



Draft Plan of Management



Bomaderry Creek Regional Park



Bomaderry Creek Regional Park Draft Plan of Management

NSW National Parks and Wildlife Service

October 2013

Acknowledgements

This plan of management was prepared by staff of the South Coast Region of the NSW National Parks and Wildlife Service (NPWS), part of the Office of Environment and Heritage, Department of Premier and Cabinet.

NPWS acknowledges that this park is in the traditional country of the Dharawal Aboriginal people.

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

Front Cover:

Walkers in Bomaderry Creek Gorge by Michael Van Ewijk / OEH.

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.

Disclaimer:

This publication is for discussion and comment only. Publication indicates the proposals are under consideration and are open for public discussion. Any statements made in this draft publication are made in good faith and do not render the Office of Environment and Heritage liable for any loss or damage. Provisions in the final management plan may not be the same as those in this draft plan.

Published by:

Office of Environment and Heritage
59–61 Goulburn Street
PO Box A290
Sydney South 1232

© Copyright State of NSW and the Office of Environment and Heritage NSW: Use permitted with appropriate acknowledgment

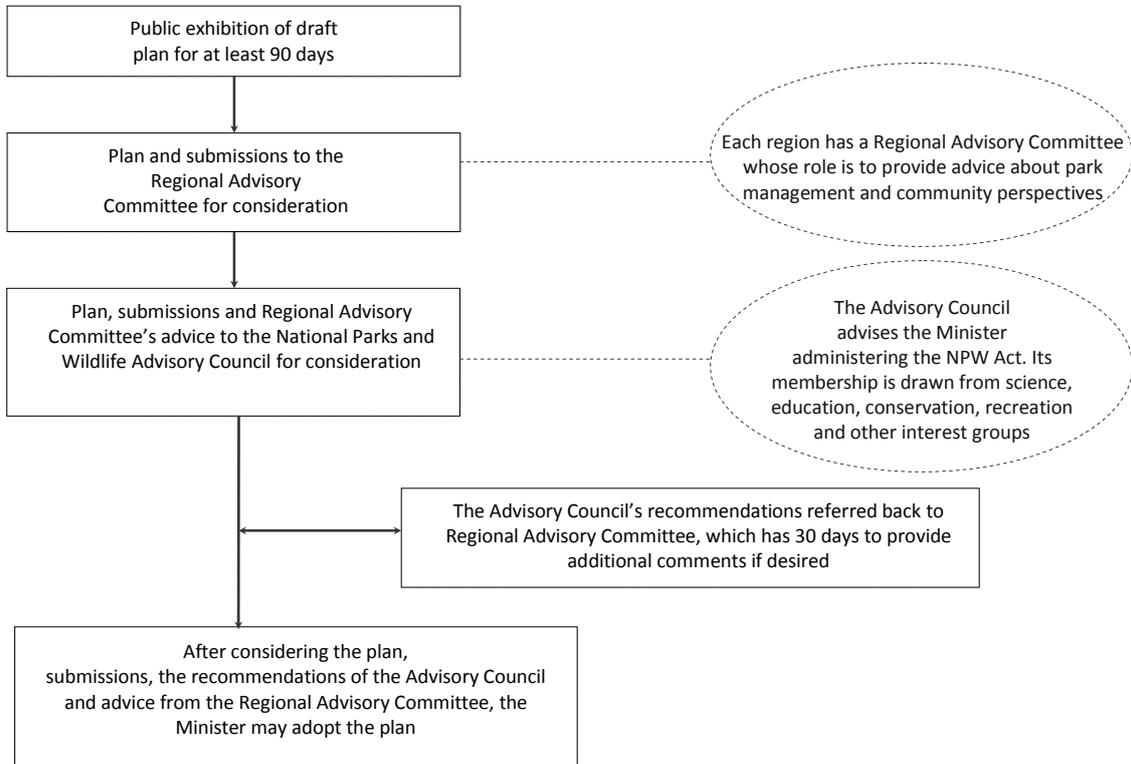
ISBN 978 1 74359 252 6
OEH 2013/0590

Printed on recycled paper

Invitation to Comment

The *National Parks and Wildlife Act 1974* (NPW Act) requires that a plan of management be prepared that outlines how an area will be managed by the NSW National Parks and Wildlife Service (NPWS).

The procedures for the exhibition and adoption of plans of management are specified under Part 5 of the NPW Act and involve the following stages:



This draft plan is now being placed on public exhibition for comment. Members of the public, whether as individuals or as members of community interest groups, are invited to comment in writing on this plan of management.

The closing date for comments on the plan is Monday 3 February 2014.

Submissions can be made by:

- i) Writing to The Planning Officer, NPWS, PO Box 707, NOWRA NSW 2541, or
- ii) Submitting comments online at www.environment.nsw.gov.au/consult.

To make consideration of your submission as effective as possible it would help us if you:

- Identify the section heading and number to which your comment relates
- Briefly explain the reason for your comment and, if appropriate, suggest other ways to address the issue.

All submissions received by NPWS are a matter of public record and are available for inspection upon request. Your comments on this draft plan may contain information that is defined as “personal information” under the *NSW Privacy and Personal Information Protection Act 1998*. The submission of personal information with your comments is voluntary.

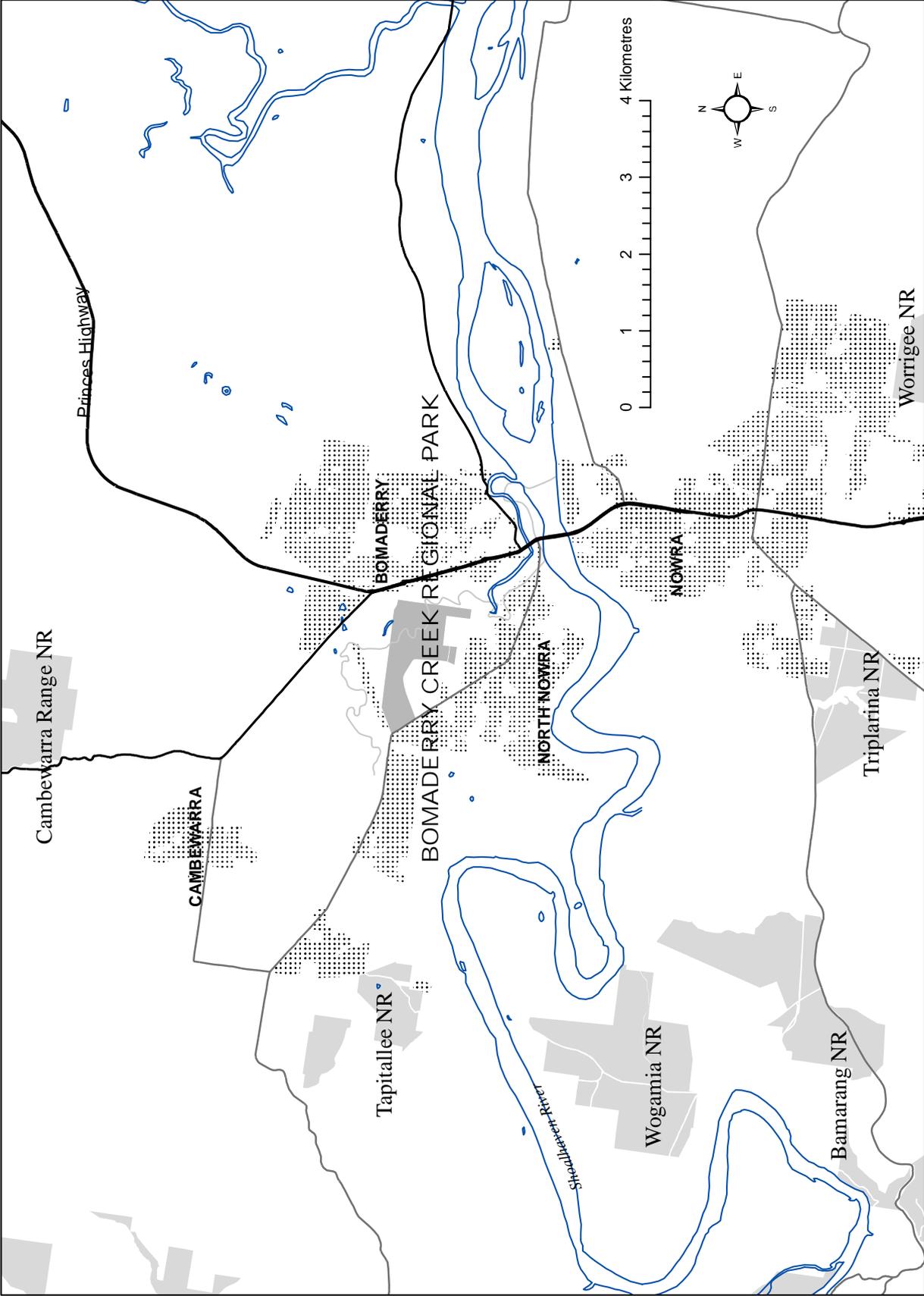
Contents

1.	INTRODUCTION	2
1.1	Location, Gazettal and Regional Setting	2
1.2	Statement of Significance	2
2.	MANAGEMENT CONTEXT	5
2.1	Legislative and Policy Framework	5
2.2	Management Purposes and Principles	5
2.3	Specific Management Directions	5
3.	VALUES	7
3.1	Geodiversity	7
3.2	Native Plants and Animals	9
3.3	Cultural Heritage	12
3.4	Recreation and Education	13
4.	THREATS	19
4.1	Pests	19
4.2	Fire	20
4.3	Isolation and Climate Change	22
5.	MANAGEMENT OPERATIONS AND OTHER USES	24
6.	IMPLEMENTATION	25
7.	REFERENCES	30

Maps

Figure 1: Location	1
Figure 2: Bomaderry Creek Regional Park	4

Figure 1: Location



1. Introduction

1.1 Location, Gazettal and Regional Setting

Features	Description
Location	On 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 Biogeographic Region. 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 three kilometres to the west (see Figure 2).
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 and privately owned land. Other land adjacent to the park includes residential properties to the south, semi rural properties to the north-west and a former tip site in the south-east.
Other Authorities	The park is within the area of Shoalhaven City Council, the Southern Rivers Catchment Management Authority and the 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 regional 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, scenery and recreation values.

Biological and catchment values

The park has the following important natural values:

- It contains populations of the endangered plant Bomaderry zieria (*Zieria baeuerlenii*), a species known to occur only within the park and immediately adjacent bushland.
- It contains populations of three other threatened species: the endangered *Hibbertia* sp. nov. 'Menai' (Guinea flower) and the vulnerable Albatross mallee (*Eucalyptus langleyi*) and Bauer's midge orchid (*Genoplesium baueri*). Albatross mallee plants in the area have been listed as an endangered population.
- It also contains several rare plants, including *Leptospermum sejunctum*, *Acacia subtilinervis*, *Rulingia hermanniifolia* and the regionally rare *Dampiera scottiana*.

- It protects habitat for at least six threatened animal species: the yellow-bellied glider (*Petaurus australis*), glossy black-cockatoo (*Calyptorhynchus lathamii*), masked owl (*Tyto novaehollandiae*), square-tailed kite (*Lophoictinia isura*), varied sittella (*Daphoenositta chrysoptera*) and southern myotis (*Myotis macropus*).

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 recorded nine Aboriginal sites within 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 up to the present day. The site is historically linked to the former Bomaderry Children's Home, which 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 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.

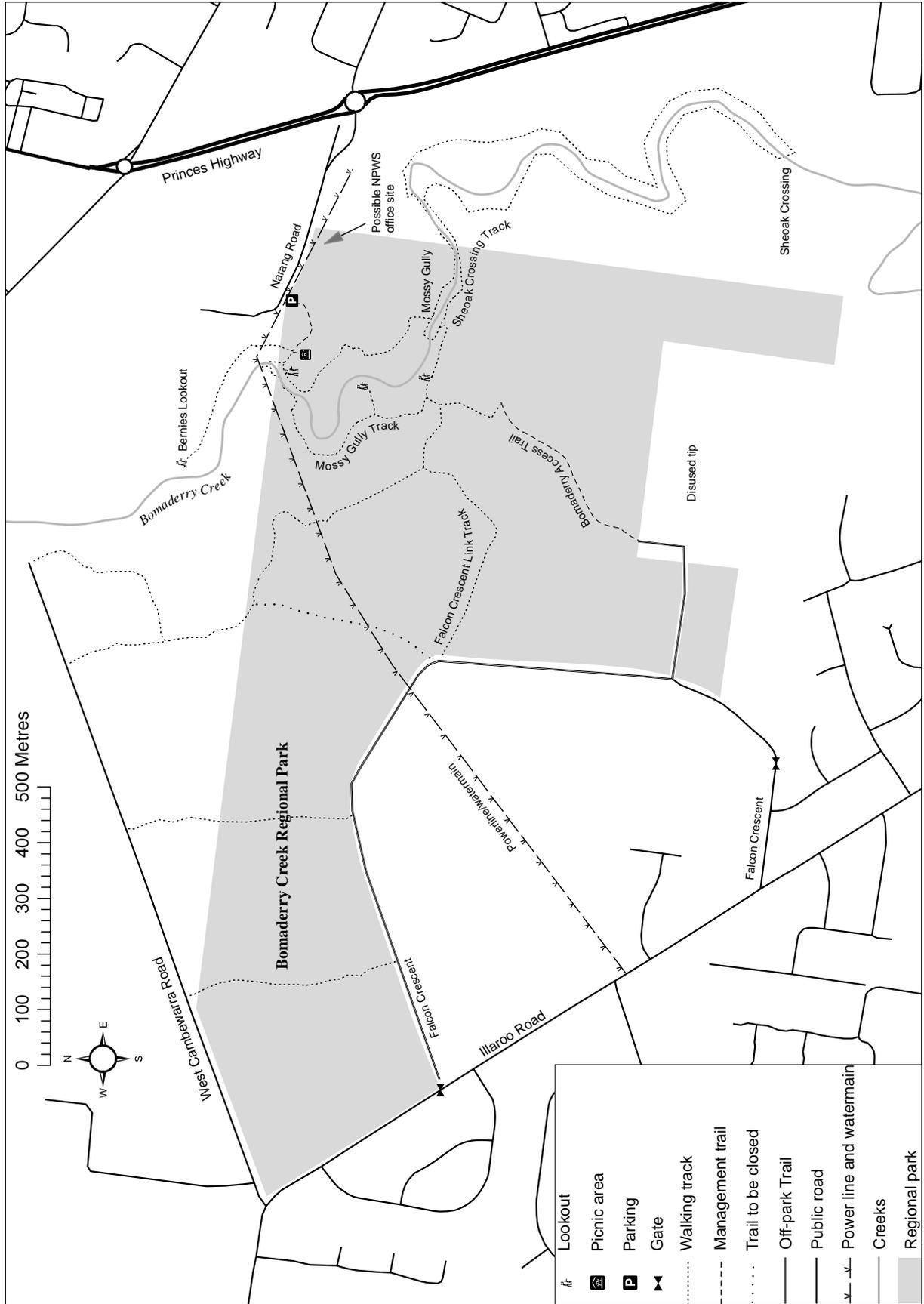
The rainforests within the gorge and taller forests above the gorge in the south-east of the park are very attractive, while the drier open forests on the plateau feature wildflowers during late winter/spring.

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 both 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.

Figure 2: Bomaderry Creek Regional Park



2. Management Context

2.1 Legislative and Policy Framework

The management of regional parks in NSW 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 the National Parks and Wildlife Service (NPWS).

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) may require the assessment and mitigation of the environmental impacts of works proposed in this plan. 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 NPW 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 NPW Act to protect and conserve areas in a natural or modified landscape that are suitable for public recreation and enjoyment.

Under the 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 reuse) 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 large areas of regional open space and bushland that are assessed as having high conservation, landscape and recreation values. Regional parks serve the dual purpose of providing outdoor recreation opportunities while providing protection for flora and fauna species.

2.3 Specific Management Directions

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 and walking tracks. Cycling will be permitted on the plateau management trails but these are only 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/watermain corridor, it contains an extensive former gravel extraction area and a separate gravel storage site, and is subject to recreational vehicle use and illegal rubbish and car dumping.

The gravel extraction and storage areas have been rehabilitated but will need ongoing access and weed control. The plan of management also provides for closure of an unnecessary vehicle trail, control of off-road motor bike 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

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 some car and rubbish dumping along the trails and around the boundaries. The picnic area is located in a former sandstone quarry that has been rehabilitated.
- A former gravel stockpile site is located in the north-east corner of the park. The site has been rehabilitated and natural revegetation is slowly occurring, but the site requires ongoing monitoring and weed control.
- A former gravel extraction area is located in the southern part of the park. This has a network of clearings and trails over approximately three hectares as a result of informal use as a motor cross 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 2005).
- A closed landfill site is located immediately south of the park. Shoalhaven City Council installed two ground water 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 Environmental 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 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 Monitor the former gravel stockpile site in the north-east of the park and undertake further rehabilitation work if required. Ensure rehabilitation does not adversely impact on Bomaderry zieria.
- 3.1.4 Monitor recovery of the former gravel extraction area in the southern part of the park and maintain fencing until adequate vegetation growth has occurred.
- 3.1.5 Liaise with the Department of Primary Industries (Crown Lands), Shoalhaven City Council, Endeavour Energy and Shoalhaven Water to prevent unauthorised vehicle access into the park from other land tenures.
- 3.1.6 Work closely with local police and Shoalhaven City Council to address car and rubbish dumping activities.
- 3.1.7 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.
- 3.1.8 Liaise with Shoalhaven City Council regarding monitoring of ground water flows from the old tip site and seek to enter into a maintenance and access agreement for the monitoring wells, if required, that includes provision for data sharing.
- 3.1.9 Monitor results from Shoalhaven City Council water quality testing on Bomaderry Creek upstream of the park, and liaise with Council if any concerns arise.
- 3.1.10 Protect the high scenic value of the Bomaderry Creek gorge through appropriate location and design of visitor and park management facilities.
- 3.1.11 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 fauna 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 subcommunities:

- 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 (*Corymbia gummifera*) - grey gum (*Eucalyptus punctata*) - blue-leaved stringybark (*E. agglomerata*) forest/woodland dominates the rocky upper margins of the gorge where the soils are relatively shallow. 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 (*Zieria baeuerlenii*), the vulnerable Albatross mallee (*E. langleyi*) and the rare *Leptospermum sejunctum*, *Acacia subtilinervis* 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 juniperum*). These two communities combine with the red bloodwood-grey gum-stringybark community to form a complex intermingling of scrub, wet heath, sedgeland and woodland habitat.

Scribbly gum (*E. sclerophylla*) - red bloodwood forest/woodland is the dominant vegetation community on the level plateau topography of the park where the soils are deeper but drier. Other tree species include spotted gum, a 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 disused tip (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 TSC Act occur within the park: the vulnerable Albatross mallee and Bauer's midge orchid (*Genoplesium baueri*) and the endangered Guinea flower (*Hibbertia sp. nov. 'Menai'*) and Bomaderry zieria (Mills 2012). Bauer's midge orchid has been recorded in open forest areas on shallow soils above the southern side of the gorge. Guinea flower is found in woodland and heathland on sandstone.

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). 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 on 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 (Eco Logical 2011).

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 layering rather than setting seed, however further research is required to confirm this. A management study (Barratt 2007) sets out a number of recommendations for the species.

Three other species listed as Rare or Threatened Australian Plants (ROTAPs) by Briggs and Leigh (1996) occur within the park: *Leptospermum sejunctum* is found in the north-east and far south-east of the park in the kunzea shrubland; *Acacia subtilinervis* is co-dominant with *Kunzea ambigua* in the kunzea shrubland; and *Rulingia hermanniifolia* occurs within the red bloodwood/grey gum/stringybark forest and 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) 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 native fauna species. Twenty mammals, 123 birds, 19 reptiles, 10 frogs, and 18 estuarine and freshwater fish species including the Australian bass (*Macquaria novemaculeata*) have been recorded in the area (Murphy 1997, BCBWG 2001).

Six species listed as threatened under the TSC Act have been recorded within the park. These are the vulnerable glossy black-cockatoo (*Calyptorhynchus lathamii*), 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 (*Helioporus australiacus*), grey-headed flying fox (*Pteropus poliocephalus*), spotted-tailed quoll (*Dasyurus maculatus*), eastern pygmy-possum (*Cercatetus 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 species within the park.

Threatened Species Priorities Action Statement

Under the TSC Act, strategies for promoting the recovery of threatened species, populations and ecological communities are set out in the Threatened Species Priorities Action Statement (PAS). The purpose of the PAS is to identify those actions required to promote the recovery of a threatened species, population or ecological community to a position of viability in nature. Specific management actions, survey and research that are identified in the PAS may be carried out within the park for protection and recovery of individual populations of threatened species.

High priority recovery actions for Bomaderry zieria include protection from pedestrian traffic, ensuring powerline/watermain 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 area of habitat to be retained locally.

Issues

- Significant plant species and fauna habitat are threatened by off-road trail bike riding (section 3.1), weeds and dumping of garden waste (refer to section 4.1) and too frequent fire (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 fauna surveys to check for additional threatened species including the giant burrowing frog and broad-headed snake.
- 3.2.2 Establish a monitoring program for Bomaderry zieria and undertake other actions for the species set out in Barratt (2007) and the Threatened Species Priorities Action Statement. In particular:
 - protection of any plants being affected by pedestrian traffic, including provision of an alternative walking track, if feasible, to enable closure of the informal track near the picnic area

- liaison with Endeavour Energy and Shoalhaven Water to ensure utility maintenance activities do not damage Bomaderry zieria
 - promotion and encouragement of research to determine the mechanism by which Bomaderry zieria is reproducing and the impacts of burning on Bomaderry zieria (see section 4.2).
- 3.2.3 Monitor the Albatross mallee population and undertake protective works if needed.
- 3.2.4 Implement relevant recovery actions from the Threatened Species Priorities Action Statement as needed for other threatened species occurring in the park.
- 3.2.5 Continue to provide advice to land use authorities to seek to maximise protection of threatened species populations and habitat in the Bomaderry Creek bushland.

3.3 Cultural Heritage

Aboriginal heritage

South Coast Aboriginal people of the Dharawal language group occupied the area incorporating Bomaderry Creek Regional Park. Use 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 that 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 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 development of interpretive material for the park (see section 3.4).

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 immediately upstream of the park. 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 (Barrett 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 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/watermain 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 on Aboriginal or historic sites and places.
- 3.3.5 Do not publicise the location of Aboriginal sites and places without the prior agreement of relevant Aboriginal community organisations.

3.4 Recreation and Education

The park is visited primarily by locals from North Nowra, Bomaderry and nearby towns and villages. Access is from the Princes Highway along Narang Road, Bomaderry, or from Falcon Crescent, North Nowra. There is no public vehicle access within the park.

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

It is estimated that there are approximately 12,000-15,000 visits annually to the park. 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 NP and by the Sydney Catchment Authority 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 car park.

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

Walking

A network of walking tracks and management trails provides opportunities for short and medium length walks through the park and enables visitors to experience a variety of forest and riverine environments. Tracks and trails are shown on Figure 2.

The main walking track begins at the picnic area and is a one kilometre circuit along both sides of the gorge (the Mossy Gully loop walk). 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 100 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 Sheoak 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/watermain trail.

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 the enjoyment and satisfaction of visitors. Interpretive signs have been placed along the Mossy Gully 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 (refer 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 Sheoak 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 on the plateau area. Cycling is not appropriate on walking tracks in order to protect the safety of walkers. Cycling will be permitted on management trails but the short management trails in the park provide only minimal cycling opportunities.

No horse riding is known to occur in the park and 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 occur downstream or upstream of the park, 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, and 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. Use should be monitored and, where necessary, regulated in order to ensure that impacts on cultural sites and the environment, and/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 and its small size and urban location make it unsuitable for the provision of camping opportunities.

Trail bike riding

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 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 (see section 4.2).

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 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/watermain 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 are raised. 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 focussed 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 focussed 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 and interested community members are informed about, and involved in, park protection and management activities where appropriate.

Management Response

- 3.4.1 Maintain the Narang Road 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 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 Sheoak Crossing Track and the track to Bernie's Lookout that are within the park. Liaise with 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 Council to determine whether any of the tracks from West Cambewarra Road will need to be closed or re-routed if cut off or

made unsafe by the eventual 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 through Discovery programs and interpretive signs 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 within the park.
- 3.4.8 Involve the local Aboriginal community in the development of any material and programs for interpretation of Aboriginal culture.
- 3.4.9 Permit 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 culture 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 regional park and the Bomaderry Creek bushland.
- 3.4.12 Permit dog walking on management trails, the powerline/watermain trail and walking tracks, but not in the picnic area. Dogs must be leashed at all times.
- 3.4.13 Permit cycling only on the Bomaderry Access Trail and the powerline/watermain trail.
- 3.4.14 Do not permit 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 8 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.

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 out-compete 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 rubbish tip, gravel extraction and stockpile sites, the urban fringe and along Bomaderry Creek.

A significant number of the 58 weed species identified within the park are considered key threatening processes under the TSC Act. These 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 (*Andredera cordifolia*), morning glory (*Ipomea indica*), moth plant (*Arujia sericifera*), passionfruit vine (*Passiflora spp.*), cape ivy (*Delairea odorata*), trad (*Tradescantia fluminesensis*) 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*), cotoneaster (*Cotoneaster glaucophyllus*) 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 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, 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 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 percent coverage by weeds in some areas (Barratt 2008). A particular concern was extensive infestations of mother of millions (*Bryophyllum delagoense*). 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 once residential development occurs west of Falcon Crescent.

Predators such as foxes and feral or pet dogs and cats are likely to occur in the park and may have a significant impact on native fauna, though are unlikely to affect most of the park's threatened species. Rabbits are known to occur in and around the picnic area and have been controlled as needed. Predation by feral cats, predation by European foxes and competition and grazing by rabbits are all listed as key threatening processes under the TSC Act.

Under the TSC Act, a Priorities Action Statement (PAS) to promote the abatement of key threatening processes has been prepared. The PAS 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.

The NPWS South Coast Regional Pest Management Strategy identifies pest species across the region's parks and priorities for control, including actions listed in the PAS, threat abatement plans and other strategies such as the NSW Biodiversity Priorities for Widespread Weeds. The overriding objective of the pest management strategy is to minimise adverse impacts of introduced species on biodiversity and other park and community values whilst complying with legislative responsibilities.

Desired Outcomes

- 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 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, however, and inappropriate fire frequency or intensity can damage natural and cultural heritage. Management of bushfire in the park is a complex issue. Management must aim to achieve both long-term conservation of native plant and animal communities and ongoing fire management obligations that contribute to the protection of life, property and community assets within and adjacent to the park.

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 8 hectares and were mainly the result of arson. Prior to reservation of the park, more than 60 percent of the Bomaderry Creek bushland was impacted by arson between October 1996 and early 1998 (SCC & DLWC 1998).

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

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. Bomaderry zieria resprouts readily following fire but can be killed by hot fires. It is thought to be vulnerable to too frequent fire as it appears to need a deep litter base to enable layering. It is also sensitive to shading by other plants, which would be partly determined by fire frequency. As a guide it is currently considered that areas with this species should not be burnt more than once every seven years but more research is needed into its fire ecology.

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* the NPWS is a fire authority and is responsible for controlling fires in the park and ensuring that they do not cause damage to other land or property. An important component of NPWS fire management obligations is participation in local co-operative 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.
- The occurrence and effects of unplanned bushfires caused by human activity are minimised.
- Bush fire 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 afforded protection from damage by bushfires and fire suppression activities.

Management Response

- 4.2.1 Implement the fire management strategy for the park.
- 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*. Avoid fuel reduction burning in areas immediately around *Bomaderry zieria* colonies and protect from frequent fire until more information is available about the appropriate fire regime.
- 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 regional park forms part of the 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 2013 draft of the Shoalhaven Local Environmental Plan (LEP) 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 proposed to continue to be zoned for residential development (SCC 2013). 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 the 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

Climate change has been listed as a key threatening process under the TSC Act. Projections of future changes in climate for NSW include higher temperatures, increasing sea levels and water temperatures, elevated carbon dioxide, more intense but possibly reduced annual average rainfall, increased temperature extremes and higher evaporative demand. These changes are likely to lead to greater intensity and frequency of fires, more severe droughts,

reduced river runoff and water availability, regional flooding, increased erosion and ocean acidification.

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

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 the impacts of introduced species, bushfires, pollution, recreation and illegal use, as set out in other sections of this plan, will help reduce the severity of the effects of climate change.

Desired Outcomes

- Habitat linkages within the park and with other areas of the Bomaderry bushland are maintained.
- The impacts of proposed development are minimised.
- Management programs increase the ability of natural systems to cope with climate change.

Management Response

- 4.3.1 Liaise with Shoalhaven City Council, neighbours and the Southern Rivers Catchment Management Authority 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, weed management and pollution control programs to increase the ability of native plants and animals to cope with the effects of climate change.

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. The other, 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 save money over other options.

As previously stated, a 33kV powerline and a watermain 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 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 closed 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 two management trails shown on Figure 2.
- 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.
- 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 of management 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 those imperative to achievement of 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 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 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 NPW 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	Monitor the former gravel stockpile site in the north-east of the park and undertake further rehabilitation work if required. Ensure rehabilitation does not adversely impact on Bomaderry zieria.	Medium
3.1.4	Monitor recovery of the former gravel extraction area in the southern part of the park and maintain fencing until adequate vegetation growth has occurred	High
3.1.5	Liaise with the Department of Primary Industries (Crown Lands), Shoalhaven City Council, Endeavour Energy and Shoalhaven Water to prevent unauthorised vehicle access into the park from other land tenures.	Medium
3.1.6	Work closely with local police and Shoalhaven City Council to address car and rubbish dumping activities.	Ongoing
3.1.7	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 protection and enhancement of the riparian corridor upstream of the park, and management of urban runoff to minimise nutrient input and weed infestation.	Ongoing
3.1.8	Liaise with Shoalhaven City Council regarding monitoring of ground water flows from the old tip site and seek to enter into a maintenance and access agreement for the monitoring wells, if required, that includes provision for data sharing.	Medium

Plan section and management response		Priority
3.1.9	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
3.1.10	Protect the high scenic value of the gorge through appropriate location and design of visitor and park management facilities.	Ongoing
3.1.11	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 fauna surveys to check for additional threatened species including the giant burrowing frog and broad-headed snake.	Low
3.2.2	Establish a monitoring program for Bomaderry zieria and undertake other actions for the species set out in Barratt (2007) and the Threatened Species Priorities Action Statement. In particular: <ul style="list-style-type: none"> - protection of any plants being affected by pedestrian traffic, including provision of an alternative walking track, if feasible, to enable closure of the informal track near the picnic area - liaison with Endeavour Energy and Shoalhaven Water to ensure utility maintenance activities do not damage Bomaderry zieria - promotion and encouragement of research to determine the mechanism by which Bomaderry zieria is reproducing and the impacts of burning on Bomaderry zieria (see also section 4.3). 	High
3.2.3	Monitor the Albatross mallee population and undertaken protective works if needed.	Medium
3.2.4	Implement relevant recovery actions from the Threatened Species Priorities Action Statement for other threatened species occurring in the park.	Medium
3.2.5	Continue to provide advice to land use authorities to seek to maximise protection of threatened species populations and habitat in the Bomaderry Creek bushland.	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
3.3.3	Support further archaeological survey and heritage assessment of the park including investigation of the shelter at risk from floodwaters.	Ongoing
3.3.4	Undertake an archaeological survey and cultural assessment prior to all works with the potential to impact on Aboriginal or historic sites and places.	Ongoing
3.3.5	Do not publicise the location of Aboriginal sites and places without prior agreement of the relevant Aboriginal community organisations.	Ongoing
3.3.2	Monitor the condition of the recorded Aboriginal sites. Undertake protective works where required to prevent damage from recreational and management activities. In particular, investigate whether it would be feasible to protect the sites affected by walking tracks and the powerline/watermain trail.	High

Plan section and management response		Priority
3.4 Recreation and Education		
3.4.1	Maintain the Narang Road picnic 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 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 Sheoak Crossing Track and the track to Bernie's Lookout that are within the park. Liaise with 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 Council to determine whether any of the tracks from West Cambewarra Road will need to be closed or re-routed if cut off or made unsafe by 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 through Discovery programs and interpretation signs. 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 - recreation opportunities within the park. 	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	Permit 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 culture tours conducted by local Aboriginal people.	Ongoing
3.4.11	Work cooperatively with Shoalhaven City Council and community organisations to inform the local community about the values of the regional park and the Bomaderry Creek bushland.	Low
3.4.12	Permit dog walking on management trails, the powerline/watermain trail and walking tracks but not in the picnic area. Dogs must be leashed at all times.	Ongoing
3.4.13	Permit cycling only on the Bomaderry Access Trail and the powerline/watermain trail.	Ongoing

Plan section and management response	Priority
3.4.14 Do not permit camping and horse riding in the park.	Ongoing
3.4.15 Prohibit wood fires. Allow gas or similiar stoves and barbecues subject to normal fire restrictions.	Ongoing
3.4.16 Allow rock climbing in suitable locations in the park as long as it is undertaken in a safe and environmentally acceptable manner. The following restrictions will apply: <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 8 participants and commercial climbing will not be permitted - the safety of rock climbers will be the responsibility of participants and their companions - prior consent will be required for development of new climbing locations - the impacts of rock climbing will be monitored and 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
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 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.	High
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

Plan section and management response		Priority
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. Avoid fuel reduction burning in areas immediately around Bomaderry zieria colonies and protect from frequent fire until more information is available about the appropriate fire regime.	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 the Southern Rivers Catchment Management Authority 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, weed management and pollution control programs to increase the ability of native plants and animals to cope with the effects of climate change.	Ongoing
5.1 Management Operations and Other Uses		
5.1.1	Maintain the two management trails shown on Figure 2.	Medium
5.1.2	Liaise with Endeavour Energy and Shoalhaven Water regarding maintenance of the powerline and 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

7. References

- Barratt T 1998, *Bomaderry Creek Bushland Draft Plan of Management – Version 5*. Report prepared for the Australian Conservation Foundation Shoalhaven Branch.
- Barratt T 2000, *Aboriginal Use of Bomaderry Creek Bushland – post European contact*, unpublished report to NPWS.
- Barratt T 2007, *Condition and Management Needs of Zieria baeuerlenii Bomaderry Creek Bushland NSW South Coast*. Prepared for NPWS Nowra Area, South Coast Region, Department of Environment and Climate Change, NSW.
- Barratt T 2008, *Bomaderry Creek Bushland, Weeds of Crown & Council Land*. Prepared for Bomaderry Creek Landcare/Bushcare Group.
- Barratt T, Wallis J & Leatch M 2001, *Bomaderry Creek Bushland Walks*, Klimpton Press, Falls Creek.
- BCBWG 2001, *Report to the Minister for the Environment and the Minister for Land and Water Conservation, final draft*, prepared by the Bomaderry Creek Bushland Working Group.
- Boot P 2001, *Bomaderry Creek Bushland – Aboriginal Cultural Heritage*. NSW National Parks and Wildlife Service Internal Report.
- Briggs J & Leigh J 1996, *Rare or Threatened Australian Plants*, Revised edition, CSIRO, Melbourne.
- Bush and Landcare Services 2004, *Bomaderry Creek Regional Park Weed Management Plan*, NSW Department of Environment and Conservation.
- Clarke E 2006, *Aboriginal and cultural heritage mapping project, Lower Shoalhaven River Valley, Stage 4A*, Archaeological Predictive Modelling and Aboriginal Community Consultation, South East Archaeology Pty. Ltd.
- DECC 2009a, *Eucalyptus langleyi: Threatened Species Profile*. Available from www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10298
- DECC 2009b *Zieria baeuerlenii: Threatened Species Profile*. Available from www.threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10850
- Department of Conservation and Land Management undated, *Land Assessment of Crown Land at Bomaderry Creek North Nowra*.
- Eco Logical 2011, *North Nowra Link Road: Biodiversity assessment*. Prepared for Shoalhaven City Council. Available as Appendix F of the Environmental Assessment at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=134
- Hazelton PA 1992, *Soil Landscapes of the Kiama 1:100,000 Sheet*. Department of Conservation and Land Management (incorporating the Soil Conservation Service of NSW) Sydney.
- JBA Planning 2011, *Environmental Assessment Report: North Nowra Link Road Concept Plan*. Submitted to Department of Planning on behalf of Shoalhaven City Council. Available at: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=134
- Kevin Mills and Associates Pty Ltd 1999, *North Nowra Link Road Species Impact Statement City of Shoalhaven*, A Preliminary report prepared for Shoalhaven City Council.

- Mills K 2002, Field Survey of *Eucalyptus langleyi* following the December 2001 bushfires, unpublished report prepared by Kevin Mills and Associates Pty Ltd for NPWS Nowra.
- Mills K 2012, 'The Threatened Plants in the South Coast Region of NSW'. *Illawarra Vegetation Studies* (24), Coachwood Publishing, Jamberoo, NSW.
- Murphy MJ 1997, Survey of the herpetofauna of the Bomaderry Creek urban bushland at Nowra, NSW. *Herpetofauna* 27 (2).
- NPWS 2006, *Bomaderry Creek Regional Park Fire Management Strategy*. Produced by NPWS Nowra Area, Department of Environment and Conservation NSW. Available at: www.environment.nsw.gov.au/resources/parks/fms_BomaderryCreek_r1.pdf
- Planning Assessment Commission 2012, North Nowra Link Road – Concept Plan. Determination Report dated 20 December 2012. Available at: <https://majorprojects.affinitylive.com/public/c9a0eff42b37ab24d240fddf300fda73/Determination%20Report%20x.pdf>
- SCC & DLWC 1998, *Draft Bushfire Management Plan, Bomaderry Creek Bushland 1998 to 2003*. Prepared by Shoalhaven City Council and the NSW Department of Land and Water Conservation.
- SCC 2005, *State of Environment Report 2004/05*, Shoalhaven City Council, Nowra.
- SCC 2013, *Draft Shoalhaven Local Environmental Plan Maps*. Shoalhaven City Council. Available at: <http://slep2013.shoalhaven.nsw.gov.au/>
- Thomas V, Gellie N & Harrison T 2000, *Forest Ecosystem Classification and Mapping for the Southern CRA Region*, NSW National Parks and Wildlife Service, Southern Directorate, a report undertaken for the NSW CRA/RFA Steering Committee. Available at: www.daff.gov.au/__data/assets/pdf_file/0011/1005032/ns02_08eh_v2_p1.pdf