

MULGOA NATURE RESERVE
PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

Part of the Department of the Environment and Climate Change

July 2008

This plan of management was adopted by the Minister for Climate Change and the Environment on 21st July 2008.

Acknowledgments

This plan is based on a draft prepared by staff of the Cumberland South Area of the Parks and Wildlife Division. The assistance of the Sydney Region Advisory Committee in preparing the plan, particularly Brigid Dowsett and Peter Caldwell, is gratefully acknowledged.

Cover photograph of Cumberland Plain Woodland in Mulgoa Nature Reserve.

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FOREWORD

Mulgoa Nature Reserve is 213 hectares in size and is located in south-west Sydney, approximately 5 kilometres south-west of Penrith and 50 kilometres west of Sydney's central business district.

Mulgoa Nature Reserve protects an important remnant of the Cumberland Plain vegetation, a native vegetation community that once dominated much of the Sydney Basin, and a variety of native animals including an endangered land snail and a highly diversified bird community.

Mulgoa Nature Reserve also protects the ruins of Regentville, a grand Regency-style country property dating from the early 1800s. The foundations of the house and the remains of associated farm buildings and other agricultural facilities, such as a dam and terraces, provide evidence of this past use of the area.

The reserve contains shale cliffs up to 30 metres in height that document the region's geological history and evolution. They are the only known examples of this landform and stratigraphic sequence in the Sydney Basin.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve. A plan of management is a legal document that outlines how an area will be managed in the years ahead.

A draft plan of management for Mulgoa Nature Reserve was placed on public exhibition from 13th May until 29th August 2005. The submissions received were carefully considered before adopting this plan.

This plan of management establishes the scheme of operations for Mulgoa Nature Reserve. In accordance with Section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

Verity Firth
Minister for Climate Change and the Environment

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1. INTRODUCTION

1.1 NATURE RESERVES IN NEW SOUTH WALES

Nature reserves are reserved under the *National Parks and Wildlife Act 1974* to protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena.

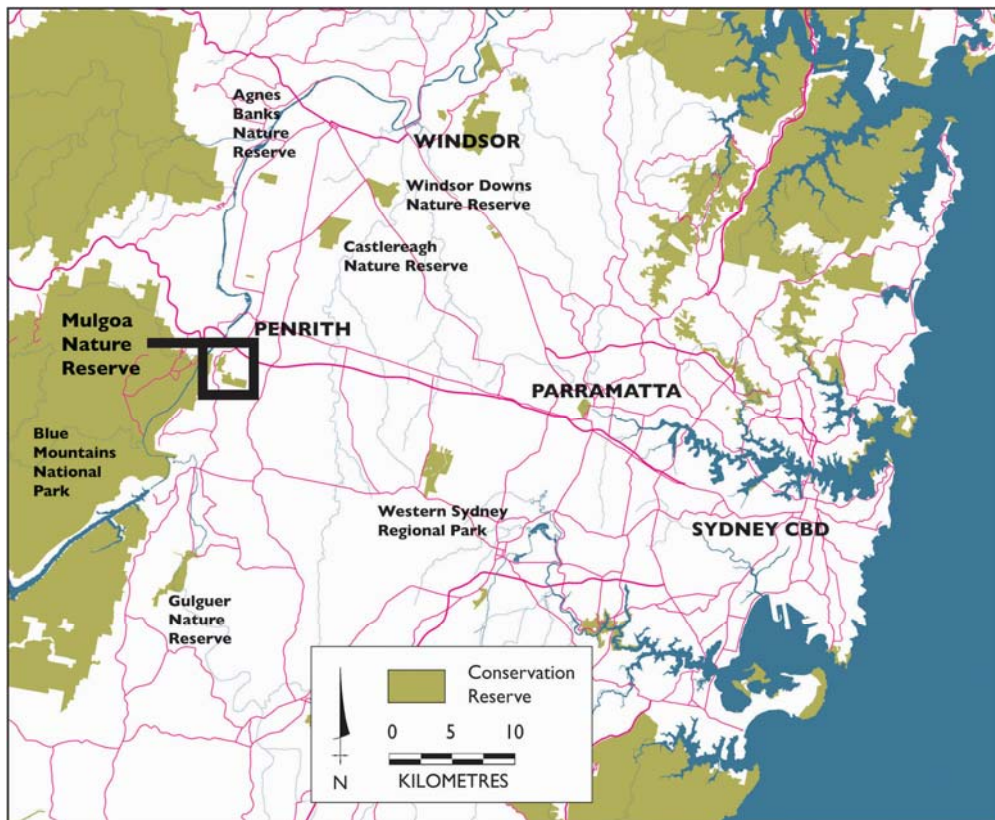
Under the Act, nature reserves are managed to:

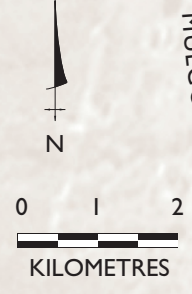
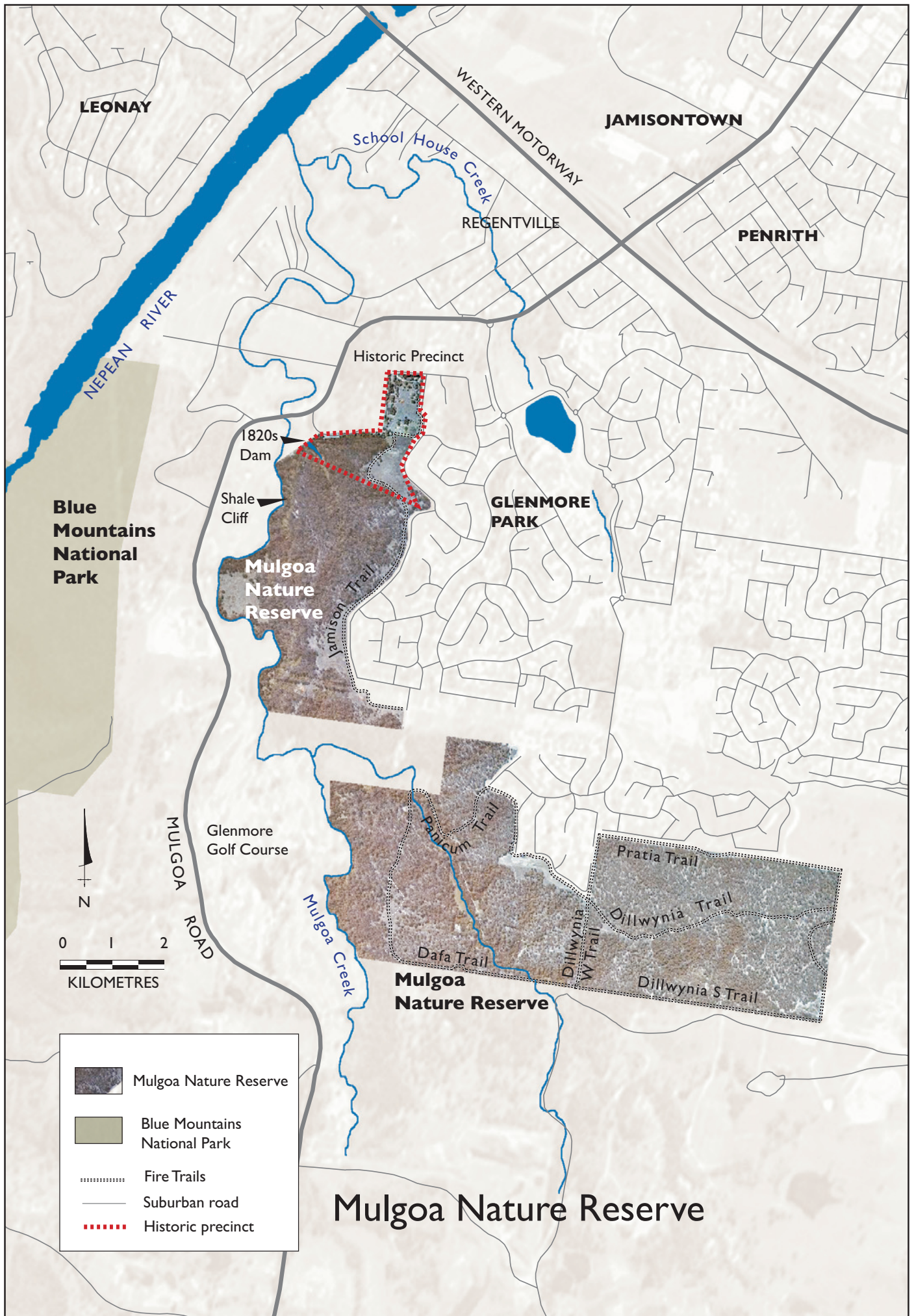
- conserve biodiversity, maintain ecosystem functions, and protect geological and geomorphological features and natural phenomena;
- conserve places, objects, features and landscapes of cultural value;
- promote public appreciation, enjoyment and understanding of the reserve's natural and cultural values; and
- provide for appropriate research and monitoring.

Nature reserves differ from national parks in that they do not have as a management principle the provision of opportunities for visitor use.

1.2 MULGOA NATURE RESERVE – LOCATION AND REGIONAL CONTEXT

Mulgoa Nature Reserve is located some 5 kilometres south-west of Penrith, and about 50 kilometres directly west of Sydney's central business district. Mulgoa Nature Reserve is located within the Penrith local government area and is bound to the west by Mulgoa Creek, to the north and east by the residential area of Glenmore Park, and to the south by rural residential land. The reserve is located on the south-western portion of a hill with altitudes varying from 20 to 70 metres above sea level. The terrain is generally undulating to hilly and dips towards the west and south.





-  Mulgoa Nature Reserve
-  Blue Mountains National Park
-  Fire Trails
-  Suburban road
-  Historic precinct

Mulgoa Nature Reserve

Mulgoa Nature Reserve was reserved on 23 December 1994. Subsequent to the original gazettal of Mulgoa Nature Reserve, an additional 75 hectares was gazetted bringing the reserve's area to 213 hectares. Further additions are likely in the next 2-5 years.

Mulgoa Nature Reserve lies at the western edge of the Cumberland Plain, an area of relatively fertile soils on flat to undulating terrain. The Cumberland Plain was once extensively covered in a characteristic group of vegetation communities generically termed Cumberland Plain Woodland. The shales of the Cumberland Plain form one of the three major landforms of the Sydney Basin, the others being the coastal sandstone and the sandstone plateaux of the Blue Mountains.

Soil fertility and easy accessibility attracted early British settlers in the early 1800s, who immediately proceeded with extensive land clearing. After more than 200 years of intense development, only isolated pockets of the Cumberland Plain native woodland and open forest communities remain. The pressure to further develop the Cumberland Plain for urban, commercial and industrial uses, and the expansion of agriculture and mining, places increasing emphasis on the need to protect and rehabilitate the remaining Cumberland Plain vegetation in western Sydney.

2. KEY VALUES OF THE RESERVE

Mulgoa Nature Reserve is of local, regional and national significance. Found within the reserve are significant native plant and animal associations that are characteristic of the Cumberland Plain as well as rare geological formations that demonstrate the region's geologic evolution, and archaeological remains that well document the non-indigenous settlement of the region from the early 1800s to the present. This rich combination of conservation values at a single location provides the community with excellent learning and research opportunities.

Mulgoa Nature Reserve key values can be summarised as follows:

Natural Values

Mulgoa Nature Reserve was established to protect the remnant Cumberland Plain vegetation and the shale cliffs in the area.

Five major vegetation communities have been identified within the reserve:

- Shale Plains Woodland - part of the Cumberland Plain Woodland;
- Shale Hills Woodland - part of the Cumberland Plain Woodland;
- Alluvial Woodland - part of the Sydney Coastal River Flat Forest;
- Western Sydney Dry Rainforest; and
- Moist Shale Woodland.

Shale Plains Woodland and Sydney Coastal River Flat Forest are both classified as Endangered Ecological Communities under the *Threatened Species Conservation Act 1995*.

Sydney Coastal River Flat Forest is a community which is not conserved elsewhere in the Sydney metropolitan region, apart from a small area along Cattai Creek in Cattai National Park.

Western Sydney Dry Rainforest, although important in its own right, is also significant for containing the threatened species *Dillwynia tenuifolia*, a species found in the understorey of this woodland. Fourteen plant species of regional significance have also been recorded in the reserve.

In addition to many common terrestrial mammals and birds, the reserve contains five threatened bats, two threatened owls, an endangered land snail and a number of woodland birds that are in broad decline in New South Wales.

Mulgoa Nature Reserve is listed on the Register of the National Estate due to its remnant vegetation on the Cumberland Plain.

In addition, Mulgoa Nature Reserve is listed on the Register of the National Estate due to the geological significance of the shale cliffs present along Mulgoa Creek on the western edge of the reserve. These cliffs, up to 30 metres high, are the only

known example of this landform. They demonstrate the stratigraphic sequence of the Wianamatta group of sediments of the Sydney Basin.

Aboriginal Heritage Values

Aboriginal people have occupied and made use of the natural resources of the greater Sydney Region for many thousands of years. Mulgoa Nature Reserve and its immediate surroundings are within the traditional lands of Dharug speaking Aboriginal groups. There are four known Aboriginal sites in Mulgoa Nature Reserve.

Historic Values

Located in the north-eastern corner of the reserve are the remains of the historic Regentville estate built by Sir John Jamison, an early settler and prominent figure of the early colony of NSW. The area contains the foundation-ruins of the house, remains of associated outer buildings and evidence of some of the terraced and cultivated fields that once surrounded the property. It also contains an extensive terraced hillside and dam built for viticulture. It is believed that this was the first grape growing for winemaking in Australia (Morris and Brittom 2000).

Regentville has been assessed as being of state significance, for its cultural landscape, remnants of an 1820s mansion and evidence of earlier and later occupations of the area (Gojak 1999, Banksia Heritage and Archaeology 2000). It is listed by the National Trust of Australia (New South Wales) and is also included on the Register of the National Estate for its historic and archaeological values.

Research and Educational Values

Mulgoa Nature Reserve is ecologically and scientifically important because it provides a benchmark for assessing and appreciating key ecological changes that have occurred on the Cumberland Plain since European settlement.

3. MANAGEMENT CONTEXT

3.1 LEGISLATIVE AND POLICY FRAMEWORK

The management of nature reserves in NSW takes place in the context of a well defined legislative and policy framework, notably the National Parks and Wildlife Act 1974, the Threatened Species Conservation Act 1995 and the policies of the National Parks and Wildlife Service. The policies arise from the legislative background and internationally accepted principles of park management. They relate to nature conservation, Aboriginal and historic heritage conservation, recreation, commercial use, research and communication.

Other legislation, international agreements and charters may also apply to management of the reserve. In particular, the *Heritage Act 1977* regulates the management of cultural heritage and the *Environmental Planning and Assessment Act 1979* requires the assessment and mitigation of environmental impacts of any works proposed in this plan.

A plan of management is a statutory document. Once the Minister has adopted a plan, no operations may be undertaken within the nature reserve except in accordance with the plan. This plan will also apply to any future additions to the nature reserve. Where management strategies or works are proposed for the reserve or any additions that are not consistent with this plan, an amendment to the plan will be required.

3.2 MANAGEMENT OBJECTIVES

In addition to the general objectives for nature reserves (refer section 1.1), the management of Mulgoa Nature Reserve will be subject to the following specific objectives:

- protection and rehabilitation of the Mulgoa Nature Reserve's biodiversity, with an emphasis on the threatened species, populations and ecological communities of the Cumberland Plain;
- protection and preservation of key geological features and formations found within the Mulgoa Nature Reserve, with a focus on the protection of the shale cliffs;
- protection and preservation of Aboriginal sites and historic places found within Mulgoa Nature Reserve, particularly the conservation of the fabric of the Regentville ruins and associated cultural landscape and protection of all Aboriginal objects; and
- making accessible to the public the significance of the Mulgoa Nature Reserve, without compromising its conservation values, through interpretation programs and the provision of learning opportunities for the public benefit with an emphasis on the above conservation issues.

4. CONSERVATION OF NATURAL AND CULTURAL HERITAGE

4.1 NATURAL HERITAGE

4.1.1 Geology, Landform, Erosion and Catchment Protection

The Cumberland Plain, on which Mulgoa Nature Reserve is located, was formed during the early/middle Triassic Period when major earth movements forced one or more large rivers to flow into the area from the north-west, disgorging a large amount of sediment into the extensive floodplains and swamps that once existed in the area. These deposits later formed the Wianamatta group of shale and sandstone Herbert (1975, 1980).

The nature reserve is characterised by two soil groups (Hazelton, Bannerman & Tille: 1989; Bannerman and Hazelton 1990). Adjacent to Mulgoa Creek there are alluvial soils of deep brown to yellow sands and loam of generally low fertility. On the more elevated areas, the Wianamatta group shales have produced shallow soils of loam, sand and clay of low to moderate fertility. The soils of the reserve have moderate to high erosion potential.

An important feature of the nature reserve is the shale cliffs that were formed by the eroding action of Mulgoa Creek on the soft underlying layers. The lines of shale cliffs, up to 30 metres high which run for approximately 300 metres on the north western side of the reserve, clearly demonstrate the stratigraphic sequence of the Wianamatta group of sediments. They are the only known examples of this landform and stratigraphic sequence in the Sydney Basin.

The friability and the shallowness of soil deposits at certain places mean that erosion is a constant threat on the reserve, especially along the creek's margins and cliff edges. Walking, sliding and motorbikes have created new tracks and aggravated erosion in the reserve. Erosion results in sediments entering and silting up Mulgoa Creek, as well as damage to the shale cliffs.

In the 1820s a dam was built as part of the irrigation system serving the property, particularly the vineyards. It still stands today and at times of heavy rainfall it overflows and the turbulent water flow has eroded a gully at the northern end of the shale cliffs. This gully threatens local soil stability and may eventually undermine the dam itself. There are also two farm dams on the nature reserve.

Desired Outcomes

- All land management activities on the reserve are undertaken in a manner that minimises soil erosion.
- Erosion-prone areas throughout the reserve are properly identified and associated erosion process controlled.

Strategies

- Undertake erosion control and associated mitigation measures as a prerequisite for any work/activity carried out within the reserve that has the potential cause or exacerbate erosion.
- Carry out bush regeneration in areas affected and/or threatened by soil loss.
- Close off tracks and trails not required for management purposes and progressively revegetate as part of the bush regeneration program.
- Investigate the stability of the 1820s dam within the reserve and undertake remedial actions if necessary.
- Retain but do not maintain the farm dams and associated channels.

4.1.2 Vegetation

Native Plants

The vegetation of Mulgoa Nature Reserve has been subject to comprehensive survey (Benson 1981, Doherty 1987, Smith & Smith 1988, Terrey & Morgan 1988, NPWS 2000). These studies identified five main vegetation types:

- Shale Plains Woodland;
- Shale Hills Woodland;
- Moist Shale Woodland;
- Alluvial Woodland; and
- Western Sydney Dry Forest.

The Shale Hills Woodland, Shale Plains, Western Sydney Dry Forest and Alluvial Woodland are all listed as Endangered Ecological Communities under the *Threatened Species Conservation Act 1995*.

The **Shale Plains, Shale Hills and Moist Shale Woodlands** are the last remaining woodlands of this type and quality on the Cumberland Plain. They are found on shale soils and comprise over 80 native plant species. Dominant species are grey box (*Eucalyptus moluccana*), narrow-leaved ironbark (*E. crebra*) and forest red gum (*E. tereticornis*). Associated tree species include thin-leaved stringybark (*E. eugenioides*), broad-leaved apple (*Angophora subvelutina*) and rough-barked apple (*A. floribunda*). It has a shrub layer dominated by blackthorn (*Bursaria spinosa*), Sydney green wattle (*Acacia parramattensis*) and black she-oak (*Allocasuarina littoralis*), with isolated occurrences of *Acacia prominens*, a species usually only found in the Gosford area. Ground cover species include kangaroo grass (*Themeda australis*), *Aristida vagans* and *Chloris truncata*.

The following species have regional conservation significance: broad-leaved apple, *Cymbonotus lawsonia*, *Wurmbea biglandulosa*, *Amyema miquelii*, *Carex breviculmis*,

Cotula australis, *Dodonaea viscosa* ssp. *cuneata*, *Eleocharis pallens*, *Myriophyllum simulans* and *Poa labillardieri*.

The **Western Sydney Dry Rainforest** is located on the sandstone and gravel derived soils within the reserve. This woodland is dominated by thin-leaved stringybark (*Eucalyptus eugenoides*), broad-leaved ironbark (*E. fibrosa*) and grey gum (*E. punctata*) with understorey dominated by the shrubs *Daviesia ulicifolia*, *Lissanthe strigosa* and *Jacksonia scoparia*. The threatened species *Dillwynia tenuifolia* has been recorded in the understorey of this woodland.

The **Alluvial Woodland** occurs on the alluvial soils adjacent to Mulgoa Creek. This forest comprises over 50 native plant species and is dominated by cabbage gum (*E. amplifolia*), swamp oak (*Allocasuarina glauca*) and broad-leaved apple (*Cymbonotus lawsonia*) with associated tree species including forest red gum (*E. tereticornis*) and grey box (*E. moluccana*). Common shrub species which occur in this forest are *Acacia parramattensis*, blackthorn and *Acacia decurrens*. Common ground cover species include *Lomandra longifolia*, *Microlaena stipoides* and the wetland species *Phragmites australis*.

This type of river-flat forest is not conserved elsewhere in western Sydney apart from a small area along Cattai Creek in Cattai National Park. The cabbage gum (*Eucalyptus amplifolia*), broad-leaved apple (*Angophora subvelutina*), *Cymbonotus lawsonia*, *Phyllanthus similis*, *Clematis glycinoides*, *Danthonia caespitosa* and *Doodia caudata* found in this community also have regional conservation significance (James et al: 1999).

Blackthorn (*Bursaria spinosa*) is an endemic successional understorey species associated with post grazing regeneration. It has been the only native species to successfully recolonise some areas of the reserve. Although blackthorn is considered to be a major component of tall woodlands, the level of colonisation of this species is considered to be disproportionately high and may be suppressing the regeneration of other locally endemic species.

Loss of vegetation cover is identified as a key threatening process in NSW. It is therefore important that vegetation clearing processes are identified and mitigated. Causes of loss of vegetation cover may include inappropriate public access, unsuitable fire regime, clearing, illegal track construction, inappropriate plantings and collection of firewood.

Other threats to the vegetation of the reserve include expansion of plant species not endemic to the area, too frequent fire and the trampling of native vegetation which exposes areas to weed invasion.

Parts of the reserve were fully cleared in the past, primarily for agriculture and public use. Some cleared areas are required for the protection of cultural sites, but there is also scope for some regeneration.

'Dieback' (the withering away of a plant from the top downwards to the stem or root) among some tree species is occurring in Mulgoa Nature Reserve. As elsewhere, it is very difficult to identify the causal agents, though it is currently thought that fungus infection (*Phytophthora cinnamomi*) and the displacement of insect-eating birds by the more aggressive bell miners (*Manorina melanophrys*) may play major roles. Any intensification of the dieback phenomenon has the potential to deprive the reserve of mature plant specimens that are crucial for the production of viable seeds (Stone 1996).

Introduced Plants

An introduced species is defined in this plan as any plant or animal species not native to the reserve. Introduced plant species within Mulgoa Nature Reserve, and on adjoining land, are of concern because they have the potential to have detrimental effects on ecological values and can spread to and from neighbouring land. In addition, 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.

Factors such as the past agricultural use of area, and its current proximity to urban and rural residential development, mean that a large number of introduced species are found within the reserve. Garden refuse is often dumped in the reserve, and this activity can lead to non-endemic species spreading and becoming established in the reserve.

A number of introduced trees are found within the reserve. These include radiata pine (*Pinus radiata*), cypress pine (*Callitris endlicheri*), liquidambar (*Liquidambar* sp.), African olive (*Olea africana*), small-leaf privet (*Ligustrum sinense*), large-leaf privet (*Ligustrum lucidum*) and peppercorn tree (*Schinus areira*); and bushes like lantana (*Lantana camara*) and blackberry (*Rubus fruticosus*). There are also herbaceous species such as *Amaranthus* sp., deadly nightshade (*Atropa belladonna* sp) and farmer's friend (*Bidens pilosa* sp). The conservation management plan (Banksia and Archaeology 2007) notes that there is no evidence that any of the trees are progenies of historic plantings from the Jamison period.

Some introduced species, such as the wild olive, lantana, and small-leaf privet, have spread quickly throughout the reserve, severely inhibiting re-growth of native species. Herbaceous species are particularly visible after fires with the opening of the tree canopy, which allows plenty of sunlight to reach the understorey. They are especially visible along creek and drainage lines.

A number of Australian native plants that are not endemic to the area, such as the Cootamundra wattle (*Acacia baileyana*), lemon scented eucalypt (*Eucalyptus citriodora*) and silky-oak (*Grevillea robusta*), have been planted and/or seeded immediately north east of the ruins. As a result, many seedlings of these species are found amongst the historic ruins. As part of the bush regeneration program, seedlings from these non-endemic species are being removed.

Blackberry (*Rubus fruticosus*) occurs within the power line easement in the northern section of Mulgoa Nature Reserve and also in low lying areas along Dillwynia Creek and cleared areas in the north and west of the reserve. Minor occurrences of prickly pear (*Opuntia* spp) are found along management tracks and in the vicinity of the shale cliffs. Blackberry and prickly pear are listed as noxious weeds for the area under the Noxious Weeds Act.

Although significantly reduced as a result of the 2002 wild fire and the bush regeneration programs, lantana (*Lantana camara*) still occurs in some parts of the reserve and particularly in areas adjacent to management tracks and along drainage lines. African olive and small-leaf privet form dense monocultures, particularly on drainage lines, and are widely distributed in northern section of the reserve. A small population of tree of heaven (*Ailanthus altissima*) occurs adjacent to Mulgoa Creek and the lower dam.

Although lantana, African olive and tree of heaven are not declared noxious weeds in the local area, they pose the greatest threat to the reserve's biodiversity, given their invasive nature.

For the last three years, NPWS has been active in removing weeds in the reserve. In addition to weed removal work carried out by NPWS staff and bush regeneration contractors, two land care groups have been actively involved in combating weeds inside and immediately outside the reserve.

The NPWS will conduct environmental impact assessment prior to undertaking any weed control works in the immediate vicinity of historic structures or potential archaeological deposits. The assessment will consider the potential heritage significance of exotic plantings and whether individual trees or exotic ground covers are contributing to the stability of historic structures or archaeological deposits.

Desired Outcomes

- The viability and diversity of native species and communities are maintained and enhanced.
- Communities of identified threatened, rare and vulnerable species remain viable or are enhanced.
- The degree of negative impact caused to biodiversity by introduced plants is reduced.
- Regeneration of the native vegetation within designated areas is apparent and incremental.

Strategies

- Continue to control introduced plants on the reserve. Priority will be given to control of African olive, tree of heaven, and lantana over the next few years. Other weed species will be targeted on a priority basis taking into consideration their

threat to biodiversity and classification under the Noxious Weeds Act (ie speed of spread, degree of infestation etc).

- Continue existing bush regeneration in association with the local Landcare groups except in those areas which will remain as grassed to protect historic sites. Use only native plant species endemic to the area as sources for seed and plant stock.
- Develop and implement a monitoring program for assessing changes in the vegetation on the reserve.
- Support Penrith City Council with its proposal to establish a flora and fauna corridor plan linking Mulgoa Nature Reserve to other areas containing remnants of Cumberland Plain vegetation.
- Liaise with neighbouring landholders and local government to develop programs to minimise the entry of exotic plant species into the reserve.
- Continue liaising with the Sydney Royal Botanic Gardens to identify the cause(s) of dieback in the reserve.
- Close trails that expose the reserve to erosion, trampling or dumping of garden wastes and that are not required for management purposes (refer map for trails to be retained).
- Encourage voluntary conservation agreements on private land.

4.1.3 Animals

Native Animals

Field surveys in the past decade have identified seven frog, nine reptile, 18 native mammal and seven introduced mammal species. Some 100 species of birds have also been identified in the reserve (Coughlan et al, 2001).

Seven animal species listed as vulnerable under the Threatened Species Conservation Act have been recorded in the reserve: the masked owl (*Tyto novaehollandiae*), barking owl (*Ninox connivens*), grey-headed flying-fox (*Pteropus poliocephalus*), eastern freetail bat (*Mormopterus norfolkensis*), large-eared pied bat (*Chalinolobus dwyeri*), eastern bentwing bat (*Miniopterus australis*) and large-footed myotis (*Myotis adversus*). In addition, the reserve contains the endangered Cumberland Plain land snail (*Meridolum corneovirens*). Other threatened species occurring in the local area, and that may from time to time occur in the reserve, are the tiger quoll (*Dasyurus maculatus*), turquoise parrot (*Neophema pulchella*), glossy black cockatoo (*Calyptorhynchus lathamii*), powerful owl (*Ninox strenua*), square-tailed kite (*Lophoictinia isura*), swamp harrier (*Circus approximans*) red-crowned toadlet (*Pseudophryne australis*) and greater broad-nosed bat (*Scoteanax rueppellii*).

All native animals, including possums, snakes and termites, are protected in the reserve. Occasionally some of these animals are perceived as a nuisance and/or adversely affecting property or public safety. As these animals are part of the natural ecosystem, they should not be removed from the reserve.

Introduced Animals

The reserve contains a number of introduced pest species, such as foxes, rabbits, cats and dogs. The cats and dogs found in the reserve are generally domestic animals from the neighbourhood, or animals that are abandoned in or adjacent to the reserve by their owners, though feral cats may live permanently in and around the reserve. Domesticated dogs are also routinely brought in by their owners for exercise and often are allowed to run free in the reserve. Goats, cows and horses have also been occasionally seen in the western and southern edges of the reserve.

Desired Outcomes

- All native animals on the reserve are protected.
- The viability and diversity of native species and populations are maintained and enhanced.
- Populations of identified threatened, rare and vulnerable species remain viable or are enhanced.
- The negative impact of introduced pest species, particularly cats and foxes, on the reserve's biodiversity is controlled.

Strategies

- A native species monitoring program will be developed and implemented.
- Non native species including domestic animals, other than registered assistance animals, are prohibited in the reserve.
- Liaison will be undertaken with neighbouring landholders in order to prevent entry into the reserve of non-native animal species.
- Bush regeneration activities will take animal habitat or temporary habitat requirements into consideration (e.g. by using a mosaic approach to weed clearing).
- Identified vertebrate pest species will be targeted for control or elimination on priority basis, taking into consideration their relative threat to biodiversity. Priority will be given to feral cats and foxes. Recovery plans and priority actions for the identified threatened species present on the reserve will be used to guide activities.

- Any perceived nuisance caused by native species (e.g. possums, termites, snakes) from or within the reserve will not be considered as a justification for their destruction or removal from the reserve.

4.1.4 Fire Management

Under the Rural Fires Act 1997, the NPWS is a fire authority and is responsible for the management of fire on all lands under its control. This includes the detection and suppression of fires and the implementation of risk-prevention programs to protect life and property from fires.

Section 50 of the Rural Fires Act sets up provisions for the establishment of Bush Fire Management Committees (BFMCs) with the task of developing and coordinating cooperative fire management between fire authorities across the state. The NPWS participates as a member of the Cumberland Zone BFMC in the preparation of bushfire risk management plans and plan of operations required under Section 52 of the Rural Fires Act. A bushfire risk management plan has been prepared which covers Mulgoa Nature Reserve.

A Reserve Fire Management Strategy has been prepared for Mulgoa Nature Reserve. The Strategy identifies three fire management zones: Asset Protection Zone (APZ); Strategic Fire Advantage Zone (SFAZ); and Land Management Zone (LMZ). The objective of the APZ is create a low fuel zone to protect human life and property. The objective of SFAZ is to manage fuels so as to reduce the intensity of fires across larger areas. The primary objective of LMZ is to conserve biodiversity and protect cultural and historic heritage. The Reserve Fire Management Strategy is publicly available and will be subject to annual updating.

The Reserve Fire Management Strategy identifies four separate APZs along the eastern boundary of the reserve. Fuels in these APZs are managed by regular slashing.

The Reserve Fire Management Strategy requires the upgrade of the existing fire trails in the northern and eastern section of the reserve to a 'Category 1' standard. This standard allows for access by heavy fire tankers. The Strategy also recommends the construction of a new fire trail (Dafa Trail) along the southern boundary of the newly gazetted section of the reserve. The construction of this fire trail is required to enable fire fighters to safely respond to a wildfire in this section of the reserve.

Fire has been an important factor influencing the environment, for many tens of thousands of years. Bushfire regimes are a major determinant in the distribution and abundance of plants and animals in the Australian bush and can also affect nutrient cycles, erosion patterns and hydrological regimes.

Ecological research suggests that a fire regime specifically designed for an area is the best option in fire management for it takes into account the area's specific needs and at same time, protect lives and property.

Wild fires have the potential to be most intense in Mulgoa Nature Reserve during the summer months, when they may be driven by dry westerly winds. The major sources of fire in the reserve are arson or wildfires burning from the lands to the west (across Mulgoa Road). The last major fire in the reserve was December 2000 which burnt 90% of the park. In the years prior to this, the majority of fires were small (approximately less than 10% of the reserve). Arson was the cause of all of these small fires.

In order to stop or minimise fire within the reserve affecting the adjacent Glenmore Park housing estate, slashing and/or other forms of fuel reduction will be carried out in strategic locations. High priority will be given to areas where houses are directly adjacent to the reserve.

Desired Outcomes

- Fire is managed in Mulgoa Nature Reserve to ensure:
 - protection of life and property;
 - the conservation of native plant and animal communities, particularly rare and threatened species and sensitive habitats; and
 - protection of Aboriginal and historic heritage and landscape values.

Strategies

- Implement the Fire Management Strategy for the reserve.
- NPWS will continue to assist in the preparation and implementation of local bush fire risk management plans and plans of operations.
- Promotion of fire awareness and education programs will be undertaken through the development of community fire programs.
- All unplanned fires will be extinguished as soon as practicable.
- Fire threat will be mitigated through a combination of fuel reduction and neighbour education.
- NPWS will seek to ensure that all new neighbouring developments incorporate fire protection zones within the development in accordance with the guideline for building in fire prone areas.

4.2 CULTURAL HERITAGE

4.2.1 Aboriginal Heritage

The NPWS is legally responsible for the protection of Aboriginal sites but acknowledges that Aboriginal peoples have the inherent right to make decisions that will affect their own heritage. The NPWS has a policy that clearly spells out the right of Aboriginal communities to be consulted in advance about decisions regarding the management of Aboriginal sites and related issues. The policy also details the ways in which Aboriginal culture and history of an area managed by the NPWS may be promoted and presented to the visiting public and the community at large.

Aboriginal occupation of the Cumberland Plain may extend back to around 25, 000 years ago, according to archaeological and paleo-environmental evidence unearthed at the Cranebrook Terrace, some 10km north of Regentville (Gojak 1999).

Prior to 1788, the area around Mulgoa Nature Reserve was occupied by Aboriginal communities belonging to the Dharug language group. Further to the west, the Gundungarra group occupied the area leading to the Blue Mountains. There are only a few accounts of contact between the Aborigines and early British settlers, however, by the 1820s the Aboriginal population inhabiting the area had been decimated by outbreaks of diseases such as influenza, smallpox, tuberculosis and measles. By the 1840s the few groups that survived were dispossessed and expelled from their land.

British exploration of the Penrith and Riverstone areas occurred early in the colony's development and large tracts of land traditionally occupied by the Dharug people were given to settlers like Richard Rouse, the Reverend Samuel Marsden and James Ruse by the colonial government of the day. The traditional owners still maintain effective ties with the area and, currently, the Deerubbin Local Aboriginal Land Council represents their interests.

The only known physical evidence of Aboriginal occupation within the reserve are the remains of four open campsites containing scatters of stone implements. Nevertheless, an area outside the reserve and around the suburb of Regentville has been subject to surveys and significant sites have been discovered. It is likely therefore that more sites are present within the reserve.

Aboriginal sites can be quite inconspicuous in the landscape and be easily damaged or destroyed by works even when carried out only on the surface. Even minor works such as digging holes for fencing can damage sites. It is essential that any such activity be carried out with care.

It is essential that the NPWS maintain effective liaison with the Local Aboriginal Land Council so that matters of common concern can be promptly identified, discussed and issues resolved.

Desired Outcome

- Identified Aboriginal heritage sites/items are effectively protected and conserved.

Strategies

- The location of the open campsites or any other Aboriginal sites will not be publicised unless:
 - the agreement of the relevant local Aboriginal community organisations has been obtained;
 - a conservation study has been prepared and any management works necessary to protect the site from damage have been implemented; and
 - the site can be interpreted to promote public knowledge and appreciation of Aboriginal culture.
- The NPWS will consult with relevant local Aboriginal community organisations and/or their representatives prior to carrying out any work that might affect Aboriginal objects.

4.2.2 Historic Heritage

Mulgoa Nature Reserve includes part of a property originally known as Regentville. Regentville was part of a land grant given to Sir Thomas Jamison in 1805, and his son, Sir John Jamison, built the mansion between 1823 and 1825 in the grandiose and sophisticated Regency style. The mansion was supplemented by fine industrial and agricultural facilities, and surrounded by landscaped gardens, vineyards and orchards. Between the house and the dam, the hillside was extensively terraced for what is believed to be the first vineyard in Australia. The dam below the terraces was built in the 1820s. The latest in technological advancement of the period was employed throughout the property and Sir John Jamison himself was renowned for his willingness to use the latest in available technologies (Gojak 1999; Wilson 1999).

In 1847, the property was sold after Sir John Jamison's fortune was greatly diminished due to a prolonged drought that decimated Regentville's agricultural production and as a consequence of the harsh financial depression of the 1840s. In the 1860s, the mansion was used as a licensed inn, servicing the highway between Sydney and the Australian interior. The mansion burned down in 1869, and from the 1880s onwards the Regentville estate was progressively subdivided and used mainly for agricultural purposes. Much of the sandstone and architectural remains were sold and reused in some of the buildings and other structures in Penrith and Mulgoa.

Regentville precinct is of State significance as a rare example of an 1820s mansion still bearing high archaeological integrity, and is listed in the Register of the National Estate. The sophistication and grandiose nature of the architectural design of Regentville and its association with its owner, Sir John Jamison, are key factors in the cultural significance of the site. As an archaeological landscape, the Regentville precinct contains the potential to reveal significant information relating to Aboriginal and post-Jamison phases of settlement (Gojak 1999).

Mulgoa Nature Reserve also contains evidence of more recent ownership and use, such as the ruins of a dairy within the eastern boundary of the reserve. These ruins, which include holding yards, parts of dwellings and storage tanks, are important as they document the evolution of the site as it changed its function and roles.

View corridors and visual catchment are an important component of the surviving heritage of the Regentville precinct. Sir John Jamison's positioning of Regentville at the top of a hill overlooking the river flats, the Western Road and, in particular, his estate, was consciously done as a statement of his power, authority and status. Consequently, the views in and out of the estate need to be conserved as a sensory component of the place and as an important value in their own right (Gojak 1999).

A new conservation management plan (Banksia Heritage and Archaeology 2007) has been prepared for the Regentville site and will be submitted to the NSW Heritage Council. The preparation of the plan has required research into the history of the site and the mapping of its cultural features, including the house, outbuildings and the physical traces of agricultural activities. Archaeological research has also been conducted on the site by Sydney University over an extended period.

There are a number of potential impacts on the remains of the Regentville property. These include natural processes such as erosion, siltation and wildfires, which can threaten the fabric of the ruins and other structures and the surrounding landscape. Another major source of impact on the site is public visitation. Impacts vary from the almost imperceptible effect of friction on the site as people walk over the area, to the obvious effects of vandalism.

In order to protect the structural stability of the historic terraces, African olive and other weeds will be removed in a series of stages, accompanied by conservation measures which may include replanting with native species. In cases where individual plants are making a significant contribution to the stability of the heritage structures, specific trees may be retained.

Desired Outcomes

- The fabric, structures, and landscapes classified as being of cultural significance are preserved.
- The view corridors to and from the site are protected, or re-established where practical.
- The heritage significance of the site is effectively conveyed to the public.

Strategies

- Conserve the ruins and other historic structures consistent with the Regentville Conservation Management Plan.

- Control the negative impacts of natural processes such as water, erosion, fire and vegetation encroachment on all historic structures (including the 1820s dam and the terraces) with appropriate techniques as necessary.
- Conduct a geotechnical and engineering assessment of the 1820s dam's condition and actions needed to conserve it. If conservation of the dam is not feasible, alternative management strategies such as draining or redirecting the overflow may be undertaken subject to environmental and heritage assessment prior to implementation.
- Maintain a mown area around the Regentville ruins and the key corridor view to the east of the ruins. Remove trees in the corridor east of the ruins except for the peppercorn tree.
- Retain the peppercorn tree, and consider replacing it with another tree of the same species when it dies.
- Erect interpretive signs and/or provide other information informing visitors about the heritage significance of the site, the agricultural and viticultural history of the property, and protection requirements.
- Liaise with Sydney University in regard to their archaeological mapping of the site.

5. USE OF THE RESERVE

5.1 VISITOR MANAGEMENT

Mulgoa Nature Reserve is adjacent to the rapidly expanding residential area of Glenmore Park to the north and east. Rural and semi-rural areas border the reserve to the south and west. The population of the Penrith Local Government Area was 154,900 in 1991, and it is predicted to increase to 206,200 in 2021 (Department of Urban Affairs and Planning 1995).

From the 1970s to the early 1990s, the reserve was used as an informal public recreation area, under either private ownership or that of the NSW Housing Commission. At that time, public use of the area included driving of motor vehicles, camping, horse riding, rubbish dumping and removal of historic artefacts. Some of these activities such as trail bike riding and dumping continue to occur, and new activities such as access by vehicles to private properties and dog walking also cause impacts on the reserve.

Mulgoa Nature Reserve was established in 1994 to protect the remnant vegetation and historic ruins. Generally, nature reserves are established for conservation purposes and access is restricted to scientific, education and conservation purposes. However, public access to remnants of Cumberland Plain Woodland has benefits from both an educational and community support perspective. To this end, the public may walk on the management trails in the reserve for the purpose of appreciating the natural and cultural values, however, new walking tracks will not be provided and informal pedestrian access will not be promoted or encouraged. Pushbikes, motorbikes and other vehicles, horses, dogs and other domestic animals are not appropriate and are prohibited.

Blue Mountains National Park, the Nattai Reserve System, Bents Basin State Recreation Area, and a number of other local parks and reserves in the vicinity of Mulgoa Nature Reserve, cater to a broad demand for public outdoor recreation. The proximity of these neighbouring reserves and parks means that Mulgoa Nature Reserve can primarily provide for natural and cultural heritage conservation as well as research purposes, and for environmental education and heritage interpretation programs.

Desired Outcomes

- Visitation to the reserve is limited to conservation, nature appreciation, educational and research purposes.
- Neighbours and users of the reserve respect the reserve's integrity.
- An increasing understanding and appreciation by reserve users and neighbours of the area's natural and cultural values, and of the ultimate importance of and need for heritage protection.

Strategies

- Allow access to the reserve for education, science, conservation or appreciation of natural and cultural values.
- Encourage walkers to keep to the management trails in the reserve (see map).
- Develop and disseminate information on the reserve's values.
- Rationalise/realign access in the reserve by closing tracks not shown on the map in this plan.
- Take advantage of, or link up with, corporate and community initiatives that foster better community understanding of conservation values in relation to Mulgoa Nature Reserve (e.g. Backyard Buddies Program, Landcare initiatives, local government environment open days, etc).
- Erect signs advising that camping, bicycling, horse riding, dog walking and vehicle access are prohibited.

5.2 RESEARCH

The purpose of research and monitoring programs is to improve understanding of the reserve's natural and cultural heritage and the processes that impact on them. Research and monitoring is also relevant to visitor management, so visitors' needs and expectations can be better understood and fulfilled. NPWS research efforts must be directed towards the areas of greatest need and will concentrate on areas of need identified elsewhere in this plan of management.

Research by other organisations and students may provide valuable information for management and will be considered.

Desired Outcomes

- Research enhances the reserve's information base and assists management of the reserve.
- Monitoring programs are in place to detect any changes in the status of reserve's resources.

Strategy

- Assess research proposals on individual basis/merit and only permit if they support and conform to the desired outcomes, or assist in assessing the extent and condition of Cumberland Plain Woodland, are targeted surveys of threatened fauna and flora, or provide information on the extent and condition of weed species after treatment.

6. MANAGEMENT FACILITIES AND OPERATIONS

NPWS management facilities provided on the reserve are limited to fences and management trails. Seven vehicle entry points provide for management access to the reserve. All are fitted with locked gates. Management trails provide vehicular access to the reserve for ongoing management and maintenance of the reserve.

Easements that existed prior to the area being dedicated as a nature reserve remain in place.

Transgrid and Integral Energy have power line easements near the southern boundary of the northern section of the reserve. Management trails provide access to the power poles. Both Transgrid and Integral Energy have agreed to adopt standard procedures for power line maintenance in lands administered by the NPWS. These procedures include standards for tree management, environmental precautions and liaison requirements. The NPWS seeks to minimise the impact that this easement has on the natural and aesthetic values of the reserve.

In addition, there is a right of way and an easement for services along the eastern boundary of the northern section of the reserve in favour of the adjacent private property between the northern and the middle portion of the reserve.

Some of the access points, maintenance trails and visitor tracks that existed prior to the area becoming a nature reserve are still used to a certain extent today. Some have become redundant, whereas others are detrimental to the management of the reserve.

Desired Outcomes

- Transgrid and Integral Energy power line easements are maintained in a way sensitive to the reserve's needs and in line with NPWS directives and in agreement with established procedures.
- Trails and tracks not required for management purposes within the reserve are closed and rehabilitated.
- The reserve's boundaries are thoroughly surveyed and marked; appropriate and effective fencing is erected.
- The integrity of the reserve's boundaries are maintained, minimising inappropriate access.

Strategies

- Ensure that all works, facilities and operations by other authorities are subject to a lease, licence, easement or agreement under the National Parks and Wildlife Act.

- Ensure the Transgrid and Integral Energy easements are managed in accordance with the terms of the “Procedures for Power Line Maintenance in Lands Administered by the National Parks and Wildlife Service of NSW, 1st July 1994”.
- Trails and tracks not required for management purposes within the reserve (refer map) will be closed and rehabilitated.
- Access through or into the reserve will only be granted for activities that are directly associated with the management of the reserve or the power line easements, or are considered to be a ‘primary purpose’ under the *National Parks and Wildlife Act 1974*.
- Where practical, construct further boundary fencing to prevent inappropriate access.

7. PLAN IMPLEMENTATION

This plan of management establishes a scheme of operations for Mulgoa Nature Reserve. The plan is part of a system of management which includes the National Parks and Wildlife Act, NPWS policies, and strategic planning at corporate, Branch and regional levels. It may also include the development of related plans such as regional recreation plans, species recovery plans, fire management plans and conservation plans.

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 Mulgoa Nature Reserve unless they are in accordance with the plan.

Relative priorities for activities identified in this plan are set out in the following table. These priorities are determined in the context of branch and regional strategic planning, and 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.

This plan of management will stay in force until amended or replaced in accordance with section 73B of the Act. The plan applies both to the land currently reserved and to any future additions. Where management strategies or works are proposed for additions or the existing area that are not consistent with the plan, an amendment to the plan will be required.

Strategies

- Undertake an annual review of progress in implementing this plan of management.
- Undertake an assessment after 5 years of the effectiveness of managing Mulgoa Nature Reserve 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.

Legend for implementation table:

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

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

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

Implementation Table

High Priority Activities	Plan reference
Carry out bush regeneration in areas affected and/or threatened by soil loss	4.1.1
Close off tracks and trails not required for management purposes (not shown on map) and progressively revegetate	4.1.1, 4.1.2, 5.1, 6
Continue control of introduced plants and bush regeneration programs	4.1.2, 4.1.3
Control domestic animals in the reserve	4.1.3
Control pest animals on the reserve	4.1.3
Implement the Fire Management Strategy for the reserve	4.1.4
Control all unplanned fires as soon as practicable	4.1.4
Assist in preparation of risk management and operations plans	4.1.4
Carry out fuel reduction work as per fire management strategy	4.1.4
Consult with Aboriginal organisations re work that might affect sites	4.2.1
Conserve the ruins and other structures consistent with the CMP	4.2.2
Control negative impacts of natural processes on all historic structures	4.2.2
Erect signs re prohibited activities	5.1
Ensure all works, facilities, etc are leased or licensed	6
Undertake an annual review of plan implementation	7
Medium Priority Activities	
Conduct a geotechnical and engineering assessment of the 1820s dam and undertake remedial action if necessary	4.1.1, 4.2.2
Develop and implement a monitoring program for assessing changes in the vegetation on the reserve	4.1.2
Liaise with neighbours to develop programs to minimise the entry of exotic plant species and non-native animals into the reserve	4.1.2, 4.1.3
Seek incorporation of fire protection zones in new developments	4.1.4
Erect signs or disseminate information on the reserve's values and protection, including encouraging walkers to keep to trails	4.2.2, 5.1
Maintain mown area and key view corridors associated with the ruins	4.2.2
Ensure easements are managed as per agreements	6
Construct further boundary fencing	6
Low Priority Activities	
Undertake erosion control and associated mitigation measures as a prerequisite for any work/activity	4.1.1
Support Penrith Council's flora and fauna corridor plan	4.1.2
Liaise with Royal Botanic Gardens to identify causes of dieback	4.1.2
Encourage voluntary conservation agreements	4.1.2
Develop and implement a native species monitoring program	4.1.3
Develop community fire awareness programs	4.1.4
Liaise with Sydney University re archaeological mapping	4.2.2
Link up with other programs fostering a better understanding of conservation values in relation to the reserve	5.1
Assess research proposals on individual basis/merit	5.2
Undertake a 5 yearly review of the effectiveness of this plan	7

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