



Environment,  
Climate Change & Water  
National Parks & Wildlife Service



# Glenrock State Conservation Area Plan of Management





# **GLENROCK STATE CONSERVATION AREA**

## **PLAN OF MANAGEMENT**

**NSW National Parks and Wildlife Service**

**Part of the Department of Environment, Climate Change and Water**

**September 2010**

**This plan of management was adopted by the Minister for Climate Change and the Environment on 15<sup>th</sup> September 2010.**

### **Acknowledgements**

The NPWS acknowledges that this park is in the traditional country of the Awabakal people.

This plan of management is based on a draft plan prepared by staff of the Hunter Region of NPWS. Valuable information and comments were provided by the Regional Advisory Committee, the Glenrock Consultative Committee, and the Awabakal Local Aboriginal Land Council. NPWS would particularly like to acknowledge the assistance of John Shoebridge, Ed Tonks and Shane Frost in the preparation of the cultural heritage sections of the plan of management.

Cover photograph of Glenrock Lagoon by David Benson (© DECCW).

For additional information or enquires about any aspect of this park or this plan, contact the NPWS Hunter Region Office at 12b Teramby Road Nelson Bay, or by phone on (02) 49848200.

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ISBN: 978 1 74232 960 4

DECCW: 2010/835

## FOREWORD

Glenrock State Conservation Area is situated eight kilometres from the central business district of Newcastle and covers an area of 534 hectares. It stretches along the coastline between the residential suburbs of Dudley and Merewether.

Glenrock State Conservation Area contains remnant vegetation representative of the area, including ten nationally significant vegetation communities, two endangered ecological communities and five threatened flora species. There are more than 145 historic sites, including Australia's first road/tram tunnel and first railway tunnels, remains of Australia's first commissioned copper smelter, and remains of Burwood Colliery which is one of the oldest and best preserved 19<sup>th</sup> century coalmines in the Hunter.

Glenrock State Conservation Area is part of the cultural landscape of the Awabakal Aboriginal people, and contains a range of Aboriginal sites including a pathway, quarry site, camp sites, middens and axe grinding grooves.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each state conservation area. A draft plan of management for Glenrock State Conservation Area was placed on public exhibition from 20<sup>th</sup> February until 25<sup>th</sup> May 2009. The submissions received were carefully considered before adopting this plan.

This plan contains a number of actions to achieve the State Plan priority to "Protect our native vegetation, biodiversity, land, rivers and coastal waterways", including rehabilitation of areas previously cleared for industrial pursuits and farming, recovery actions for threatened flora and fauna species, weed control programs, and fire management strategies. The plan also contains a number of actions to help achieve "More people using parks", including the conservation, interpretation and improved access to colliery remains, upgrading and interpretation of a number of walking tracks, provision of a mountain bike track network in the northern zone of the park and continued horse riding and hang gliding opportunities.

This plan of management establishes the scheme of operations for Glenrock State Conservation Area. In accordance with section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.



**Frank Sartor MP**  
**Minister for Climate Change and the Environment**



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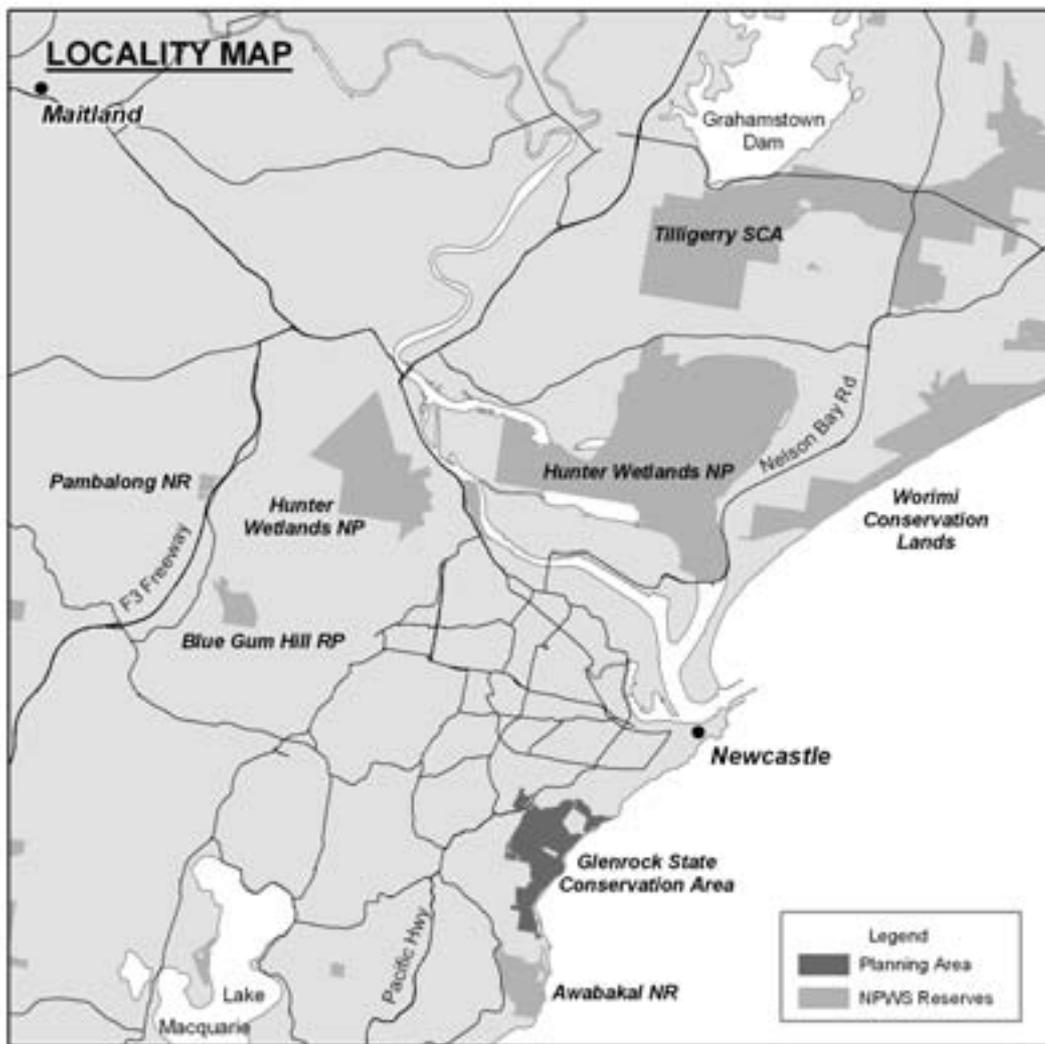
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## 1 INTRODUCTION

### 1.1 LOCATION, GAZETTAL AND REGIONAL SETTING

Glenrock State Conservation Area (referred to as “the park” throughout this plan) is located approximately eight kilometres from the central business district of Newcastle and covers an area of 534 hectares. It stretches along the coastline between the residential suburbs of Dudley and Merewether, and is within both the Newcastle and Lake Macquarie Local Government Areas. The park is within the traditional country of the Awabakal people. It also falls within the area of the Awabakal Local Aboriginal Land Council.



**Figure 1: Glenrock State Conservation Area locality map.**

The first sections of the park were gazetted in 1986, with additions following from a mixture of land tenures including BHP lands, Crown lands and Hunter District Water Board lands. An area of 22 hectares to the north-west of the park has been recently acquired but is yet to be gazetted as part of the park.

The declaration of Glenrock as a state recreation area (now state conservation area) was the result of a lengthy process of community activism and urban planning. The National Trust, the National Parks Association, the Dudley Progress Association, the Northern Parks and Playgrounds Movement, the Association for Environmental Education and the Newcastle Flora and Fauna Protection Society all lobbied for the protection and preservation of Glenrock (NFFPS, 1983).

The park links to Awabakal Nature Reserve in the south, which in turn connects to Jewells Wetland and the Belmont Wetlands managed by the Department of Lands and Lake Macquarie City Council.

## **1.2 STATEMENT OF SIGNIFICANCE**

The park contains an important remnant of Newcastle's pre-European vegetation and conserves a mosaic of nationally, regionally and locally significant vegetation communities, several threatened plant and animal species and much of what remains of Newcastle's Aboriginal and industrial heritage. The park's cultural landscape is of state heritage significance based on the collective values of its natural, Aboriginal and historic heritage.

### **Natural values**

- The park contains high geodiversity, demonstrating the continuous development of the Sydney basin over the course of 300 million years, including the entire formation of the Permian-formed Newcastle Coal Measures (incorporating eight separate coal seams, fossil bearing shales, conglomerates, sandstones and chert). Their uplift and cross sectional exposure by marine erosion reveals them to spectacular effect in the ocean cliffs of the park.
- The park contains remnant vegetation representative of the area, including ten nationally significant vegetation communities, two endangered ecological communities and five threatened flora species. Within a fifty kilometre radius only four or less of these communities are present in other reserves. Glenrock has a floristic diversity index of 72.26 species per hectare, which places it in the top five of the twenty conservation reserves in the Sydney basin.

### **Landscape values**

- A landscape of scenic contrasts, ranging from the rugged cliffs of the coast to the gently undulating terrain of its interior, and the ravines, waterfalls and water-worn rock pools associated with Flaggy and Little Flaggy Creeks and the picturesque Glenrock Lagoon.
- One of the last remaining natural landscapes in Newcastle, providing a stark contrast to the highly urban landscape surrounding it.

### **Cultural heritage values:**

- The park preserves an important remnant of Newcastle's physical Aboriginal heritage, the majority of which has been destroyed by residential and industrial development. Significant sites include an

Aboriginal pathway, quarry site, camp sites, middens and axe grinding grooves. Associated with these sites is a detailed historical record of the Awabakal people and their interactions with colonial Europeans.

- Today the Awabakal and other local Aboriginal people are still involved in looking after the area and telling stories of their relationship with this landscape. To the Awabakal the park is much more than a collection of useful resources. The word 'Country' involves the rocks, the hills, the sea, the sky, the creeks, the plants, the animals and the people all connected together in a complex web of creation, belief and kinship. Aboriginal people remember, maintain and recreate these spiritual connections through ceremony, story, song and other practises. Places in the landscape have special meaning and people have responsibilities towards Country to care for it and look after it.
- The park preserves more than 145 historic sites, including: Australia's first road/tram tunnel (c1846); Australia's first railway tunnels (c1861 and 1862); remains of Australia's first commissioned copper smelter (c1851); remains of a unique coastal railway (c1860s), and remains of Burwood Colliery which is one of the oldest and best preserved 19<sup>th</sup> century coalmines in the Hunter. These sites have documented associations with historical events that were instrumental in changing the face of industry in the Hunter and in building the nation of Australia.
- There is considerable social attachment to the park by local and regional communities, in particular the Awabakal community, the Newcastle Scouting movement, and workers and their descendants from the Burwood Colliery which only ceased operation in the 1970s.

#### **Recreation and tourism values**

- The park contains a high density of recreational sites which are greatly valued by the Newcastle community. These include: Dudley and Burwood Beaches with their associated surf breaks and fishing spots; the Yuelarbah Track, which forms part of the Great North Walk stretching from Sydney to Newcastle; the hang gliding launch site and viewing area off Hickson Street; and the extensive track network in the north of the park which has developed as an important mountain biking destination.
- The improvements to visitor facilities proposed provide considerable opportunities to encourage broader tourism use of these recreational sites, adding significantly to the tourism assets of the City of Newcastle.

#### **Research and educational values**

- The park preserves evidence of much of the early settlement period and subsequent development of Newcastle, the Hunter and Australia. It is also one of the last remaining natural areas in Newcastle, containing nationally significant vegetation communities, endangered ecological communities and threatened species. It is readily available from the Newcastle central business district and is a popular destination for Novocastrians, Scouting and school groups from throughout the Hunter. Therefore it has a primary role in promoting an awareness of the cultural resources, landscapes and plant and animal communities of the Hunter Region.

## 2 MANAGEMENT CONTEXT

### 2.1 LEGISLATIVE AND POLICY FRAMEWORK

State conservation areas in NSW are managed in accordance with a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act) and Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS). The matters to be considered in the preparation of a plan of management are listed in section 72AA of the NPW Act. NPWS policies relate to nature conservation, cultural heritage conservation, recreation, commercial use, research and communication.

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* (EPBC Act) also applies in relation to actions that may impact on any matters of National Environmental Significance listed under that Act.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, no operations may be undertaken within the park except in accordance with this plan. A plan of management for Glenrock State Recreation Area was adopted in 1997. This plan replaces the 1997 plan. This plan will also apply to any future additions to Glenrock State Conservation Area.

### 2.2 MANAGEMENT PURPOSES AND PRINCIPLES

#### State Conservation Areas

Under the NPW Act (section 30G), state conservation areas are managed to:

- conserve biodiversity, maintain ecosystem functions, protect natural phenomena and maintain natural landscapes;
- conserve places, objects and features of cultural value;
- provide for the undertaking of uses permitted under other provisions of the NPW Act (including uses permitted under section 47J such as mineral exploration and mining), having regard to the conservation of the natural and cultural values of the state conservation area;
- provide for sustainable visitor or tourist use and enjoyment that is compatible with conservation of the area's natural and cultural values and with uses permitted in the area;
- provide for sustainable use (including adaptive reuse) of any buildings or structures or modified natural areas having regard to conservation of the area's natural and cultural values and with other uses permitted in the area; and
- provide for appropriate research and monitoring.

The NPW Act also requires review of the classification of state conservation areas every five years in consultation with the Minister administering the *Mining Act 1992*.

**State Heritage Register**

Glenrock's early coal mining sites are listed on the State Heritage Register. Under the *Heritage Act 1977* all items listed on the State Heritage Register must have a Conservation Management Plan and be maintained in accordance with best practice heritage management principles.

### 3 MANAGEMENT DIRECTIONS

The primary emphasis of this plan is the conservation of the natural and cultural heritage values of the park, whilst providing for sustainable visitor use and enjoyment.

The park is an important recreational area for the Newcastle community. It has a reputation as an excellent location to experience a range of opportunities in a natural setting on the coast, and the park continues to be a favoured location for walking, running and cycling. The growth in the Newcastle and Lake Macquarie populations combined with the increased popularity of outdoor recreation, has led to increased pressures on the park's resources. A key challenge is to ensure that this plan provides the management framework required to ensure that recreational use is ecologically sustainable and consistent with the conservation of the park's natural and cultural values.

A Conservation Management and Cultural Tourism Plan for the park was completed in 2003 (Griffin nrm, 2003) and a Bush Regeneration Plan completed in 2005 (NPWS, 2005). These two documents have provided a significant contribution to the management directions outlined in this plan.

Conservation of the park's values will be achieved through the following:

- protection of geological significance by minimising disturbance and undertaking active rehabilitation where necessary;
- control of soil erosion and sedimentation through active management and minimisation of recreational and management infrastructure impacts;
- conservation of native vegetation, including threatened species, endangered ecological communities, and nationally and regionally significant vegetation communities;
- reduction of the effects of habitat loss and fragmentation on fauna populations by restoring habitat area and diversity, and through the implementation of appropriate pest and weed control programs;
- improvement of catchment values and water quality in Flaggy, Little Flaggy and Murdering Gully Creeks, and in Glenrock Lagoon, through appropriate management of tracks, trails and access;
- conservation and management of Aboriginal cultural heritage in partnership with Awabakal Traditional Owners and the Aboriginal community through: the conservation of archaeological sites; the interpretation of Aboriginal landscape features and key sites, shared history and prehistory; and through providing opportunities for education/cultural experiences;

- conservation and management of historic heritage consistent with the conservation management plan (Griffin nrm, 2003), and through adaptive reuse of the Bailey's precinct;
- implementation of the Reserve Fire Management Strategy, to assist in the protection of life and property within and adjacent to the park, and the long term conservation of natural plant and animal communities and cultural heritage;
- provision of a range of ecologically sustainable, nature based, recreation and tourism opportunities that: are consistent with the park's conservation significance; encourage greater public awareness and appreciation for the park's heritage values; and minimise conflicts between recreational users;
- promotion of the visitor and tourism opportunities of the park through improved directional signage, brochures and improved links with tourism organisations;
- provision of interpretive and educational opportunities and activities designed to assist visitor understanding and enjoyment of the park's natural and cultural heritage values; and
- development of formalised agreements with relevant non-park infrastructure providers to facilitate management outcomes for their facilities which are compatible with the conservation values of the park.

## 4 CONSERVATION OF NATURAL AND CULTURAL HERITAGE

### 4.1 GEOLOGY AND LANDFORM

In geological terms the park is located at the northern end of the Sydney basin, a foreland sedimentary basin system approximately 350 kilometres long and an average of 100 kilometres wide. This basin has its centre at about Fairfield and extends from Port Stephens to Bateman's Bay, and underlies the key NSW cities of Wollongong, Sydney and Newcastle.

The majority of the Sydney Basin's exposed sediments are of Triassic origin, with a geological history of 200 to 250 million years. In contrast, the park contains Permian sediments laid down 250-300 million years ago known as the Lower Newcastle coal measures. The oldest strata in these measures is the Lambton sub-group, followed in turn by the Adamstown, Boolaroo and the Moon Island Beach sub-groups.

The Lambton sub-group is comprised of eight separate coal seams, seven of which outcrop in the park, including the Victoria tunnel seam, the Nobby's seam, the Dudley seam, the Yard seam and the Borehole seam. Their uplift and cross-sectional exposure by marine erosion has revealed them to spectacular effect in the ocean cliffs of the park. The sediments that separate these coal seams include fossil-bearing shales, conglomerates, sandstones and chert (tuff), the latter of which is an indication of past volcanic activity.

Fossil deposits abound in the park and have been considered some of the richest deposits in the country since the early 1800s. It was for this reason that the colonial explorer Ludwig Leichhardt visited Glenrock Lagoon in 1842 (section 4.5). At Dudley headland the rock platform contains fossilised tree trunks embedded in conglomerate sediments which overlie the Victoria tunnel coal seam.

The Adamstown sub-group contains the Kotara formation, comprised of massive conglomerates and sandstones, and these provide the main source of parent material for soils in the park. The argillaceous conglomerates of this group (consisting of very small particles less than 0.002 millimetres in diameter), weather to produce highly dispersible clay soils that erode easily (see section 5).

It is the tightly packed nature of the Permian sediments in a very small area of steep coastal terrain that has contributed to the large number of different vegetation communities in the park (see section 4.2).

The geology of the area has also shaped the way humans, both Aboriginal and non-Aboriginal, have interacted with the landscape. A rhyolitic tuff layer, formerly called Nobby's chert, can be found throughout the park. This was an important source of stone for tools manufactured and traded by the Awabakal and was quarried extensively on Burwood Beach (see section 4.4). The coal seams in the park were all mined extensively from the early 1800s to the 1970s (see section 4.5).

The geomorphology of the area is also complex, and adds to the natural diversity of the park. For example, Glenrock Lagoon and Murdering Gully show different stages in the ageing of coastal lagoons. Glenrock Lagoon was formed during the Quaternary period, between 2 million years ago and the present. A rise in sea level formed the lagoon which was then closed to the sea by the accumulation of marine sand deposits at its mouth. Murdering Gully exhibits the next stage in this process, whereby a combination of wind-blown sands and sedimentation has reclaimed an earlier lagoon, and established a terrestrial surface much younger than nearby sediments. Recent sedimentation studies of Glenrock Lagoon show that it is headed in the same direction (Peady, 1991; cited in Griffin nrm, 2003).

Another interesting geomorphic feature is the armouring effect of the conglomerates protecting the large rock-platform 'flags' of Flaggy and Little Flaggy Creeks from weathering. These produce the distinctive water worn rock pools, waterfalls and caverns which characterise these waterways.

The geology and geomorphologic processes have led to a generally hemispherical park landscape draining to the ocean that is approximately 4 kilometres north to south, and 2.5 kilometres east to west at its widest point.

### **Desired Outcome**

The geological features of the area are protected.

### **Strategies**

- *Park roads, management trails, the track network and other facilities will be managed to minimise erosion and sedimentation (also refer section 5.1)*
- *Unnecessary clearings and unauthorised tracks will be progressively closed and rehabilitated (also refer section 5.1).*

## **4.2 NATIVE PLANTS**

The park conserves over 500 hectares of native vegetation which has otherwise largely been removed or severely modified throughout the lower Hunter. Comparisons between vegetation surveys of the European settlement period (Leichhardt, 1843) and the present demonstrate that the park is a remnant of Newcastle's pre-European vegetation. Only three plant species listed in 1843 are known to have been lost to the park. The area conserves a mosaic of regionally and nationally significant vegetation communities and several threatened plant species.

Twelve distinct vegetation communities have been recorded in the park (Bell, 1998). Of these, eight are considered to be poorly conserved at a national level (Bell, 1998), two are listed as endangered ecological communities under the NSW *Threatened Species Conservation Act 1995* (TSC Act), with Littoral Rainforest also listed as critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Within a 50 kilometre radius only four or less of these communities are

present in other conservation reserves. The park has a floristic diversity index of 72.26 species per hectare which places it in the top five of the twenty conservation reserves in the Sydney Basin (Griffin nrm, 2003). The high conservation significance of the park's vegetation is due to the restricted distribution of the Permian sediments on which they occur. The remainder of the Sydney Basin is Triassic in origin (see section 4.1). Very few conservation reserves contain Permian geology, with Newcastle and Lake Macquarie being the only areas where such sediments outcrop in a coastal location (Bell, 1998).

**Table 1: Vegetation Communities recorded in the park.**

<b>Community</b>	<b>Conservation Significance</b>	<b>Occurrence in Glenrock</b>
Littoral Rainforest	National – EEC* <sup>#</sup>	Contains five out of the seven pockets known to occur in the Lower Hunter
Permian Coastal Clay Grassland <sup>^</sup>	National – EEC*	Two areas behind Burwood Beach
Permian Coastal Gully Rainforest	Regional	Along creek lines
Permian Sheltered Bluegum Forest	National	Little Flaggy Creek
Permian Sheltered Dry Forest	National	Upper reaches of Flaggy Creek
Permian Macquarie Paperbark Gully Forest	National	Murdering Gully
Permian Macquarie Shrubby Forest	National	Gun Club Road and Flaggy Creek
Permian Macquarie Grassy Forest	National	Common throughout the park
Permian Exposed Coastal Scrub	National	Coastal headlands
Permian Coastal Clay Melaleuca Scrub	National	Behind dunes
Coastal Foredune Acacia Scrub	Regional	Burwood Beach
Permian Coastal Laterite Heath	National	Common in dunes
Estuarine Rushland	Local	Lagoon

Source: Bell, 1998.

\* Endangered ecological community under the TSC Act.

<sup>^</sup> Listed as 'Themeda grassland on seacliffs and coastal headlands' under the TSC Act.

<sup>#</sup> Critically endangered ecological community under the EPBC Act.

Five threatened plant species listed under the TSC Act are known to occur in the park (refer Table 2), all of which are also listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

**Table 2: Threatened species recorded in the park**

<b>Common name</b>	<b>Scientific name</b>	<b>Legal status</b>
rough double tail	<i>Diuris praecox</i>	Vulnerable*
magneta lilly pillly	<i>Syzygium paniculatum</i>	Vulnerable*
white-flowered wax plant	<i>Cynanchum elegans</i>	Endangered*
black-eyed susan	<i>Tetradlea juncea</i>	vulnerable*
heath wrinklewort	<i>Rutidosis heterogama</i>	vulnerable*

\* Also denotes species listed as nationally threatened under the EPBC Act.

European settlement, mining and associated activities, utility development and past recreational activities have removed significant areas of the park's native vegetation and fragmented what remains, particularly in the north of the park. Just as damaging, but less obvious are the effects of stormwater and erosion, altered fire regimes and urban encroachment. Vegetation communities in the park are under increasing threat from these impacts and competition due to the invasion of weed species.

Bell Miner Associated Dieback provides an illustration of such effects on relatively intact ecosystems. Bell Miner Associated Dieback occurs in several locations throughout the park. While research into this phenomenon is in its infancy it appears to be linked to increased nutrient levels in the soil, a history of disturbance, altered fire regimes and the presence of lantana.

A Bush Regeneration Plan was developed (NPWS, 2005) to prioritise the management of these impacts and minimise fragmentation while retaining and enhancing existing vegetation (see section 5.3). The plan also incorporates actions from recovery plans and relevant strategies in the Priorities Action Statement which has been prepared to guide management of threatened species under the TSC Act. The Aboriginal cultural values of plants in the park, such as for bush foods, medicinal and other purposes, will be considered in bush regeneration activities.

### **Desired Outcomes**

The diversity of native vegetation in the park is protected, and threatened species, endangered ecological communities, and nationally and regionally significant vegetation communities are conserved.

### **Strategies**

- *Implement the Bush Regeneration Plan to address habitat loss and fragmentation.*
- *The Priorities Action Statement and recovery plans will be used to guide management of threatened species in the park.*

### **Actions**

- 4.2.1 *Rehabilitate areas previously cleared for industrial pursuits and farming as outlined in the Bush Regeneration Plan and conservation management plan.*

4.2.2 *Implement relevant strategies in the Priorities Action Statement and recovery actions for threatened flora species and endangered ecological communities.*

4.2.3 *Monitor Bell Miner Associated Dieback sites and implement appropriate management strategies as recommended by relevant research.*

### 4.3 NATIVE ANIMALS

Whilst no systematic fauna survey has been undertaken in the park, 140 species of birds have been recorded in or nearby, including the threatened species listed in Table 3. Reptiles recorded in the park include the diamond python (*Morelia spilotes var. spilotes*), death adder (*Acanthophis antarcticus*), red bellied black snake (*Pseudechis porphyriacus*), brown snake (*Pseudonaja textilis*), tiger snake (*Notechis scutatus*) and the land mullet (*Ergenia major*).

Mammals such as the short beaked echidna (*Tachyglossus aculeatus*), the long nosed bandicoot (*Parameles nasuta*), sugar glider (*Petaurus breviceps*), feathertail glider (*Acrobates pygmaeus*), new holland mouse (*Pseudomys novaehollandiae*), brown antechinus (*Antechinus stuartii*) and the common dunnart (*Sminthopsis murina*) can be found in the park. Historically the swamp wallaby (*Wallabia bicolor*) and eastern grey kangaroo (*Macropus giganteus*) also occurred, but these species have not been seen since the late 1800s. Threatened mammal species recorded in the park are listed in Table 3. The Priorities Action Statement and recovery plans will be used to guide management of threatened species in the park.

**Table 3: Threatened bird and mammal species**

Common name	Scientific name	Legal status
powerful owl	<i>Ninox strenua</i>	vulnerable
masked owl	<i>Tyto novaehollandiae</i>	vulnerable
turquoise parrot	<i>Neophema pulchella</i>	vulnerable
regent honeyeater	<i>Xanthomyza phrygia</i>	endangered*
swift parrot	<i>Lathamus discolor</i>	endangered*
common bent wing bat	<i>Miniopterus schreibersii</i>	vulnerable
little bent wing bat	<i>Miniopterus australis</i>	vulnerable
grey-headed flying fox	<i>Pteropus poliocephalus</i>	vulnerable
squirrel glider	<i>Petaurus norfolcensis</i>	vulnerable

\* Also denotes species listed as nationally threatened under the EPBC Act.

Although many of the species listed in this plan are common on a regional scale, their occurrence in a small, isolated and fragmented bushland remnant surrounded by urban infrastructure is significant and their populations are under increasing pressure. Whilst further fragmentation in the park is unlikely, linkages with surrounding bushland are limited and under pressure. The only significant bushland corridor remaining is through to Jewells Wetland in the south via Awabakal Nature Reserve.

Roads and pathways can act as major barriers to some species. Isolated populations are known to encounter problems with inbreeding and genetic drift unless the population is large enough to maintain genetic diversity, or they can disperse through the surrounding area. Populations are also better able to withstand environmental perturbations such as a wildfire event if they are buffered to some extent by a diverse habitat range (Knott and Schroder, 2006). These options were probably not available to large mammals and their absence from the park illustrates this point.

The impacts of fragmentation and isolation are compounded by predation and competition from introduced species such as foxes, dogs, cats, rabbits and hares (see section 5.4).

The Bush Regeneration Plan (NPWS, 2005) proposes a number of actions to increase habitat area and diversity within the park. This includes revegetating cleared areas, rehabilitating tracks and trails, undertaking stormwater management throughout the catchment, reintroducing appropriate fire regimes and addressing the problem of weeds. It seeks to decrease isolation through the introduction of corridors across easements and by retaining linkages through the surrounding urban area to other areas of important bushland. Co-operation with local governments and other land managers is required to promote the retention and enhancement of these links.

### **Desired Outcomes**

The conservation of all fauna species and populations within the park.

### **Strategies**

- *Implement the Bush Regeneration Plan to address habitat loss and fragmentation.*
- *The Priorities Action Statement and recovery plans will be used to guide management of threatened species in the park.*
- *Priority will be given to the management of threatened species, critical habitats and endangered populations in the park.*
- *Support, encourage and promote the retention and enhancement of links to adjoining areas of bushland through cooperation with local governments, other land managers, residents and landholders that adjoin the park.*

### **Actions**

- 4.3.1 *Implement relevant strategies in the Priorities Action Statement and recovery actions for threatened fauna species.*
- 4.3.2 *Introduce vegetated corridors across cleared easements and revegetate disturbed areas.*
- 4.3.3 *Undertake fauna surveys to establish the nature and extent of fauna species and populations in the park.*
- 4.3.4 *Encourage and support other land managers, residents and landholders that adjoin the park to retain and enhance areas of conservation value in the vicinity of the park.*

#### 4.4 ABORIGINAL HERITAGE

Glenrock is part of Awabakal Country. The country of the Awabakal people includes what is now Newcastle, Lake Macquarie, the Central Coast, the coalfields area and the Watagan mountains to Wollombi. They called the Newcastle Area '*Mullobinbah*' and referred to themselves as the '*Biraban*' or Eaglehawk Tribe (Maynard, n.d.).

Archaeological evidence suggests that the area has been lived in since the Pleistocene period. Because of fluctuating sea levels since the last ice age 12,000 years ago, the earliest coastal archaeological sites would now be buried under estuarine sediments or submerged beneath the sea. As the climate warmed and ice-caps melted around the world, the ocean rose to where it is today about 6,000 years ago. The Awabakal would have witnessed and adapted to the rising sea levels by moving further inland. As a result, the majority of sites on today's coastline date from the Holocene period (5,000 years ago) through to today (Kamminga, 2003).

The park preserves a considerable proportion of what remains of Newcastle's physical Aboriginal heritage. The majority of sites have been destroyed or covered over by development of the city of Newcastle. The existence and protection of sites so close to the centre of the city makes the park highly significant to Aboriginal people.

At least five Aboriginal site types are known to occur in Glenrock – shell middens, stone scatters, axe grinding grooves, quarry sites and a traditional Aboriginal pathway. Rock shelters with shallow earth floors may have been used for camping in prehistoric times and it is probable that some of these may contain artefacts. No systematic archaeological survey has been carried out in the park and it is likely that further sites would be found were such a survey conducted, particularly if it occurred immediately after fire when ground surface visibility is enhanced.

The Awabakal community, Awabakal Traditional Owners and the Awabakal Local Aboriginal Land Council are concerned that Aboriginal sites may be subject to acts of vandalism and prefer that the location of most of their sites is kept secret. They have given permission for a number of representative sites to be interpreted, including the Burwood Beach quarry site, a traditional Aboriginal pathway and the open camp site and midden at the mouth of Glenrock Lagoon.

The cliffs and coastline of the park with their exposed layers of tuff, coal and ochre have been a manufacturing and export centre for thousands of years. The Awabakal particularly prized the many layers of rhyolitic tuff, a stone which is rich in silica, hard, smooth and fine grained. It is the hardest form of this rock that was used in tool manufacture. The Awabakal used this stone to make sharp-edged tools such as chisels, scrapers, graters and rasps which were then used to manufacture wooden implements such as boomerangs, clubs, spear throwers, shields, food and water containers, canoes and

paddles. An outcrop of this rock that could be easily quarried, like that found in the headlands from Merewether to Glenrock Lagoon, was an extremely valuable resource.

Raw rock and stone tools from the Burwood Beach Aboriginal quarry were traded throughout the Hunter valley. The local axe heads were highly prized and have been found as far inland as Quirindi, demonstrating that the Awabakal had extensive trade and communication routes into the territories of other Aboriginal peoples (Kamminga, 2003).

One of the most important areas in the park for the Awabakal was the coastal strip at the mouth of Glenrock Lagoon where they had easy access to resources from the ocean, the lagoon, and the surrounding hills. An Awabakal camp site was present in this location at the time of European settlement, and an extensive midden can still be found there. Middens are accumulations of shell material with other food remains, such as fish, bird and mammal bones, artefacts such as flakes, grinding stones and axe heads as well as evidence of hearths. Middens can also contain burial sites. Middens such as this are often the only physical indicators left of past Aboriginal use of the area before the time of European settlement and are therefore very important to Aboriginal people today. This midden requires stabilisation and active site management to keep people off it and protect its significance.

Glenrock and its Aboriginal sites are also significant because of their association with a detailed historical record relating to the Awabakal and their life in the area at the time of European settlement (referred to as shared history).

After the Newcastle convict settlement was established in 1804 the Awabakal and Europeans mingled freely and relations between the two groups were considered friendly (Maynard, n.d). The Awabakal supplied food to the convict settlement and often joined free men on hunting and fishing expeditions. Lt. William Sacheverell Coke, second in command at the convict station in 1827, described his adventures around Newcastle and Glenrock in his diary. He was joined in his recreational activities of fishing, shooting and stuffing specimens by several Aboriginal men whose company he obviously enjoyed. Desmond and Birabahn often gave him oysters, lobster, shark, mullet, tailor and snapper. Lt. Coke in turn loaned them his gun, and gave them tobacco and clothes.

The Awabakal contributed to the Skottowe Manuscript (1813), commissioned by the then convict settlement's commandant, providing both their words and the specimens depicted. The convict artist Lycet was also based at the convict settlement between 1815 and 1817 (Rowan and Miller, 1990) and many of the scenes in his paintings depict the Awabakal way of life. It is believed that the earliest pictorial representation of Glenrock is in a painting of Lycett's entitled 'Red Head'. At the time Lycet undertook this painting the only 'Red Head' in existence in the historical record was what we now know as 'Little Red Head' – the bluff sitting above and to the south of the Glenrock Lagoon (Tonks, 2004).

In 1825 the missionary Rev. Lancelot Threlkeld recorded some of the names of significant Awabakal places now in the park – illustrating its importance to the Awabakal and his own association with the place. According to Threlkeld the camp site at the mouth of the lagoon was called *Koi-y-ong* by the Awabakal. The lagoon was called *Pillapay-kullitaran* and the sand spit separating the lagoon from the ocean was called *puntei*.

The Awabakal man Birabahn was a pivotal figure in the shared history of the area. He came from Lake Macquarie but spent time as an officer's servant in Sydney and as a bush constable in Port Macquarie. He spoke fluent English and bridged the two cultures easily. Birabahn is probably responsible for much of the information Reverend Threlkeld collected on the Awabakal people, and he assisted Threlkeld in establishing the mission at Lake Macquarie in 1825. Together they translated St. Luke's Gospel into the Awabakal language, making it the first Aboriginal language to be recorded and published. Birabahn escorted many government officers and colonists through, or to, the Glenrock area including the explorer Ludwig Leichhardt, Lt. Coke, Threlkeld and Lycet along a traditional Aboriginal pathway.

The modern day Yuelarbah Track, where it traverses Burwood Beach, is believed to have been part of this Aboriginal pathway that was a major trading route stretching from Lake Macquarie to Newcastle (Griffin nrm, 2003). The Awabakal name Yuelarbah, when loosely translated, means 'place of the footstep/track' (literally *Yulo* means footstep/track and *bah* means place). This pathway later became the European industrial transport route of the coastal railway c1860s (see section 4.5). The original pathway was along Burwood Beach and around Little Red Head, but in 1825 Threlkeld cut a track overland west of the lagoon, possibly on what is now Burwood Road. Aboriginal pathways such as this were used to gather resources, to maintain connections with Country and to communicate with other groups. They were remembered and passed on through stories and songs.

By the late 1830s/early 1840s European attitudes towards the Awabakal in Newcastle had changed from that which Lt. Coke and Birabahn had experienced. Whilst there is no evidence the Awabakal were subject to the massacres which occurred elsewhere in NSW, the European demand for land meant that they were denied access to their hunting grounds and progressively marginalised as settlement expanded. European diseases took a heavy toll and women and girls were brutalised. Between 1820 and 1830 the Aboriginal population of NSW was reduced to a tenth of its original number. Threlkeld was one of the few Europeans to publicly speak out against the terrible treatment of Aboriginal people. As a result he was ridiculed and ignored. The extent of the change in public opinion towards the Awabakal is evidenced by Leichhardt's derision of Birabahn in 1842, only 15 years after Lt. Coke had written so highly of him. By that time the Glenrock area had transferred to private ownership (see section 4.5) and the Awabakal now had to seek approval to visit.

Today the Awabakal and other local Aboriginal people are still involved in looking after the area and telling stories of their relationship with this landscape in cultural tours. To the Awabakal the park is much more than a collection of useful resources. The word 'Country' involves the rocks, the hills, the sea, the sky, the creeks, the plants, the animals and the people all connected together in a complex web of creation, belief and kinship. Aboriginal people remember, maintain and recreate these spiritual connections through ceremony, story, song and other practises. Places in the landscape have special meaning and people have responsibilities towards Country to care for it and look after it. There is the potential for the park to be used for cultural camps so that the Awabakal can continue their association with Country.

The park's Aboriginal cultural landscape is of state heritage significance (Griffin nrm, 2003). A conservation management plan was produced in 2003 in consultation with the Awabakal community and Awabakal Local Aboriginal Land Council. This document outlines strategies for the management of Aboriginal sites and cultural landscapes in line with the NPW Act and the community's expectations.

### **Desired Outcomes**

The Aboriginal cultural heritage will be conserved and interpreted in partnership with the Aboriginal community.

### **Strategies**

- *Protection and conservation of archaeological sites, interpretation of Aboriginal landscape features and key sites, shared history and prehistory will be undertaken in partnership with the Awabakal community.*
- *The conservation management plan (Griffin nrm, 2003) will guide management of the Aboriginal cultural landscape and sites.*
- *Aboriginal archaeology will be managed according to the Archaeological Management Guidelines specified in appendix 5 of the conservation management plan (Griffin nrm, 2003).*
- *A survey for cultural sites will precede all works involving ground disturbance undertaken in the park.*
- *Subject to required assessments and approvals, cultural camps may be provided within the park.*

### **Actions**

- 4.4.1 *Stabilise and protect midden sites 38-4-42 and 38-4-0043.*
- 4.4.2 *Remove the steel mesh from the site at Murdering Gully (38-4-45).*
- 4.4.3 *Record and monitor site GR13 in Flaggy Creek but do not promote access.*
- 4.4.4 *Interpret the quarry site, the camp site at Glenrock Lagoon and the Aboriginal pathway as described in the conservation management plan (Griffin nrm, 2003).*
- 4.4.5 *Undertake a comprehensive survey of the park for Aboriginal sites in partnership with the Awabakal community.*
- 4.4.6 *In partnership with the Aboriginal community, investigate the potential for cultural camps to be conducted in the park.*

## 4.5 HISTORIC PLACES

The park contains more than 145 recorded historic sites, including the remains of Australia's first road/tram tunnel (Mitchells tunnel), NSW's first railway tunnels, Australia's first commissioned copper smelter, a unique coastal railway on Burwood Beach and one of the oldest and best preserved remains of a 19<sup>th</sup> century coal mine in the Hunter – the Burwood Colliery (as shown on Map 1). These features are of national, state and regional significance (NSW Heritage Inventory). The historical events associated with their construction are directly related to the development of the modern resource extraction industry, and the building of the nation of Australia. It is the combination of these features, together with the natural and social values associated with them which make Glenrock a major cultural landscape (Griffin nrm, 2003).

The first European visitors to Glenrock may have been the escaped convicts Mary and William Bryant, their two children and nine others who stole the Governor's boat in Sydney and rowed to Timor in 1791. They recorded stopping by a lagoon where coal was exposed on a beach. There is much speculation about the exact location of this beach, however Glenrock Lagoon and its opening to the sea fits their description. Soon afterwards coal was 'officially' discovered and a penal colony established in Newcastle. Glenrock was then regularly visited by Europeans on hunting expeditions and was also on a transport route to Lake Macquarie (see also section 4.4).

In 1835 Sydney doctor and businessman James Mitchell purchased about 900 acres of coastal land extending from the far side of Merewether ridge to Glenrock Lagoon, encompassing what is now the park. He named the property the Burwood estate, after his wife's family home in London and later extended it to 1,834 acres. (For a full account of the historical events on the Burwood Estate refer to Shoebridge (2006 and 2008) and Tonks (2004)).

In 1842 Ludwig Leichhardt visited the Burwood estate and drew up the stratigraphy of the coastline. Leichhardt may also have established the extent of the coal seams under Mitchell's property, as it was not long after Leichhardt's visit that Mitchell commissioned a tram/road tunnel through Burwood ridge (now Merewether ridge). Known as 'Mitchell's tunnel' the historical events surrounding its construction make it one of the most significant sites in NSW (see below). It was partly due to its construction that coal mining in Australia was opened up to independent mining, which in turn led to the Hunter's establishment as a coal mining centre. It was also the first tunnel of its type to be constructed in Australia.

Mitchell publicly claimed construction of the tunnel was to allow access to Burwood Beach so he could build a salt works. In private, however, it appears Mitchell was planning to overturn the Australian Agricultural Company's (AACo) Government supported monopoly on coal mining. He had already approached Governor Gipps with several requests, including: that the *Metallic Ores Act* be repealed, allowing copper ores to enter NSW duty free; that

Newcastle be made a free port so private vessels could enter the estuary without restrictions; and that he be permitted to mine and use coal from his estate as fuel for a copper smelter. Gipps agreed to the first two requests but felt he had no power to agree to the third.

Despite this set back, Mitchell continued with his tunnel project and commissioned its construction in 1846. It was constructed directly into a coal seam, located in line with present day Merewether Street. Work was carried out from both ends with the point of meeting marked by an obvious change in direction of the pick axe marks. The roof was high enough to accommodate a horse team. Two to three thousand tons of coal were extracted, which Mitchell could do nothing with due to the AACo monopoly.

The AACo and the Government were also under a great deal of pressure from other quarters to relinquish the monopoly. A number of people operated small mines in the district in defiance of the monopoly, which the AACo mostly ignored. However, a former employee of Mitchell's mining near East Maitland, a Mr James Brown, brought the matter into the public domain when he directly undercut the AACo price to supply coal to steamships at Morpeth. He was subsequently prosecuted. The Government's legal advice after this case was that they would have to individually prosecute every other person involved in such activities. The then Governor, Fitzroy, expressed the opinion that the AACo should bear the costs of these prosecutions. In 1847 the NSW Legislative Council appointed a Select Committee to investigate the matter further. This was known as *the Coal Inquiry*, and both Mitchell and Brown gave evidence; Mitchell in relation to his tunnel, Brown in relation to price cutting.

Before the committee could issue any recommendations the AACo gave in and relinquished its monopoly. Mitchell proceeded to lease out the coal rights on the Burwood estate, with five mines being quickly established by J & A Brown, Donaldson, Alexander Brown, Nott and Morgan. However, the AACo owned the land between the Burwood estate and the Port of Newcastle and refused to allow Mitchell to transport coal by rail across its land. Mitchell lobbied the Government again and in 1850 a Private Act of Parliament *Mitchell's Tram Road Act* (the first in NSW) was passed finally allowing him to carry coal through AACo lands.

The same year as the coal mining monopoly ended the *Metallic Ores Act* was repealed as promised by Governor Gipps, allowing copper to be brought into NSW duty free. Mitchell then established his copper smelter in 1851 in the dunes behind Burwood Beach (known as Smelters Beach for obvious reasons). The smelter was described as "*a two storey building, 130 by 32 foot, with a shingled roof, housed two offices, an assay furnace, a large storeroom and two dwellings...nearby stood the large shed, 50 by 28 foot which sheltered one calcining furnace, two melting furnaces, a refining furnace and a roasting furnace which was never completed. There was also... Blacksmiths and carpenters shops...a managers house, a labourers hut and four three roomed workman's cottages. Stables for six horses and a harness room*" (report by Morgan cited in Shoebridge, 2006). The smelter was never a

success and operated intermittently for 21 years, using coal from the estate and copper ore from South Australia, Goulburn and Queensland. The smelter closed in 1872, although some of the cottages remained occupied well into the 1890s. The remaining buildings were finally dismantled in 1913 and the materials sold. Salvaged bricks were used to cap some of the old mines elsewhere in the estate. The smelter site is still marked by copper slag and brick foundations.

Mitchell floated the Newcastle Coal and Copper Company in 1854 and concentrated on coal and coke production, buying up the Burwood Ridge mining leases and introducing the latest technology by replacing the wooden tramroads with iron railways and the horses with steam locomotives. By 1858 the company was focussed at one mine, the Victoria tunnel, but this became threatened by geological instability, so the company started the Red Head Tunnel on the southern shore of Glenrock Lagoon in 1861 and constructed a coastal railway to service it. The railway roughly followed the Aboriginal pathway along Burwood Beach and included two tunnels through Merewether bluff, the first rail tunnels in NSW (dating from 1861 and 1862 respectively). The railway proved a costly exercise. The construction costs, conflict and court action between the company and the builder plus a miners' strike lead to the company's failure in 1864. The new mine was in full operation and employing 120 men at the time. As landlord Mitchell resumed control of the company's leases and as principal creditor he took over all other assets. He then formed the Burwood Coal Company and renamed the Red Head Colliery the Burwood Colliery.

In 1865 Mitchell went into partnership with Charles Wolfskehl. After Mitchell's death in 1869 his family discovered that he had left everything to Wolfskehl. The family disputed the new will on the grounds of mental incapacity and undue influence. The resulting lawsuit in the Supreme Court aroused considerable public interest throughout the colony of Australia, and was known as the 'Great Will Case'. Judgement was in favour of the Mitchell family and Wolfskehl was exposed as a charlatan, fraud and swindler. Mitchell's properties reverted to his widow Augusta Maria and the Burwood Colliery closed. After Mrs Mitchell died in 1872 the Burwood Estate passed to her daughter and was managed by her husband Edward C Merewether.

Merewether was an administrator and had been an *aide de campe* to three Governors, Commissioner of Crown Lands and Clerk of the Executive Council. When he took control of the property it was encumbered with debt. The family did not have the resources to undertake further exploration for viable coal seams nor the infrastructure to reach them. Merewether therefore sought other interested parties to undertake these ventures. By the end of 1884 he had negotiated mining leases with several companies who were permitted to mine coal beneath his estate paying a fixed rent, a royalty and in some cases a wayleave.

Merewether also leased out land for residential and business purposes until 1910 when tenants were allowed to purchase their holdings. This was the

start of the suburb of Merewether. The last commercial land sale by the Merewether Estate took place in 1969.

In 1884 Merewether negotiated a lease with the Burwood Coal Mining Company. They sank two shafts adjacent to the old Burwood Colliery workings near the lagoon down into the Borehole seam, the richest seam in the Newcastle coal measures. Burwood No 1, the main extraction shaft was 83.8 metres deep. The No 2 or ventilation shaft was 91.4 metres deep. By 1887 the company was raising 111,782 tons of coal, employed 400 men and boys and had 225 hoppers in daily use on the coastal railway.

In 1893 the company opened a third shaft at Whitebridge and soon afterwards sold the colliery to the Scottish Australian Mining Company. The No 1 and No 2 shafts near the lagoon were then used for access and ventilation purposes and the surface works became redundant, however coal continued to be mined underground being raised via the No 3 shaft at 'New Burwood'. In 1900 the No 2 furnace shaft was superseded by a Walker Indestructible fan erected at the top of a No 4 shaft at the New Burwood. The coastal railway ceased operation as the new company used the Redhead Coal Company's railway via Adamstown (which is now the present day Fernleigh Track).

In 1904 the Scottish Australian Mining Company sublet a portion of their lease to Howley and Foreshaw who established the Glenrock Colliery on the northern side of the lagoon and reopened the coastal railway. They also took up the rails crossing the lagoon and reused them to form an extension along the northern side of the lagoon. The Glenrock Colliery opened with a workforce of only four men, using horses for transport until 1910 when they acquired the well known 'coffee pot' locomotive. Two other locomotives were used by the company until it closed in 1944 and the railway tunnels were sealed in 1945. Railway relics can be found along the old railway route on Burwood Beach

In 1932 BHP acquired the Burwood Colliery (both 'old' and 'new') from the Scottish Australian Mining Company. It then became a major supplier to BHP's steelworks at Port Waratah up until the company donated its land to become part of the park in 1986. At its peak the Burwood Colliery was the fourth largest mine in the district. Today the remains of the 'Old' Burwood Colliery may still be seen adjacent to Glenrock Lagoon and the nearby Scout Camp. It is now one of the oldest and best preserved remains of a 19<sup>th</sup> century coal mine in the Hunter, which has contributed to its listing on the State Heritage Register. In contrast, the 'New' Burwood Colliery at Whitebridge was redeveloped into a housing estate known as the Dudley Beach Estate.

Other state heritage listed sites occur along Flaggy Creek and the Yuelarbah Track, including winding engine foundations at Leichhardt's Lookout, brick-lined air shafts, a dry stone rock wall, railway relics and the 'ziggy track' – a cutting through solid rock created by miners. Numerous open shafts and tunnels occur throughout the park. Many of these have been capped, however others are still to be identified and could pose a risk to people straying off

formed tracks. Mine subsidence is also an issue. Open mine tunnels and shafts are the responsibility of the Department of Primary Industries, and mine subsidence is the responsibility of the Mine Subsidence Board.

Another locally important group of features are the relics of orcharding operations in the southern and northern ends of the park. In 1856 Mr Walter Bailey developed a 120 acre orchard and market garden in the valley above the southern end of the Dudley Beach. The farm was called Mount Pleasant and produced a variety of vegetables and fruit. After the death of Walter and his wife the property was divided amongst their eight children. Two of the children, Arthur and Charles Bailey, bought more land at the northern end of the park from the old Burwood/Merewether estate, and also set up orchards. This property is now part of the park and is referred to as the Bailey's Precinct (see Map 1). A Conservation Analysis was prepared for the site (Truman et al) in 2001. It identified that the precinct and the heritage structures it contains are of local heritage significance and should be maintained and interpreted. To facilitate this outcome, the site has the potential to be leased to enable adaptive reuse of the buildings, structures and curtilage. A license to occupy and use the Precinct for a term not exceeding 3 consecutive days may also be approved (see section 6.9).

The Scouting movement acquired a 99 year lease adjacent to Glenrock Lagoon in 1932 and established the Glenrock War Memorial Scout Camp. They obtained freehold title to the property in 1971. The Burwood Colliery under-manager's house, known as the Overman's Cottage (1887), is situated on their land, along with various mining relics. For the duration of World War II the area and buildings were used by the Defence Corps which built machine gun nests, gun emplacements and trenches in the area. This area has a special connection to the park (refer to section 8).

The early coal mining sites at Glenrock are listed on the state heritage register; however Griffin nrm (2003) considers that all of Glenrock State Conservation Area should be listed as a cultural landscape of state heritage significance. A conservation management plan (Griffin nrm, 2003) was produced to ensure that management and interpretation of the sites in the park is consistent with the *Heritage Act 1997*, the NPW Act and the Burra Charter.

### **Desired Outcomes**

The historic heritage of the Glenrock cultural landscape is conserved and interpreted.

### **Strategies**

- *The sites listed in the CMP will be conserved and interpreted in accordance with the conservation management plan (Griffin nrm, 2003).*
- *Information on the historic heritage of the park will be included on signs within the park when they are replaced or upgraded.*
- *All weed control works around significant historic sites will adhere to the Vegetation Control Procedure specified in appendix 3 of the conservation management plan (Griffin nrm, 2003).*

- *Historical archaeology will be managed according to the Archaeological Management Guidelines specified in appendix 5 of the conservation management plan (Griffin nrm, 2003).*
- *Work with the Department of Primary Industries and the Mine Subsidence Board to determine appropriate risk management responses to possible open shafts, tunnels and mine subsidence.*
- *All open shafts, tunnels and mine subsidence will only be dealt with after appropriate environmental impact assessment and required approvals.*
- *Bailey's Precinct will be managed in accordance with the Conservation Analysis (Truman et al, 2001).*

### **Actions**

- 4.5.1 *Stabilise, remove weeds and protect the copper smelter remains.*
- 4.5.2 *Conserve, interpret and explore options to provide visitor access to the Burwood Colliery and the Mitchell's tunnel sites.*
- 4.5.3 *Conserve, interpret and improve access to colliery remains along Flaggy Creek and the Yuelarbah Track.*
- 4.5.4 *Fully record the coastal railway and relics and maintain the rail embankment.*
- 4.5.5 *Fence the Merewether bluff railway tunnels to improve visitor safety.*
- 4.5.6 *Undertake essential risk management, and ensure appropriate risk messages are incorporated into park interpretation.*
- 4.5.7 *Undertake a thorough survey for open mine shafts or tunnels and cap those requiring capping. Undertake appropriate environmental impact assessment prior to any works on the shafts or tunnels as they may provide habitat for insectivorous bats.*
- 4.5.8 *Maintain existing cleared areas throughout the Bailey's Precinct and provide signs interpreting the site and the buildings.*
- 4.5.9 *Stabilise the weatherboard cottage and packing shed by securing significant fabric and preventing unauthorised access.*
- 4.5.10 *Monitor remaining significant fabric throughout the Bailey's Precinct including the cast iron water tank, concrete water tanks, and Ranger's cottage and stabilise as required.*
- 4.5.11 *Fence the derelict weatherboard (miners) cottage and manage as a ruin.*
- 4.5.12 *Explore adaptive re-use licensing and leasing proposals for the Bailey Precinct.*
- 4.5.13 *Update the conservation management plan to incorporate more recent research and current knowledge of the park's historic heritage.*

## 5 PARK PROTECTION

### 5.1 SOIL EROSION

The main parent material for the park's soils are the massive conglomerates and sandstones of the Kotara formation. The conglomerates weather to produce highly dispersible clay soils. The combination of these clays and the undulating terrain make the soils particularly prone to erosion. Special consideration is therefore required in the siting and construction of tracks and facilities.

Due to past land use, recreational activities and the presence of public utilities such as electricity and sewerage easements, there are numerous unplanned and poorly designed tracks and trails throughout the northern half of the park.

The park also contains an extensive network of park management trails and poorly designed and maintained utility access tracks and walking routes. Previously intact native vegetation has been disturbed as a result of this history.

Soil erosion is a major and ongoing problem in the park. During rainfall events runoff from tracks and easements transports an unknown quantity of sediment into gullies, especially in the Flaggy and Little Flaggy Creek catchments (see section 5.2). Erosion damage is greatest from the access tracks associated with the Energy Australia powerlines, but is also considerable on the worst of the walking routes that link the rim of the park with the coast. Impacts to vegetation communities down slope from eroding tracks are high. The compaction and erosion of trails favours the establishment of weeds over native species. In addition, vehicles, bikes, horses and people using trails are known to spread weeds. Weeds are common along the edges of all tracks and trails (see section 5.3).

#### **Desired Outcomes**

Soil erosion and sedimentation is controlled.

#### **Strategies**

- *The closure and rehabilitation of all unauthorised and unnecessary tracks and trails, with priority on the most intact sections of the park or areas of high conservation value.*
- *All facilities and infrastructure will be constructed and maintained to "best practice" soil erosion and mitigation standards, to minimise erosion and sedimentation.*
- *Work with Energy Australia and Hunter Water Corporation to address erosion, sedimentation and other issues associated with their infrastructure and associated vehicle access tracks.*

**Actions**

- 5.1.1 *Close and rehabilitate all tracks and trails not to be retained in the management or recreational track network.*
- 5.1.2 *Maintain park roads, management trails and the track network so that erosion and sedimentation are minimised. Undertake erosion control works as required.*
- 5.1.3 *Develop and implement formal agreements and/or other cooperative measures with Energy Australia and Hunter Water Corporation in order to address erosion and sedimentation issues related to their facilities and infrastructure.*

**5.2 WATER QUALITY**

The park contains a number of natural creek lines which form part of the Flaggy and Little Flaggy Creek catchment, which in turn feed into Glenrock Lagoon. These creek lines receive stormwater from adjoining urban areas with considerable impacts on the park's natural systems. This stormwater increases the volume and velocity of water entering the system, and decreases water quality through an increase in sedimentation and nutrient levels. Stormwater and urban runoff are major factors in the distribution and establishment of weeds in urban bushland remnants and sedimentation in creeks and lagoons. Stormwater also contributes to habitat loss through stream bank erosion and the impact of nutrient induced dieback of native vegetation. Lake Macquarie City Council has developed a stormwater management strategy for the Flaggy and Little Flaggy Creek catchment with input from NPWS, other land managers and the community, to attempt to address these issues.

Studies indicate that Glenrock Lagoon is rapidly accumulating sediment from stormwater and erosion from nearby tracks and trails (Peady, 1991). As discussed earlier, unplanned and eroding tracks as well as the management trail network in the park contribute significant levels of sediment to the catchment and lagoon. Of particular concern are the major creek crossings on the Yuelarbah Management Trail and the Fernleigh Loop Track. Considerable erosion occurs at these locations and damage to the creek bed is evident in each. These crossings are used by Hunter Water Corporation, Energy Australia and the NPWS. Alternative, low impact crossings are needed for these locations.

Water quality concerns are compounded by problems with the sewerage pipeline that traverses Flaggy Creek. This pipeline is designed to surcharge during high rainfall events, resulting in untreated effluent entering the park, often in areas with high levels of recreational access. Weed growth immediately adjacent to the surcharge points is obvious, promoted by soil disturbance and increased nutrients from the discharge events. Hunter Water Corporation is finalising a proposal to upgrade this pipeline, which will minimise these events in the future. NPWS will continue to work with Hunter Water Corporation to address these issues.

### Desired Outcomes

The park's catchment values and the water quality and health of the Flaggy and Little Flaggy Creeks, Murdering Gully Creek and Glenrock Lagoon are enhanced.

### Strategies

- *Encourage and support local government to develop and implement stormwater management strategies that will improve the water quality entering the park's catchments.*
- *Investigate alternative access arrangements for the eroding creek crossings.*
- *Continue to work with Hunter Water Corporation on the upgrade of the Charlestown to Burwood Sewerage Line to minimise its impact on the park.*

### Actions

- 5.2.1 *Identify suitable mitigation measures to improve the quality of stormwater runoff and reduce velocity during heavy rainfall events such as energy dissipaters, sediment traps and stilling basins.*
- 5.2.2 *Liase with Hunter Water Corporation and Energy Australia to determine viable alternative arrangements for vehicles crossing Flaggy and Little Flaggy Creeks.*
- 5.2.3 *Establish a long-term water quality monitoring program for Glenrock Lagoon in conjunction with Hunter Water Corporation and relevant government authorities.*
- 5.2.4 *Work with Hunter Water Corporation to ensure appropriate NPWS notification occurs in the event of an effluent discharge within or in the vicinity of the park.*

## 5.3 INTRODUCED PLANTS AND BUSH REGENERATION

Introduced plants, commonly known as weeds, are those plants that are not native to an area. Weeds in the park can impact on forest structure, species diversity, habitat values, and prevent natural regeneration. The *Noxious Weeds Act 1993* places an obligation upon public authorities to control noxious weeds on land that they occupy to the extent necessary to prevent such weeds spreading to adjoining lands.

Weed establishment and proliferation in the park is extensive, with over 75 species known to occur (Bell, 1998). Of the species identified, 20 are known environmental weeds with the ability to invade natural systems and six are listed as noxious weeds under the *Noxious Weeds Act 1993*. These include bitou bush (*Chrysanthemoides monilifera*), lantana (*Lantana camara*) and blackberry (*Rubis fruticosus*), which are also considered to be weeds of national significance.

Bitou bush is a particular concern in the park. It is considered to pose a serious threat to natural terrestrial ecosystems and is listed as a key threatening process under the TSC Act, as it is impacting on a number of

endangered ecological communities and threatened species. Bitou is widespread in Glenrock and all endangered ecological communities and threatened flora species locations where it occurs have been identified as high and medium priority sites under the NSW Bitou Threat Abatement Plan (2008).

Investigation into the causes of weed invasion in the park show that the effects of habitat loss and fragmentation are pervasive and that weed growth and proliferation could be considered a symptom of this greater problem (Knott and Schroder, 2006).

The NPWS Hunter Region Pest Management Strategy (2008) provides management direction at a regional level for pest management within NPWS managed lands. The strategy establishes high, medium and low priorities, on a regional basis, for introduced plant and animal management programs.

A Bush Regeneration Plan for the park was developed in 2005 to address the effects of habitat loss and fragmentation. Its development was guided by the Pest Management Strategy (NPWS, 2002), recovery plans and threat abatement plans, where applicable. The Bush Regeneration Plan divides the park into management areas and develops priorities for action. An area with threatened species directly threatened by weed invasion or an isolated weed infestation is automatically given a high priority. The plan focuses management programs on a linked range of intact vegetation communities in the core of the park, and on areas with threatened species, endangered ecological communities or cultural heritage sites of significance.

Proposed works to address the effects of habitat loss and fragmentation, such as the rehabilitation of tracks and managing stormwater, will also begin in these high priority areas before expanding as programs prove successful. It is anticipated that addressing these impacts will lead to a reduction in the costs associated with weed control in the longer term.

### **Desired Outcomes**

The conservation of all native vegetation in the park with an emphasis on high priority areas, including threatened species, endangered ecological communities, nationally and regionally significant vegetation communities and significant cultural heritage sites.

### **Strategies**

- *Manage introduced plant species in accordance with the Noxious Weeds Act 1993, the priorities identified in the current Hunter Region Pest Management Strategy and the Bush Regeneration Plan (NPWS, 2005).*
- *Focus on key management areas and priorities as outlined in the Bush Regeneration Plan, undertaking weed control in a linked range of intact vegetation communities in the core of the park, and in areas with threatened species, endangered ecological communities or cultural heritage sites of significance. Monitor and revisit priorities based on the program success.*

- *Encourage and support an integrated management approach with other government authorities, Scouts Australia, neighbours and land managers to address those factors which promote weed growth and proliferation across all land tenures including the park.*

### **Actions**

- 5.3.1 *Implement priority weed control programmes, focusing on the intact core of the park and in areas of threatened species and endangered ecological communities or cultural heritage sites of significance.*
- 5.3.2 *Develop and implement these weed control plans in conjunction with local government, park neighbours, Energy Australia, Hunter Water Corporation and Scouts.*
- 5.3.3 *Implement Bitou Threat Abatement Plan priorities for high and medium priority sites.*
- 5.3.4 *Work with neighbours to remove encroachments and minimise weed invasion on the urban fringe of the park.*
- 5.3.5 *Support and encourage community bush regeneration volunteer groups.*

## **5.4 INTRODUCED ANIMALS**

Introduced animals include feral and domestic animal species that are not native to the area. Introduced animals in the park include rabbits (*Oryctolagus cuniculus*), hares (*Lepus capensis*), foxes (*Vulpes vulpes*), dogs (*Canis lupus familiaris*), cats (*Felis catus*) and black rats (*Rattus rattus*). These have a detrimental effect through competition and/or predation on native species, compounding the impacts of fragmentation and isolation mentioned above.

The Hunter Region Pest Management Strategy (2008) provides management direction at a regional level for pest management activities within NPWS managed lands. The strategy establishes priorities on a regional basis for management programs, and identifies broad management actions for individual species based on those priorities and the probability of practical success for a control program.

Vertebrate pest control programs have been undertaken on rabbits and cats in the past, with a fox control program planned for implementation. The surrounding urban environment is a constant source of introduced animals to the park. An ongoing commitment from other land managers and private landholders in the area is needed for control programs to succeed in the long term. The implementation of fox baiting programs, whilst desirable, is severely constrained by the proximity of neighbouring residential areas to the majority of the park.

### **Desired Outcomes**

Reduce the impacts of feral animals through the implementation of appropriate pest control programs.

## Strategies

- *Vertebrate pest control programs will be implemented in accordance with the Hunter Region Pest Management Strategy (NPWS, 2008).*
- *Develop cooperative vertebrate pest control programs with other agencies, neighbours and stakeholders. Priority will be given to fox, cat and rabbit control.*

## Actions

- 5.4.1 *Develop and implement a fox baiting program for the park.*
- 5.4.2 *Monitor rabbit and cat populations to determine control requirements and implement control programs as required.*
- 5.4.3 *Discuss, develop and implement cooperative pest control strategies with local government, park neighbours and stakeholders.*

## 5.5 FIRE MANAGEMENT

Fire is a natural feature of many environments and is essential for the survival of some plant communities. However, inappropriate fire regimes related to fire frequency, season, and intensity, can lead to loss of particular plant and animal species and communities. The ecological consequences of high frequency fire in some communities have been listed as a key threatening process under the TSC Act.

The primary fire management objectives of the NPWS are to protect life, property and community assets from the adverse impacts of fire, whilst managing fire regimes to maintain and protect biodiversity and cultural heritage (NPWS, 2008).

Cooperative fire management involving the community is critical to the achievement of both life and property protection, as well as natural and cultural heritage management objectives in the planning area. An important part of this is NPWS's participation in the Newcastle Bush Fire Management Committee which aims to coordinate fire management and fire control on a district basis. The committee is also responsible for the development of a Bush Fire Risk Management Plan and Operations plan which NPWS are actively assisting and support.

A Reserve Fire Management Strategy (RFMS) for the planning area has been completed and is updated annually. The RFMS identifies bushfire threats and requirements for the conservation of native plants and animals and cultural values, and provides the basis for management strategies and burning prescriptions. A detailed analysis of the fire biodiversity thresholds is contained within the RFMS for the planning area. The RFMS also includes operational and environmental guidelines, maps with vehicle water points, fire trails and helipads.

Fire history records date back to 1984 and document all significant fire events. Glenrock's fire history is dominated by numerous small patchy burns due to

the combination of regular arson (the fire source) with easily available access for suppression, the prevalence of wetter vegetation, and the fire suppressing effects of weeds such as bitou bush and lantana.

Considering the high distribution of weed species within the park it is important that fire management planning addresses the issue of weeds. Prescribed burning has been used as a tool in the primary treatment of weed infestations. Follow up weed control after fires should continue wherever biodiversity thresholds and resources allow. Ongoing research suggests fire may also be used as a tool to control Bell Miner Associated Dieback.

### **Desired outcome**

- Management of fire to achieve both ongoing protection of life and property within and adjacent to the planning area and the long-term conservation of natural plant and animal communities and cultural values.

### **Strategies**

- *Minimise the potential for the spread of bushfires within, from or into the park.*
- *Fire regimes will be managed to protect biodiversity in accordance with the identified fire frequency thresholds (as identified in the Reserve Fire Management Strategy) for each vegetation group in the park.*
- *As far as is possible, fire will be completely excluded from areas of littoral rainforest.*
- *The use of heavy machinery for fire suppression will be avoided as far as is possible, particularly in the vicinity of threatened species, littoral rainforest, and cultural heritage sites.*
- *Areas disturbed by fire suppression operations will be rehabilitated as soon as practical after the fire.*
- *Protect from damage by bushfires all Aboriginal sites, historic places and culturally significant features which are known to exist within the park.*

### **Actions**

- 5.5.1 *Implement the Reserve Fire Management Strategy for the park.*
- 5.5.2 *Maintain fire history data for the park and incorporate this information into fire management planning and revisions of the Reserve Fire Management Strategy.*
- 5.5.3 *Encourage research into the response to fire of significant threatened plant species, such as Diuris praecox.*
- 5.5.4 *Monitor the impacts of fire on ecological communities following both prescribed burns and wildfires.*
- 5.5.5 *Continue to actively participate in the Newcastle Bush Fire Management Committee.*
- 5.5.6 *Work with other agencies, neighbours and government departments to manage fire within mutual management zones.*
- 5.5.7 *Undertake follow up weed control post fire where funding permits.*

## 5.6 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 evaporation. These changes are likely to lead to greater intensity, duration and frequency of fires, more severe droughts and increased regional flooding.

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. Species most at risk are those unable to migrate or adapt, particularly those with small population sizes or with slow growth rates. 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 weeds and feral animals. Programs to reduce pressures arising from such threats will help reduce the severity of the effects of climate change.

### **Desired Outcome**

The impacts of climate change on natural systems are minimised.

### **Strategies**

- *Continue existing fire, pest and weed management programs to increase the ability of native flora and fauna to cope with future disturbances, including climate change.*
- *Liaise with neighbours, catchment management authorities and other agencies to encourage retention, and where possible expansion, of areas of native vegetation close to the park.*

## 6 VISITOR OPPORTUNITIES AND EDUCATION

### 6.1 RECREATION OPPORTUNITIES

As one of only two significant areas of bushland left in Newcastle, the park plays an important role in providing nature based recreational opportunities for the local community. The improvements to visitor facilities proposed provide considerable opportunities to build on this history and encourage broader visitor use of these recreational sites, adding significantly to the tourism assets of the City of Newcastle.

Glenrock provides regionally significant settings for several of these recreational activities, including:

- Dudley and Burwood Beaches, with their associated surf breaks, fishing spots and natural forested backdrop;
- the Yuelarbah Track, the best developed and most heavily used bushland walk in Newcastle and part of the 'Great North Walk' stretching from Sydney to Newcastle;
- the heavily used Hickson Street hang-glider launch site and viewing area, and
- the network of management trails and informal walking tracks, particularly in the north of the park, that have developed as a popular mountain biking destination.

The park will continue to be promoted and managed for a diverse range of recreational opportunities including disabled access, long and short bushwalks, surfing, beach fishing, hang gliding, horse riding, cycling/mountain biking, orienteering, educational tours, bird watching, cultural tours, Scouting activities, and photography.

Recreational use of the park has evolved in a relatively unplanned fashion over a long period. At times this has led to environmental damage and user conflicts. The number of recreational users in the park has increased markedly in recent years and is expected to increase further in association with planned population growth in the Newcastle area. If not managed appropriately these higher levels of use may lead to further negative impacts and issues such as increased demand for toilet facilities.

A consultative committee, comprised of nominated representatives from a range of recreational user groups and community stakeholders, was formed in 2006 to help the NPWS in developing a response to these issues. Over an 18 month period this committee assisted the NPWS to develop the community based recreational management approach presented in this plan. Its goal is to provide for a range of high quality recreational opportunities in the park that are ecologically sustainable, encourage public awareness and appreciation for natural and cultural heritage values, while minimising conflicts between different recreational user groups.

To balance the need to protect Glenrock's conservation values with the desire to provide enhanced recreational opportunities, a simple two part zoning

scheme has been developed to guide decisions on recreational use. This zoning scheme reflects the fact that the park landscape is not homogenous, and different areas have different natural and cultural values, recreation settings and capacity to support different uses. The aim of this approach is to minimise the impact of recreational use on areas of high conservation significance.

This southern zone contains the areas of highest conservation significance, both natural and cultural, and is the least fragmented. Within this 253 hectare zone, the existing recreational track network will not be expanded, with effort focussed on upgrading and enhancing the existing walking tracks and maintaining the Dudley Beach visitor use infrastructure. This approach is consistent with objectives outlined in the Bush Regeneration Plan and the conservation management plan, maximising the opportunity to restore habitat and minimise fragmentation in the most intact vegetation communities of the park

The northern zone has the majority of the utility infrastructure and is ecologically more fragmented and disturbed. The current high level of recreational use experienced in this 285 hectare zone will be managed through formalisation and enhancement of a diverse network of multiple use trails for walkers and cyclists. Unnecessary and unauthorised trails will be closed and rehabilitated, and degraded routes re-built to minimise soil erosion. The majority of horse riding routes are located on management trails in this zone.

Wherever possible, linkages with other land tenures will be pursued to enhance the recreational opportunities provided. This is particularly important for the provision of longer distance cycling and horse riding opportunities. Linkages to other large areas of land, such as the Jesmond Bushland are a high priority for this reason. Visitor nodes containing signage, and/or picnic facilities will be provided at locations where the park's track network links with off-park facilities and connecting routes, such as the Fernleigh Track, Bathers Way and the Lake Macquarie City Council Coastal Walk.

### **Desired Outcome**

Continuation of an ecologically sustainable range of nature based, recreational opportunities that are managed to encourage public awareness and appreciation for the park's conservation values, the minimisation of conflict between recreational user groups, and a quality experience for all.

### **Strategies**

- *Upgrade the walking track network with a greater level of site hardening and the provision of more built facilities such as boardwalks or raised stairways to protect the park's highly erosion prone soils and fragile vegetation to lessen impacts.*
- *Encourage the ongoing involvement of recreational user groups and other stakeholders in recreation management within the park.*
- *Upgrade and maintain a safe and sustainable track network, incorporating appropriate signage, codes of conduct and educational materials.*

- *Strengthen regional recreational linkages to the Fernleigh Track, Bathers Way and the Lake Macquarie City Council Coastal Walk and appropriate bushland areas.*
- *Market and promote the recreational opportunities available in the park to encourage its use by visitors to Newcastle and the Hunter.*

### **Actions**

- 6.1.1 *Provide visitor facilities and amenities as appropriate at the Yuelarbah Track head on Burwood Road, the Gun Club Road Track head, near the bridge over Flaggy Creek, Fernleigh Track junction off Burwood Road, Leggy Point Loop Track and carpark, Burwood Beach leading to the Bathers Way via Hickson Street and/or Merewether Baths, Dudley Beach carpark and Bombala Track and the Lake Macquarie City Council Coastal Walk.*
- 6.1.2 *Liaise with Newcastle City Council and other land managers to encourage the development of links to the Jesmond Bushland and other off-park sites for mountain bike riding.*
- 6.1.3 *Encourage the development of a link via the Fernleigh Track to off-park sites for horse riding with Lake Macquarie City Council.*
- 6.1.4 *Encourage and support the involvement of recreational user groups in recreation management in the park through educational programs, monitoring of visitor use and voluntary activities.*
- 6.1.5 *Work with the Hunter Regional Tourism Organisation to better promote the experiences available within the park*

## **6.2 VEHICLE ACCESS**

Scout Camp Road and Dudley Beach Road are high use, sealed park roads and will continue to be managed for public vehicle access during the day. They are closed at night to minimise antisocial behaviour and vandalism.

The park contains an extensive management trail network for fire fighting and management purposes and to provide access to utilities managed by Energy Australia and Hunter Water Corporation (refer also sections 5.1, 5.2 and 8). These management trails are not open for public vehicle access. All management trails in the northern zone are multi-use trails for recreational purposes, and in some instances cyclists, horse riders and pedestrians may share the one trail. In the southern zone only pedestrians and horse riders are permitted on management trails. The type of recreational use permitted on management trails in the park is shown on Maps 1 and 2.

### **Desired outcome**

Provision of safe and ecologically sustainable public vehicle access to recognised recreational access areas that does not impact on the park's natural and cultural values.

### **Strategies**

- *Provide public vehicle access on parks roads as shown on Maps 1 and 2.*
- *Management trails will be closed to public vehicular access.*

## **Actions**

*6.2.1 Close the gates on Scout Camp Road and Dudley Beach Road at night.*

*6.2.2 Implement appropriate signage to advise visitors on the multiple use opportunities available on management trails.*

## **6.3 BUSHWALKING AND DAY USE**

The track network in the park is highly popular with walkers (see Map 1). In addition to the 24 kilometres of management trail, over eight kilometres of track is provided for solely pedestrian use, primarily in the southern zone. An additional 14 kilometres of mountain bike single track, including the Diuris Track, will be formalised (refer Section 6.4 and Map 1), and while mountain biking is the primary use, walking will be permitted.

The track network requires a greater degree of site hardening and more built structures to improve visitor access and minimise environmental impacts. Signs will be provided to guide visitors around the track network and to points of interest. Interpretation signs will be provided at several main visitor nodes and points of interest to inform and educate. Visitor nodes link in with major off park facilities or walking tracks, providing visitors with extended recreational opportunities.

### **The Yuelarbah Track**

The main walking track in the park is the Yuelarbah Track, part of the Great North Walk stretching from Newcastle to Sydney. This is a pedestrian only track beginning at the Yuelarbah carpark off Burwood Road. The track follows Flaggy Creek to Leichhardt's Lookout, past Glenrock Lagoon and on to Burwood Beach. From here visitors can loop back to the Yuelarbah carpark via the Leggy Point Loop and Burwood Tracks, or continue along the beach at low tide to Merewether Baths outside the park. During high tide visitors heading to Merewether must exit via the Hickson Street Track at the northern end of Burwood Beach.

The first part of the track is a class 1 walking track (AS 2156.1-2001), providing disabled access via a raised boardwalk and track from the carpark to Flaggy Creek. A range of appropriate visitor facilities are provided, and these may need to be expanded to include toilet facilities over time. The car park and entrance facilities link to the adjacent Fernleigh Track, a multiple use trail which is jointly managed by Newcastle and Lake Macquarie City Councils

Beyond the Flaggy Creek Falls, the remainder of the track through to Burwood Beach is predominantly a class 4 walking track. Due to the level of use this track experiences it will be progressively upgraded to a class 2 or 3 walking track. Works will address safety issues, erosion and track duplication. Sections of the track identified for works include the descent down to Little Flaggy Creek bridge where rocky outcrops obstruct progress, and the section between Leichhardt's Lookout and Burwood Beach where areas require

realigning and stabilising and several small wooden pedestrian bridges require upgrading. A link walking track joining the Yuelarbah Track to the Yuelarbah Management Trail above will be provided just before the track leads on to Burwood Beach.

### **The Leggy Point Loop Track**

This track is pedestrian only and begins at the Leggy Point carpark at the end of Scout Camp Road and loops around to the water tank above the Scout Camp on Scout Camp Road. Walkers may continue on to the Burwood Track from opposite the tank on Scout Camp Road. A side track also links the Leggy Track to Glenrock Beach, Burwood Beach and on to the Yuelarbah Track. The majority of this track is a hiking track with poor drainage and substantial erosion in the steep sections. It is a popular beach access track for surfers that provides spectacular northern coastal views, and requires progressive upgrading to class 3 track standard. With appropriate upgrading and signage, combined with the Burwood Track it will provide a highly valuable loop return walk to the existing Yuelarbah Track. The carpark requires formalising, with parking provided for approximately 20 vehicles.

### **The Burwood Track**

The Burwood Track is a multi-use track that will be enhanced to be suitable for pedestrians and horses. It begins opposite the water tank on Scout Camp Road and continues on to join up with the Yuelarbah Track and the Yuelarbah Management Trail at Flaggy Creek. The track is currently a class 4 walking track. It requires upgrading in sections and the provision of steps suitable for horse and pedestrian use at the trail head. A short link track to the nearby Burwood Colliery historic site may be provided subject to available resources.

### **The Bombala Track**

Bombala Track is a pedestrian only track providing access to the southern end of Dudley Beach. A small set of steps and a viewing platform occur midway along the track. The track is currently a class 4 walking track. Further works are required to bring it to the desired class 3 walking track standard, including addressing gully erosion at several locations and safety issues associated with the Bombala hang gliding launch site. Interpretation signage is provided at the track head. From Dudley Beach walkers may continue on to walking tracks in the north via Gardeners Link Management Trail. This track links with the Lake Macquarie City Council Coastal Walk.

### **The Hickson Street Track**

The track is pedestrian only, and begins off Hickson Street at the northeast of the park and ends on Burwood Beach. The popular Hickson Street hang gliding pad is situated part way along this track, just prior to its descent to the beach. Good views of Burwood Beach and the Newcastle coastline are available from the pad. The track below the launch site requires major work to address severe erosion and meet the required class 3 walking track standard suitable for its level of use. The track provides a high tide alternative to walkers on the Yuelarbah Track heading towards Merewether, linking in to the Bathers Way via Lloyd Street in Merewether. An interpretation shelter and seating are provided at the junction between the Hickson Street Track, the

Yuelarbah Track on Burwood Beach and the loop track still to be formalised to the copper smelter site. The interpretation signs provide information on the natural and cultural heritage of Burwood Beach and surrounds, including the railway, copper smelter and Awabakal stone quarry.

### **Single Track Mountain Biking Network**

It is proposed to formalise and up-grade 14 kilometres of formerly unauthorised routes in the northern zone of the park as mountain bike single track (see Map 1 and Section 6.4 CYCLING). Current pedestrian access is characterised by walking and running for fitness. While walking/running is permitted, mountain biking will be the primary use of these tracks.

### **Management trail network**

The management trail network provides an additional 24 kilometres of walking opportunities in the park. The management trails provide a number of alternative pathways, linking walking tracks and providing a diverse range of walking route options for park visitors. Many of these management trails are multiple use, and all will be adequately signposted to reflect the recreational uses permissible in each instance.

### **Desired Outcome**

An enjoyable, safe and sustainable walking track system with visitor nodes linking to off park facilities.

### **Strategies**

- *Walking is permitted on all management trails, walking tracks and mountain bike single tracks as shown on Map 1.*
- *Walking tracks will be progressively upgraded to address problems of erosion and track duplication, including the Yuelarbah Track, Hickson Street Track, Leggy Point Loop Track, Burwood Track, and Bombala Track.*
- *Interpretation signage will be provided at key sites and visitor nodes.*
- *Links with major off park facilities or walking tracks will be signposted to provide visitors with extended walking opportunities.*

### **Actions**

- 6.3.1 *Upgrade the Yuelarbah Track to a class 2 or 3 track, depending on location. Upgrade interpretation and highlight the links to the Fernleigh Track. Install toilet where appropriate based on an assessment of visitor use levels and need.*
- 6.3.2 *Linking tracks to the Yuelarbah Track, Hickson Street Track and Leggy Point Loop Track will be constructed. These will be maintained to class 4 standard.*
- 6.3.3 *The Burwood Track will be upgraded to provide for both horses and pedestrians. This may include a link to the Burwood No.1 colliery site.*
- 6.3.4 *The Bombala Track will be upgraded to a class 3 walking track. Interpretation will be upgraded and links to the Lake Macquarie City Council Coastal Walk signposted.*

- 6.3.5 *The Hickson Street Track will be upgraded to a class 3 walking track. Interpretation will be upgraded and links to the Bathers Way highlighted.*
- 6.3.6 *The Leggy Point Loop Track will be upgraded to a class 3 walking track, and appropriate interpretation provided.*
- 6.3.7 *All trails will be signposted to indicate the recreational use permitted on each track.*
- 6.3.8 *Directional signage will be provided throughout the track network.*
- 6.3.9 *A carpark for up to 20 cars will be constructed at the start of Leggy Point Loop Track off Scout Camp Road.*

## **6.4 CYCLING**

Whilst cycling is a long term recreational use of the park, the past ten years has seen a rapid and continuing expansion in the use of Glenrock by more specialised mountain bike riders. The park is immediately accessible to the large urban population of Newcastle, and currently provides the most significant “off road” cycling opportunity in the Lower Hunter region.

Mountain bike use has expanded in an unplanned and uncontrolled fashion, with cyclists utilising unauthorised walking routes, old closed roads, infrastructure routes and building new unauthorised trails. The existing system of formerly unauthorised trails has been assessed and reviewed in consultation with the cycling community, with a focus on environmental sustainability, safety and recreational diversity. As a result, it is proposed to formalise and upgrade 14 kilometres of trail as mountain bike single track in the northern high use recreation zone (see Map 1). While walking will be permitted, the primary use of these tracks is mountain biking. Combined with 20 kilometres of linked management trail (see Map 2), this will provide an extensive network of diverse riding opportunities including challenging single track style sections more suitable for experienced mountain bike riders, as well as gentle trails suitable for the relatively inexperienced recreational cyclist.

A ‘No sign-no ride’ policy will be adopted for cycling in the park. If a track or trail is not marked as allowing cycling then it is not permitted. Cycling will not be permitted in the southern zone, except on bitumen roads. A risk assessment of the cycling network has been undertaken, and a signage system developed in line with the International Mountain Biking Association’s trail difficulty system will be implemented. Cycling on the track network will be uni-directional to assist in achieving this purpose. Signs will consist of directional signs and a grading system relating to the degree of difficulty each track offers. A code of conduct will also be developed to guide use of the track and trail network and interactions with other park users.

A greater degree of site hardening will be required in some areas of the track network to address erosion and safety issues. Cyclists, and in particular mountain bike riders, the NPWS and others are keen to develop a track maintenance and rehabilitation group to carry out ongoing maintenance on the

track network and to assist in the closure and rehabilitation of the tracks deemed unsustainable and not retained in the track network.

Visitor nodes will link with the Fernleigh Track near the viaduct at Highfields Parade and at Gun Club Road, providing cyclists with links to off park riding opportunities. Information and orientation signage will be provided at these locations to inform and educate.

The Diuris Track provides access from Scenic Drive and passes through an area containing two threatened plant species, *Diuris praecox* and *Tetratheca juncea*. There are currently a number of tracks in this area, which are impacting on these threatened species. These will be rationalised to address these impacts and maintain access. Cycling will be uni-directional reducing the potential for track widening. Should track widening or branching occur in this location the track will be fenced to restrict use to the track corridor.

During wet weather the walking track network available for cycling may be closed to minimise damage to the track surface.

### **Desired Outcome**

An enjoyable, safe and ecologically sustainable cycling network which links to off park facilities.

### **Strategies**

- *Cycling will be permitted on the track and trail network in the northern zone as shown on Map 2.*
- *Adopt a 'No sign-no ride' policy for cycling in the park.*
- *Adopt a comprehensive risk management strategy for the multi trail use network, including a uni-directional signage system for the cycling track network.*

### **Actions**

- 6.4.1 *Develop and implement a risk assessment strategy for the cycling network and multi-use trails in the northern zone.*
- 6.4.2 *Develop and implement a directional and graded system of signage for the proposed cycling network.*
- 6.4.3 *Develop educational and orientation signage at track access points used by cyclists incorporating appropriate use messages and the 'No sign – no ride' policy.*
- 6.4.4 *Progressively upgrade tracks to be retained for cycling to address erosion and safety issues.*
- 6.4.5 *Work with the local cycling community to develop and implement a mountain bike use Code of Conduct.*
- 6.4.6 *Support volunteer groups to carry out maintenance and rehabilitation works on the track network, and assist in closure and rehabilitation of old or unauthorised tracks.*
- 6.4.7 *Monitor cycling in environmentally or culturally sensitive areas and modify where necessary to minimise impacts.*
- 6.4.8 *Temporarily close tracks and trails to cycling during wet weather to minimise damage if required.*

6.4.9 *Work with the cycling community to develop and implement an environmental management plan that will assist in the achievement of a sustainable mountain bike track network.*

6.4.10 *Monitor track use in the vicinity of threatened species on the Diuris Track, and fence the track corridor if required.*

## **6.5 HORSE RIDING**

The number of horse riders in the park has historically been small, and it is not envisaged that this situation will change. The existing horse riding opportunity is highly valued by local horse owners, and the plan aims to facilitate this on-going use.

It is proposed to cater for horse riding primarily on a network of vehicle width management trails in the northern zone as shown on Map 2. As local horse riders have no access to the Council-managed Fernleigh Track to allow access from Dudley and points south, a single access route through the southern zone of the park will be provided. This route utilises management trails, Dudley Beach and a designated section of the Burwood Track to reach the northern trail network. As Dudley is a highly popular public beach, horse riding access will be limited to those with an annually issued permit with conditions. Permit conditions will include restricting horse access to the beach to a short period in the morning (between 5am and 9:30am eastern standard time).

A 'No sign - no ride' policy will be adopted for horse riding in the park. If a trail is not marked as allowing horse riding then it is not permitted. The NPWS state-wide code of conduct for horse riding will apply. Parking for horse floats is available near the Glenrock works depot at the start of Scout Camp Road.

### **Desired Outcome**

A safe and ecologically sustainable horse riding network which links to off park facilities.

### **Strategies**

- *Horse riding will be permitted on Scout Camp Road, the designated section of the Burwood Track and identified management trails as shown on Map 2.*
- *Horse riding access to Dudley Beach will be permitted between 5am and 9:30am eastern standard time.*
- *Adopt a 'No sign-no ride' policy for horse riding in the park.*
- *Adopt the NPWS state wide code of conduct for horse riding.*
- *Horse riding in the southern zone without a permit and outside the designated hours will not be permitted.*
- *Competitive horse riding will not be permitted.*

## **Actions**

*6.5.1 Develop and implement a permit system governing access for horse riding in the southern zone on Dudley Beach and management trails south of Scout Camp Road.*

*6.5.2 Provide sign posting to direct horse riders around the track network and to points of interest.*

## **6.6 HANG GLIDING/PARAGLIDING**

Two hang gliding/paragliding pads occur in the park, one midway along the Hickson Street Track and one mid way along the Bombala Track. The use of hang-gliders is subject to a Civil Aviation Order, which specifies the conditions to be complied with by hang glider pilots. There are very specific topographical and wind requirements that enable hang gliding and paragliding to take place, and their activities are limited to specific places which have either been cleared of high growing vegetation or provide a landing platform.

Each hang gliding pad will be subject to a formal site assessment and review of environmental factors leading to a site management plan and formal consent arrangements.

### **Hickson Street hang gliding pad**

This is a grass pad providing for both takeoff and landing in south to south-east wind conditions. Access is via the Hickson Street Track. This heavily used pad is suitable for the safe training of new pilots. Landing is not permitted on Burwood Beach, except in the event of an emergency. The NPWS will work with the Newcastle Hang Gliding Association to upgrade the site to improve the surface cover and minimise erosion. Due to the size of the hang gliding pad, commercial use is permitted subject to NPWS licensing arrangements.

### **Bombala Track hang gliding pad**

This is a poorly developed takeoff only pad used by experienced pilots in east to north-east wind conditions. Access is via the Bombala Track at Dudley. Landing should occur outside the park. In the event of an emergency landing the hang glider must be carried out via the Dudley Beach carpark or the Banksia Fire Trail as the Bombala Track is not suitable for this purpose. Hang glider pilots are advised to use a buddy system to enable retrieval of their hang glider in such circumstances.

A launch structure may need to be built at this site to minimise environmental impacts and allow native ground cover vegetation to regrow. The site requires fencing to restrict access from park visitors using the Bombala Track. Due to the unsafe nature of the hang gliding pad it will remain closed until the necessary infrastructure is installed in co-operation with the Newcastle Hang Gliding Association.

**Desired Outcome**

The provision of safe and environmentally sustainable hang gliding in accordance with NPWS policy.

**Strategies**

- *Formalisation of the Hickson Street and Bombala Street hang gliding pads.*
- *Hang gliders are not to be removed from Burwood Beach via the Hickson Street Track, and landing is not permitted on Burwood or Dudley Beaches, except in an emergency.*
- *Commercial use of Hickson Street hang gliding pad will be permitted, subject to appropriate licensing.*
- *The Hickson Street pad may be used for both take off and landing.*
- *Bombala Street pad may only be used for take off.*
- *Bombala Street pad will remain closed until infrastructure is installed.*

**Actions**

- 6.6.1 *Undertake a review of environmental factors and site management plan for Hickson Street and Bombala Street hang gliding pads.*
- 6.6.2 *Develop and implement formal consent arrangements for each hang gliding pad.*
- 6.6.3 *Determine infrastructure requirements at each hang gliding pad, including fencing, signage and launch structures as required.*
- 6.6.4 *Install essential infrastructure and signage at each pad as required.*

**6.7 ORIENTEERING**

Newcastle and the broader Hunter region have an active orienteering movement who have used Glenrock occasionally over the years, primarily for simpler, beginner events. Orienteering events are generally held in unfamiliar territory and off established routes or tracks. Orienteering will continue to be permitted in the northern zone. All orienteering activities require written consent, and permissibility will be assessed against the likelihood of unacceptable impacts on the park's natural and cultural values, other park users and infrastructure. Orienteering must be organised to an acceptable standard as per NPWS Policy.

**Desired Outcome**

Opportunities for orienteering are provided in the northern zone.

**Strategies**

- *Orienteering will not be permitted in the southern zone, with the exception of the area north of Scout Camp Road until such time as a new orienteering map is prepared, after which it will not be permitted anywhere in the southern zone.*
- *Placement of markers or other fixtures must not disturb the soil, substrate, rock, vegetation, wildlife, or interfere with park infrastructure.*

**Action**

*6.7.1 All orienteering events will be assessed on an individual basis and require written consent.*

**6.8 BEACH ORIENTATED ACTIVITIES**

Swimming, fishing and surfing are popular recreational activities at Dudley, Burwood and Glenrock Beaches. The park offers a relatively isolated and natural beach setting which is lacking at other nearby beaches.

Dudley Beach is one of the most popular beaches in Newcastle. Pedestrian access is provided from the Dudley Beach carpark and picnic area via a board and chain in the south and via a boardwalk in the north. Interpretation is provided where the Bombala Track links with the Lake Macquarie City Council Coastal Walk. The southern dune is experiencing a minor blowout which will be rehabilitated and fenced to define access.

Burwood Beach North is situated directly in front of the Burwood Beach waste water treatment facility. A bitumen management road links this facility to Hunter Water Corporation infrastructure in the hind dunes. Several abandoned tracks also occur in this area. The remains of Australians first commissioned copper smelter and a unique coastal railway can be seen in the area. Management will concentrate on rehabilitation of the dune system, heath and grasslands and non-operational vehicle tracks behind the beach (see section 8). Walking tracks will be upgraded but no other facilities will be constructed. Management and emergency vehicle access will be provided via board and chain from the bitumen road behind the dunes.

Glenrock Beach, or Burwood Beach South, is more isolated with pedestrian access only. The carpark at the end of Scout Camp Road, above Leggy Point, will be upgraded and the Leggy Point Loop Track from the carpark to the beach will be upgraded for pedestrian access (see section 6.3). The dune system between the lagoon and the beach needs to be rehabilitated and fenced to define access.

Surfing events are permitted on all beaches subject to written consent. Limitations may be placed on numbers of participants based on the potential for the event to impact adversely on other beach goers and the park.

**Desired Outcome**

Provision of ecologically sustainable beach-orientated activities.

**Strategies**

- *Rehabilitation of vegetation and dunes at all beaches to enhance their natural and semi-isolated settings.*
- *Surfing events are permitted on Dudley Beach and Burwood Beach (north and south) subject to written consent.*

## **Actions**

- 6.8.1 *Rehabilitate the blowout and dune at Dudley Beach and provide appropriate fencing to define access.*
- 6.8.2 *Rehabilitate the dune system, heath and grasslands at Burwood Beach North.*
- 6.8.3 *Close and rehabilitate non-operational Hunter Water Corporation vehicle tracks at the back of Burwood Beach North on park, particularly those impacting on Themeda grassland.*
- 6.8.4 *Provide emergency vehicle access using board and chain from the Hunter Water Corporation bitumen road to Burwood Beach.*
- 6.8.5 *Rehabilitate the dune system and define access to Burwood Beach South.*

## **6.9 COMMERCIAL AND GROUP ACTIVITIES**

### **Commercial and non-commercial activities**

Commercial activities are organised activities conducted within the park to generate income or profit. A non-commercial recreational group activity is an activity undertaken by a group of 30 or more people where income or profit will not be generated. A commercial activity may require a consent or licence and a non-commercial activity requires a consent issued by the NPWS.

All activities should be nature based and facilitate understanding and appreciation of the natural and cultural heritage values of the park, and applications will be assessed in accordance with relevant NPWS policies.

### **Adaptive re-use leases and licences for modified natural areas**

The historic Bailey's Precinct is comprised of a weatherboard (Rangers) cottage and colourbond garage, a weatherboard (miners) cottage, garages, packing shed, terraces and grassed clearings. A range of uses for these historic buildings and structures is considered appropriate in providing greater diversity and flexibility of use, improved public access and to ensure conservation outcomes for the buildings and structures.

Adaptive reuse or short term licensing of the Bailey's Precinct (see Map 1) will be permitted provided any proposed modification and use is carried out in a sustainable manner and is consistent with the conservation of the natural and cultural values of the land. Any proposal is to be compatible with the retention of the cultural significance of the buildings and structures.

### **Desired Outcomes**

Commercial and non-commercial use, leasing and licensing is compatible with the natural and cultural heritage values of the park, ecologically sustainable and enhances visitor use and understanding.

### **Strategies**

- *Commercial activities and non-commercial group activities may be permitted, such as:*
  - *Guided walks, talks and tours (including school groups)*

- *Weddings*
  - *Surfing and sailboarding competitions*
  - *Commercial hang gliding*
  - *Commercial filming and photography including wedding, portrait and landscape photography*
  - *Provision of mobile catering services at appropriate locations*
  - *Military activities*
  - *Other passive non-commercial recreational uses.*
- *Issue commercial operational licences or consents where the activity is ecologically sustainable, appropriate for the setting, compatible with other visitor use and enhances visitor understanding of the park.*
  - *All buildings, structures and modified landscapes within the Bailey's Precinct may be considered for leasing under section 151B(2) and considered for short-term licences under section 151B(3) of the NPW Act with the consideration of the following purposes: residential uses, educational or research facilities, retail outlets, kiosk/café, cultural institutions (such as a gallery or museum), short term visitor or tourist accommodation and/or facilities in relation to Aboriginal culture and activities. The use of the land adjacent to Scenic Drive and in front of the cottages and packing shed to be considered for carparking or facilities and amenities for tourists and visitors.*

### **Actions**

- 6.9.1 *Monitor all group activities with respect to their cumulative impacts, safety requirements, conflicts with other park users, quality of information being given and compliance with licence or consent conditions.*
- 6.9.2 *Limit or prohibit commercial or non-commercial activities where adverse impacts are identified.*

## **6.10 INFORMATION PROVISION**

The park has an important role in promoting an awareness of the cultural resources, landscapes and plant and animal communities of the Hunter region. The cultural landscape and associated Aboriginal and historical places are highly regarded for their cultural values.

The interpretation of the park's natural heritage should inform of the links between geology and landform, and its flora and fauna, and in turn how humans have used and modified the landscape. Interpretation in the park should provide an enhanced understanding of its values as a cultural landscape and highlight the key Aboriginal and historic sites and important natural heritage values as outlined in previous sections. It should provide information on the area's threatened species, endangered ecological communities as well as more common species. It should also outline how the park is being managed to protect and enhance these values.

Interpretation should be provided at the main visitor sites throughout the park and at sites that link with the Newcastle Council Bathers Way Walk, the Fernleigh Track and the Lake Macquarie City Council Coastal Walk. Signage at these locations should include visitor orientation and interpretative panels covering natural, Aboriginal and historic heritage information pertinent to that area.

The interpretation of the park's Aboriginal landscape, shared history and prehistory will occur in partnership with the Awabakal community and only sites agreed to by the community will be interpreted. The interpretation of the park's cultural landscape and key historic sites will occur in partnership with local historians and the community. Separate Aboriginal and historic heritage tours currently occur as part of the Discovery for Schools program.

Detailed information on the park's cultural landscape exists, and should be made available to the public. The *Historical Overview* section from the conservation management plan (Griffin nrm, 2003) and interpretation signage would form the basis of this information. The conservation management plan text requires editing and updating in line with more recent research by Shoebridge (2006) and Tonks (2004) to ensure historical accuracy.

There is the opportunity to develop both a Hunter indigenous cultural heritage trail and a Hunter industrial heritage trail in conjunction with the community, Newcastle Museum and local councils focussing on sites of significance in Newcastle and Lake Macquarie.

### **Desired Outcomes**

Visitors have an improved understanding of the natural and cultural values of the park, its significance as a cultural landscape, and the available recreational and cultural opportunities.

### **Strategies**

- *Create opportunities for Aboriginal cultural tourism in order to enhance interpretation and to involve and generate benefits for the local Aboriginal community.*
- *Explore the concept of a Hunter Aboriginal cultural heritage trail and a Hunter industrial heritage trail with Local Aboriginal Land Councils and the community, Newcastle Museum, and local councils.*
- *Support and assist educational use of the park by schools, community groups and individuals through the provision of information and programs such as the Discovery walks, talks and tours.*

### **Actions**

- 6.10.1 *Update the history of the park as written in chapter 3 of the conservation management plan and make it available to the public.*
- 6.10.2 *Update the park brochure to reflect recent historical research and this Plan of Management.*
- 6.10.3 *Interpretation panels will be placed at each of the key sites and visitor nodes identified in the Aboriginal and historic heritage sections of this Plan of Management (ie the Aboriginal quarry site, camp site at*

*Glenrock Lagoon, Aboriginal pathway/Yuelarbah Track, Burwood Colliery, the Mitchell's tunnel sites, the colliery remains along Flaggy Creek, and the old Bailey land).*

- 6.10.4 *Undertake Discovery walks, talks and tours as required, and continue the Discovery for Schools program in the park.*

## 7 RESEARCH AND MONITORING

The purpose of scientific study in the park is to improve understanding of its natural and cultural heritage and the processes which affect them. Research also establishes the requirements for management of particular species.

Under the NPW Act, research and monitoring projects within the park require prior approval from the NPWS. Any research proposals need to be assessed and managed to ensure appropriate use and beneficial outcomes.

NPWS research efforts must be directed towards the areas of greatest need and will concentrate on monitoring for the effectiveness of its weed, feral animal, visitor and fire related management activities. Research by other organisations and students may provide valuable information for management. Some specific research needs have been identified in previous sections of this plan. Other important research topics are listed below.

### **Desired Outcome**

Improved understanding and knowledge of the park's values which assists in achieving better park management.

### **Strategies**

- *Research is undertaken that enhances the information base and assists management of the park.*
- *Research has minimal environmental impact.*
- *Monitoring programs are in place to detect any changes in the status of park resources.*

### **Actions**

- 7.1 *Permit appropriate research by other organisations and individuals and promote research that is directly useful for management purposes.*
- 7.2 *Encourage research and monitoring where it will assist park management and provide better outcomes for the protection of park values. Preferred topics will be those of direct relevance to management and will include:*
  - *research and survey of Bell Miner Associated Dieback;*
  - *research into the ecological fire requirements and response to fire of significant threatened plant species such as *Diuris praecox*;*
  - *research into the effects of weed control on fauna species where weeds provide significant resources;*
  - *a comprehensive weed survey every ten years to provide comparative data on changes in weed density and distribution;*
  - *visitor use patterns and expectations.*
- 7.3 *Encourage bush regeneration groups, bird watchers or similar groups to pass on information gathered in the park.*
- 7.4 *Continue with programs to monitor the effectiveness of its weed, feral animal and fire related management activities.*

## 8 OTHER USES

The park contains a number of public utilities such as electricity easements, sewerage pipes, underground telephone lines and water connections. This infrastructure and related access tracks are predominantly in the northern zone of the park. Impacts associated with these facilities are addressed in sections 5.1 to 5.3. Easement agreements and environmental management plans need to be developed with the relevant authorities to formalise their access arrangements and to encourage management which is more compatible with the conservation significance of the park. The Scout Camp and Burwood Beach waste water treatment facility occur on private in-holdings surrounded by the park. Opportunities to build partnerships and joint programs addressing a range of environmental issues will be pursued with these organisations.

### **The Glenrock War Memorial Scout Training Camp**

The Glenrock War Memorial Scout Training Camp (Scout Camp) is located behind Glenrock Beach in the middle of the park. Vehicle access to the Scout Camp is via Scout Camp Road. The Scout Camp was donated to the Newcastle Scout Association (Scouts) by BHP in the 1970s. The Burwood Colliery under-managers house (1887) remains within the grounds. This is the oldest house in the Lake Macquarie Local Government Area and is part of Glenrock's coal mining remains as listed on the State Heritage register. The Scouts have completed an extensive native planting program within their grounds over the last few years, improving the Scout Camp's environmental compatibility with the park.

NPWS and Scouts have established a mutually beneficial but informal arrangement for the provision of the NPWS Discovery for Schools program and park management access to the Burwood Colliery site and Glenrock Beach. The Scouts have unlimited access to Glenrock Beach, Glenrock Lagoon and recreational facilities throughout the park. An underground telephone line and water pipes connect the Scout Camp to town supplies on Burwood Road. No formal easement agreement is in place for these utilities. Vandalism and antisocial behaviour occurs on Scout Camp Road and at the Scout Camp after hours. Scout Camp Road will be closed at night to help manage this problem.

Opportunities exist to strengthen links or enter into formal arrangements with Scouts to ensure ongoing cooperation and compatible environmental use continues. Such arrangements could include a memorandum of understanding defining access arrangements, and a Voluntary Conservation Agreement which would ensure that the environmental investment the Scouts have put into their land is protected in perpetuity.

### **Hunter Water Corporation Infrastructure**

The Burwood Beach waste water treatment facility is located on Hunter Water Corporation land behind Burwood Beach. This facility has a significant visual impact on the park. The building of the sewage outfall pipe from this facility has created an area of disturbance between it and Burwood Beach, passing

through sections of the state heritage significant copper smelter site. Attempts were made by Hunter Water Corporation to rehabilitate this area, however more work is required. Non-operational access tracks are located within the Themeda grassland endangered ecological community on Burwood Beach.

Sections of a number of key management trails traverse the Hunter Water lands, and provide essential management and public access opportunities of considerable benefit to the park. Opportunities exist to establish mutually beneficial environmental programs on the land outside the treatment works compound but still owned by Hunter Water Corporation, which are compatible with the conservation significance of the surrounding park. Such programs could include the closure and rehabilitation of the non-operational access tracks, rehabilitation of the hind dunes and screen planting of the treatment works with appropriate, locally sourced native species.

The Charlestown sewer main follows Flaggy Creek from Charlestown to Burwood Road in the south, and then traverses the park to the treatment facility at Burwood Beach. There are issues with this pipeline and their resolution is discussed in section 5.2 above. Hunter Water Corporation will be encouraged to develop an environmental management plan to ensure ongoing management of the pipeline is to appropriate environmental standards and minimises any adverse impacts on park values.

The majority of the existing sewer mains were constructed prior to the park's gazettal, and constitute existing interests under section 47H of the NPW Act, and most are covered by formal easements. As part of the approval of the upgrade works, it is proposed to ensure formal easements or licences are in place for all Hunter Water Corporation infrastructure.

### **Energy Australia Infrastructure**

A 30 metre wide easement for a high voltage transmission line traverses the park from Highfields Parade to Gun Club Road, crossing Little Flaggy Creek. A 30 metre wide easement for a transmission line also bisects the park from Burwood Road in the south to Scenic Drive in the north, crossing both Flaggy and Little Flaggy Creeks. Four other 'feeder lines' occurring on easements supply electricity to the waste water treatment facility and the Scout Camp. These easements and infrastructure fragment the park and have allowed the establishment of weed species along their edges. In certain gullies weeds are affecting the canopy. Vehicular tracks are present on all easements and erosion is a significant problem due to their location and construction.

Energy Australia periodically slashes its electricity easements, a procedure known to contribute to the spread of weeds due to the presence of weed seed and propagules in vehicle cabins and engine bays (Moerkerk, 2006). This can be dealt with by the introduction of vehicle hygiene protocols. Changes to the slashing regime should also be explored with slashing taking place prior to weed seed set. An alternative to slashing is the use of the rope-wick applicator technique (Murdoch, 1994).

The Energy Australia policy requiring all vegetation to be cleared up to seven metres below its powerlines may allow for the revegetation to shrub level of many of their easements. Such corridors may not have the same spatial and temporal diversity as core habitat areas, but all attempts at reproducing this should be made.

The majority of the existing power supply infrastructure present in the park existed prior to its gazettal and constitute an existing interest under section 47H of the NPW Act, and many are covered by easements. Some sections of the 'feeder lines' may not be covered under existing easements. This needs to be investigated, and easements or licenses to occupy or use the land negotiated in accordance with the NPW Act.

Energy Australia currently uses many NPWS management trails to access its infrastructure. Such access may need to be formalised via a license and may be linked to meeting appropriate environmental standards.

NPWS propose that an environmental management plan be developed with Energy Australia for their activities on the park, to ensure management of power supply infrastructure meets acceptable environmental standards and is compatible with the park's values.

### **Mining and Exploration**

The tenure of state conservation area allows for mining activity. The area is not currently covered by any mineral exploration licence. Industry and Investment NSW (II NSW) is the lead authority for mining, mineral exploration and mine site rehabilitation. II NSW is required under the EPA Act to undertake environmental assessments for mining and exploration activities in all SCAs. A Memorandum of Understanding (MOU) between NPWS and II NSW describes the management and consultative arrangements associated with exploration and mining in SCAs.

### **Desired Outcome**

Utility infrastructure has a minimal environmental impact and is managed in accordance with formal legal agreements.

### **Strategies**

- *Easements or licences and environmental management plans are developed with relevant non-NPWS utility authorities and organisations to formalise access arrangements and minimise impacts.*
- *Opportunities to build partnerships and joint programs addressing a range of environmental issues are explored with Hunter Water Corporation and the Scouts.*
- *All easement or licence agreements minimise environmental impacts relating to the management and maintenance of utility infrastructure both on site or wherever impacts directly related to the infrastructure is occurring, such as downstream.*

**Actions**

- 8.1 *Investigate the tenure of all non-NPWS uses and ensure that licenses or easements are granted as appropriate under the NPW Act, and that management of easements is to acceptable environmental standards.*
- 8.2 *Assist Hunter Water Corporation and Energy Australia in developing Environmental Management Plans for their easements, which will incorporate the following:*
  - *Regular weed control, targeting lantana and other weeds;*
  - *Maintenance and erosion control works to all access tracks on their easements; and*
  - *Maximising native vegetation to establish corridors across easements.*
- 8.3 *Ensure the waste water treatment facility is screened from the beach with appropriate, locally sourced, native vegetation.*
- 8.4 *Keep non-NPWS utilities under review, with the aim of closure or relocation where feasible.*
- 8.5 *Develop a Memorandum of Understanding with Newcastle Scout Association to define access arrangements for environmental programs and other purposes.*
- 8.6 *Discuss the preparation of a Voluntary Conservation Agreement with Newcastle Scout Association.*
- 8.7 *Any applications for approval to undertake exploration for mining within the SCA will be subject to environmental assessment in accordance with the MOU between the NPWS and II NSW.*

## 9 MANAGEMENT FACILITIES AND OPERATIONS

There are a number of park management facilities situated within the park, including a works depot, a quarry, park roads, and management trails.

The works depot is located on Scout Camp Road and is the base for all field activities and maintenance in the park and other reserves in the Newcastle area.

A gravel quarry is located at the end of Gun Club Road. A risk assessment of the quarry was completed as part of preparing a Quarry Safety Management Plan to ensure compliance with the *Mine Inspection Act 1901* and Regulations. The quarry is important for providing a local source of gravel for walking track and management trail maintenance in the park.

A network of management trails exists throughout the park, which are used for fire and weed control and other management purposes. They may also be used for recreational purposes. Some of the management trails exist or cross into other land tenures adjacent to the park, such as the Seacourt Avenue Fire Trail located on Crown land at the southern end of the park (maintained jointly with Lake Macquarie City Council), the Forgacs Fire Trail also on Crown land below the Burwood Colliery Bowling Club, and the Fernleigh Fire Trail near Fernleigh Loop on a mixture of Commonwealth land and land set aside for public recreation and preservation of native fauna and flora managed by Lake Macquarie City Council.

A Memorandum of Understanding has been entered into with Lake Macquarie City Council for the eventual addition to the park of certain blocks of land situated on the coastal strip between the park and Awabakal Nature Reserve. The Memorandum of Understanding details arrangements for weed control, erosion control, stormwater management and fire management to take place prior to the lands being added to the park. Memoranda of Understanding covering the management of other adjoining lands should also be considered.

There is a helipad adjacent to the depot on Scout Camp Road but it is not required given the other available landing sites nearby.

### **Desired Outcome**

Management facilities adequately service park management needs and have minimal environmental impact.

### **Strategies**

- *Maintain operations from the works depot on Scout Camp Road.*
- *Maintain and operate the quarry on Gun Club Road according to requirements outlined in the Quarry Safety Management Plan.*
- *Maintain all management trails to a standard that is sustainable and suitable for use.*
- *Maintain close liaison with park neighbours, such as Lake Macquarie City Council to deal with management matters of mutual concern.*

**Actions**

- 9.1 *Liaise with neighbouring land management agencies and develop memoranda of understanding as appropriate.*
- 9.2 *Close and rehabilitate the helipad adjacent to the depot.*

## 10 PLAN IMPLEMENTATION

This plan of management establishes a scheme of operations for the Glenrock State Conservation Area. Section 81 of the Act requires that this plan of management shall be carried out and given effect to, and that no operations shall be undertaken in relation to Glenrock State Conservation Area unless they are in accordance with the plan. Implementation of this plan will be undertaken within the annual program of the NPWS Hunter Region.

Relative priorities for identified activities are set out in the table below. These priorities are subject to the availability of necessary staff and funds and to any special requirements of the Director-General or Minister. The implementation of the plan will be monitored and its success in achieving the identified objectives will be assessed.

The environmental impact of proposed activities will be assessed at all stages in accordance with established environmental assessment procedures. Where impacts are found to be unacceptable, activities will be modified in accordance with the plan.

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.

### Strategies

- *Undertake an annual review of progress in implementing this plan of management.*
- *Undertake an assessment after five years of the effectiveness of managing the park in accordance with this plan and of the degree of success in achieving the plan's objectives and desired outcomes. Base the evaluation on the monitoring programs set out in this plan and any others that may be developed.*

### 10.1 IMPLEMENTATION – SUMMARY OF ACTIONS

As a guide to the implementation of the actions in this plan, relative priorities have been assigned (high, medium, low) to each action which is summarised in Table 4. The following criteria have been used to allocate priorities.

- High: Actions that are imperative to achieve the plan's desired outcomes and if deferred would result in unacceptable loss of natural and/or cultural heritage values or unacceptable risk to the public.
- Medium: Actions that are necessary to achieve the management outcomes set out in the plan, but can be deferred without unacceptable loss of natural and/or cultural heritage values.
- Low: Actions that are desirable to achieving the management objectives set out in the plan but can be delayed until resources are made available.

**Table 4: Summary of actions****High Priority**

- 4.2.1 *Rehabilitate areas previously cleared for industrial pursuits and farming as outlined in the Bush Regeneration Plan and conservation management plan.*
- 4.2.2 *Implement relevant strategies in the Priorities Action Statement and recovery actions for threatened flora species and endangered ecological communities.*
- 4.3.1 *Implement relevant strategies in the Priorities Action Statement and recovery actions for threatened fauna species*
- 4.4.1 *Stabilise and protect midden sites 38-4-42 and 38-4-0043.*
- 4.4.2 *Remove the steel mesh from the site at Murdering Gully (38-4-45).*
- 4.4.3 *Record and monitor site GR13 in Flaggy Creek but do not promote access.*
- 4.4.4 *Interpret the quarry site, camp site at Glenrock Lagoon and the Aboriginal pathway as described in the conservation management plan (Griffin nrm, 2003).*
- 4.5.1 *Stabilise, remove weeds and protect the copper smelter remains.*
- 4.5.2 *Conserve, interpret and explore options to provide visitor access to the Burwood Colliery and the Mitchell's tunnel sites.*
- 4.5.3 *Conserve, interpret and improve access to colliery remains along Flaggy Creek and the Yuelarbah Track.*
- 4.5.4 *Fully record the coastal railway and relics and maintain the rail embankment.*
- 4.5.5 *Fence the Merewether bluff railway tunnels to improve visitor safety.*
- 4.5.6 *Undertake essential risk management, and ensure appropriate risk messages are incorporated into park interpretation.*
- 5.1.1 *Close and rehabilitate all tracks and trails not to be retained in the management or recreational track network.*
- 5.1.2 *Maintain park roads, management trails and the track network so that erosion and sedimentation are minimised. Undertake erosion control works as required.*
- 5.1.3 *Develop and implement formal agreements and/or other cooperative measures with Energy Australia and Hunter Water Corporation in order to address erosion and sedimentation issues related to their facilities and infrastructure.*
- 5.2.2 *Liaise with Hunter Water Corporation and Energy Australia to determine viable alternative arrangements for vehicles crossing Flaggy and Little Flaggy Creeks.*
- 5.2.3 *Establish a long-term water quality monitoring program for Glenrock Lagoon in conjunction with Hunter Water Corporation and relevant government authorities.*
- 5.2.4 *Work with Hunter Water Corporation to ensure appropriate community notification occurs in the event of an effluent discharge within or in the vicinity of the park.*
- 5.3.1 *Implement priority weed control programmes, focusing on the intact core of the park and in areas of threatened species, and endangered ecological communities or cultural heritage sites of significance.*

- 5.3.2 *Develop and implement these weed control plans in conjunction with local government, park neighbours, Energy Australia, Hunter Water Corporation and Scouts.*
- 5.3.3 *Implement Bitou Threat Abatement Plan priorities for high and medium priority sites.*
- 5.5.1 *Implement the Reserve Fire Management Strategy for the park.*
- 5.5.2 *Maintain fire history data for the park and incorporate this information into fire management planning and revisions of the Reserve Fire Management Strategy.*
- 5.5.3 *Encourage research into the response to fire of significant threatened plant species such as Diuris praecox.*
- 5.5.4 *Monitor the impacts of fire on ecological communities following both prescribed burns and wildfires.*
- 5.5.5 *Continue to actively participate in the Newcastle Bush Fire Management Committee.*
- 5.5.6 *Work with other agencies, neighbours and government departments to manage fire within mutual management zones.*
- 6.1.1 *Provide visitor facilities and amenities as appropriate at the Yuelarbah Track head on Burwood Road, the Gun Club Road Track head, near the bridge over Flaggy Creek, Fernleigh Track junction off Burwood Road, Leggy Point Loop Track and carpark, Burwood Beach leading to the Bathers Way via Hickson Street and/or Merewether Baths, Dudley Beach carpark and Bombala Track and the Lake Macquarie City Council Coastal Walk.*
- 6.1.4 *Encourage and support the involvement of recreational user groups in recreation management in the park through educational programmes, monitoring of visitor use and voluntary activities.*
- 6.2.1 *Close the gates on Scout Camp Road and Dudey Beach Road at night.*
- 6.2.2 *Implement appropriate signage to advise visitors on the multiple use opportunities available on management trails.*
- 6.3.1 *Upgrade the Yuelarbah Track to a class 2 or 3 track, depending on location. Upgrade interpretation and highlight the links to the Fernleigh Track. Install toilet where appropriate based on an assessment of visitor use levels and need.*
- 6.3.2 *Linking tracks to the Yuelarbah Track, Hickson Street Track and Leggy Point Loop Track will be constructed. These will be maintained to class 4 standard.*
- 6.3.3 *The Burwood Track will be upgraded to provide for both horses and pedestrians. This may include a link to the Burwood colliery site.*
- 6.3.5 *The Hickson Street Track will be upgraded to a class 3 walking track. Interpretation will be upgraded and links to the Bathers Way highlighted.*
- 6.3.7 *All trails will be signposted to indicate the recreational use permitted on each track.*
- 6.3.8 *Directional signage will be provided throughout the track network.*
- 6.4.1 *Develop and implement a risk assessment strategy for the cycling network and multi-use trails in the northern zone.*
- 6.4.2 *Develop and implement a directional and graded system of signage for the proposed cycling network and multi-use tracks.*

- 6.4.3 *Develop educational and orientation signage at track access points used by cyclists incorporating appropriate use messages and the 'no sign – no ride' policy.*
- 6.4.5 *Work with the local cycling community to develop and implement a mountain bike use Code of Conduct.*
- 6.4.7 *Monitor cycling in environmentally or culturally sensitive areas and modify where necessary to minimise impacts.*
- 6.4.8 *Temporarily close tracks and trails to cycling during wet weather to minimise damage if required.*
- 6.4.9 *Work with the cycling community to develop and implement an environmental management plan that will assist in the achievement of a sustainable mountain bike track network.*
- 6.4.10 *Monitor track use in the vicinity of threatened species on the Diuris Track, and fence the track corridor if required.*
- 6.5.1 *Develop and implement a permit system governing access for horse riding in the southern zone on Dudley Beach and management trails south of Scout Camp Road.*
- 6.5.2 *Provide sign posting to direct horse riders around the track network and to points of interest.*
- 6.6.1 *Undertake a review of environmental factors and site management plan for Hickson Street and Bombala Street hang gliding pads.*
- 6.7.1 *All orienteering events will be assessed on an individual basis and require written consent.*
- 6.8.1 *Rehabilitate the blowout and dune at Dudley Beach and provide appropriate fencing to define access.*
- 6.9.2 *Limit or prohibit commercial or non-commercial activities where adverse impacts are identified.*
- 6.10.3 *Interpretation panels will be placed at each of the key sites and visitor nodes identified in the Aboriginal and historic heritage sections of this Plan of Management (ie. the Aboriginal quarry site, camp site at Glenrock Lagoon, Aboriginal pathway/Yuelarbah Track, Burwood Colliery, the Mitchell's tunnel sites, the colliery remains along Flaggy Creek, and the Bailey's precinct).*
- 6.10.4 *Undertake Discovery walks, talks and tours as required, and continue the Discovery for Schools program in the park.*
- 7.1 *Permit appropriate research by other organisations and individuals and promote research that is directly useful for management purposes.*
- 7.4 *Continue with programs to monitor the effectiveness of its weed, feral animal and fire related management activities.*
- 8.1 *Investigate the tenure of all non-NPWS uses and ensure that licenses or easements are granted as appropriate under the NPW Act, and that management of easements is to acceptable environmental standards.*
- 8.2 *Assist Hunter Water Corporation and Energy Australia in developing Environmental Management Plans for their easements, which will incorporate the following:*
  - *Regular weed control, targeting lantana and other weeds;*
  - *Maintenance and erosion control works to all access tracks on their easements; and*
  - *Maximising native vegetation to establish corridors across easements.*

- 8.4 *Keep non-NPWS utilities under review, with the aim of closure or relocation where feasible*
- 9.2 *Close and rehabilitate the helipad adjacent to the depot.*

### **Medium Priority**

- 4.2.3 *Monitor Bell Miner Associated Dieback sites and implement appropriate management strategies as recommended by relevant research.*
- 4.3.2 *Introduce vegetated corridors across cleared easements and revegetate disturbed areas.*
- 4.3.3 *Undertake fauna surveys to establish the nature and extent of fauna species and populations in the park.*
- 4.3.4 *Encourage and support other land managers, residents and landholders that adjoin the park to retain and enhance areas of conservation value in the vicinity of the park.*
- 4.4.5 *Undertake a comprehensive survey of the park for Aboriginal sites in partnership with the Awabakal community.*
- 4.4.6 *In partnership with the Aboriginal community, investigate the potential for cultural camps to be conducted in the park*
- 4.5.7 *Undertake a thorough survey for open mine shafts or tunnels and cap those requiring capping. Undertake appropriate environmental impact assessment prior to any works on the shafts or tunnels as they may provide habitat for insectivorous bats.*
- 4.5.8 *Maintain existing cleared areas throughout the Bailey's Precinct and provide signs interpreting the site and the buildings.*
- 4.5.9 *Stabilise the weatherboard cottage and packing shed by securing significant fabric and preventing unauthorised access.*
- 4.5.10 *Monitor remaining significant fabric throughout the Bailey's Precinct including the cast iron water tank, concrete water tanks, and Ranger's cottage and stabilise as required.*
- 4.5.11 *Fence the derelict weatherboard (miners) cottage and manage as a ruin.*
- 4.5.12 *Explore adaptive re-use licensing and leasing proposals for the Bailey Precinct.*
- 4.5.13 *Update the conservation management plan to incorporate more recent research and current knowledge of the park's historic heritage.*
- 5.2.1 *Identify suitable mitigation measures to improve the quality of stormwater runoff and reduce velocity during heavy rainfall events such as energy dissipaters, sediment trap and, stilling basins.*
- 5.3.4 *Work with neighbours to remove encroachments and minimise weed invasion on the urban fringe of the park.*
- 5.3.5 *Support and encourage community bush regeneration volunteer groups.*
- 5.4.1 *Develop and implement a fox baiting program for the park.*
- 5.4.2 *Monitor rabbit and cat populations to determine control requirements and implement control programs as required.*
- 5.4.3 *Discuss, develop and implement cooperative pest control strategies with local government, park neighbours and stakeholders.*
- 5.5.7 *Undertake follow up weed control post fire where funding permits.*

- 6.1.2 *Liaise with Newcastle City Council and other land managers to encourage the development of links to the Jesmond Bushland and other off-park sites for mountain bike riding.*
- 6.1.3 *Encourage the development of a link via the Fernleigh Track to off-park sites for horse riding with Lake Macquarie City Council.*
- 6.1.5 *Work with the Hunter Regional Tourism Organisation to better promote the experiences available within the park.*
- 6.3.4 *The Bombala Track will be upgraded to a class 3 walking track. Interpretation will be upgraded and links to the Lake Macquarie City Council Coastal Walk signposted.*
- 6.3.6 *The Leggy Point Loop Track will be upgraded to a class 3 walking track, and appropriate interpretation provided.*
- 6.3.9 *A carpark for up to 20 cars will be constructed at the start of Leggy Point Loop Track off Scout Camp Road.*
- 6.4.4 *Progressively upgrade tracks to be retained for cycling to address erosion and safety issues.*
- 6.4.6 *Support volunteer groups to carry out maintenance and rehabilitation works on the track network, and assist in closure and rehabilitation of old or unauthorised tracks.*
- 6.6.2 *Develop and implement formal consent arrangements for each hang gliding pad.*
- 6.6.3 *Determine infrastructure requirements at each hang gliding pad, including fencing, signage and launch structures as required.*
- 6.6.4 *Install essential infrastructure and signage at each pad as required.*
- 6.8.2 *Rehabilitate the dune system, heath and grasslands at Burwood Beach North.*
- 6.8.3 *Close and rehabilitate non-operational Hunter Water Corporation vehicle tracks at the back of Burwood Beach North on park, particularly those impacting on Themeda grassland.*
- 6.8.4 *Provide emergency vehicle access using board and chain from the Hunter Water Corporation bitumen road to Burwood beach.*
- 6.8.5 *Rehabilitate the dune system and define access to Burwood Beach South.*
- 6.9.1 *Monitor all group activities with respect to their cumulative impacts, safety requirements, conflicts with other park users, quality of information being given and compliance with license or consent conditions.*
- 6.10.2 *Update the park brochure to reflect recent historical research and this Plan of Management.*
- 7.2 *Encourage research and monitoring where it will assist park management and provide better outcomes for the protection of park values. Preferred topics will be those of direct relevance to management and will include:*
  - *research and survey of Bell Miner Associated Dieback;*
  - *research into the ecological fire requirements and response to fire of significant threatened plant species such as Diuris praecox;*
  - *research into the effects of weed control on fauna species where weeds provide significant resources;*

- a comprehensive weed survey every ten years to provide comparative data on changes in weed density and distribution;
  - visitor use patterns and expectations.
- 8.3 Ensure the waste water treatment facility is screened from the beach with appropriate, locally sourced, native vegetation.
- 8.5 Develop a Memorandum of Understanding with Newcastle Scout Association to define access arrangements for environmental programs and other purposes.
- 8.6 Discuss the preparation of a Voluntary Conservation Agreement with Newcastle Scout Association.
- 8.7 Any applications for approval to undertake exploration for mining within the SCA will be subject to environmental assessment in accordance with the MOU between the NPWS and DII (Minerals).
- 9.1 Liaise with neighbouring land management agencies and develop memoranda of understanding as appropriate.

#### **Low Priority**

- 6.10.1 Update the history of the park as written in chapter 3 of the conservation management plan and make it available to the public.
- 7.3 Encourage bush regeneration groups, bird watchers or similar groups to pass on information gathered in the park.

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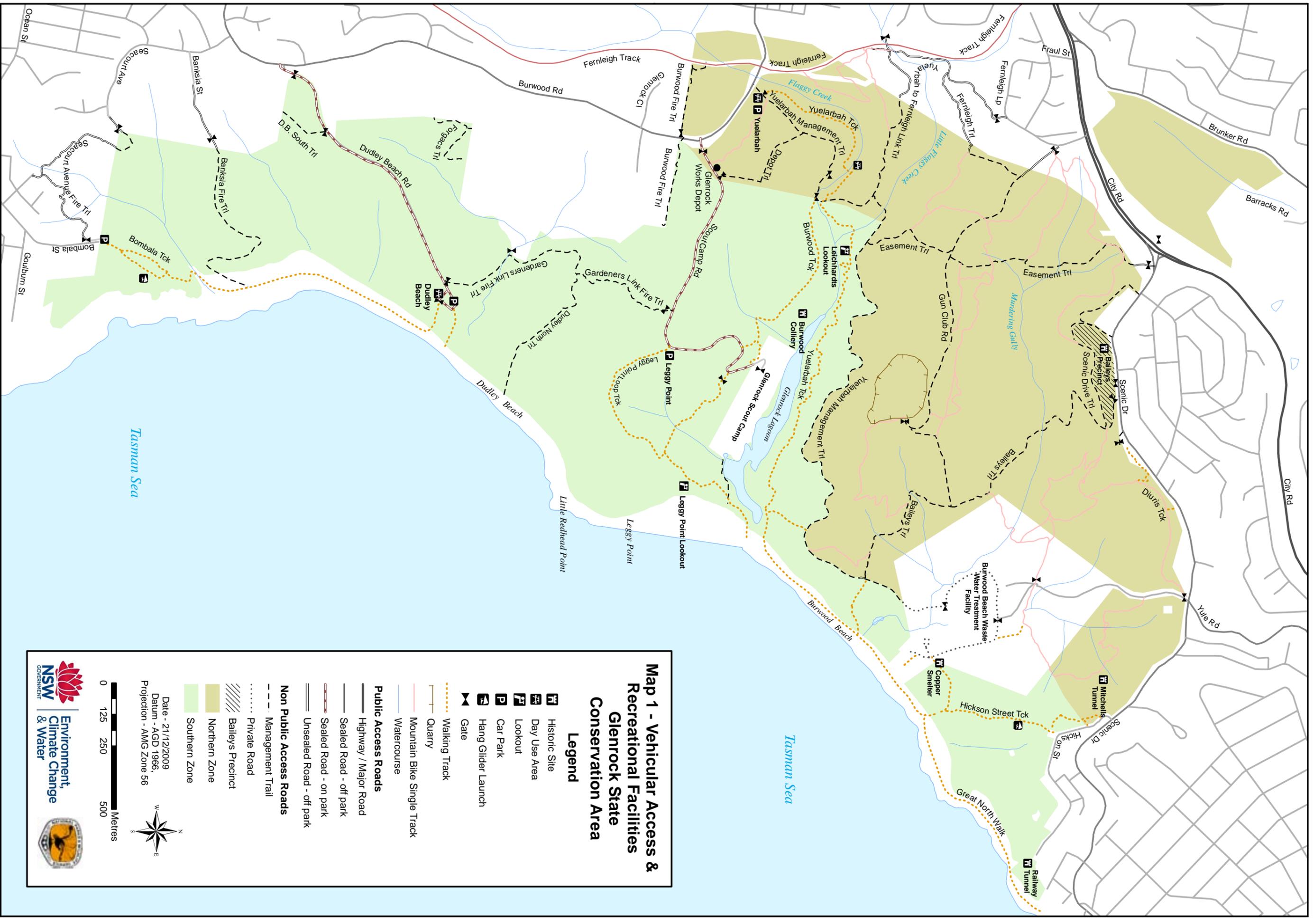
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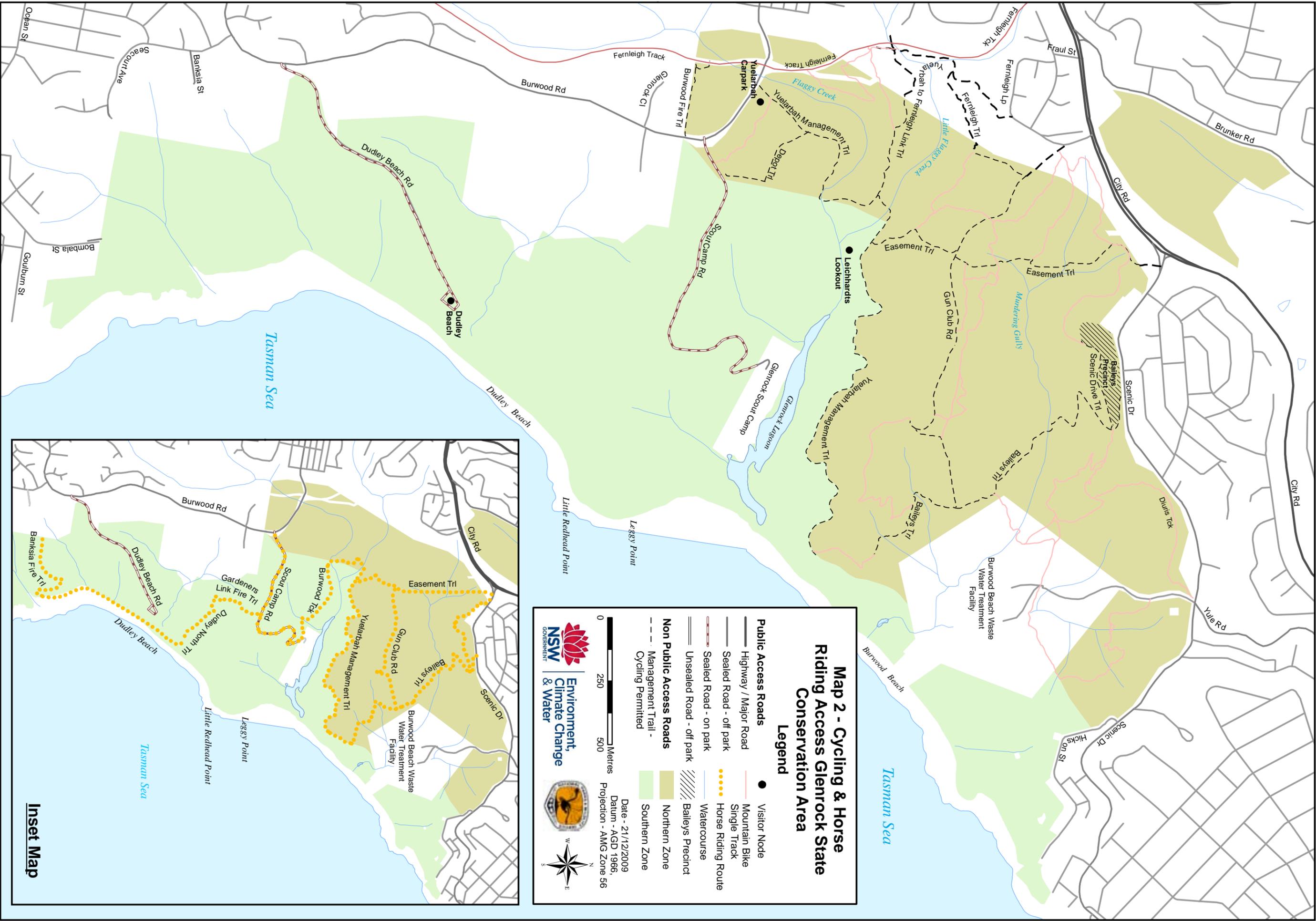
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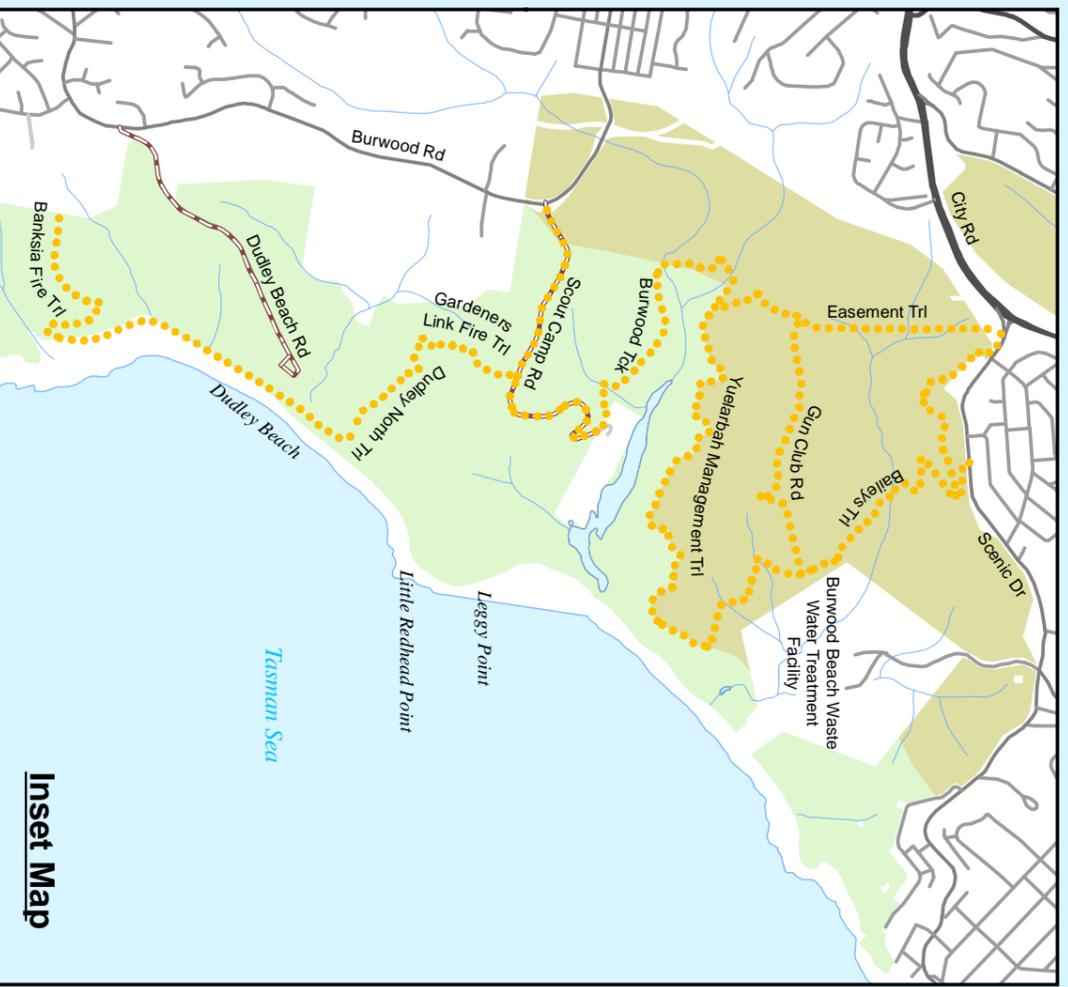


### Map 2 - Cycling & Horse Riding Access Glenrock State Conservation Area

#### Legend

- Visitor Node
- Public Access Roads
  - Highway / Major Road
  - Sealed Road - off park
  - Sealed Road - on park
  - Unsealed Road - off park
- Non Public Access Roads
  - Management Trail - Cycling Permitted
  - Northern Zone
  - Southern Zone
- Mountain Bike Single Track
- Horse Riding Route
- Watercourse
- Baileys Precinct

Date - 21/12/2009  
Datum - AGD 1966, Projection - AMG Zone 56



**Inset Map**