire suppression and avoid its use in areas of threatened plant species habitat or cultural features. Rehabilitate areas disturbed by fire suppression operations as soon as practical after fire.	Ongoing
4.2.4	Monitor the fire response of significant plant species and communities in the park.	Low
4.2.5	Participate in research to determine the effects of burning intensity and frequency on the survival and spread of Bomaderry zieria while managing the overall impact of fire to avoid high frequency wildfires on the population.	High
4.2.6	As far as possible, manage visitor activities to limit unplanned human-caused bushfires within the park. This may include closing the park to public use during periods of extreme fire danger.	Ongoing
4.2.7	Continue to actively participate in the Shoalhaven Bush Fire Management Committee. Maintain close contact and cooperation with neighbours and the NSW Fire Brigade.	High
4.3 Isolation and climate change		
4.3.1	Liaise with Shoalhaven City Council, neighbours and South East Local Land Services to minimise as far as possible the ecological impacts of adjacent residential development on the park and encourage retention of areas of native vegetation, including habitat and riparian corridors.	Ongoing
4.3.2	Liaise with Shoalhaven City Council in relation to minimising the impacts on the park should the North Nowra Link Road be constructed.	Ongoing
4.3.3	Continue existing fire, pest and weed management programs and adapt where required to minimise climate change induced threats	Ongoing
5.1 Management operations and other uses		
5.1.1	Maintain the management trails shown on Figure 2.	Medium
5.1.2	Liaise with Endeavour Energy and Shoalhaven Water regarding maintenance of the powerline – watermain route to limit impacts on threatened species and cultural heritage values, minimise erosion potential and limit unauthorised access.	Medium
5.1.3	Investigate the potential for constructing an NPWS information outlet and regional office on disturbed land in the north-east of the park. If it is decided to proceed, keep the area and visual impact of the building to a minimum and include sustainability design principles as far as possible.	Medium

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