



BIDJIGAL (D1010489) RESERVE

Plan of Management

Prepared for
Bidjigal Reserve Trust

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Pursuant to section 114 of the Crown Lands Act 1989



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Abbreviations & Glossary

ABBREVIATION	DESCRIPTION
APZ	Asset protection zones are fuel-reduced areas that provide a buffer between bushland and residential, commercial and industrial areas to reduce the impact of bushfire.
BHLEP	Baulkham Hills Local Environmental Plan
Board	Members of the Bidjigal (D1010489) Reserve Trust Board include ex-officio members who represent other organisations such as the Excelsior Park Bushland Society, The Hills Shire s355 Bushland Conservation Committee and Darug community, and Trustees who are individual volunteers. Each Board is appointed for five years.
CLA	<i>Crown Lands Act 1989</i>
DECCW	NSW Department of Environment, Climate Change and Water
DP	Deposited Plan
DPI	Department of Primary Industries (Catchments and Lands Division)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
Excelsior Park	In 2003, the bushland area of Excelsior Park (and the former Darling Mills State Forest) was incorporated in Bidjigal Reserve. The remaining area outside Bidjigal Reserve is referred to as Excelsior Reserve.
LGA	Local Government Area
RTA	Roads and Traffic Authority
SMCMA	Sydney Metropolitan Catchment Management Authority
SWC	Sydney Water Corporation
Trust	In 2004, Bidjigal (D1010489) Reserve Trust was established under the <i>NSW Crown Lands Act 1989</i> to administer Bidjigal Reserve.
TSC Act	<i>Threatened Species Conservation Act 1995</i>

Executive Summary

Eco Logical Australia and Gondwana Consulting were commissioned by the Bidjigal Reserve Trust to prepare this Plan of Management for Bidjigal Reserve. The Plan:

- Identifies and gains a comprehensive understanding of the existing qualities, features and issues of Bidjigal Reserve (in Section 3)
- Provides a masterplan for maintenance and enhancement of the environmental integrity of the Reserve, its flora and fauna, cultural heritage and public recreation opportunities (in Section 4 and 5)

Bidjigal Reserve is a 186 ha bushland reserve located within the Hills Shire and within the boundaries of land traditionally occupied by Aboriginal people of the Darug Language Group. The reserve comprises Crown land and was formerly part of Excelsior Park and Darling Mills State Forest. In 2004, Bidjigal Reserve was created through the settlement of a native title application by representatives of the Darug People and involved the *Forestry (Darling Mills State Forest Revocation) Act 2005*.

The Crown lands within the reserve were dedicated for public purpose under Section 82 of the *Crown Lands Act 1989* (Gazette No. 134, 13 August 2004, page 6559). The dedicated public purposes are:

- Preservation of Aboriginal cultural heritage
- Preservation of flora and fauna
- Public recreation

Care, control and management of the reserve are the responsibility of the Bidjigal Reserve Trust and its Board (the Board). Darug People are represented on the Board. Publicly owned bushland areas adjoining the reserve are managed by The Hills Shire Council (and unless named otherwise are known collectively as Excelsior Reserve) and the Roads and Traffic Authority.

The cultural histories held by Aboriginal people themselves, as well as the archaeological evidence, point to Aboriginal occupation of the Darling Mills Valley for at least the last 10,000 years. The reserve and adjacent bushland are now surrounded by urban development within the suburbs of Castle Hill, Baulkham Hills, Northmead, North Parramatta, Carlingford and West Pennant Hills.

Bidjigal Reserve comprises significant stands of bushland in good condition, providing habitat for threatened species. The reserve is crossed and bordered by the M2 Hills Motorway, and contains fire trails, walking tracks, and easements for major transmission lines and sewer lines. Darling Mills Creek is the principal waterway through the reserve, flowing into the Paramatta River.

The community and government agencies were consulted during preparation of this Plan. An issues paper was prepared once the initial consultation period was complete and comments were considered in the Plan. The Reserve is highly valued by the community for its natural and cultural heritage values, amenity and recreation opportunities.

Threats to these values include, but are not limited to:

- Weed infestation associated with stormwater runoff, garden dumping and past sewer construction, particularly along creek lines. Weeds are a significant threat to the reserve because they can out-compete native plants and degrade habitat. Weeds also decrease the amenity of bushland
- Risk of uncontrolled bushfire or inappropriate regimes for hazard reduction burns and maintenance of the APZs
- Encroachment and impacts from neighbouring properties, including the community nursery and sports fields
- Lack of consolidated, co-ordinated management due to lack of funds and staff; and different land ownership and/or management of adjacent bushland
- Inappropriate use and maintenance of service corridors – powerlines, sewer and water supply infrastructure, including impact of service vehicles
- Sedimentation and erosion, particularly relating to track maintenance and stormwater
- Vandalism and littering
- Feral and uncontrolled domestic animals

The Reserve offers significant opportunities to maintain and improve biodiversity, foster a greater appreciation of cultural heritage and increase involvement in recreational activities. Key actions identified in this Plan aim to protect and improve current conditions, and are as follows:

- Improved coordination of existing resources and programs for catchment management, community education and bushfire management
- Reserve ranger could be engaged and responsible for guiding implementation of this Plan (under the direction of the Board), including liaison with residents, The Hills Shire Council, the DPI, and other agencies (\$80,000 p.a.). However, if a ranger was not appointed, the Plan could be implemented by a coordinated effort of volunteers under guidance from the Trust.
- Weed control, seed collection and bush regeneration in accordance with the Vegetation Management Plan by UBM (2009) (\$50,000 p.a.)
- Maintenance of the fire trail and tracks to standard suitable for intended use (\$20,000 p.a.)
- Review creek crossing infrastructure to determine priority for replacement and/or maintenance (allow \$50,000 each)
- Prepare and install signage (\$30,000)
- Monitoring (\$10,000 p.a.)

At present, funding for projects within the Reserve is primarily provided through government grants and management is largely coordinated and conducted by community volunteers. A small amount of funding income is generated from guided walks and bank interest. This lack of resources for management has contributed to concerns about the condition of the bushland and appropriate activities within it.

No development (subject to development application) is currently proposed within the Reserve. Future developments in the reserve should be assessed according to statutory requirements and the objectives set out in this plan, with particular attention given to potential for impact on the values of the reserve, its neighbours and visitors. Activities that are compatible with the reserve's bushland character should be allowed only if they do not significantly impact the ecology, heritage or amenity of the reserve or surrounding areas.

This Plan will be valid for five years from date of adoption by the Minister for Primary Industries.

1 Introduction

Eco Logical Australia, in conjunction with Gondwana Consulting, have prepared this Plan of Management for the Bidjigal Reserve Trust Board in accordance with the requirements of the *Crown Lands Act 1989* (CLA). The Plan identifies objectives and actions for the long-term sustainable management of Bidjigal Reserve. Following adoption by the Board, the Plan will be sent to Crown Lands with a request that the Minister adopt the Plan under section 114 of the CLA.

Preparation of this Plan was funded by the Public Reserves Management Fund administered by Catchments and Lands Division of DPI. To ensure transparency, accountability and openness, an abbreviated Reserve Trust Report for the last financial year is provided in **Appendix A** as per section 122 of the CLA and clause 32 of the CLA Regulation 2006.

1.1 THE STUDY AREA

Bidjigal Reserve is a 186 ha bushland reserve located within the Hills Shire (**Figure 1**). The reserve and adjacent bushland are surrounded by urban development within the suburbs of Castle Hill, Baulkham Hills, Northmead, North Parramatta, Carlingford and West Parramatta. Darling Mills Creek is the principal waterway through the reserve, flowing into the Paramatta River.

The reserve comprises Crown land as defined in **Table 1** and was formerly part of Excelsior Park and Darling Mills State Forest. The Deed of Agreement signed to establish the Reserve requires the definition of Bidjigal Reserve boundaries by cadastral survey.

Table 1: Land identification details

Land District:	Metropolitan	Shire:	The Hills
Parish:	Field of Mars	County:	Cumberland
Surrounding suburbs:	West Pennants Hills, Northmead, Carlingford North Rocks, Baulkham Hills and Castle Hill		
Lot and Deposited Plan: <i>DPI to advise regarding the remainder of the former Darling Mills State Forest</i>	Lot 7060 in DP1070986 Lot 7061 in DP1070989 Lot 7062 in DP1070987 Lot 7062 in DP1070987 Lot 7063 in DP1070983 Lot 967 in DP 723631		Lot 7064 in DP1070990 Lot 7065 in DP1070984 Lot 7066 in DP1070985 Lot 13 in DP841630 Lot 12 in DP 843588 Lot 24 in DP 843588

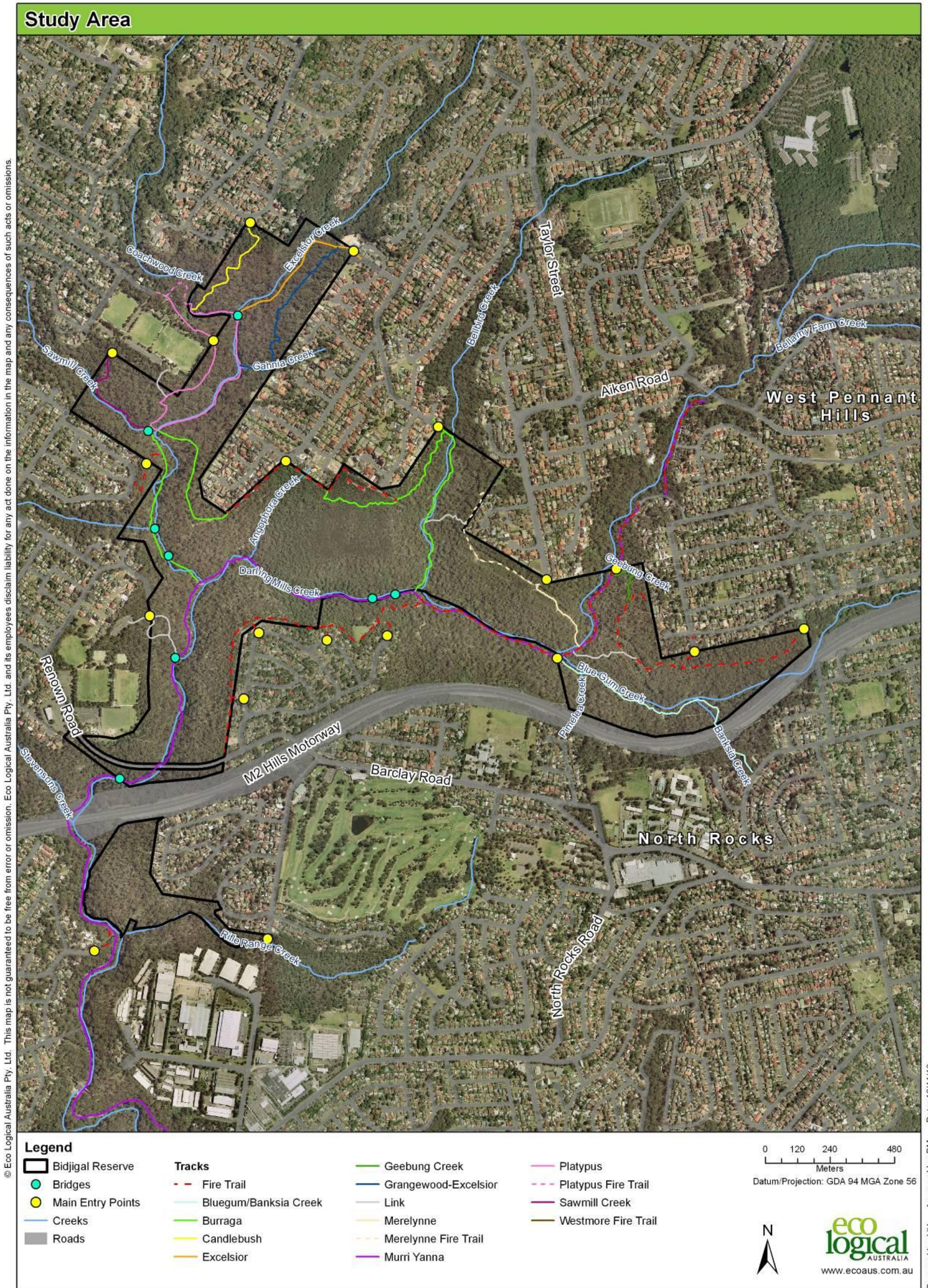


Figure 1: Study location

In 2004, the Crown lands within the reserve were dedicated for public purpose under Section 82 of the CLA (Gazette No. 134, 13 August 2004, page 6559). The dedicated public purposes are:

- Preservation of Aboriginal cultural heritage
- Preservation of flora and fauna
- Public recreation

Care, control and management of the reserve are the responsibility of the Bidjigal Reserve Trust and its Board. Adjacent public bushland areas are managed by the NSW Government (e.g. the Roads and Traffic Authority) or The Hills Shire Council and unless named otherwise are now known as Excelsior Reserve. Cadastre are indicated in **Figure 2**.

1.2 PROJECT AIMS AND OBJECTIVES

The aims and objectives for this Plan of Management were defined by the Board and are outlined below.

Aims:

- To identify and gain a comprehensive understanding of the existing qualities and features of Bidjigal Reserve.
- To provide a masterplan for maintenance and enhancement of the environmental integrity of the Reserve, its flora and fauna, cultural heritage and public recreation opportunities.

Objectives:

- To identify and understand how the local community and the Aboriginal community value the reserve.
- To investigate the Aboriginal significance of the reserve. It is expected that Heritage assessment of some sites will be required for this Plan, in order to determine impacts of current use. Where conflicts are identified between use and conservation, the Plan will suggest appropriate steps to take for the management of each site.
- To investigate the conflict between existing and emerging recreational and other uses and the preservation of natural and cultural heritage. This will include sites used for bouldering or abseiling.
- To identify opportunities for, and constraints on, future development of the Reserve based on the outcomes achieved above.
- To increase the community's knowledge and appreciation of the Reserve and its opportunities for their participation, as users and volunteers.
- To determine requirements for ensuring safety of reserve users and others who may be working therein.
- Determine a set of objectives to direct the Board in its management of the Reserve for the next five years, based on the above.
- Recommend goals and performance measures by which the objectives of the Plan can be realistically achieved and the manner in which those achievements will be assessed.

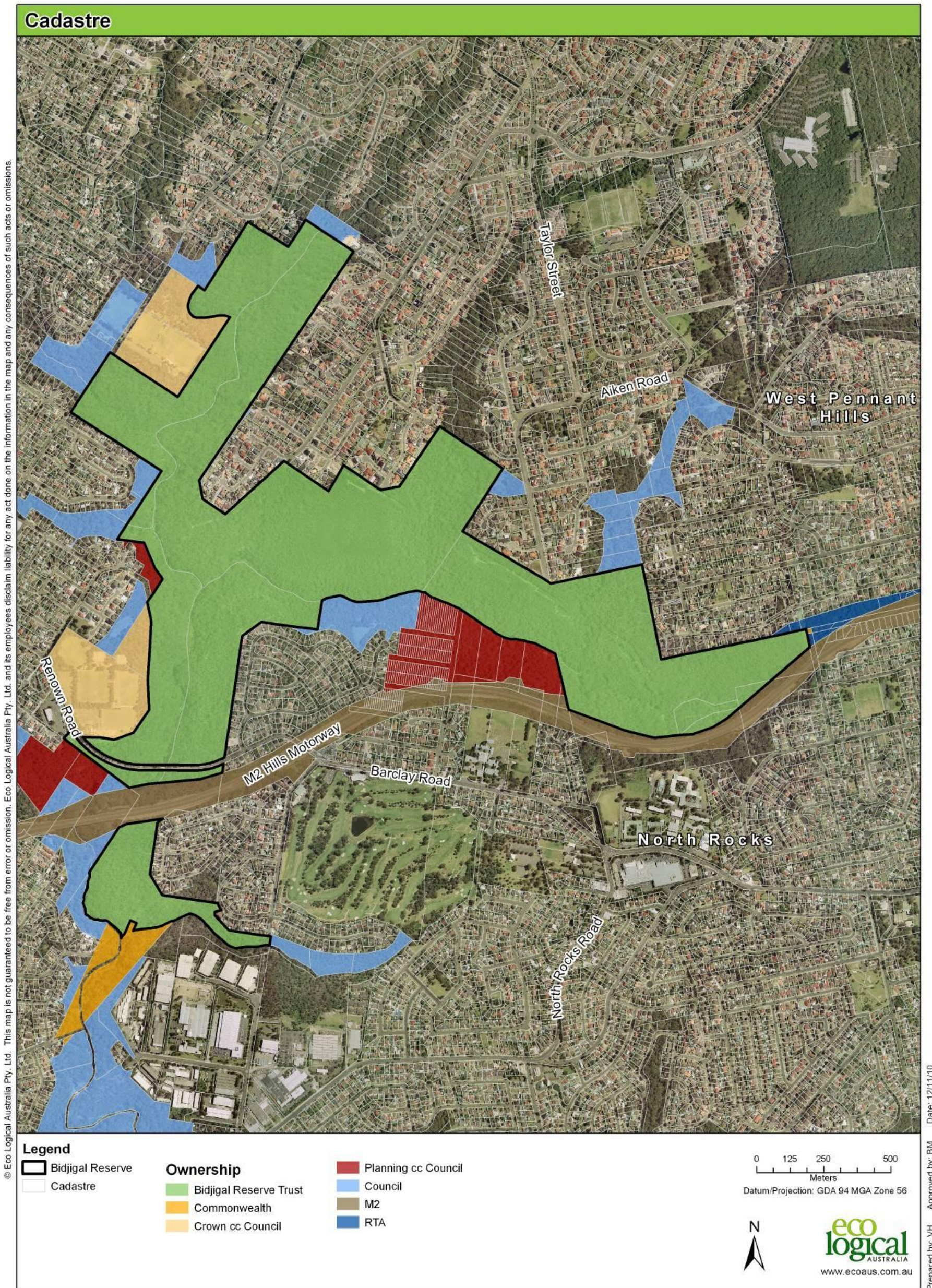


Figure 2: Cadastre

1.3 METHODOLOGY

This Plan of Management has been developed to address the aims and objectives listed above and the statutory requirements outlined in **Section 2**. Values and features of the Reserve are described from the literature, data, field inspection and community consultation. Recent relevant studies that have provided a significant source of information for this Plan of Management include:

- *Baulkham Hills Shire Council Biodiversity Strategy* (BHSC 2006)
- *Bidjigal Reserve Asset Protection Zone Works Plan* (Asset Protection Zone Maintenance 2009)
- *Bush Fire Risk Assessment and Mitigation Plan for Council Managed Lands* (BES 2005)
- *Heritage and Natural Areas Survey Report – Governor Phillip Arm of the Great North Walk* (ELA 2008)
- *Vegetation Management Plan for Bidjigal Reserve* (UBM Ecological Consultants 2009)

The community and relevant agencies were consulted during preparation of the Plan to identify values, issues and actions. This consultation process aimed to generate support for greater stakeholder involvement in the long term management of the Reserve. The consultation process is outlined in **Section 1.4**.

A vision, objectives and performance measures are identified in this Plan. Detailed actions are described and mapped, where possible. Priorities, responsibilities and costs are allocated to actions to enable a smooth transition to the 'on-ground' implementation phase.

1.4 CONSULTATION

As outlined below, a range of stakeholders were consulted during preparation of the Plan. Representation was sought from the Bidjigal Reserve Trust Board, local and state government, special interest groups, residents and the broader community. Stakeholders were informed about progress on the Plan and asked to provide additional information and comment on proposed management strategies and actions. Feedback is summarised in **Appendix B**.

1.4.1 Consulting the Board

Eco Logical Australia met with the Board in November 2009 to discuss approaches to stakeholder consultation within the available budget. The agreed consultation strategy aimed to provide opportunities for a wide range of groups and individuals to contribute to formulation of the Plan. The initial consultation phase extended from February to May 2010.

1.4.2 Media release and newspaper advertisement

A media release was prepared that outlined the project, its aims, process and invited response. Responses were directed to ELA via email or postal address. A copy of the media release is given in **Appendix C**. The media release was issued to The Hills Shire Times, The Hills News, Parramatta Advertiser, The Koori Mail and National Indigenous Times.

An advertisement was placed in the Sydney Morning Herald – Public Notices (Weekend Edition February 27-28, 2010, page 11) and a copy is provided in **Appendix C**.

1.4.3 Direct mail

A list of government and community stakeholders was identified by the consultants, the Board and from the Council's database of community organisations. Letters were sent to all stakeholders, including the following government agencies:

- The Hills Shire Council
- Sydney Metropolitan Catchment Management Authority
- Catchments and Lands Division of the Department of Primary Industries
- NSW Rural Fire Service
- Telstra Corporation
- Integral Energy
- Sydney Water Corporation

An example copy of the letter is provided in **Appendix C**.

At least 42 non-government stakeholders were consulted via email or post. They are listed in **Appendix B**.

1.4.4 Aboriginal consultation

Aboriginal groups and individuals listed in **Appendix B** were consulted initially to determine issues associated with the reserve. All Aboriginal consultation was undertaken via letter/ email/ follow up phone call by Gondwana. No field visits with Aboriginal groups were undertaken as part of this consultation.

1.5 REPORT STRUCTURE

This Plan is structured as follows:

- Section 1 – introduction and basic details about the Reserve
- Section 2 – framework under which the Reserve should be managed to be consistent with statutory requirements
- Section 3 – Features and issues based on detail of observations, literature and data review, consultation
- Section 4 – management objectives arising from Sections 2 and 3
- Section 5 – tasks required to achieve those objectives; listed in **Table 10** and mapped in **Figure 11**
- Appendices include detailed information relevant to Sections 1 to 3

2 Planning and policy framework

2.1 CROWN LANDS ACT 1989

Native Title

In 1994, a Native Title Application was lodged over Crown lands, including the now Bidjigal Reserve. The Bidjigal Reserve Trust was established following an agreement reached between the NSW Government, Baulkham Hills Shire Council and descendants of the Darug to settle the outstanding Native Title claim (N94/6). The Bidjigal Reserve Deed of Agreement was entered into in December 2003. The Deed of Agreement outlined the role and composition of the Reserve Trust.

The Bidjigal Reserve Trust was established with an aim to:

Provide for a consistent future shared management and conservation of the overall bushland area of Excelsior Park and Darling Mills State Forest in perpetuity for the mutual benefit of the citizens of NSW, the local community and the descendants of the Darug people to facilitate the preservation and promotion of Darug culture and heritage (Bidjigal Reserve Deed of Agreement 2003).

The Agreement saw the former Darling Mills State Forest and the bushland of Excelsior Park combined into a single reserve, Bidjigal Reserve. Darug people are represented on the Reserve Trust Board.

Management principles

Bidjigal Reserve is Crown land. Section 10 of the CLA requires the DPI 'to ensure that Crown land is managed for the benefit of the people of NSW'. The principles of Crown land management are listed in section 11 of the CLA, as follows:

- That environmental protection principles be observed in relation to the management and administration of Crown Land
- That the natural resources of Crown Land (including water, soil, flora, fauna and scenic quality) be conserved where possible
- That public use and enjoyment of Crown Land be encouraged
- That, where appropriate, Crown Land should be used and managed in such a way that both the land and its resources are sustained in perpetuity
- That Crown Land be occupied, used, sold, leased or licensed in the best interests of the State consistent with the above principles

Management framework

A reserve trust is a corporation established and appointed by the Minister for Primary Industries to manage a Crown reserve (s 92 CLA). A reserve trust is responsible for the care, control and management of the reserve consistent with provisions in the CLA. The DPI encourages the public to be either directly involved in, or contribute to, the planning and management of the reserve trust system.

The Bidjigal Reserve Trust was appointed on 22 October 2004 to manage Dedication 1010489, which covers all of Bidjigal Reserve. Dedication 1010489 is reserved for the following public purposes:

- Preservation of Aboriginal cultural heritage
- Preservation of flora and fauna

- Public recreation

Members of the Trust Board include ex-officio members who represent other organisations such as the The Hills Shire s355 Bushland Conservation Committee, Darug community, Excelsior Park Bushland Society and Trustees who are individual volunteers. Each Board is appointed for five years, and a new Board was appointed in December 2009.

The Hills Shire Council withdrew from the Board on 1 December 2007 because of *a lack of ongoing financial commitment from the State Government to maintain Crown Land* (Minutes of the BHSC Extraordinary Meeting, 30/10/2007). All services, including the facilitation and supervision of six volunteer bush regeneration groups, were withdrawn, and the Board was left with no operational support.

Plan of Management

The CLA requires a Plan of Management to be prepared for Crown land reserves such as Bidjigal. A draft plan must be publicly exhibited for 28 days and notified in the Government Gazette and a newspaper with local or state circulation. Once approved by the Minister, the Board will need to comply with the plan. The Minister has the right to amend or revoke the plan at any time.

Crown Lands Regulation 2006

The Regulation specifies requirements for land assessments; sale, lease or disposal of Crown land; dedication and reservation of land; administration and record-keeping by the Reserve Trust; and penalty notice offences.

2.2 OTHER KEY LEGISLATION

- *Commonwealth Environmental Protection Biodiversity Conservation Act 2000* - is the Australian Government's key piece of environmental legislation.
- *NSW Threatened Species Conservation Act 1995* - identifies and protects native plants and animals in danger of becoming extinct. The Act also provides for species recovery and threat abatement programs.
- *NSW Environmental Planning and Assessment Act 1979* – the EP&A Act sets requirements for assessment and approval of proposed development and activities.
- *NSW Protection of the Environment Operations Act 1997* - is the key piece of environment protection legislation administered by the Department of the Environment, Climate Change and Water (DECCW). The legislation addresses environmental offences, air quality, water quality, pollution control, and noise control.
- *NSW Fisheries Management Act 1994* - NSW Industry and Investment is responsible for the management of fish and marine vegetation.
- *NSW Noxious Weeds Act 1993* – lists noxious weeds declared for each LGA and requirements for their control
- *Rural Fires Act 1997* – deals with bushfire management
- *NSW Heritage Act 1977* – sets out responsibilities for assessing and managing non-Aboriginal heritage
- *National Parks and Wildlife Act 1974* - administered by DECCW, is the principal legislation governing the protection and management of Aboriginal heritage in NSW. The Act makes it an offence to damage, deface, destroy, disturb or collect any Aboriginal object or evidence without the approval of the Director of the DECCW. Recent amendments to the Aboriginal heritage provisions of the Act differentiate between type and severity of these

'harm' offences and provide a number of defences to prosecution. The most serious offence, and carrying the higher penalties, is the offence of knowingly harming or desecrating an Aboriginal object. The Act now provides a 'due diligence' defence for unintentional harm to Aboriginal objects where an activity is undertaken in compliance with an adopted (DECCW endorsed) industry code of practice, in compliance with an Aboriginal Heritage Impact Permit, or after following the process set out in the DECCW code of practice for due diligence. There is also no requirement to follow the due diligence process for certain activities defined as low impact under the revised legislation – such as specified land management, maintenance, surveying or environmental rehabilitation works. Notably, in a local government context, these low impact activities (as defined in the accompanying Regulation) include maintenance of existing roads or fire trails or tracks, maintenance of existing utilities, and environmental rehabilitation works (such as temporary silt fencing, tree planting, bush regeneration and weed removal). Certain activities are also exempt from the new Aboriginal heritage offences, while other actions are described as 'trivial or negligible' events and no longer considered as 'harm'.

2.3 ENVIRONMENTAL PLANNING INSTRUMENTS

Relevant State Environmental Planning Policies (SEPP) and the Baulkham Hills Local Environmental Plan 2005 are outlined below.

2.3.1 State Environmental Planning Policy (Infrastructure) 2007

Under the Infrastructure SEPP:

'Development for any purpose may be carried out without consent: ...

(d) in the case of land that is a reserve within the meaning of Part 5 of the Crown Lands Act 1989, by or on behalf of the Director-General of the Department of Lands, a trustee of the reserve or (if appointed under that Act to manage the reserve) the Ministerial Corporation constituted under that Act or an administrator,

if the development is for the purposes of implementing a plan of management adopted for the land under the Act referred to above in relation to the land.'

Other limitations may apply. For example, a Section 132C licence from the Department of Environment, Climate Change and Water would be needed to conduct environmental management works such as weed control and revegetation in areas where an endangered ecological community is present.

Activities or development proposals that are not endorsed in the plan of management would need to be subject to a separate assessment and approvals process under the *Environmental Planning and Assessment Act 1979*.

2.3.2 State Environmental Planning Policy - Bushland in Urban Areas (SEPP 19)

SEPP 19 protects and preserves bushland within certain urban areas as part of the natural heritage or for recreational, educational and scientific purposes. The policy is designed to protect bushland in public open space zones and reservations, and to ensure that bush preservation is given a high priority when local environmental plans for urban development are prepared.

2.3.3 Baulkham Hills Local Environmental Plan 2005

The Baulkham Hills Local Environmental Plan (BHLEP) contains the land use planning controls and standards to allow the orderly and economic and sustainable development of lands in the LGA. The

BHLEP includes a land use zoning map and written instrument that categorises development or land uses as either permissible or prohibited. All development must comply with the provisions of the relevant zoning.

Land use zones relevant to the Reserve are defined by the BHLEP as:

- 6(a) Public Open Space
- 5(a) Special Uses Forestry

These zonings pre-date the creation of the Reserve. It is recommended that the land use zones be reviewed in accordance with the Department of Planning’s LEP template and made consistent with objectives of the Reserve (e.g. E2 zone).

Adjoining areas are predominantly zoned for residential use. The Reserve has over 350 residential and industrial properties within 50 m of the boundary.

2.4 CATCHMENT ACTION PLAN

The *Draft Sydney Metropolitan Catchment Action Plan* (CAP) (Sydney Metropolitan Catchment Management Authority 2007) provides the planning framework for natural resource management projects within the Sydney Metropolitan Catchment, including Bidjigal Reserve. The table below summarises the CAP targets and provides examples of management targets relevant to Bidjigal Reserve.

Table 2: Sydney Metropolitan CAP target examples

SUMMARY OF CAP TARGETS	EXAMPLES OF CAP MANAGEMENT TARGETS
Biodiversity – enhance ecological resilience and connectivity of bushland and aquatic habitats	By 2016 there is an increase in the extent, condition and connectivity of regional biodiversity corridors (MTB3.3)
Water – enhance the positive connectivity of aquatic processes	By 2016 selected high priority reaches of waterways and riparian corridors are protected and rehabilitated (MTW1.1)
Land – reduce the negative edge effects of urban expansion	By 2016 indigenous cultural landscape values inform and influence planning instruments, land management plans and on-ground natural resource management activities (MTLD3.1)
Community – improve community and institutional connections between natural resources, strong communities and robust economy	By 2016 local and regional training, education and awareness programs have been developed and implemented for priority communities and NRM stakeholders (MTC1.1)

Adapted from SMCMA (2007)

3 Features and issues

3.1 RESERVE BOUNDARIES

The Deed of Agreement requires the establishment of Bidjigal Reserve boundaries by survey.

The current cadastral boundaries of the reserve do not encompass contiguous areas of urban bushland. Pockets of bushland in some of the upper tributaries are under care and control of Council. The RTA is responsible for bushland east of Bidjigal Reserve to Oakes Road, and in the M2 corridor, including broader areas surrounding the bridge over Darling Mills Creek.

A more coordinated approach to management of the whole area of bushland would be beneficial. This would require adjoining areas of bushland to be consolidated into the Reserve, either formally by redefinition of the Reserve boundaries, or through a memorandum of understanding signed by the relevant parties (e.g. Council, the RTA and the DPI).

Potential acquisitions to the bushland reserve to be considered by the DPI may include:

- Department of Planning land adjoining Bidjigal Reserve, north of the M2 Motorway and Barclay Road
- Potential additions from the M2 Motorway, but subject to its proposed widening
- The former rifle range, currently owned by the Commonwealth. This extends south from Bidjigal Reserve along Darling Mills Creek from Winton Avenue to Rifle Range Road

3.2 TOPOGRAPHY AND DRAINAGE

The Reserve contains rocky outcrops, ridges, steep slopes and gullies, as indicated in **Figure 3**. The principal watercourse within the Reserve is Darling Mills Creek, which is one of the two main tributaries of the Parramatta River. Tributaries of Darling Mills Creek include Excelsior Creek, Bellbird Creek, Blue Gum Creek and Geebung Creek.

Soil landscape mapping of the area has been undertaken by the NSW Soil Conservation (1984). Soil within the Reserve is predominately comprised of Hawkesbury, with a small areas of Gynea, Glenorie and Lucas Heights soil landscapes also present. These soil landscapes have high to extreme soil erosion hazard. Hawkesbury soil landscapes are also characterised by rock fall hazard. (Bannerman & Hazelton 1990, and Chapman & Murphy 1989)

Eroded sediment is typically sourced from unsealed tracks and/or in association with pipe infrastructure. Rates of erosion are greatest in steep terrain and during heavy rainfall, such as that experienced in early 2010. Scour and erosion of creek banks results in bank slumping and siltation of the watercourse (UBM 2009).



Plate 1: Junction of Darling Mills Creek (main creek visible in photo) and Sawmill Creek. Track crosses over Sawmill Creek just upstream of this junction



Plate 2: Flood warning sign damaged by recent flood of Darling Mills Creek

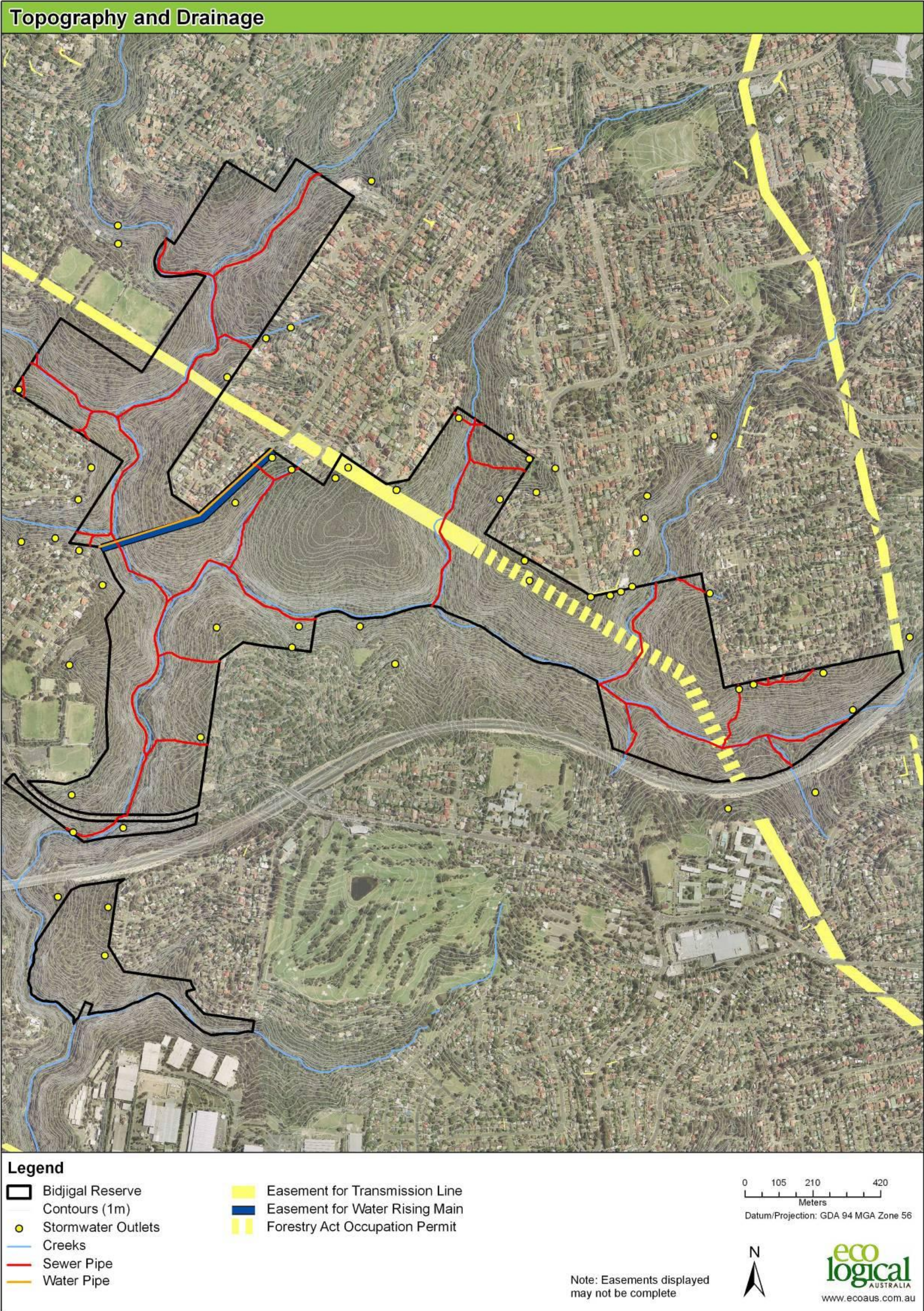


Figure 3: Topography, drainage and major easements

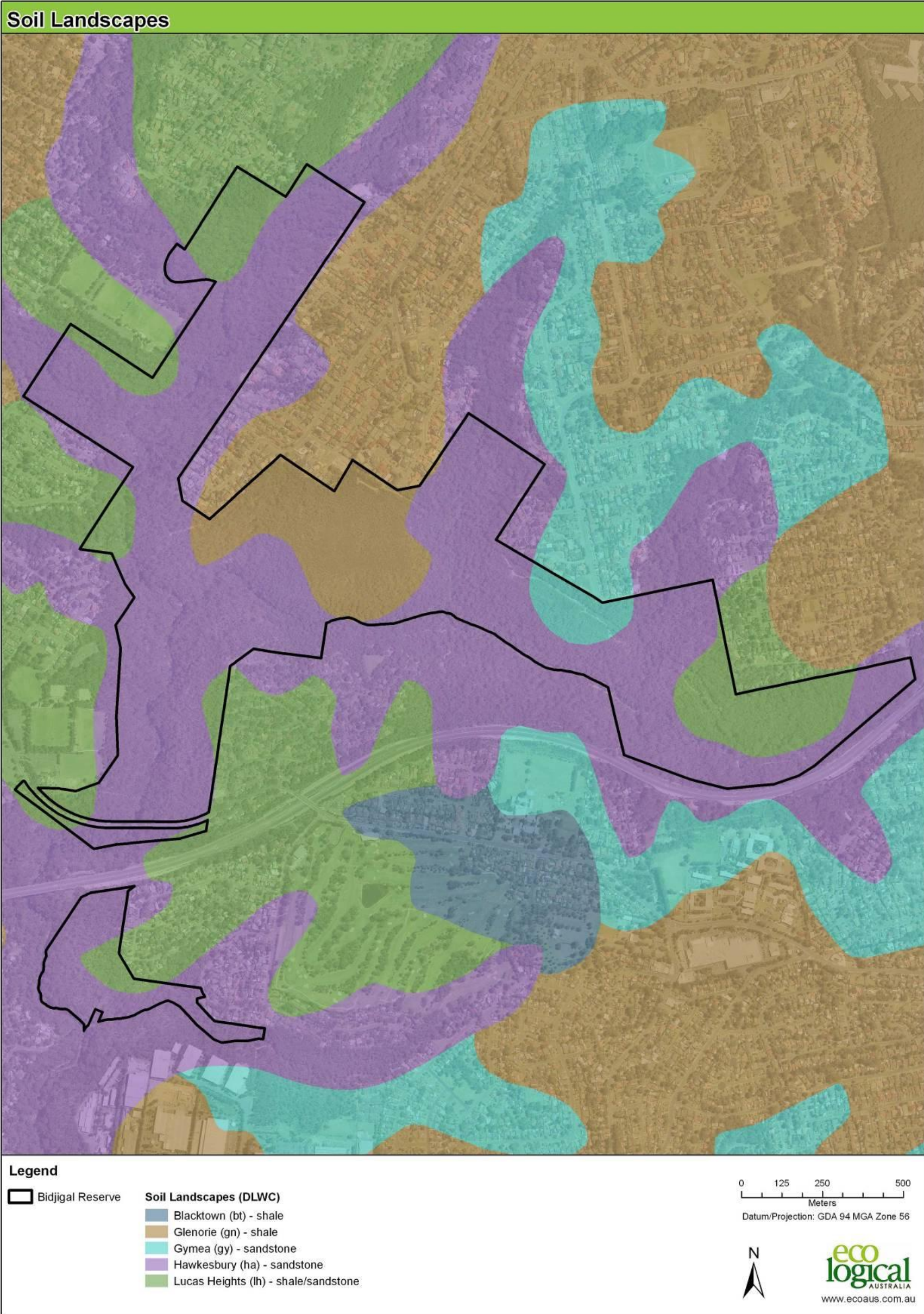


Figure 4: Soil landscapes

3.3 WATER

Figure 3 depicts the locations of water supply pipes, sewer pipes, and stormwater outlets into the Reserve. The sewerage system follows natural watercourses to allow gravity flow. This is common in Sydney's urban bushland areas, however, it presents a major ongoing environmental management challenge. Sewerage and stormwater infrastructure are associated with vegetation and ground disturbance, and ongoing sources of moisture, nutrients and other pollutants.

3.3.1 Water quality

Water quality monitoring has been undertaken for the Upper Parramatta River Catchment Trust between January 1990 and March 1993 by the Council and local schools through the Streamwatch Program (Manidis Roberts 1994). The results of the monitoring indicated that water quality was good during dry weather and was almost clear of faecal coliform bacteria. During wet weather events, the water quality of the creek deteriorates as a result of increased inflow of stormwater and sewage overflows.

These results are consistent with water quality monitoring by Sydney Water in Darling Mills Creek at Lodore Place each month since April 2009 (Dr Manu Black, Sydney Water Community Education Officer, pers. comm. 17/2/10). Interpretation of the results is difficult because they are based on single 'grab' samples tested for a limited range of parameters. However, the results suggest that water quality overall is good, with occasionally elevated concentrations of phosphorus and faecal coliforms – possibly associated with heavier rainfall.

3.3.2 Flood risk

Darling Mills Creek and its tributaries experience low flows for the majority of time, with dramatic increases for short periods during and immediately following rain events. Such increases in water level and velocity are typical of creeks within urbanised catchments with steep topography. Erosion can occur during peak flows and floods can present a hazard to people in the Reserve. During field investigation for this Plan of Management in February 2010, there was evidence of the force of recent flooding due to heavy rain (see **Plate 2** - photo of a damaged flood warning sign adjacent to the creek).

3.4 ECOLOGY

The Reserve contains large areas of bushland in good condition, providing habitat for numerous native species of flora and fauna. However, overall bushland condition was observed to have declined since contract bush regeneration activities ended after 1995 (UBM 2009). Weed infestation tends to be concentrated along creeklines, stormwater outlets and disturbed areas.

The *Western Sydney Urban Bushland Biodiversity Survey*, NSW National Parks and Wildlife Service, Sydney (1997) identified The Hills Shire as the most biological diverse local government area in the Sydney region. Bidjigal Reserve lies at the junction between high and low rainfall zones in the Sydney district and is located on the transition zone between the sandstone and shale geology. This combination of factors means that a wide range of species occurs, making it extremely diverse.

The corridor of bushland in which Bidjigal is located extends from Cumberland State Forest at Castle Hill Road through to the Parramatta River at Westmead. Reserves and parklands in the region around Bidjigal are identified in **Figure 5**. These provide 'stepping stones' for fauna, especially birds, and are vital to maintain ecological connectivity, health and resilience.

Bidjigal Reserve and immediately adjoining bushland areas contain over 370 native plant species, three endangered ecological communities and two threatened species, as well as eight species not present or

inadequately reserved elsewhere in the local area (*Bushland of Bidjigal Reserve and Adjoining Reserves V Bear*, The Hills Shire Council 2004). The value of these areas is reflected in The Hills Shire Council's draft Biodiversity Conservation Lands (in progress), which maps most of this area as *Critical A: Regional*, the highest possible zoning. The *Critical A: Regional* zone is defined as *intact vegetation requiring preservation and management to avoid likely Shire-wide extinction of Threatened Species*.

Key ecological features relevant to Bidjigal Reserve are discussed below.

3.4.1 Vegetation communities

The types and distribution of vegetation communities within Bidjigal Reserve are illustrated in **Figure 6** based on data presented by UBM (2009). The UBM mapping is consistent with that of ELA (2008) although different classification systems have been used. A number of classification systems have been used to map the vegetation within Bidjigal Reserve in the past. A summary of the various vegetation classification systems and the equivalent communities under each system has been outlined in **Table 3**.

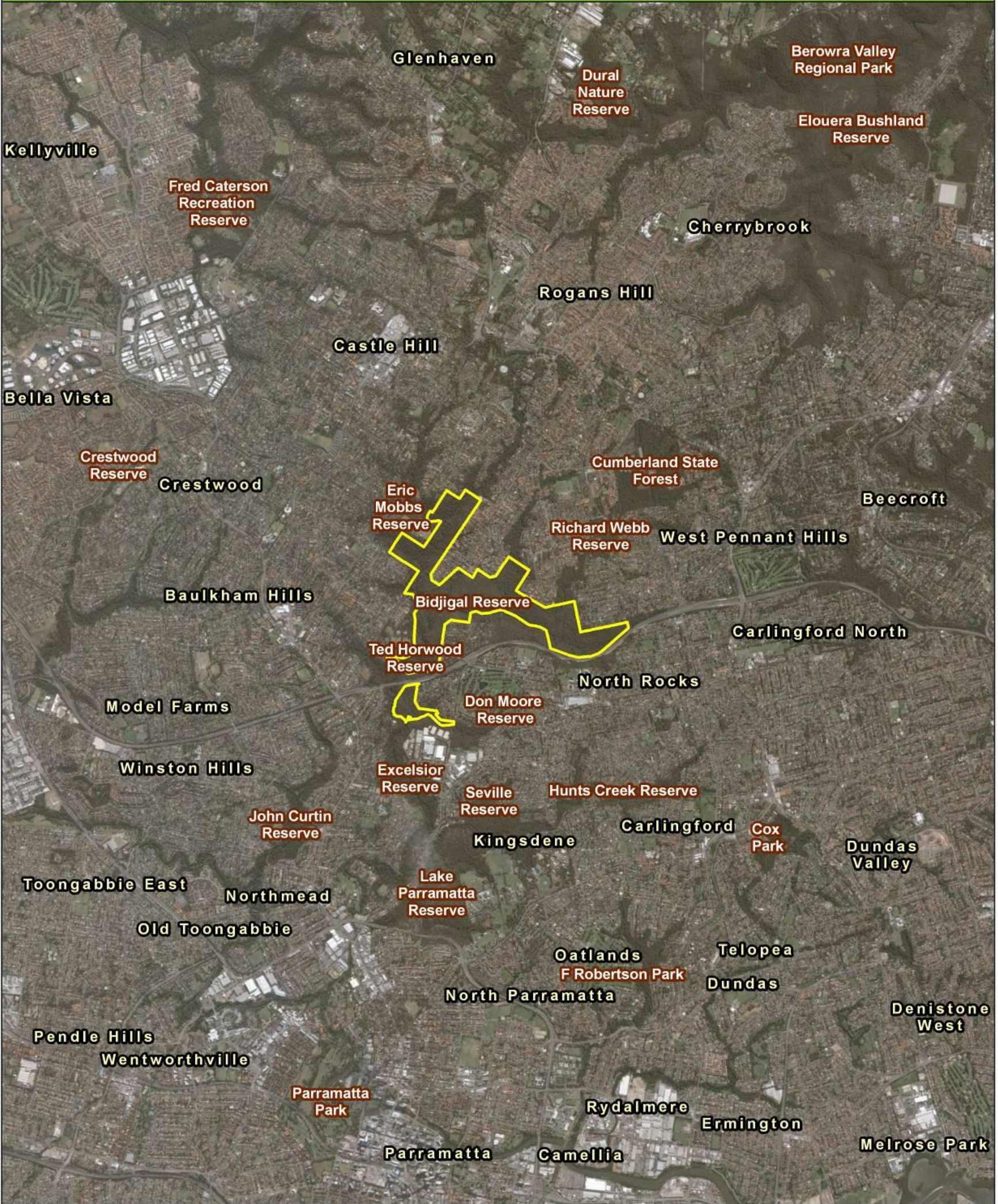
A description of the vegetation communities is given in Section 4.1.1 of the VMP by UBM (2009), which is presented in **Appendix D**. This is based on Tozer et al (2006) which describes the general characteristics of the relevant vegetation communities across the Cumberland Plain and is not specific at a local scale. As background, the Tozer descriptions have been included in the Appendices and a summary of the more local descriptions used by ELA (2008) for each of the communities has been included below. For those vegetation communities that did not fall within the ELA (2008) study area, the Tozer et al (2006) descriptions have been included below.

No endangered ecological communities as listed under the *Threatened Species Conservation Act 1995* have been recorded within the study area although they are known to occur in areas to the north and south of Bidjigal Reserve. This finding is consistent across the UBM (2009), Baulkham Hills Shire Council (2006) and ELA (2008) vegetation mapping.



Plate 3: Rock steps on walking track through bushland

Regional Context



Legend
 Bidjigal Reserve

Image: Microsoft Virtual Earth

0 0.5 1 2
 Kilometres

Datum/Projection: GDA 94 MGA Zone 56

N

eco logical
 AUSTRALIA
 www.ecoaus.com.au

Date: 27/09/10
 Approved by: BM
 Prepared by: JD

Figure 5: Regional context

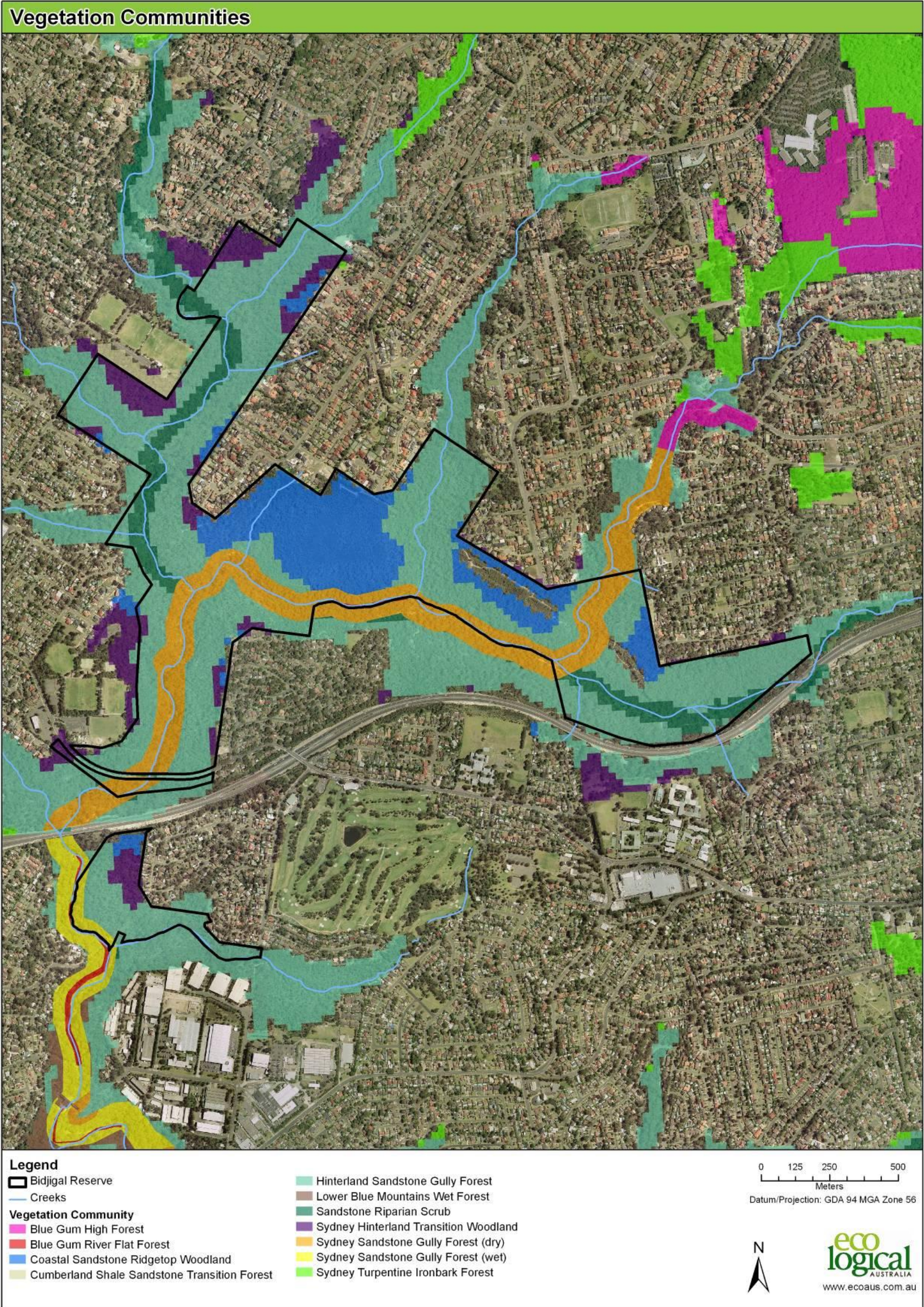


Figure 6: Vegetation communities

Table 3: Vegetation classification systems

SCIVI (2006)	BIDJIGAL RESERVE & SURROUNDING BUSHLAND (BHSC 2004)	BAULKHAM HILLS SHIRE COUNCIL (2006)	ECO LOGICAL (2008)	UBM (2008) * AFTER TOZER ET AL (2006)
Sydney Hinterland Gully Forest	Sydney Sandstone Gully Forest	Sydney Sandstone Gully Forest Complex	Sydney Sandstone Gully Forest (dry)	Sydney Hinterland Gully Forest
Coastal Sandstone Ridgetop Woodland	Sydney Sandstone Ridgetop Woodland	Sydney Sandstone Ridgetop Complex	NA	Coastal Sandstone Ridgetop Woodland
Sydney Turpentine Ironbark Forest	Sydney Turpentine Ironbark Forest	Sydney Turpentine Ironbark Forest	Sydney Turpentine Ironbark Forest	Not present
Sandstone Riparian Scrub	Sydney Sandstone Gully Forest	Sydney Sandstone Gully Forest Complex	Sydney Sandstone Gully Forest (dry)	Sandstone Riparian Scrub
Sydney Hinterland Transition Woodland	NA	Shale / Sandstone Transition Forest	Blue Gum River Flat Forest	Sydney Hinterland Transition Woodland
Cumberland Shale / Sandstone Transition Woodland	NA	Shale / Sandstone Transition Forest	NA	Not present
NA	Sydney Sandstone Scrub / Heath	Sydney Sandstone Heath	NA	Not present

Source: Adapted from UBM (2009)

Sydney Sandstone Gully Forest

(Sandstone Riparian Scrub / Hinterland Sandstone Gully Forest - Tozer et al 2006)

The community supports an open woodland / forest structure and is dominated by *Eucalyptus pilularis*, *Angophora costata*, *Syncarpia glomulifera*, *Eucalyptus piperita*, *Angophora bakeri* and *Corymbia gummifera*. An understorey of native dry sclerophyll heath vegetation with small areas of more mesic vegetation present. The understorey is dense in unburnt areas supporting species such as *Allocasuarina torulosa*, *Callicoma serratifolia*, *Pittosporum undulatum*, *Acacia linifolia*, *Banksia spinulosa*, *Banksia serrata*, *Ceratopetalum apetalum*, *Ceratopetalum gummiferum* and *Tristaniopsis laurina*.

Shrub and groundlayer species include *Acrotriche divaricata*, *Xanthorrhoea arborea*, *Breynia oblongifolia*, *Lepidosperma laterale*, *Pteridium esculentum*, *Eriostemon australasius*, *Calochlaena dubia*, *Lepidosperma laterale*, *Lomatia silaifolia*, *Lomandra oblique*, *Entolasia stricta* and *Imperata cylindrica*. A number of vines and climbers are also present including *Eustrephus latifolius*, *Pandorea pandorana*, *Smilax glycyphylla*. *Ligustrum sinense* is common throughout this community.

In more mesic examples of this community, rainforest species such as *Glochidion ferdinandi*, *Elaeocarpus reticulatus* and *Myrsine variabilis* become more common.

In general, a narrow band of riparian vegetation was present adjacent to the creek for the entire length. This vegetation would broadly correspond to the areas mapped by UBM (2009) as Sandstone Riparian

Scrub (SRS), and includes scattered eucalypts such as *Angophora costata* and *Syncarpia glomulifera*. Common understorey species included *Callicoma serratifolia*, *Ceratopetalum gummiferum*, *Ligustrum sinense*, *Elaeocarpus reticulatus*, *Ceratopetalum apetalum* and *Tristaniopsis laurina*.

Blue Gum River Flat Forest

(Sydney Hinterland Transition Woodland – Tozer et al 2006)

Blue Gum River Flat Forest (BGRFF) exists as a narrow bank (approximately 5 m wide) where the Blacks Road Track meets Darling Mills Creek / the Great North Walk Track and south of this area for a distance of approximately 250 m. The areas mapped as BGRFF by ELA correspond to the small area of Sydney Hinterland Transition Woodland (SHTW) mapped by UBM (2009).

The canopy is dominated by *Eucalyptus saligna* with a closed understorey dominated by *Ligustrum sinense* and *Callicoma serratifolia*. Other species present within this community include *Syncarpia glomulifera*, *Backhousia myrtifolia*, *Callicoma serratifolia*, *Ceratopetalum apetalum*, *Acacia parramattensis*, *Acrotriche divaricata*, *Cyathea cooperi*, *Hedycarya angustifolia*, *Elaeocarpus reticulatus*, *Lantana camara*, *Microlaena stipoides*, *Pteridium esculentum*, *Tradescantia albiflora*, *Viola hederacea*, *Cardiospermum grandiflorum* and *Pandorea pandorana*.

Coastal Sandstone Ridgetop Woodland

(CSRW - Tozer et al 2006)

Coastal Sandstone Ridgetop Woodland (CSRW) is a low eucalypt forest form with a diverse sclerophyll shrub layer and open groundcover of sedges. It is extensively disturbed on the Hawkesbury Sandstone plateau surrounding the Sydney Basin. CSRW grades into heath where soils become shallower, or into upland swamps in areas of impeded drainage. CSRW is replaced by Coastal Sandstone Gully Forest in the deeply incised drainage lines dissecting the plateaux. About one-quarter of its area had been cleared for urban development, but large areas are represented in conservation reserves. Typical floristic species may include *Corymbia gummifera* (Red Bloodwood), *Eucalyptus sieberi* (Silver-top Ash), *E. racemosa* (Snappy Gum), *Leptospermum trinervium* (Paperbark Tea-tree), *Lambertia formosa* (Mountain Devil), *Persoonia levis* (Broad-leaved Geebung), *Banksia serrata* (Old Man Banksia), *Caustis flexuosa* (Old Man's Beard) and *Lomandra obliqua*.

Cumberland Shale Sandstone Transition Forest

(CSSTF - Tozer et al 2006)

Cumberland Shale Sandstone Transition Forest (CSSTF) is typically a eucalypt forest or woodland form with a mixed understorey of sclerophyll shrubs and grasses. It occurs on clay soils derived from Wianamatta Shale, predominately where the underlying sandstone strata are near the surface. CSSTF is highly variable in floristic composition, and varies as a function of the degree of sandstone influence in the soil.

CSSTF is listed on Schedule 1 of the NSW *Threatened Species Conservation Act* (1995) as 'Sydney Shale Sandstone Transition Forest'. It continues to be threatened by urban expansion, weed invasion and high frequency fires. Typical floristic species include *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus fibrosa* (Broad-leaved Ironbark), *Allocasuarina littoralis* (Black She-oak), *E. punctata* (Grey Gum), *Persoonia linearis* (Narrow-leaved Geebung), *Bursaria spinosa* (Blackthorn), and *Lepidosperma laterale* (Flat Sword-sedge).

3.4.2 Threatened flora

Two threatened flora species have been recorded within the Reserve including *Epacris purpurascens* var. *purpurascens* (ELA 2008 and UBM 2009) and *Hibbertia superans* (UBM 2009), as shown in **Figure 7**. *E. purpurascens* var. *purpurascens* was located in a number of areas and the majority of populations recorded were in good health. *H. superans* was recorded in only one site which was adjacent to Renown Road, on the boundary of the Reserve. The majority of plants found were outside the boundary and were at threat from weed invasion and other roadway disturbances such as runoff (UBM 2009).

These two species are listed as vulnerable and endangered (respectively) under the NSW TSC Act. This means that these species are likely to become increasingly threatened or extinct in nature in NSW unless the circumstances and factors threatening its survival or evolutionary development cease to operate. The habitat requirements, threats and recovery actions for these species are profiled in **Table 4** using information from the DECCW threatened species website.

A search of the NSW Wildlife Atlas (10 km radius) was undertaken in June 2010 and identified twelve additional threatened species that have potential to occur in the general area. Those species for which the Reserve would provide potential habitat and their habitat requirements have been provided in **Appendix E**. Targeted surveys of areas which have not been assessed are required to establish the presence of any additional threatened flora species in the Reserve.

3.4.3 Fauna habitat



The reserve provides important habitat for a variety of fauna including 178 native fauna species (Bear 2004). It also forms part of an important vegetated corridor within north-western Sydney (**Figure 5**). The Department of Environment, Climate Change and Water in the Sydney Metropolitan Catchment Management Authority publication *Rapid Fauna Habitat Assessment of the Sydney Metropolitan Catchment Management Authority Area* (June 2008) assessed the area as high fauna habitat value with habitat for a range of threatened and rare species, and it is likely to provide habitat for a range of others.

ELA (2008) found that the study area and surrounds support a large tract of primarily intact native bushland located within a sandstone gully and including sandstone ridge tops in parts. Consequently, the value and diversity of fauna habitat throughout the area is high. Habitat features present throughout the study area range from rocky outcrops to sandstone creek lines and include a large number of hollow-bearing trees. **Table 5** summarises the key habitat features found throughout study area, and identifies the vegetation type in which they are present and the species for which each feature would provide habitat.



Figure 7: Threatened flora and fauna species

Table 4: Profiles of recorded threatened flora species

SPECIES	HABITAT	THREATS	RECOVERY ACTIONS
<p><i>Epacris purpurascens</i> var. <i>purpurascens</i></p> 	<p>Found in a range of habitat types, most of which have a strong shale soil influence.</p> <p>Lifespan is recorded to be 5-20 years, requiring 2-4 years before seed is produced in the wild.</p> <p>Killed by fire and re-establishes from soil-stored seed.</p>	<p>Those habitats which remain, particularly on ridge-tops, are under increasing threat of clearance or habitat modification resulting from urban or rural development.</p> <p>Existing populations are directly threatened by urban run-off leading to flooding, erosion, nitrification of soil substrate, altered pH, weed invasion, and introduction of plant pathogens</p> <p>Other threats include altered fire regimes, uncontrolled vehicular access, soil compaction, slashing eg. powerline easements, fill and rubbish dumping, and trampling through inappropriate pedestrian access</p>	<p>Fire intervals of 10-15 yrs (where there are no needs for asset protection zones).</p> <p>Prevent further loss and fragmentation of habitat</p>
<p><i>Hibbertia superans</i></p> 	<p>Flowering time is July to December. The species occurs on sandstone ridgetops often near the shale/sandstone boundary.</p> <p>Occurs in both open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.</p> <p>The fruit is dehiscent and the seed has a fleshy aril which attracts ants and encourages them to disperse the seeds. The soil seedbank is persistent.</p> <p>Highly sensitive to both frequent and infrequent fire and other disturbance regimes. The recommended minimum fire interval is unknown, however the recommended maximum fire interval is 25 years.</p> <p>An obligate seeder, it is usually killed by fire, sometimes resprouting from the base. Flowers first appear from resprouting material about 2 years after fire.</p>	<p>Clearing for urban and rural residential development.</p> <p>Habitat disturbance.</p> <p>Weed invasion.</p> <p>Impacts from road and rail maintenance</p>	<p>Prevent further loss, fragmentation and degradation of habitat.</p> <p>Where track maintenance activities are planned in potential habitat, systematic surveys should be conducted and appropriate protection measures should be implemented if the species is present.</p> <p>Undertake targeted surveys to determine the extent of the species distribution</p>

Source: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.aspx

Table 5: Fauna habitat features present within the study area

HABITAT FEATURE	VEGETATION TYPE	SPECIES
Hollow-bearing tree / stag	SSGF, SRW, CSSTF	Arboreal mammals, microchiropteran bats, hollow-dependent birds including owls, reptiles
Stag	SSGF, SRW, CSSTF	Birds, particularly birds of prey
Rocky outcrop	SSGF, SRW, CSSTF	Reptiles
Sandstone watercourse	SSGF, BGRFF	Amphibians, birds, reptiles, microchiropteran bats
Dense shrubs	SSGF, SRW, CSSTF	Small birds, ground-dwelling mammals
Dense exotic shrub and vine layers	SSGF	Small birds and birds common to urban environments.
Autumn / winter-flowering Eucalypts	SSGF – red bloodwood (<i>Corymbia gummifera</i>)	Birds & bats, in particular Swift Parrot and Grey-headed Flying-fox
Flowering Myrtaceous trees and shrubs	SSGF, SRW, CSSTF, BGRFF	Foraging resources for birds and mammals.
Fallen timber	SSGF, SRW, CSSTF	Small mammals & reptiles
Leaf litter	SSGF, SRW, CSSTF, BGRFF	Amphibians, reptiles, ground-dwelling mammals
<i>Allocasuarina torulosa</i> and <i>Allocasuarina littoralis</i>	SSGF, SRW	Glossy Black Cockatoo
Defoliating bark	SSGF, SRW, CSSTF	Microchiropteran bats, reptiles
Common lerp infested species	SSGF, SRW – blackbutt (<i>Eucalyptus pilularis</i>)	Swift Parrot and other bird species.

SSGF = Sydney Sandstone Gully Forest, SRW = Sandstone Ridgetop Woodland, SGTF = Shale Gravel Transition Forest, BGRFF = Blue Gum River Flat Forest

3.4.4 Threatened fauna

A search of the DECCW Wildlife Atlas (10 km radius) was undertaken in June 2010 and this identified 35 threatened fauna species with the potential to occur within the study area. Those species for which the Reserve would provide potential habitat and their habitat requirements have been provided in **Appendix F**. A search of the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool was also undertaken. Any threatened species identified on the DECCW and EPBC searches and for which there is the potential habitat within the Reserve have been included in **Appendix F**.

UBM (2009) recorded three species of threatened fauna including the Powerful Owl (*Ninox strenua*), the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) and the Grey-headed Flying-fox (*Pteropus poliocephalus*). These species are listed as vulnerable under the TSC Act. The habitat requirements, threats and recovery actions for these species are tabulated below using information from the DECCW threatened species website. Their recorded locations are indicated in **Figure 7**.

3.4.5 Pest species

Introduced species pose a significant threat to the natural values of the Reserve, as indicated in the threatened species profiles in **Table 4** and **Table 7**. A systematic and effective approach to the control and management of pest species must be developed.

Introduced fauna

Introduced fauna observed in the Reserve are listed in **Table 6**. There is a known population of the European Red Fox (*Vulpes vulpes*) within the Reserve. Fox control programs have previously been conducted within the Reserve (November 2008 and August 2009) by Bidjigal Reserve Trust and the Council. A small number of feral European Rabbits have also been observed within the Reserve and are thought to be escaped pets (UBM 2009).



Table 6: Introduced fauna


SPECIES	COMMON NAME
<i>Vulpes vulpes</i>	European Red Fox
<i>Oryctolagus cuniculus</i>	European Rabbits
<i>Apis mellifera</i>	European Honeybee
<i>Vespula germanica</i>	European Wasp
<i>Acridotheres tristis</i>	Common Myna
<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul

Members of the community have recorded ten nests of the European Honeybee (*Apis mellifera*), with a potential of a further 60-120 nests existing in the Reserve. Feral bees invade tree hollows and displace avifauna (e.g. the threatened Powerful Owl) and possums.

The European Wasp (*Vespula germanica*) has also been recorded in the Reserve. Council has destroyed two wasp nests in the Reserve in the last ten years. The feral European Wasp presents a hazard to all Reserve users and need to be managed by eradication.

Table 7: Profiles of recorded threatened fauna species

SPECIES	HABITAT	THREATS	RECOVERY ACTIONS
<p>Powerful Owl (<i>Ninox strenua</i>)</p> 	<p>Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest.</p> <p>Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine <i>Syncarpia glomulifera</i>, Black She-oak <i>Allocasuarina littoralis</i>, Blackwood <i>Acacia melanoxylon</i>, Rough-barked Apple <i>Angophora floribunda</i>, Cherry Ballart <i>Exocarpus cupressiformis</i> and a number of eucalypt species.</p> <p>The main prey items are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider. As most prey species require hollows and a shrub layer, these are important habitat components for the owl.</p> <p>Pairs of Powerful Owls are believed to have high fidelity to a small number of hollow-bearing nest trees and will defend a large home range of 400-1450 ha.</p> <p>Nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. During the breeding season, the male Powerful Owl roosts in a "grove" of up to 20-30 trees, situated within 100-200 metres of the nest tree where the female shelters.</p> <p>Are monogamous and mate for life. Nesting occurs from late autumn to mid-winter.</p>	<p>Historical loss and fragmentation of suitable forest and woodland habitat from land clearing for residential and agricultural development. This loss also affects the populations of arboreal prey species, particularly the Greater Glider which reduces food availability for the Powerful Owl.</p> <p>Inappropriate forest harvesting practices that have changed forest structure and removed old growth hollow-bearing trees. Loss of hollow-bearing trees reduces the availability of suitable nest sites and prey habitat.</p> <p>Can be extremely sensitive to disturbance around the nest site, particularly during pre-laying, laying and downy chick stages. Disturbance during the breeding period may affect breeding success.</p> <p>High frequency hazard reduction burning may also reduce the longevity of individuals by affecting prey availability.</p> <p>Road kills.</p> <p>Secondary poisoning.</p> <p>Predation of fledglings by foxes, dogs and cats.</p>	<p>Apply low-intensity, mosaic pattern fuel reduction regimes.</p> <p>Retain at least a 200 m buffer of native vegetation around known nesting sites.</p> <p>Retain large stands of native vegetation, especially those containing hollow-bearing trees.</p> <p>Protect riparian vegetation to preserve roosting areas.</p> <p>Protect hollow-bearing trees for nest sites. Younger recruitment trees should also be retained to replace older trees in the long-term.</p> <p>Minimise visits to nests and other disturbances, including surveys using call playback, when owls are breeding.</p> <p>Assess the importance of the site to the species' survival. Include the linkages the site provides for the species between ecological resources across the broader landscape.</p>
<p>Eastern Bentwing-bat (<i>Miniopterus schreibersii oceanensis</i>)</p> 	<p>Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.</p> <p>Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.</p> <p>Maternity caves have very specific temperature and humidity regimes.</p> <p>At other times of the year, populations disperse within about 300 km range of maternity caves.</p> <p>Breeding or roosting colonies can number from 100 to 150,000 individuals.</p> <p>Hunt in forested areas, catching moths and other flying insects above the tree tops.</p>	<p>Damage to or disturbance of roosting caves, particularly during winter or breeding.</p> <p>Loss of foraging habitat.</p> <p>Application of pesticides in or adjacent to foraging areas.</p> <p>Predation by feral cats and foxes</p>	<p>Control foxes and feral cats around roosting sites, particularly maternity caves.</p> <p>Retain native vegetation around roost sites, particularly within 300 m of maternity caves.</p> <p>Minimise the use of pesticides in foraging areas.</p> <p>Protect roosting sites from damage or disturbance</p>

SPECIES	HABITAT	THREATS	RECOVERY ACTIONS
<p>Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)</p> 	<p>Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.</p> <p>Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.</p> <p>Individual camps may have tens of thousands of animals and are used for mating, birth and the rearing of young.</p> <p>Annual mating commences in January and a single young is born each October or November.</p> <p>Site fidelity to camps is high with some camps being used for over a century.</p> <p>Travel up to 50 km to forage.</p> <p>Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.</p>	<p>Loss of foraging habitat.</p> <p>Disturbance of roosting sites.</p> <p>Unregulated shooting.</p> <p>Electrocution on powerlines</p>	<p>Protect roost sites, particularly avoid disturbance September through November.</p> <p>Identify and protect key foraging areas.</p> <p>Manage and enforce licensed shooting.</p> <p>Identify powerline blackspots and implement measures to reduce deaths</p>

Source: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.aspx

Other non-native fauna likely to be present within the Reserve include the Domestic Cat (*Felis catus*), Domestic Dog (*Canis familiaris*) and Black Rat (*Rattus rattus*).

A study by Banks and Bryant (2007) found that dogs in woodland leads to a 35% reduction in bird diversity and 41% reduction in abundance. There are anecdotal reports of walkers being threatened by unrestrained dogs in Bidjigal Reserve. While prohibition is unlikely to be effective without enforcement, greater education and regulation are needed.

Weeds

Parts of the Reserve have been infested with invasive exotic weed species for a number of years. These weed infestations are generally concentrated along easements of stormwater drains, access roads and paths, the interface between residential development and the Reserve boundary, and along riparian corridors.

A total of 123 weed species were recorded by UBM (2009) across the Reserve, including ten noxious weeds. Three of the noxious weeds are Weeds of National Significance including Lantana (*Lantana camara*), Blackberry (*Rubus discolor*), and Bridal Creeper (*Asparagus asparagoides*).

Areas of weed infestation have been mapped and categorised according to their severity by UBM (2009) as illustrated in **Figure 8**.

A Vegetation Management Plan (VMP) has been prepared for the Reserve by UBM (2009) on behalf of the Trust and is given in **Appendix D**. The VMP ranks locations within the Reserve using criteria such as threats posed by noxious weeds and presence of threatened species.

Bush regeneration and weed control need to be scheduled and performed in a manner that is in accordance with the VMP, and sensitive to the requirements of threatened species and their habitats. To achieve this, the reserve ranger (or team of volunteers, if a ranger is not appointed) should refer to recovery actions for threatened flora and fauna species outlined in **Table 4** and **Table 7**. This information should be discussed with contractors, volunteers, staff etc prior to on-ground bush regeneration works.

Contractors and volunteers who have undertaken weed control and bush regeneration within the reserve and surrounds have complained that their work is being undone because there is no supportive bush regeneration for the slopes of the valley and behind people's houses. Bushcare groups managed by the Council have been withdrawn from the reserve and now work in the adjacent bushland.

A more coordinated and comprehensive approach is needed by Council and the Trust to tackle weed infestation within the reserve and surrounds. It is recommended that the Trust liaise with Council's Natural Assets Officer and Bushcare co-ordinator prior to implementing the VMP so that resources and efforts are more effectively applied in the Reserve and surrounding bushland.

3.5 UTILITIES

3.5.1 Stormwater

Stormwater from the surrounding areas drains into the Reserve primarily via Council's stormwater infrastructure pipes (**Figure 3**). Some stormwater from the M2 (managed by the RTA) is discharged to the Reserve via controls such as detention basins. Stormwater is a major source of pollutants (e.g. nutrients, sediment, weed propagules, rubbish) entering the reserve. Weed infestation and litter are commonly associated with stormwater plumes in urban bushland.

Better control of pollutants before they enter the Reserve can be achieved by engineering measures such as gross pollutant traps, sediment basins, swales, rain gardens and constructed wetlands. Community education (e.g. ‘the drain is just for rain’) can also assist by limiting stormwater pollution at source.

3.5.2 Sewerage and water mains

A sewer system was constructed through the Reserve in the 1970s. The construction of the line involved use of clay fill. There was no site rehabilitation undertaken where the fill was used and construction works undertaken. As a result weeds became established in these areas and spread into adjacent bushland.

Sydney Water Corporation (SWC) has several sewerage pipes and a large water supply pipe passing through the Reserve (**Figure 3**). This infrastructure needs to be maintained and, if necessary, replaced to enable ongoing operations. SWC and its contractors need to continue to consult representatives of the Trust to discuss how to minimise potential impacts prior to working in the reserve.

SWC also needs to monitor the performance of its infrastructure, including the frequency and volume of sewage overflows and water leaks. Community observations of leaks and overflows should be reported immediately to SWC by phone on 13 20 90.

3.5.3 Electricity

There are a number of high voltage electricity transmission line easements through the reserve, as shown in **Figure 3**. Integral Energy is expected to comply with the relevant industry codes of practice as outlined in the Industry Safety Steering Committee (ISSC) 3 publication *Guide to Tree Planting and Maintaining Safety Clearances Near Powerlines*. The Integral Energy Vegetation Management program:

- Ensures a safe and reliable electricity power supply
- Minimises the possibility of accidental electrocution
- Prevents destruction, damage or interference with our network
- Reduces the risk and inconvenience of power interruptions to business and the community
- Reduces the risk of bushfires caused by electricity

Integral Energy's vegetation contractors are required to strictly adhere to the Tree Management Plan¹ and engage all relevant stakeholders prior to conducting routine vegetation maintenance along the easements. Four routine and one bushfire inspection are conducted each year to ensure that vegetation is outside the minimum safety clearances as recommended by the Industry Safety Steering Committee (3) Guidelines 2005.

1

<http://www.integral.com.au/wps/wcm/connect/a5fbc080405ac1fbb4d1bcdccb7f5ab5/Tree+Management+Plan.pdf?MOD=AJPERES>

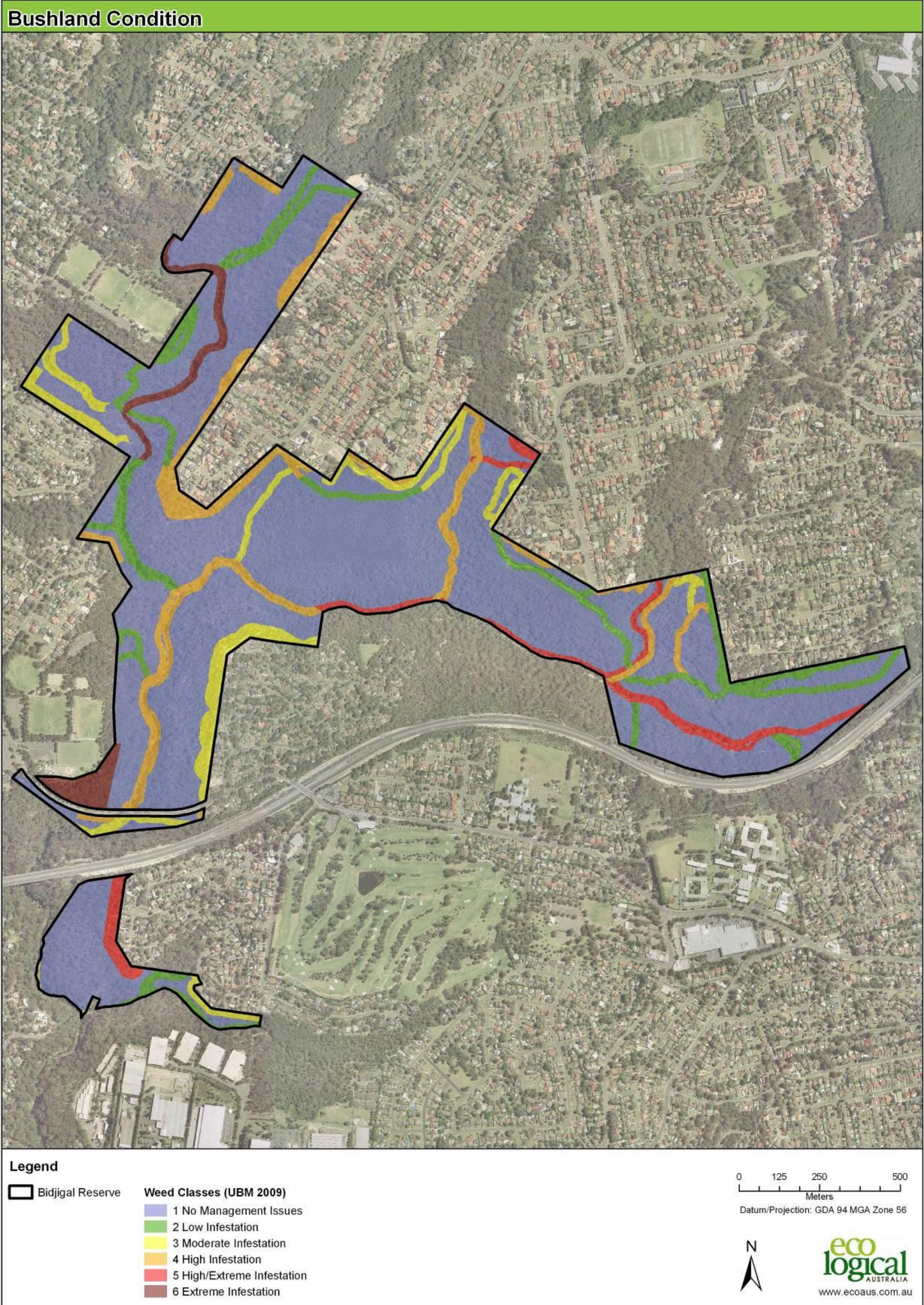


Figure 8: Weed infestation (UBM 2009)

3.6 RECREATION

There is no formal data available of recreational usage in the Reserve. Observations and community comments received during preparation of this plan of management indicate that the reserve is highly valued for recreational opportunities, including bushwalking, walking dogs, mountain bike riding, bouldering, orienteering and nature observation. Most of the community responses during the initial consultation phase emphasised the need to maintain opportunities for recreation within the reserve.

Principal access locations are shown in **Figure 1**.

3.6.1 Tracks

The main form of recreation in the Reserve is bushwalking along the extensive network of tracks. **Figure 1** identifies the main tracks through the reserve, although there are numerous minor tracks as well. The tracks range from a wide, well-graded fire trail to narrow, eroded and overgrown minor tracks.

Mountain biking is a popular recreational activity in the reserve. Cycling needs to be restricted to well-maintained, sign-posted tracks such as the fire trail, to avoid erosion and damage to bushland. Cyclists need to be aware (through signage, education and enforcement) that they share the track network with bushwalkers, and public safety is a priority. Cyclists need to be encouraged to participate in track maintenance and should not create new 'illegal' tracks.

Dirt-bikes, four-wheel drives and other motorised vehicles are prohibited in the Reserve, unless authorised by the Trust or for emergency services.

The Murri-Yanna Track (shown in **Figure 1**) is part of the Governor Phillip Arm of the Great North Walk. The Great North Walk offers short and long distance walking tracks extending south to Parramatta Park, north to Newcastle via Cumberland State Forest and east to Manly. The Murri-Yanna Track is expected to eventually cater for long-distance walking events. Grant funds should be sought to upgrade the Murri-Yanna Track including:

- Engineering investigation of sites along the track that require remediation to address public safety and functionality
- New and/or replacement bridges or stepping stones where the track crosses the creek
- Signage

There is an urgent need to inspect all tracks with qualified person/s to determine work needed to address erosion and undercutting, particularly where the track crosses or approaches a creekline. Repair tracks and address erosion problems where identified. If an existing creek crossing needs to be repaired or completely replaced, the redesign and construction should be sympathetic to the environmental character of the area as well as satisfy engineering and public safety requirements.

Minor tracks that have limited recreational connectivity or pass through sensitive areas need to be closed and rehabilitated.

The need for additional formal creek crossings (e.g. bridges, stepping stones) to prevent walkers becoming trapped during flooding was raised during consultation with the Board. However, if flooding occurs or is likely to occur, walkers should be advised by signage and education to avoid the creek. In other words, it would be safer to head for higher ground even if a track is not available.

No new tracks or creek crossings are proposed, including bridges or boardwalks.

3.6.2 Orienteering

Orienteering is an outdoor sporting and recreational activity involving navigating cross country with the aid of a map and compass. Competitors travel alone, unless they are beginners or families. Competitors start the race usually two minutes apart, rather than as a large group, and mostly run or walk on existing tracks.

Orienteering has been held in various locations within Bidjigal Reserve since the early 1980s. The Western & Hills Orienteers organise orienteering events in the reserve once or twice per year, and can attract up to 100 competitors who assemble in an adjacent park prior to commencement (Chris Crane pers. com. 18/3/2010).

These events are managed in accordance with Orienteering Australia's environmental code of practice². This includes marking unsuitable areas 'out of bounds' to participants because of management, security or privacy factors.

3.6.3 Bouldering

Bouldering is the name given for a particular type of climbing (smallish crags), and is a popular activity in the Sydney region. Bidjigal Reserve is regarded as an important and popular climbing area in Sydney, much of it regarded as world class in quality. It also contains several climbs of extreme difficulty which are of national significance. The area attracts climbers from other parts of the country as well as overseas visitors. (Dr Peter Balint pers. comm. 25/2/2010)

Sydney Bouldering (Balint 2001) contains detailed information about the climbing opportunities in Bidjigal Reserve and outlines the ethic of environmental care in a section of the guide called 'Very Important Stuff'. The general name given for climbing areas in the reserve is The Balkans. The two main areas are:

- The Trenches – the rocks behind the playing fields on the western side of Darling Mills Creek
- Frontline – the cliff line behind the houses on the opposite side of the creek, accessed from Lara Crescent

The climbers etch hand-holds into some of the rock faces and may cause minor damage to vegetation around the rocks. However, if done in accordance with the ethic of environmental care outlined in Balint (2001), bouldering has limited impact and is compatible with the character of the bushland reserve. There was no evidence of rubbish or vandalism during the field inspection for this Plan of Management, however these have occurred in the past.

3.6.4 Picnic areas and parking

Picnic facilities, parking areas and sporting ovals are available at Ted Horwood and Eric Mobbs Reserves, adjacent Bidjigal Reserve. There are picnic tables at the start of the walking track at Grangewood Place, on Council-owned land.

² <http://www.orienteering.asn.au/environment/envcode/>

3.6.5 Go Ape proposed development

On 2 February 2010, The Hills Council rejected a proposal to develop a 'Go Ape' adventure course within Bidjigal Reserve. Reasons for rejecting the development application included concerns about potential impacts to flora and fauna, and traffic and parking.

3.6.6 Future management

Improved management is needed to ensure that the reserve continues to offer people the opportunity to participate in recreation activities for generations to come. This is important because the reserve is highly valued by the community for a variety of existing recreational opportunities within an urbanised landscape. Measures required include:

- Identification and monitoring of areas of high ecological or cultural heritage sensitivity, and restriction of access to these areas if needed
- Education
- Regulation and enforcement
- Signage
- Community involvement e.g. through Bushcare and Clean-up programs
- Track maintenance

Activities that are compatible with the reserve's bushland character should be allowed only if they do not significantly impact the ecology, heritage or amenity of the reserve or surrounding areas. Monitoring will be essential to determine if thresholds of unacceptable adverse impact are being approached and additional management or restrictions are required. As a guide, unacceptable levels of impact are those that are unsustainable or irreversible. This monitoring should include counts of people entering the reserve at the main access locations e.g. near the bouldering sites.

It is recommended that recreational activities be prohibited from site DMC4 because of Aboriginal heritage sensitivities.

New recreational infrastructure that could be installed includes:

- A picnic table and chairs in the cleared area at the main junction of the track at the western end of Blue Gum Creek
- Shelter at Eric Mobbs Reserve (which is outside Bidjigal Reserve, but would be used by people accessing Bidjigal)

3.7 SIGNAGE

There is limited signage within the Reserve. Directional, informative and regulatory signage is needed at various locations throughout the reserve. Suggested locations for signage are entry points, track intersections and intensively used areas (e.g. popular bouldering sites and picnic areas).

A signage strategy needs to be developed and implemented for the reserve that depicts a consistent style and the type(s) of material to be used. Signs should be pictorial rather than have lengthy text. Examples of material to be presented in the signs includes:

- Flood warning and advice
- Dogs to be on a leash at all times in the reserve
- Prohibited activities (e.g. littering, trail bike riding) and 'no go' areas
- Map of tracks with distances and degree of difficulty for each route

The location for signage should consider visibility, safety and maintenance requirements. Signs that restrict access to sensitive areas should be carefully positioned so that they don't inadvertently attract people to the area. Not all restricted areas will require signage.

A magnetic sign that can be temporarily attached to a vehicle should be available to the Trust, contractors and others requiring a vehicle to work in the reserve. This sign should display the Bidjigal Reserve logo and have a contact phone number clearly visible.

3.8 EDUCATION

In addition to the broader educational activities for the catchment outlined elsewhere in this document, there are a number of excellent opportunities to improve community awareness about the values of Bidjigal Reserve to assist with its protection and management. Priority should be given to:

- Investigating how the new Darug Tribal Aboriginal Corporation cultural centre at Seven Hills can facilitate education programs focussing on Aboriginal cultural heritage in the reserve
- Working with local schools to integrate environmental and cultural heritage features of the reserve in curriculum activities
- Targetted education for recreational users, particularly groups and individuals involved in bouldering, orienteering, dog walking, abseiling and mountain bike riding

3.9 RUBBISH DUMPING & GRAFFITI

Rubbish dumping and graffiti are a common problem in urban bushland areas within Sydney. A Draft Policy on Encroachments and Dumping for Bidjigal and Adjoining Reserves was tabled at Board meetings in August 2006 and March 2009. However, no further action has been taken because a ranger would be needed to enforce compliance.

3.10 HERITAGE

3.10.1 European heritage

Council's heritage database (Schedule 1 of LEP 2005) indicates that there are no known items of European cultural heritage in the immediate locality.

The DPI has indicated that it intends to liaise with the Commonwealth to have the former Baulkham Hills Rifle Range site transferred to the State and added to Bidjigal Reerve. There may be contamination issues associated with the site. Costs for clean-up would need to be resolved as part of the transfer agreement.

3.10.2 Aboriginal cultural heritage

Bidjigal Reserve is located within the boundaries of the Darug Language Group. Aboriginal people with traditional links to the Reserve and the wider Darug lands live in northern Sydney and elsewhere and the cultural histories held by Aboriginal people themselves, as well as the archaeological evidence, both point to Aboriginal occupation of the Darling Mills Valley for at least the last 10,000 years.

Bidjigal Reserve itself was created in 2004 through the settlement of a native title application by representatives of the Darug People. This saw the former Darling Mills State Forest and the bushland of Excelsior Park combined into a single reserve with Darug People represented on the Reserve's Trust Board.

The Darling Mills Valley, including Bidjigal Reserve and its surrounds, has been the subject of numerous Aboriginal cultural heritage surveys and reports, most related to various development proposals or environmental impact assessments. Those most applicable to the Reserve and PoM include:

- In 1990 Attenbrow surveyed the Darling Mills Catchment (as part of stage 1 of the wider Port Jackson Catchment Archaeological Project) involving reviewing existing data, relocating earlier recorded sites, and identifying new sites having archaeological research potential – Attenbrow identified the Darling Mills sub-catchment as having the greatest density of archaeological deposits (excluding middens) of all 8 sub-catchments assessed (at a density of 0.3 sites per sq km)
- In 1990 Corkill undertook a reconnaissance level survey of the proposed route of the, subsequent, M2 Hills Motorway
- In 1992 Attenbrow excavated DMSF2 (AHIMS Site 45-6-2097) located in the then Darling Mills State Forest (now the upper/north-east section of Bidjigal Reserve, just north of the M2)
- In 1992 Corkill surveyed a 7km section of Darling Mills Creek, and associated valley and tributaries, north from Northmead for the Upper Parramatta River Catchment Trust as part of the environmental impact assessment process for proposed stormwater management works on Darling Mills Creek (subsequently the Loyalty Road Stormwater Detention Basin) – Corkill later carried out test excavations in five known sites at the junction of Darling Mills and Stephenson Creeks (just outside the Reserve)
- In 2008 Eco Logical Australia and Gondwana Consulting surveyed a 100m wide corridor along the Great North Walk through the reserve, beside Darling Mills and Bellbird Creeks, collating the findings of all previous studies and identifying/documenting additional sites
- In 2009 A R C Heritage assessed an area along Darling Mills Creek north of Renown Road, the site of a proposed recreation venture
- In 2009 Archaeological and Heritage Management Solutions assessed an area along Excelsior Creek, between Mill and Christmas Bush Creeks, as part of proposed Sydney Water infrastructure upgrading works

A total of 52 tangible Aboriginal heritage sites have, to-date, been recorded within Bidjigal Reserve – refer to **Table 8**. Of these, nine sites are formally recorded on the DECCW's Aboriginal Heritage Information Management System (however the AHIMS register is far from complete or comprehensive, and is focused very much towards tangible Aboriginal sites [where there is remaining physical evidence] with a strong bias towards pre-contact sites). The remaining 43 sites have been recorded in various surveys but not yet registered in the DECCW system. The greater majority of sites are located along Darling Mills Creek and other major drainage lines – refer to **Figure 9**.

These 52 recorded tangible Aboriginal heritage sites comprise the following:

- 3 shelters with art (recorded) and deposit
- 1 shelter with art (recorded)
- 7 shelters with deposit
- 4 shelters with potential archaeological deposit
- 28 potential habitation shelters
- 1 grinding groove
- 7 possible scarred trees
- 1 other site (a creekside white clay deposit)

Table 8: Recorded Aboriginal heritage sites

TYPE	CODE
Shelter with art and deposit	DMC 4 (= 45-6-2162); CF 1 (a & b) (= 45-6-2160); CF 6 (= 45-6-2472 and 45-6-2513)
Shelter with art	DMC 3 (= 45-6-2550 and 45-5-0888)
Shelter with deposit	DMSF 1 (= 45-6-2041 and A8); DMSF 2 (= 45-6-2097); DMC 2 (= 45-6-2549 and 45-5-0887); CF 3 (= 45-6-2161); CF 5 (= 45-6-2163); A 7; ARC 1
Shelter with pad (potential archaeological deposit)	PAD 17 (= A34); PAD 18; PAD 20 (= A19); PAD 21
Potential habitation shelter	PH 9 (= A 52); PH 13 (= A 36); PH 14 (= A 33); PH 15 (= A 29); PH 16; PH 17; PH 18; PH 19; PH 20 (= A 39); PH 21 (= A 20); PH 22 (= A 21); PH 23 (= A 23); PH 24 (= A 27); PH 25 (= A 30); PH 27 (= A 50); A 5; A 6; A 9; A 10; A 11; A 16; A 26; A 28; A 32; A 37; A 38; AHMS 1; AHMS 2
Grinding groove	A 12
Possible scarred tree	14 (?); A 15 (??); A 24 (?); A 25; A 31 (??); A 35 (= ARC 2); BUND 1
Other (white clay)	A 13

Key to Records/Reports

“45” numerically coded sites = site listed on DECCW Aboriginal Heritage Information Management System

“PAD” and “PH” prefix sites = Corkill, 1992

“A” prefix sites = Eco Logical Australia and Gondwana Consulting, 2008

“ARC” prefix sites = A R C Heritage, 2009

“AHMS” prefix sites = Archaeological and Heritage Management Solutions, 2009

“BUND” prefix sites = site identified/advised by Bundeluk, 2008

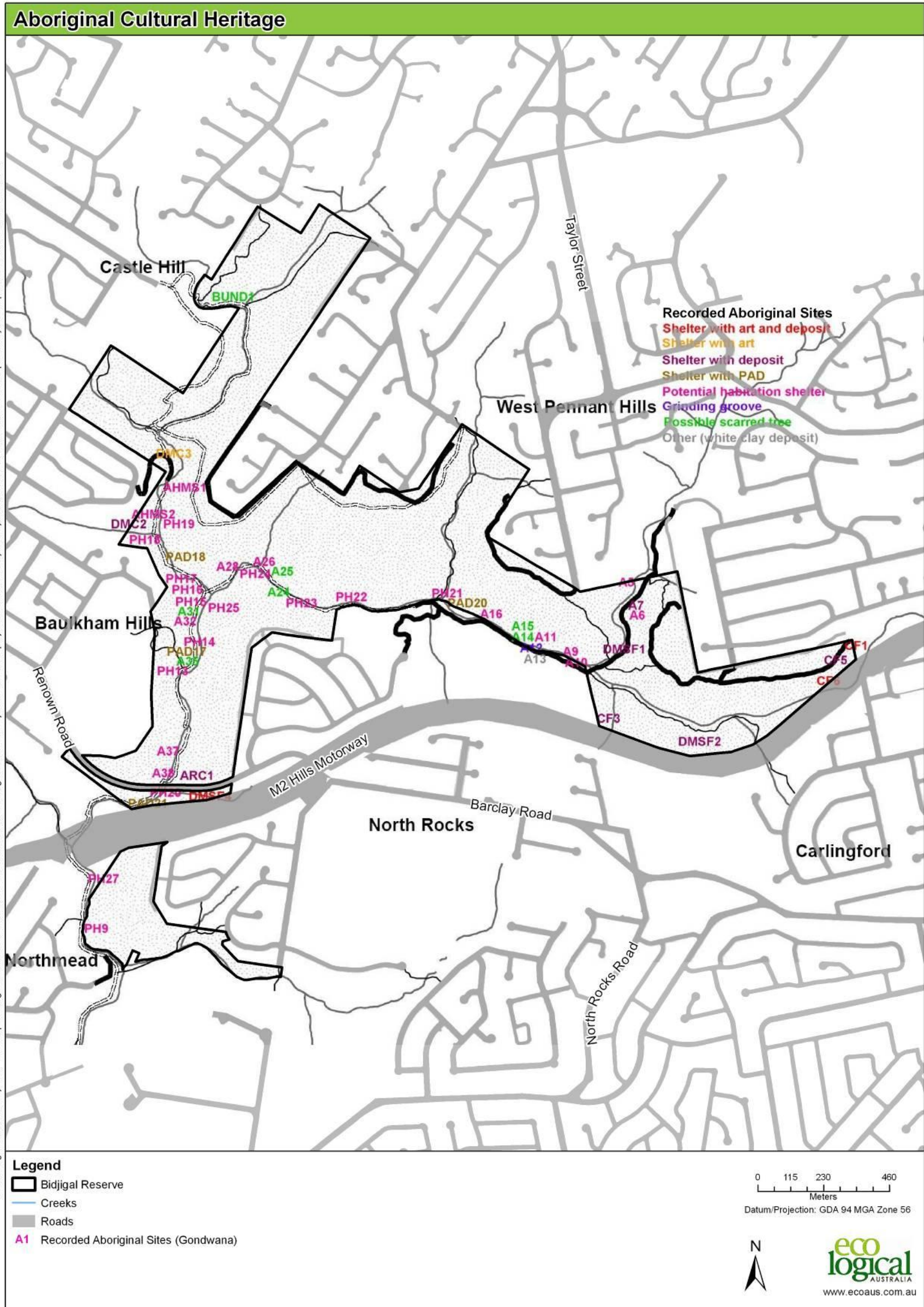


Figure 9: Recorded Aboriginal sites



Plate 4: Possible interpretation sites along the main walking tracks (site A28, a potential habitation shelter, on the northside of Darling Mills Creek)



Plate 5: DMSF2 – the fifth oldest dated occupation site in the Sydney Basin

Fieldwork undertaken by Gondwana Consulting in 2008 and 2010 identified or relocated and inspected 46 of these sites (1 shelter with art and deposit, 1 shelter with deposit, and 4 potential habitation shelters were unable to be relocated in the field). Observations from this fieldwork include the following:

- Only 2 of the 3 rock shelters with recorded art retained any visible signs of pigment art – sites DMC4 and DMC3 – however the stencil art at DMC3 has been extremely impacted by graffiti and is barely visible (and would be unseen by casual visitors to the overhang)
- “Bouldering” appears to have recently started at art site DMC4 (between Renown Road and the M2), with the white hand stencil at this site threatened by “chalking”, physical contact, raised dust and malicious impacts
- No art was evident at site CF1a&b, however there is evidence of the recent removal of rock sheets from the rear wall of this shelter and regular visitor access;
- “Bouldering” is well established at site ARC1 (a shelter with deposit) and is compromising the integrity of this site
- No Aboriginal heritage sites investigated were subject to any (on-site) special/protective management measures
- The majority of recorded sites are in close proximity to drainage lines and are readily accessible from the walking tracks that also follow these creeklines (walking tracks are routed through some sites) meaning that many sites are subject to high levels of access/use
- There is concentration of sites along Darling Mills Creek north of Renown Road to the junction with Excelsior Creek, and in the lower section of Excelsior Creek – however this may also be a result of more intensive and numerous survey efforts in these areas
- Many sites are impacted by “natural” flooding and deposition
- Graffiti, vandalism, fires and litter are a serious problem at many sites and degrade the heritage values of these features
- Even the more remote, less accessible or hidden sites (chiefly rock overhangs/shelters) are subject to varying levels of visitor access/use – few sites investigated showed no evidence of visitor access
- The authenticity of scarred trees is very difficult to determine, of the 7 possible scarred trees investigated only 3 could be confidently considered to be of Aboriginal origin (BUND1, A25 and A35)
- The abundance of rock shelters across the Reserve’s slopes, ledges and creeklines creates high potential for the occurrence of as yet unlocated/unrecorded sites
- Site DMSF2 is the fifth oldest known and reliably dated Aboriginal occupation site in the Sydney Region, demonstrating repeated use by Aboriginal people over several thousand years with first occupation dating from the start of the Holocene over 10,000 year BP, and is a site of great cultural and scientific importance
- The Reserve’s significance for Aboriginal people, and array of Aboriginal heritage sites, have considerable interpretive and educational potential – with several accessible sites well located and suitable for interpretive and educational use
- Several major, and well-documented, sites occur just outside the Reserve’s boundary – notably in the vicinity of the junction of Darling Mills and Stephenson Creeks

3.11 BUSHFIRE

Inappropriate bushfire regimes can threaten ecosystems as well as assets along the bushland/urban interface. To provide a framework for suitable bushfire regimes, there have been a number of studies relevant to bushfire management within Bidjigal Reserve, including:

- *Bushfire Risk Assessment and Mitigation Plan for Council Managed Lands – Stage 1 and Stage 2 across Baulkham Hills Shire Council (BES 2005a; BES 2005b).*
- *Bidjigal Reserve Asset Protection Zone Works Plan (APZM 2009)*

BES (2005a) states that every building (or ‘asset’) on the reserve interface must have a bushfire asset protection zone (APZ) of dimensions appropriate to the slope and fuel on the site to adequately lower their bushfire risk. BES (2005a) mapped APZs for bushland areas within the LGA. Detailed APZ plans were developed by APZM (2009) for sections of the APZ around the Bidjigal Reserve boundary and indicate the required:

- Area of treatment e.g. 20 m wide APZ
- Methods of treatment e.g. by hand or portable mechanical machinery
- Work program
- Performance monitoring

Differences in the APZs defined by BES (2005a) and APZM (2009) for bushland near and including Bidjigal Reserve need to be resolved in consultation with relevant parties such as the Board, Council, the RTA, NSW Fire Brigade, RFS and DPI. The forum for consultation is available through the Bush Fire Management Committee (BFMC).

The Bush Fire Management Committee (of which the Trust is a member) currently coordinates proposals for hazard reduction burns in Bidjigal Reserve and surrounding bushland. Hazard reduction burns (or mosaic prescribed burns) are a complementary strategy to APZs. The objective of the burn (or other fuel reduction practice) is to lower fuel levels within strategic areas of the bushland to reduce the intensity or rate of spread of a fire approaching the critical attack and defence points at the urban/bushland interface. Planning of these fires includes reference to the Bushfire Environmental Assessment Code. This code includes recommended fire intensities and intervals for threatened species and vegetation types.

Fire agencies (NSWFB and RFS) also carry out pile burns to dispose of cuttings from asset protection zone and bushcare works.

Fire trails are used to allow access to the interior of the Reserve, and to create a wide fuel reduced strip to compartmentalise less intense fires, or provide a control line for other more intense fires.

There are a number of parties currently involved in bushfire management planning and implementation in or adjacent to the Reserve. Decisions regarding asset protection zones and mosaic hazard reduction burns need to be consistent, co-ordinated and understood by all potentially affected landowners and agencies responsible for bushfire planning and management.

It is recommended that liaison between relevant parties continue to be coordinated through the existing Bushfire Management Committee. This would include defining and managing APZs, and scheduling hazard reduction burns in the reserve and surrounding bushland. Funds for bushfire management activities in Bidjigal Reserve should be provided as grants from State and Federal Governments through the DPI and/or the BFMC.

All vegetation communities within and surrounding Bidjigal Reserve have a recommended minimum fire interval of at least seven years, with the exception of Sydney Turpentine Ironbark Forest, which has a recommended minimum fire interval of at least ten years (BES 2005a). (Refer to **Figure 6** for a map of vegetation communities within the reserve.) Additional consideration should be given to restrictions regarding threatened species. As outlined in **Table 4** and **Table 7**:

- *Epacris purpurascens* var. *purpurascens* requires at least ten to fifteen years between burns
- *Hibbertia superans* requires systematic surveys to be conducted and appropriate protection measures implemented if the species is present where track maintenance activities are planned in potential habitat
- Powerful Owl (*Ninox strenua*) requires low-intensity, mosaic pattern fuel reduction regimes, and visits to nests and other disturbances to be minimized when owls are breeding from late autumn to mid-winter
- Grey-headed Flying-fox (*Pteropus poliocephalus*) roost sites should not be disturbed from September through to November

3.12 SUMMARY OF THREATS AND OPPORTUNITES

The main threats to Bidjigal Reserve are:

- Weed infestation associated with stormwater outlets, garden dumping and past sewer construction, particularly along creek lines. Weeds are a significant threat to the reserve because they can out-compete native plants and degrade habitat. Weeds also decrease the amenity of bushland.
- Stormwater runoff
- Risk of uncontrolled bushfire or inappropriate regimes for hazard reduction burns and maintenance of the APZs
- Encroachment and impacts from neighbouring properties, including the community nursery and sports fields
- Lack of consolidated, co-ordinated management due to lack of funds and staff; and different land ownership and/or management of adjacent bushland
- Inappropriate use and maintenance of service corridors – powerlines, sewer and water supply infrastructure, including impact of service vehicles
- Sedimentation and erosion, particularly relating to track maintenance and stormwater
- Vandalism and littering
- Feral and uncontrolled domestic animals

The Reserve offers significant opportunities to maintain and improve biodiversity, foster a greater appreciation of cultural heritage and increase involvement in recreational activities.

4 Management framework

4.1 VISION

The Trust’s vision for the Reserve is for a well-managed and resourced urban bushland, the preservation of its Aboriginal cultural heritage, the preservation of its natural flora and fauna, and the provision of environmentally compatible public recreation opportunities.

The vision reflects the priorities, values and desires for the future of the area. It is consistent with views expressed during stakeholder consultation.

4.2 MANAGEMENT OBJECTIVES

Management objectives are outlined below for each element in the vision.

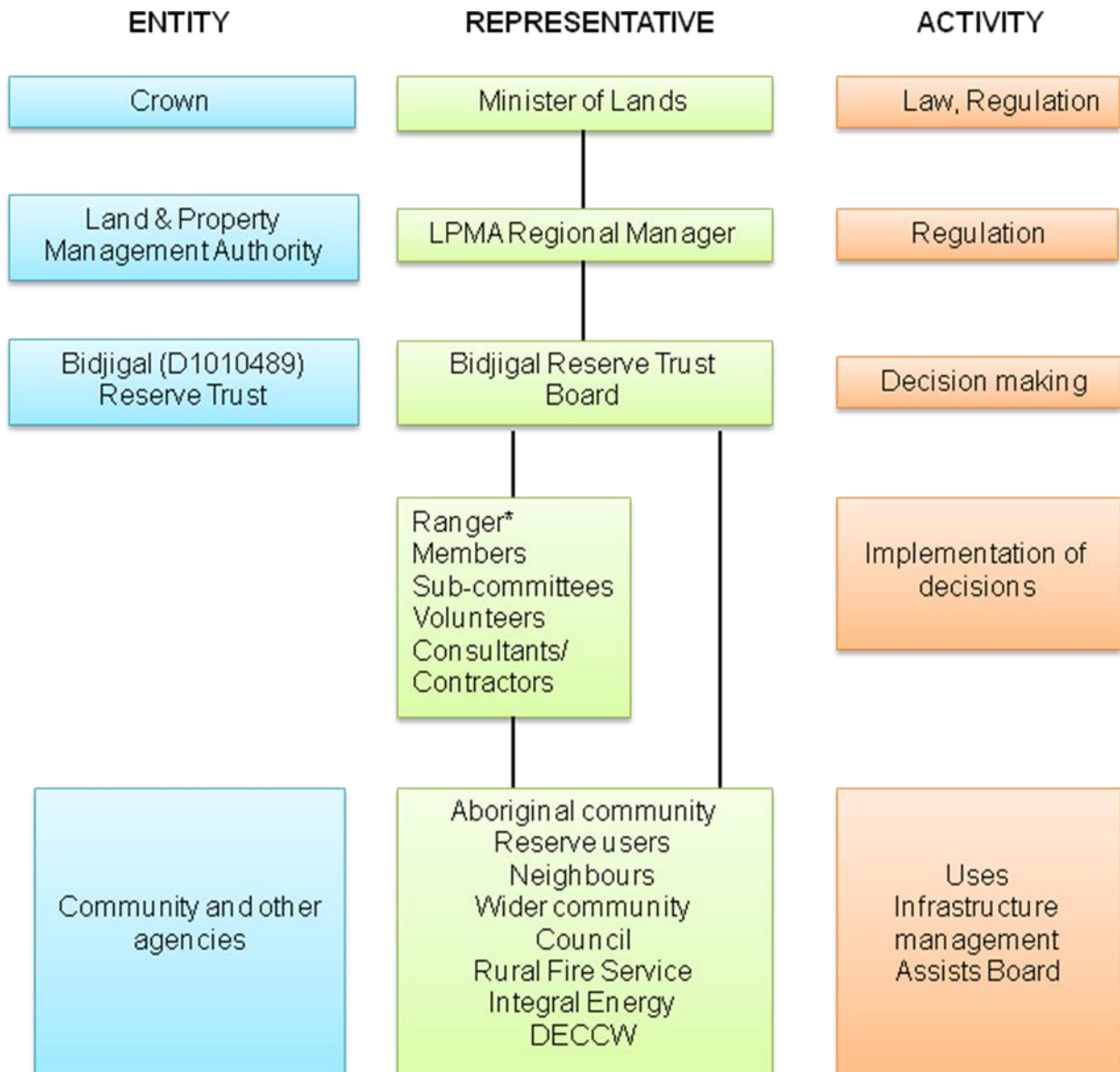
Table 9: Management objectives

ELEMENT	MANAGEMENT OBJECTIVES
Management and resources	<p>Provide a safe and healthy environment for people using and working in the Reserve</p> <p>Increase community involvement and education</p> <p>Improve communication between the Trust and the community</p> <p>Establish a well defined reserve boundary (as required by the Deed of Agreement) that closely aligns with the margins of natural bushland</p> <p>Reduce the impacts from encroachments and adjacent activities</p>
Aboriginal cultural heritage	<p>Manage and protect known, and as yet unrecorded, Aboriginal cultural heritage sites and values within the Reserve in accordance with <i>National Parks and Wildlife Act 1974</i>, the <i>Heritage Act 1977</i> and other relevant legislation</p> <p>Actively involve the Aboriginal community in the management of Aboriginal sites, items and other values as well as in presentation of the area’s cultural heritage values. Management decisions and, as far as practicable, the conservation and other management actions relating to the Reserve’s Aboriginal cultural heritage sites/values will be undertaken in collaboration with Aboriginal groups and people associated with the area and advice from the DECCW where warranted.</p> <p>Present the Reserve’s Aboriginal cultural heritage values, and selected sites if appropriate, for interpretative and educational use – where supported by the Aboriginal community</p> <p>Increase awareness, appreciation and respect for the Reserve’s Aboriginal cultural heritage sites and values, as well as the continuing significance for Aboriginal people, among Reserve neighbours and visitors</p> <p>Promote and implement measures to further investigate the Reserve’s Aboriginal</p>

ELEMENT	MANAGEMENT OBJECTIVES
	<p>history, sites, values and significance</p> <p>Ensure that Aboriginal cultural heritage sites and values are appropriately addressed in the planning, development and management of Reserve facilities, in routine and emergency management operations, and in any third party proposals/activities</p> <p>Ensure that information regarding Aboriginal cultural heritage sites is recorded, stored and dealt with securely where warranted</p>
Ecology	<p>Protect and enhance biodiversity, particularly threatened flora and fauna species and habitat, in accordance with the <i>Threatened Species Conservation Act 1995</i> and <i>Environment Protection and Biodiversity Conservation Act 1999</i> and other relevant legislation</p> <p>Reduce threats to biodiversity (e.g. weeds, native vegetation clearing), with consideration given to key threatening processes identified by DECCW</p> <p>Maintain and improve water quality and aquatic ecosystems</p> <p>Revegetation programs are based on local genetic material</p> <p>Reduce the frequency and spread of declared noxious and environmental weeds.</p> <p>Reduce the impacts from domestic and feral animals.</p> <p>Maintain biodiversity of plant and animal communities in bushfire hazard reduction areas.</p> <p>Identify and protect fire sensitive species</p>
Recreation	<p>Allow ecologically sustainable recreational activities within acceptable thresholds of impact, to be determined on a case-by-case basis</p> <p>Upgrade and maintain a well defined, sign-posted track network. Identify tracks suitable for different uses e.g mountain biking</p> <p>Improve water quality, and minimize erosion, soil loss and sedimentation</p>

4.3 RESPONSIBILITIES AND FUNDING

Responsibilities and relationships relevant to management of the Reserve are depicted in **Figure 10**.



*This role is currently undertaken by BRTB members

Figure 10: Management structure

The Board Secretary is currently responsible for managing all correspondence in relation to Bidjigal Reserve, including liaison with third parties and those responsible for implementation of decisions (as indicated in **Figure 10**). As outlined in the following sections, a ranger (if appointed) would be able to assist this role.

Types of decisions can be broadly grouped into:

- Routine matters that should be resolved or implemented through reference to the Trust’s policies and plans, statutory requirements, and other available information
- Other matters that require discussion at Board level, including allocation of funds and policy decision-making

Written records need to be kept of actions and decisions.

A Resourcing Plan needs to be developed for the Reserve which reflects the following responsibilities and funding arrangements.

4.3.1 The Trust Board

The original Deed of Agreement to establish Bidjigal Reserve Trust did not assign clear responsibilities to the signatories (Background Information endorsed by the Board of the Bidjigal Reserve Trust 15 October 2009). However, the Trust Board assumes responsibility for decision making and delegating works required, whether to Board members, contractors, Council, other groups or volunteers. This includes:

- Development and implementation of policies
- Publicity and promotion of the Reserve and Trust activities
- Preparation and administration of funding/resourcing grants
- Responses to development applications and proposed activities (e.g. sewer maintenance) for areas bordering or within the reserve
- Educational activities e.g. guided walks for local schools, community groups
- Liaison with groups/users e.g. Western & Hills Orienteers needing to define 'out of bounds' areas for events
- Involvement of Aboriginal groups/individuals in decision-making regarding the management of Aboriginal heritage sites and values
- Legislative obligations for the protection of all tangible Aboriginal heritage items, whether officially listed or otherwise documented, under the *National Parks and Wildlife Act 1974*

At present, funding for projects within the Reserve is primarily provided through government grants and management is largely coordinated/conducted by community volunteers. A small amount of income is generated from guided walks and bank interest. This lack of resources for management has contributed to concerns about the condition of the bushland and appropriate activities within it.

The Trust is presently negotiating with Council towards an agreement to engage Council (as a contractor) for the provision of on-ground or other works at a reduced rate. It may be more cost effective to appoint a ranger to carry out some of the work that may be included in the agreement when finalised.

4.3.2 Reserve ranger

It is recommended that a ranger be appointed by the Board and be responsible for coordinating:

- Work required in the reserve e.g. track maintenance, ecological burns, bush regeneration – including greater volunteer/community involvement
- Rapid resolution of problems, including public safety concerns
- Enforcement e.g. dogs, trail bikes, rubbish
- Monitoring e.g. threatened species habitat, bouldering and abseiling areas, walking tracks, heritage sites
- Assist with Board activities where required in the responsibilities listed above (**Section 4.3.1**)

Costs associated with the ranger would include a part-time salary, vehicle mileage and disbursements such as stationery. It is estimated this could be done for an annual cost of about \$80,000. It is

anticipated that office rental could be provided at minimum cost by sharing with Council. If funding for a ranger is not available, the Plan could be implemented by a team of volunteers guided by the Trust.

4.3.3 Funding and reporting

Funding source(s) and reporting lines have not been identified for the proposed reserve ranger position. Options could include The Hills Shire Council; the Sydney Metropolitan Catchment Management Authority (SMCMA); the Department of Environment, Climate Change and Water; the Catchments and Lands Division of the Department of Primary Industries or The Bidjigal Reserve Trust (although the Trust does not have ongoing, secure funding). It may also be possible to contract these functions to a suitable company. It is recommended that the Board explore these options further.

Funding and in-kind contributions to implement actions identified in this Plan can be sought from a range of sources, for example:

- State and Commonwealth government environmental, recreation, cultural and volunteer grants
- The Hills Shire Council decided unanimously in 2010 to enter into an agreement to provide works at cost to the Trust. Negotiations between Council and the Trust are ongoing. It is likely that Council would be engaged as a contractor for on-ground and other works, at a reduced rate.
- Council's Stormwater Levy for drainage and stormwater treatment works on Council's land (outside the Crown Land Reserve)
- Bushcare volunteers and other community groups (e.g. schools, scouts, orienteers, rock climbers etc) can assist with bush regeneration, revegetation, track maintenance, rubbish removal etc

The Trust currently has some funds provided by the Public Reserves Management Fund, administered by Catchments and lands, to spend on feral animal control, weed control and signage (refer to **Appendix A**). It is recommended that expenditure of these funds proceed under management of the Board.

Irrespective of the arrangements for funding and reporting, the Trust will need to maintain a close working relationship with a variety of organisations, including Council, the RFS, SMCMA, the DPI and the community.

If funding is not available for a ranger, actions within the plan could be implemented by a group of volunteers under direction from the Trust.

4.3.4 Contractors

Contractors may be appointed by Council, RFS, DPI or the Trust to work in natural areas for bush regeneration, weed control, general maintenance and facility installations such as walking tracks.

4.3.5 Agencies

There are a number of major easements passing through the reserve that are managed by agencies such as Sydney Water Corporation and Integral Energy. These agencies and their contractors are expected to operate in accordance with guidelines for the maintenance of engineering assets such as sewers and electricity transmission lines. The guidelines require that relevant parties, in this case representatives of the Bidjigal Reserve Trust, be consulted prior to work being undertaken.

Many of the threats to the reserve arise from broader activities in the catchment. Council and some agencies (e.g. CMA, Sydney Water) have a number of existing education and on-ground works programs that could be applied or expanded to benefit Bidjigal Reserve. The Trust needs to work closely with Council and relevant agencies to improve catchment management by on-ground actions and education. Examples include:

- Installing stormwater pollution controls to reduce weeds and pollutants entering the Reserve from upstream shopping centres and residences. Point source stormwater discharges to the reserve are identified in **Figure 3**
- Reducing the frequency and volume of sewer overflows
- Educating residents and businesses in the catchment about stormwater and litter
- Educating neighbours to the reserve regarding encroachments and garden escapees

4.3.6 Community involvement

Effective management of natural areas requires a sympathetic public, informed about the values of natural areas and the impacts society can have on its viability. The level of awareness and sympathy towards natural areas varies considerably within the community. Some of the more obvious symptoms of the lack of awareness or disregard for bushland values include:

- Dumping of domestic and garden refuse in the bush
- Encroachment of private properties into bushland or open space (retaining walls, tracks, steps)
- Destruction and damage to tracks and signs
- Lack of control of domestic pets in bushland
- Unauthorised clearing of bushland understorey
- Unauthorised poisoning and lopping of trees
- Planting of inappropriate species in, or on the boundaries of reserves
- Discharging water from swimming pools into bushland
- Discharging water from tennis courts, roofs, other hard surfaces and gardens into bushland

There are a range of opportunities for greater community involvement in the management of Bidjigal Reserve. These cover research, education, training and participation. Feedback from community consultation indicates that there are a number of schools, scout groups, recreational and environmental groups, and individuals that are keen to learn more about the Reserve, and help protect and manage it through 'hands-on' activities.

Examples of how this could be achieved include:

- Volunteer bush regeneration and track maintenance activities
- Rubbish removal (e.g. Clean-up Australia Day)
- Monitoring (e.g. water quality, recreational use, flora and fauna)
- Prevention of threats (e.g. garden dumping and encroachments) through community education

Existing community involvement in vegetation management should be strongly supported and expanded, if possible. For example, bush regeneration undertaken by volunteers has significantly reduced weed infestation, and improved habitat and amenity along Blue Gum Creek. The role and operation of Council's Bushcare program within the reserve needs to be discussed and clarified with Council.

All community involvement needs to be conducted in accordance with the:

- *Occupational Health and Safety Act 2000* (and Regulation 2001)
- National Standards for Involving Volunteers in Not for Profit Organisations³

³ http://www.volunteeringaustralia.org/html/s02_article/article_view.asp?id=124&nav_cat_id=163&nav_top_id=61

5 Actions

Actions that have been identified in this Plan address the three dedications for the Reserve:

- Preservation of Aboriginal cultural heritage
- Preservation of flora and fauna
- Public recreation

The actions are summarised in **Table 10** and, where possible, illustrated in **Figure 11**. The table allocates priorities, responsibilities, performance objectives/expected outcomes and cost estimates.

The Board has requested that this Plan have a five-year time frame. Priority for each action is rated as follows:

- High priority – within one year
- Medium priority – within two to three years
- Low priority – within five years
- Ongoing

According to best practice environmental management principles, highest priority should be given to protecting larger areas of better quality bushland before rehabilitating degraded areas. Priority should also be given to mitigating serious threats.

On-ground works proposed in this Plan do not require development consent because they fall within the framework of exempt development under the State Environmental Planning Policy (Infrastructure) 2007 (the SEPP). In summary, exempt development must be carried out by or on behalf of a public authority (such as the Trust) and be of minimal environmental impact. Examples of exempt development listed under Schedule 1 of the SEPP include maintenance of existing fire trails or asset protection zones, installation of certain types of directional or information signs, and boundary adjustments to create a public reserve.

A Section 132C licence from the Department of Environment, Climate Change and Water will be needed to conduct environmental management works such as weed control and revegetation in areas where an endangered ecological community is present.

Table 10: Actions

NO.	ACTION	PRIORITY	PERFORMANCE MEASURE/OUTCOME	COST	RESPONSIBILITIES	Refer Sections in the PoM
Management Actions						
M1	Develop resourcing plan	High	Resourcing plan ready	V/S	Trust	4.3
M2	Seek & obtain funds for implementation of actions. Expend current available funds as allocated for feral animal control, weed control and signage	High – Ongoing	Adequate funds	V/S	Trust	4.3
M3	Engage ranger to guide implementation of the Plan of Management. However if a ranger cannot be employed, a committed team of volunteers could be used to implement the plan.	High	Ranger engaged	\$80,000 p.a.	Trust	4.3,2
M4	Liaise with Council to establish an office 'base' for the ranger/ volunteers e.g. nursery, Council office, new building just outside the reserve	High	Office available for use	V/S + Office rental	Trust & Council	4.3.2
M5	Liaise with agencies regarding maintenance of infrastructure and easements e.g. culverts, sewer, electricity transmission	Ongoing	Infrastructure & easements maintained appropriately	N/A	Council, SWC, other agencies	3.5, 4.3.5,
M6	Prepare signage strategy and install signage	High	Suitable signage installed	\$30K	Trust	3.6, 3.7
M7	Cadastral survey of reserve boundaries	Med	Reserve boundaries defined	\$100,000	Trust, Council & DPI	1.1, 3.1, 4.2
M8	DPI to investigate possible acquisitions of adjoining bushland for the reserve. DPI & the Commonwealth to consider potential contamination issues if the former Rifle Range land is to be added to the reserve	Med – Low	Suitable areas identified and acquired	N/A	DPI	3.1

NO.	ACTION	PRIORITY	PERFORMANCE MEASURE/OUTCOME	COST	RESPONSIBILITIES	Refer Sections in the PoM
M9	Seek clarification about management responsibilities regarding bushland in areas that adjoin the Reserve	High	Responsibilities clarified	V/S	Trust, RTA, Council & DPI	3.1
M10	Establish & implement a policy on encroachments and dumping	High	Better management of encroachments & dumping	\$5,000	Trust or Ranger	3.9, 4.2
M11	Trust to make a submission to Council requesting rezoning of the reserve to E2 in accordance with the LEP template	High	Submission made	V/S	Trust	2.3.3
M12	Report sewer & water pipe overflows and leaks to Sydney Water on 13 20 90	As needed	Prompt reporting and action to address overflows & leaks	N/A	All	3.5.2
M13	SWC to reduce the frequency & volume of sewer overflows, where possible	Ongoing	Reduce sewage pollution	N/A	SWC	3.5.2
M14	Liaise with Council to improve stormwater quality prior to it entering the reserve	High	Identify opportunities for improved stormwater control	V/S	Trust & Council	3.5.1
M15	Liaise with the RTA to improve stormwater management, reduce weed incursions, determine responsibility for management of Aboriginal cultural heritage sites, and reduce noise associated with the M2	High	Improved environmental management of M2 corridor	V/S	Trust & RTA	3.5.1, Appendix G
M16	Liaise with Council to prepare & implement a community education campaign (e.g. for residents & businesses in the catchment; local schools & community groups; recreational users; and neighbours to the reserve)	Med	Effective community education	N/A	Trust & Council, BFMC	3.4.5, 3.5.1, 3.6, 3.8, 3.10, 4.2, 4.3

NO.	ACTION	PRIORITY	PERFORMANCE MEASURE/OUTCOME	COST	RESPONSIBILITIES	Refer Sections in the PoM
M17	Liaise with schools to increase schools' use of the reserve for educational purposes	Med	Increased use of the Reserve by local schools in their education programs and activities	V/S	Trust, local schools	3.8, 4.3, 6
M18	Prepare promotional material for Trust activities e.g. guided walks	Ongoing	Promotional material	\$2,000 p.a.	Trust	4.2, 4.3.1
M19	Maintain membership on the Bush Fire Management Committee (BFMC) to coordinate proposals for hazard reduction burns and APZ maintenance.	Ongoing	Coordination of bushfire information	V/S	Trust & BFMC	3.11
M20	Maintain bushfire APZs & undertake mosaic hazard reduction burns across the reserve in consultation with BFMC. Consider threatened species' requirements when scheduling burns	Ongoing	Coordination of bushfire activities	Shared cost N/A	Trust, Ranger, RFS, Council, BFMC	3.11, 3.4
M21	Implement all actions as ascribed to the Trust by the Bushfire Risk Management Plan	Ongoing	Involvement in bushfire management, including community education	Shared cost N/A	Trust or Ranger, BFMC	3.11
M22	Increase the number of volunteers participating in ongoing, well planned, supported, trained and supervised volunteer programs	Med	Improved volunteer services	V/S	Trust	4.3, 4.2
M23	Monitoring & adaptive management. Any monitoring data will be provided to relevant agencies, e.g. AHIMS, NSW Wildlife Atlas	Ongoing	Determine trends & effectiveness of management; adjust management as needed	\$10,000 p.a.	Trust, SWC	6

NO.	ACTION	PRIORITY	PERFORMANCE MEASURE/OUTCOME	COST	RESPONSIBILITIES	Refer Sections in the PoM
Aboriginal Heritage Actions						
A1	Comprehensive Aboriginal cultural heritage survey of the reserve	Med	Complete Aboriginal heritage baseline data	\$50,000	Trust	3.10.2, 6, Appendix G
A2	Prohibit recreational activities from site DMC4 because of Aboriginal heritage sensitivities – mechanism(s) for protection (e.g. signage, education, monitoring) to be determined in consultation with Aboriginal community	Ongoing	Site protected	V/S	Trust (especially Aboriginal community reps), Ranger	3.10.2, Appendix G
A3	Investigate how the new Darug Tribal Aboriginal Corporation (DTAC) cultural centre at Seven Hills can facilitate education programs focusing on Aboriginal cultural heritage in the reserve	Med	Determine role of cultural centre	N/A	Trust & Aboriginal community reps	3.10.2, Appendix G
A4	Implement actions relevant to Aboriginal cultural heritage described in Appendix G	Ongoing	Protect & raise awareness of Aboriginal cultural heritage	\$10,000 p.a.	Trust, Ranger & Aboriginal community	3.10.2, Appendix G
A5	Investigate grants available to fund development of a Heritage Management Plan.	Med	Funding obtained	N/A	Trust & Aboriginal community	3.10.2, Appendix G
Ecology Actions						
E1	Comprehensive ecological survey of the reserve	Med	Complete ecological baseline data	\$50,000	Trust	6
E2	Weed control & bush regeneration in accordance with the VMP, four sites were identified as having a high management priority (referred to as an 'extreme' priority in the VMP – Appendix D)	High – ongoing	Refer to VMP	\$50,000 p.a. initially, then \$10,000 p.a. for follow-up	Trust or Ranger	Appendix D

NO.	ACTION	PRIORITY	PERFORMANCE MEASURE/OUTCOME	COST	RESPONSIBILITIES	Refer Sections in the PoM
E3	Weed control & bush regeneration in accordance with the VMP (high priority sites in Appendix D)	Med – ongoing	Refer to VMP	\$50,000 p.a. initially, then \$10,000 p.a. for follow-up	Trust or Ranger	Appendix D
E4	Weed control & bush regeneration in accordance with the VMP (Moderate priority sites in Appendix D)	Low – ongoing	Refer to VMP	\$50,000 p.a. initially, then \$10,000 p.a. for follow-up	Trust or Ranger	Appendix D
E5	Collect seed for bush regeneration activities – liaise with Council to determine if adjacent nursery can be used	High	Refer to VMP	\$10,000	Trust or Ranger	Appendix D
E6	Engage professional bush regenerators to implement the VMP, with support from community volunteers. VMP tasks to be scheduled & performed with reference to recovery plans for threatened species	Ongoing	VMP implemented by professional bush regenerators & the community. VMP work assists recovery of threatened species	Costs covered above	Trust or Ranger	3.4, Appendix D
E7	Liaise with Council regarding Bushcare in the reserve & VMP implementation	High	Re-establish Bushcare groups operating in the reserve	V/S	Trust or Ranger & Council	3.4.5, 4.3.6, Appendix D
E8	Provide records of threatened species to DECCW for the NSW Wildlife Atlas database	Ongoing	Updated database	N/A	Trust or Ranger & DECCW	6
E9	Continue fox and rabbit control programs; and remove feral bee and wasp nests	Ongoing	Control/eliminate pest fauna	\$5,000 p.a.	Trust or Ranger	3.4.5
E10	Regularly update map to show new records of threatened species within the reserve, and give consideration to results for management purposes, e.g. weed and bushfire control	Ongoing	Threatened species habitat map kept up to date	< \$2,000 p.aa	Trust or Ranger	3.4

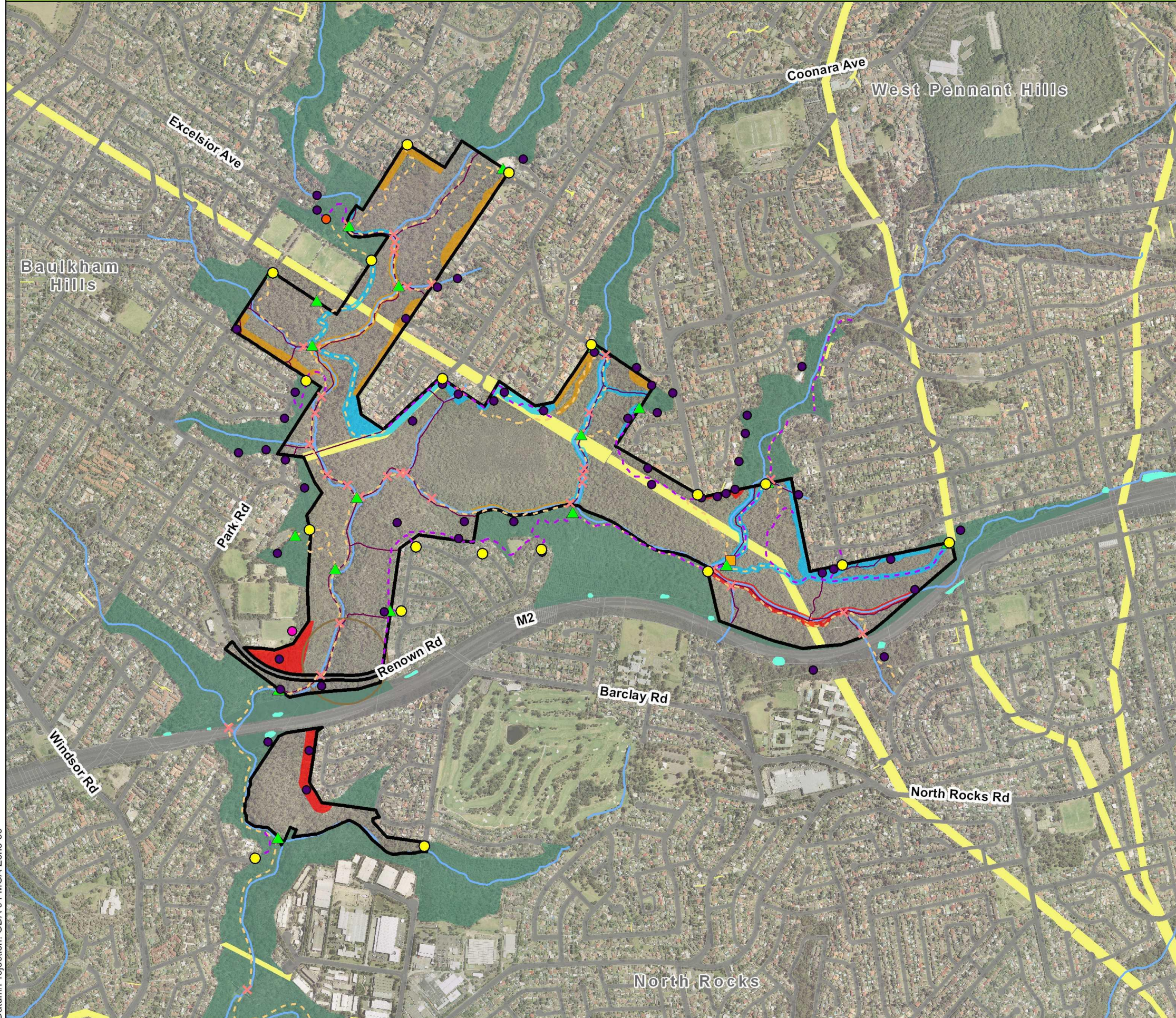
NO.	ACTION	PRIORITY	PERFORMANCE MEASURE/OUTCOME	COST	RESPONSIBILITIES	Refer Sections in the PoM
Recreation Actions						
R1	Recreation survey to determine current uses and future needs	Med	Understanding of current types & intensity of recreational activities in the reserve, and needs	\$30,000	Trust	3.6
R2	Maintenance & repair of the fire trail and tracks to standard suitable for intended use (e.g. fire trail, mountain biking, walking). Consider safety, erosion control, grading, and removal of fallen trees and large branches. Close & rehabilitate minor tracks	Ongoing	Identify suitable uses for different trails; identify maintenance requirements; well-maintained tracks	\$20,000 p.a.	Trust, Ranger & RFS	3.6.1
R3	Review creek crossing infrastructure to determine priority for replacement and/or maintenance (cost allows for design & construction of new and/or replacement crossings)	High	Degraded creek crossings repaired or replaced	\$50,000 ea	Trust	3.6.1
R4	Install a picnic table and chairs in the cleared area at the main junction of the track at the western end of Blue Gum Creek	Med	Picnic facilities installed	\$30,000	Trust or Ranger	3.6.4, 3.6.6
R5	Install a shelter at Eric Mobbs Reserve (which is outside Bidjigal Reserve, but would be used by people accessing Bidjigal)	Med	Shelter installed	\$30,000	Trust or Ranger & Council	3.6.4, 3.6.6
R6	Establish a code of conduct for recreation users to inform signage, education & enforcement;	High	Code of conduct developed & implemented	\$5,000	Trust	3.6

NO.	ACTION	PRIORITY	PERFORMANCE MEASURE/OUTCOME	COST	RESPONSIBILITIES	Refer Sections in the PoM
	including education on keeping all dogs on a leash while in the reserve; and onus on bouldering community to regulate their activities.					
R7	Recreation user-groups to liaise with the Trust prior to events being held in the reserve	Ongoing	Liaison prior to events	N/A	Trust & groups	3.6
R8	Formally advise bouldering groups of their obligations and responsibilities under the NPW Act to not cause harm to items of Aboriginal heritage, via letter.	High	Letter sent to bouldering groups	N/A	Trust	Appendix G
R9	Hold meetings for mountain and BMX bike riders to assess risks and impacts with a view to restricting access in vulnerable areas.	Ongoing	Group consultation	N/A	Trust or Ranger	3.6.1


















V/S = Board volunteer or ranger salary

N/A = not available, cost may be covered fully or in part by agencies

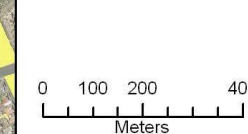
Actions



Bidjigal Reserve - Selected Actions

-  Survey boundary, investigate possible encroachments & adjoining bushland suitable for acquisition
-  High Priority Vegetation Management Plan (VMP) sites
-  Moderate Priority VMP sites
-  Low Priority VMP sites
-  Agencies to liaise with Trust regarding maintenance of infrastructure & easements
-  Liaise with the RTA to improve stormwater management
-  LPMA to investigate possible acquisitions of adjoining bushland for the reserve
-  Limit recreational activities near DMC4
-  Report sewer & water pipe overflows and leaks to Sydney Water on 13 20 90
-  Vehicle track maintenance
-  Walking track maintenance
-  Possible locations for signage
-  Proposed location for picnic table
-  Proposed shelter shed location
-  Investigate stormwater control improvements
-  Investigate creek crossing infrastructure
-  Council nursery - possible office base and site for seed propagation

Datum/Projection: GDA 94 MGA Zone 56



6 Monitoring

Monitoring and adaptive management are required to ensure the management objectives listed in **Table 9** are being achieved, or at least worked toward. **Table 11** indicates the types of monitoring that could be undertaken to assist ongoing management. It is recommended that at least \$10,000 be available for monitoring each year. Other groups (e.g. schools, the SMCMA) should be encouraged to monitor conditions with the reserve as well, and share the results of monitoring with the Trust to improve management.

If monitoring results indicate that activities are causing environmental conditions to deteriorate, additional management measures need to be implemented (e.g. education, enforcement, soil erosion controls, weed and rubbish removal). If conditions deteriorate further, consider restricting access to these areas temporarily or permanently.

Table 11: Monitoring

CATEGORY	MONITORING REQUIRED
Community involvement and education	Records of community involvement and education programs e.g. numbers of participants, types of programs and activities offered, and feedback about the quality of programs and activities Results to indicate where to build on or consolidate previous success or modify programs/activities to be more effective
Recreation	Areas of known high use or environmental sensitivity for flora species, fauna habitat, soils erosion, rubbish etc to determine if conditions are deteriorating as a result of recreational activities
Aboriginal cultural heritage	Known Aboriginal cultural heritage sites, including sites in restricted access areas
Boundaries, edge effects and encroachments	Environmental conditions along the boundaries of the reserve
Water and soils	Soil erosion, particularly associated with tracks Water quality and aquatic ecosystems
Ecosystems, particularly in response to bush regeneration	Species diversity Vegetation condition and fauna habitat Opportunistic and targeted fauna monitoring, including feral animals
Fire	Fuel loads, soil erosion, populations of fire sensitive species, and biodiversity recovery following fire

Results of monitoring will be essential to inform adaptive management practices. Environmental managers often deal with considerable uncertainty and complexity about how ecosystems and the physical environment interact. Adaptive management is a widely accepted approach to natural resource management that involves learning from implementation. By following the adaptive management cycle (shown below), practitioners ensure that learning is focussed on management needs and that new knowledge feeds back to inform future management choices.

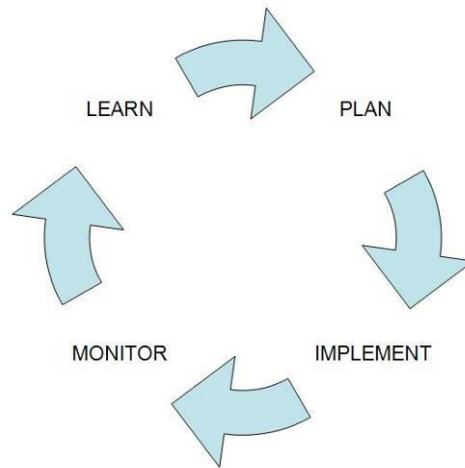


Figure 12: Adaptive management cycle

People (including students) involved in monitoring or research that could potentially impact a threatened species, population or ecological community or their habitats (*Threatened Species Conservation Act 1995*), or any protected species listed under the *National Parks and Wildlife Act 1974*, need to hold a current Section 132C Scientific Licence from the Department of Environment, Climate Change and Water. People seeking to trap, capture or collect native fauna are also required to obtain an Ethics Licence from NSW Industry and Investment.

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Appendix A: Reserve Trust Annual Report



Annual Report for 2009-2010

Item	Description	Detail
Financial statements setting out details of income, expenditure, assets and liabilities,	Gross Income:	36334
	Gross expenditure:	37827
	Cash assets	12654
	Investment Assets	73873
	Structural Assets	120000
	Other Assets	0
	Total Assets	206527
	Debts	0
	Other Liabilities	0
	Total liabilities	0
	Profit/Loss	-1493
The value and condition of all assets (other than land) valued at \$5,000 or more	Footbridges and signs (good condition) (est)	\$120,000
Heritage items		NIL
The value of work and improvements undertaken costing more than \$5,000	Blue Gum Creek Crossing (by others)	\$90000
Any insurance arrangements in place	<i>Standard TMF insurance</i>	1000000
The fire prevention and occupational, health and safety measures in place	APZ strategy adopted	
Any plans of management in place		NIL
Any environmental management initiatives undertaken	Fox baiting, APZ management, tree management	4500
Purposes for which the reserve is used	Preservation of Aboriginal Cultural Heritage Preservation of Flora and Fauna Public Recreation	
Any particulars of pecuniary interests recorded in the book referred to in clause 1 (3) of Schedule 4 to the Act		NIL
Grants or sponsorship received	Dept of Lands / DPI (Feral Animal control)	\$3000
	Donations from school	\$525
	PRMF	\$30,000
Employees and contractors, including any training provided to such persons	Estimated number of contractors:	12
	Training provided	NIL
The number of trust board meetings held during the financial year	Meetings held	10
Any other matter required to be reported under section 96A of the Act .		NIL

Appendix B: Stakeholder issues paper

This paper summarises the methodology and results of initial stakeholder consultation undertaken for the Bidjigal Reserve Plan of Management in 2010. It includes:

- A brief discussion of the methodology and issues
- The list of stakeholders consulted during this period
- A summary table of key issues

Responses have been used to inform the Plan of Management.

B.1 DISCUSSION OF METHODOLOGY AND RESULTS

This section provides a brief discussion of the methodology and issues raised during initial stakeholder consultation.

Method

Consultation was undertaken between February and April 2010.

A range of media were used to invite Aboriginal groups, local schools, community groups and government organisations to identify key issues relevant to management of Bidjigal Reserve. Known stakeholders that were consulted directly via letter and/or email are listed in the following section. Media releases in the following newspapers were used to invite the broader community to comment:

- The Hills Shire Times
- The Hills News
- Parramatta Advertiser
- The Koori Mail
- National Indigenous Times
- Advertisement in the Sydney Morning Herald – Public Notices (Weekend Edition February 27-28, 2010, page 11)

Responses

Almost thirty responses were received from individuals and representatives of community or government organisations. Email and letter responses are summarised in Section B.3.

Key points

There was acknowledgement of the substantial, voluntary efforts of individuals and community groups who have been involved in the protection and management of the reserve over the years.

Key values of the reserve were consistently identified by stakeholders as the natural environment, recreational opportunities and Aboriginal cultural heritage.

The important ecological values of the reserve were highlighted and the need to protect these values was emphasized. Values include threatened species such as the Powerful Owl, Eastern Bentwing-bat, Greater Broad-nosed Bat and *Hibbertia superans*.

A recurring theme from a diverse range of respondents was the desire to ensure that people have the opportunity to continue to participate in 'nature based' recreational activities. There were two differing views regarding appropriate recreation:

- Some respondents recommended that recreational activities other than walking, picnicking and observing nature be excluded from the reserve because of potentially detrimental impacts. Prohibited activities would include dog walking, bouldering, mountain-bike riding
- Other respondents suggested that people should be encouraged to recreate in the reserve inclusive of a broader range of activities so that they experience nature and

therefore are more likely to value it. These respondents recognised that there would be a need to manage impacts in urban bushland

Some submissions referred to the 'Go Ape' proposed adventure recreational facility. Views were expressed in favour or against this proposal.

Submissions indicated a desire to protect and better understand Aboriginal cultural heritage in the reserve. Some sites may be suitable for educational use, possibly in conjunction with the new DTAC cultural centre at Seven Hills.

An Indigenous Land Use Agreement (ILUA) is being pursued over the reserve (and other lands) as part of settlement of a native title claim. Implications for the Plan of Management need to be identified as a priority.

Suggested management

Many submissions made recommendations about management of the reserve.

There is broad agreement between stakeholders about the need to reduce threats to the three core values of the reserve (i.e. biodiversity, Aboriginal cultural heritage and recreational opportunities). The main threats are typical of urban bushland reserves and include weeds, pest animals, inappropriate fire regimes, rubbish, graffiti, erosion and pollution.

Some submissions suggested that a reserve ranger with access to ongoing funds is needed to coordinate management, compliance and enforcement of activities within the reserve. It was further suggested that better signage and education would be needed to prevent threats.

Some stakeholders identified the need for a comprehensive bush regeneration/weed control program to be implemented by professional bush regeneration contractors.

The importance of education was highlighted by several stakeholders. There are opportunities for nearby schools, universities and community groups (e.g. scouts) to utilise the reserve in programs regarding Aboriginal cultural heritage, the natural environment and recreation. A number of stakeholders suggested that there is a need for local residents to be better educated about their impacts on the reserve to minimise threats from weeds, domestic animals, stormwater pollution and bushfire risk.

A few submissions referred to a rezoning proposal for the reserve to E2 Environmental Conservation in the Draft LEP 2010.

Approach to be taken in the PoM

The Plan of Management will highlight the values of Bidjigal Reserve, and pressures from the surrounding areas and activities within it.

To address the challenge presented by different views about what is acceptable recreation in this urban bushland reserve, we suggest that better management, education and enforcement is required and can only be achieved with dedicated on-ground resources and ongoing funding as well as community support.

The Plan will recommend that high priority be given to protecting and improving the values of the reserve by:

- Greater bush regeneration and weed control
- Identification of 'no go' areas of high conservation value
- Rationalisation and improved maintenance of the track network
- Appropriate bushfire control regimes that account for ecological requirements as well as asset protection
- Improved stormwater management from surrounding catchments (primarily the responsibility of Council and Sydney Water Corporation)
- Education programs for users of the reserve, local residents, schools and community groups e.g. targeting groups such as the rock climbers or dog walkers
- Greater focus on Aboriginal cultural heritage through education programs in conjunction with the DTAC centre at Seven Hills
- Installation of informational and directional signage
- Enforcement and coordinated management by a ranger

B.2 LIST OF STAKEHOLDERS CONSULTED BY LETTER &/OR EMAIL

Government Organisations

- Hills Shire Council
- Integral Energy
- Department of Primary Industries
- NSW Rural Fire Service
- Sydney Metropolitan Catchment Management Authority
- Sydney Water Corporation
- Telstra Corporation

Aboriginal Groups

- Deerubbin Local Aboriginal Land Council
- Metropolitan Local Aboriginal Land Council
- Darug Custodians Aboriginal Corporation
- Darug Tribal Aboriginal Corporation
- Darug Aboriginal Cultural Heritage Assessments
- Northwest Aboriginal Development Association
- Bundeluk

Community Organisations

Local Schools

- Baulkham Hills High School
- Baulkham Hills North Public School
- Beecroft Public School
- Castle Hill High School
- Gilroy Catholic College
- Muirfield High School
- Murray Farm Public School
- North Rocks Public School
- Northmead High School
- Northmead Public School
- Oakhill College
- Our Lady of Lourdes Primary School
- Tara Anglican School for Girls
- The Hills School
- The Kings School

- West Pennant Hills Public School

Other

- Australian Bouldering (Chris Webb and Dave Pearsons)
- Australian Climbing Association
- Australian Plants Society Parramatta Hills District Group
- Bidjigal Reserve Action Group
- Council Bushcare Groups
- Castle Hill Mens Shed
- Cilla and Ray Norris, Baulkham Hills
- Climb.org (Mike Moore and Kylie Dunsire)
- Confederation of Bushwalking Clubs NSW Inc
- Cumberland Bird Observers Club
- Excelsior Park Bushland Society
- Fern Gully Child Care Centre
- Geocaching NSW Inc.
- Greater Western Sydney Region
- Guides NSW - The Hills Region
- National Parks Association
- Nature Conservation Council of NSW
- Northern Sydney Region
- Orienteering Association of NSW
- Peter Balint (author of *Sydney Bouldering Guide, 2001*)
- Reconciliation 4 Western Sydney
- Scouts Australia NSW Branch
- Sheila Binegas (bouldering)
- THSC S355 Bushland Conservation Committee
- Tim O'Neill (bouldering)
- West Pennant Hills Valley Progress Association

B.3 SUMMARY OF STAKEHOLDER ISSUES

Each row represents one stakeholder response	Protect Aboriginal Heritage	Protect Native Flora ⁴	Protect Native Fauna/ Habitat	Bushfire	Climate Change	Domestic/ Feral Animals	Rubbish Dumping	Stormwater/ Water Quality	Soil Erosion/ Compaction	Track maintenance/ signage	Vandalism/ graffiti	Weed Management	Sustainable Recreation ⁵	Bouldering	Education	Orienteering	Scouts	Parking	Asset Mgmt	Compliance/ Enforcement	Content of PoM	Rezoning/ Adjacent Development	Go Ape Proposal	Rifle Range	Consultation	
	No issues raised																									
	✓	✓ ⁶	✓	✓						✓	✓ ⁷		✓	✓		✓			✓	✓	✓	✓	✓ ⁸		✓	✓
	✓	✓	✓																	✓	✓	✓				
	✓								✓											✓						
	No issues raised. Would like to review the draft																									
	✓	✓	✓											✓							✓			✓		
	✓													✓	✓	✓	✓				✓					
	✓	✓	✓ ⁹											✓					✓							
	✓	✓	✓	✓			✓				✓		✓	✓ ¹⁰	✓	✓			✓	✓ ¹¹	✓		✓	✓	✓	✓
														✓				✓								
	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓			
		✓						✓	✓					✓												
	✓	✓	✓				✓			✓	✓			✓		✓								✓	✓	
	✓	✓	✓				✓				✓			✓		✓								✓	✓	
	✓		✓				✓							✓		✓								✓	✓	
	No comment, copy of plan requested																									
	✓	✓												✓	✓											
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓					✓		✓	✓		✓
	✓	✓												✓		✓								✓	✓	
	✓															✓	✓									

⁴ Including unauthorised removal of native vegetation.

⁵ Sustainable recreation activities include: mountain bike riding, dog walking, trail and mini-bikes, rock climbing and abseiling.

⁶ Suggest a protection hierarchy or ranked system for vegetation conservation with buffer zones to limit development, tracks and recreational activities within high conservation areas. Address discrepancies in naming vegetation communities within the reserve.

⁷ Creek crossing are to be safe and flash flooding signage to be installed. Plan to consider future extension to the Great North Walk, in terms of the Governor Phillip Arm walk proposed through the reserve. Costing options have been provided.

⁸ Limit development/ commercial ventures to already cleared areas, and design these so they can be readily removed and bushland restored.

⁹ In particular protection of powerful owls.

¹⁰ Including population increase.

¹¹ Including dangerous creek crossings

Appendix C: Consultation

This appendix contains copies of consultation media, including:

- Media release (General) 22 February 2010 issued to Parramatta Advertiser, Hills Shire Times and Hills News
- Media release (Aboriginal) dated 22 February 2010 National Indigenous Times and Koori Mail
- Advertisement in the Sydney Morning Herald – Public Notices (Weekend Edition February 27-28, 2010, page 11)
- Letter to government stakeholders (example of letter to Council 22 February 2010)

All consultation media were issued with a colour map of the study area.



MEDIA RELEASE February 22, 2010

**INITIAL COMMUNITY CONSULTATION
BIDJIGAL RESERVE PLAN OF MANAGEMENT**

Members of the local and wider community are invited to take this first opportunity to contribute to the first Plan of Management for the popular and well loved Bidjigal Reserve.

Bidjigal Reserve (formerly part of Excelsior Park and Darling Mills State Forest) is the beautiful bushland that surrounds Darling Mills creek and its tributaries between Castle Hill, Carlingford and North Rocks. It contains sites of Aboriginal significance and is used for various activities by local residents as well as international visitors.

Since 2005 the Reserve has been managed by Bidjigal Reserve Trust Board, whose Trustee and ex-officio members have worked hard to set the vital plan of management process into action.

The Plan of Management recently commissioned by the Board will be prepared by environmental consultants Eco Logical Australia and heritage consultants Gondwana Consulting, working with the local Indigenous and wider community.

David Wilmshurst, spokesperson for the Board, said that "the development of a Plan of Management will involve wide scale community consultation and once completed will form the basis for all decisions related to the management of the Reserve."

The Plan will identify natural, recreational and cultural assets in the Reserve and how these should be preserved, as well as current issues for Reserve users and local residents, and opportunities for improvements. The Plan will therefore produce a set of recommended actions which will aim to balance:

- The preservation of Aboriginal cultural heritage, working with those Aboriginal people and groups associated with the area
- The preservation of native flora and fauna
- Public recreation opportunities

All members of the public are invited to contribute to preparation of the Plan. If you have information or ideas relevant to the Plan, the consultants would like to hear from you.

There will be further opportunities for the community to contribute to the Plan, including during the Public Exhibition of the Draft Plan of Management in mid-2010.

Further information can be obtained from the Board's website www.bidjigal.org.au and submissions can be forwarded to

Beth Medway
Bidjigal Reserve PoM
Eco Logical Australia
PO Box 12
Sutherland NSW 1499
Or by email to bidjigal@ecoaus.com.au

Media Contact: Beth Medway (02) 8536 8612



MEDIA RELEASE February 22, 2010

INITIAL COMMUNITY CONSULTATION BIDJIGAL RESERVE PLAN OF MANAGEMENT

Members of the northern Sydney Aboriginal community are being invited to help in the preparation of a Plan of Management for the popular and well loved Bidjigal Reserve.

Bidjigal Reserve (formerly part of Excelsior Park and Darling Mills State Forest) is the beautiful bushland that surrounds Darling Mills creek and its tributaries between Castle Hill, Carlingford and North Rocks in northern Sydney. It is located in the traditional country of the Darug People, and falls across the areas of both the Metropolitan and Deerubbin Land Councils.

The Reserve contains many sites of Aboriginal significance, and the reserve came about as a result of an earlier Native Title Claim on the area. Today it is enjoyed by local residents as well as international visitors, but very few know the value of the area to Indigenous People or the area's amazing cultural heritage.

Since 2005 the Reserve has been managed by the Bidjigal Reserve Trust Board, whose members have worked hard to get the Plan of Management process underway.

The Plan of Management recently commissioned by the Board will be prepared by environmental consultants Eco Logical Australia and heritage consultants Gondwana Consulting, working with the local Indigenous and wider community.

David Wilmshurst, spokesperson for the Board, said that "the development of a Plan of Management will involve wide scale community consultation and once completed will form the basis for all decisions related to the management of the Reserve."

The Plan will identify natural, recreational and cultural assets in the Reserve and how these should be preserved, as well as current issues for Reserve users and local residents, and opportunities for improvements. The Plan will therefore produce a set of recommended actions which will aim to balance:

- The preservation of Aboriginal cultural heritage, working with those Aboriginal people and groups associated with the area
- The preservation of native flora and fauna
- Public recreation opportunities

All members of the local Indigenous community, and wider public, are invited to contribute to preparation of the Plan. If you have information or ideas relevant to the Plan, the consultants would like to hear from you.

There will be further opportunities for the community to contribute to the Plan, including during the Public Exhibition of the Draft Plan of Management in mid-2010.

Further information can be obtained from the Board's website www.bidjigal.org.au and submissions can be forwarded to

Beth Medway
 Bidjigal Reserve PoM
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 Or by email to bidjigal@ecoaus.com.au
 Media Contact: Beth Medway (02) 8536 8612

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In The Supreme Court of New South Wales, Equity Division
AFTER 14 days from publication of this notice...
AFTER 14 days from publication of this notice...
AFTER 14 days from publication of this notice...

POWERBALL OFFICIAL RESULTS

Table with columns: Div, Prize Pool, Winners, Prize Value. Shows results for Thursday 25 February 2010.

JACKPOTS TO \$10 MILLION

A Power45 Entry picks all the Powerballs
LEPRECHAUN LUCK \$30,000 - Winning ticket sold at Rutherford
PEACOCK CASH \$30,000 - Winning ticket sold at Figtree

BRIDGE USA - Unbelievably Silly Actions

At all Australian national tournaments, the boards are duplicated across the whole field...
WEST NORTH EAST SOUTH
WEST NORTH EAST SOUTH

LOST AND FOUND

Phone: 13 25 35

PERSONAL AND MISSING FRIENDS
Phone: 13 25 35

COMPANY NOTICES

CECENNO CITY COUNCIL
MOTORCYCLE ACCIDENT
PASSPORT LOST

PUBLIC NOTICES

Phone: 13 25 35

ASSOCIATION OF STAIRS...
SOCIETY NO. 1
SOCIETY NO. 2

LEGAL NOTICES

AFTER 14 days from publication of this notice...
AFTER 14 days from publication of this notice...

DENTAL NOTICES

Phone: 13 25 35

ADULT SERVICES

PSYCHIC PHONE
ANDREW LOV & DESTINY



The Hills Shire Council
 PO Box 75
 CASTLE HILL NSW 1765

22 February 2010

To the General Manager,

RE: BIDJIGAL RESERVE PLAN OF MANAGEMENT – INITIAL COMMUNITY CONSULTATION

The Hills Shire Council is invited to take this opportunity to contribute to the first Plan of Management for the popular and well loved Bidjigal Reserve. Bidjigal Reserve (formerly part of Excelsior Park and Darling Mills State Forest) is the bushland that surrounds Darling Mills creek and its tributaries between Castle Hill, Carlingford and North Rocks. It contains sites of Aboriginal significance and is used for various activities by local residents as well as international visitors.

Since 2005 the Reserve has been managed by Bidjigal Reserve Trust Board, whose Trustee and ex-officio members have worked hard to set the vital plan of management process into action. The Plan of Management recently commissioned by the Board will be prepared by environmental consultants Eco Logical Australia and heritage consultants Gondwana Consulting, working with the local Indigenous and wider community.

The Plan will identify natural, recreational and cultural assets in the Reserve and how these should be preserved, as well as current issues for Reserve users and local residents, and opportunities for improvements. The Plan will therefore produce a set of recommended actions which will aim to balance:

- The preservation of Aboriginal cultural heritage, working with those Aboriginal people and groups associated with the area
- The preservation of native flora and fauna
- Public recreation opportunities

The Hills Shire Council is invited to contribute to preparation of the Plan by responding to this letter with information and/or requirements relating to management of the Reserve. We would appreciate if comments could be received by Eco Logical Australia before 31st March 2010.

Responses should be forwarded to Beth Medway, Senior Consultant at:

Bidjigal Reserve PoM
 Eco Logical Australia
 PO Box 12 Sutherland NSW 1499
 Ph. (02) 8536 8612

Kind regards,

Robyn Johnson
 Environmental Scientist

Appendix D: Vegetation Management Plan (UBM 2009)

Appendix E: Potential threatened flora species

Threatened flora species with the potential to occur within Bidjigal Reserve are tabulated below. Highlighted species have been recorded in the reserve.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	Heath and dry sclerophyll forest
<i>Acacia gordonii</i>		E	E	Grows in dry sclerophyll forest and heathlands amongst or within rock platforms on sandstone outcrops.
<i>Callistemon linearifolius</i>	Netted Bottle Brush	V		Grows in dry sclerophyll forest on the coast and adjacent ranges.
<i>Darwinia peduncularis</i>		V		Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone.
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V		Found in a range of habitat types, most of which have a strong shale soil influence.
<i>Grammitis stenophylla</i>	Narrow-leaf Finger Fern	E		Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower Grevillea	V	V	Range of vegetation types from heath and shrubby woodland to open forest.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Hibbertia superans</i>		E		Sandstone ridgetops often near the shale/sandstone boundary. Open woodland and heathland, and appears to prefer open disturbed areas, such as tracksides.
<i>Leptospermum deanei</i>		V	V	Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone
<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.
<i>Persoonia mollis subsp. maxima</i>		E	E	Sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with warm temperate rainforest influences. Associated species: Smooth Barked Apple <i>Angophora costata</i> , Sydney Peppermint <i>Eucalyptus piperita</i> , Red Bloodwood <i>Corymbia gummifera</i> , Turpentine <i>Syncarpia glomulifera</i> , Coachwood <i>Ceratopetalum apetalum</i> and Black Wattle <i>Callicoma serratifolia</i> .
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	V	Gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Triplarina imbricata</i>		E	E	<p>Along watercourses in low open forest with Water Gum (<i>Tristaniopsis laurina</i>).</p> <p>Found only in a few locations in the ranges south-west of Glenreagh and near Tabulam in north-east NSW.</p>
<p>Note:</p> <p>TSC Act = <i>Threatened Species Conservation Act 1995</i>; EPBC Act = <i>Environment Protection and Biodiversity Conservation Act 1999</i>; V = Vulnerable, E = Endangered, EP = Endangered Population Source: DECC (2008), DEWHA (2008), RBG (2008), Australian Museum (2008)</p>				

Appendix F: Potential threatened fauna species

Threatened fauna species with the potential to occur within Bidjigal Reserve are tabulated below. Highlighted species have been recorded in the reserve.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
Mammals				
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V		Rainforest, sclerophylla forest & woodland to heath – but heath & woodland preferred. Forages on banksias, eucalypts & bottlebrushes.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Hirundo ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	<p>Range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.</p> <p>Use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites.</p> <p>Females occupy home ranges up to about 750 hectares and males up to 3500 hectares; usually traverse their ranges along densely vegetated creeklines.</p>
<i>Dasyurus viverrinus</i>	Eastern Quoll	E		<p>Occurs in dry sclerophyll forest, scrub, heathland and cultivated land.</p> <p>Home ranges vary between sexes. Males may travel over a kilometre in a night, whilst females restrict their movements to a few hundred metres surrounding their dens.</p>
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		<p>Prefers moist habitats with trees >20 m. Roosts in hollow-bearing trees or under bark or in buildings.</p>
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V		<p>Roosting – caves, derelict mines, stormwater tunnels, buildings. Foraging - forested areas.</p>
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V		<p>Dry sclerophylla forest & woodland. Roosts - hollows & under bark or man-made structures.</p>

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Myotis adversus</i>	Large-footed Myotis	V		Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage. Forages over streams and pools catching insects and small fish by raking their feet across the water surface.
<i>Petaurus australis</i>	Yellow-bellied Glider	V		Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soil.
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	Rocky escarpments, outcrops, steep slopes or cliffs – especially those with caves, ledges or overhangs & shrub cover.
<i>Pteropus alecto</i>	Black Flying-fox	V		Large communal day-time camps in remnants of coastal subtropical rainforest or swamp forest, often with Grey-headed Flying-foxes. Bats fly out at dusk to feed on rainforest fruits as well as nectar and pollen from flowering eucalypts, paperbarks and banksias. When native foods are scarce, particularly during drought, they take fruit from orchards.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Subtropical & temperate rainforests, tall sclerophylla forests & woodlands, heaths & swamps.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V		Roosts singly or in groups of up to six, in hollow-bearing trees & buildings. Will use mammal burrows. Forages in most habitats across with and without trees. Appears to defend an aerial territory.
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V		Woodland, moist & dry eucalypt forest & rainforest but prefers tall wet forest. Roosts - tree hollows but also buildings.
Amphibians				
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	Found in heath, woodland and open forest with sandy soils. Generally lives in heath or forest and will travel several hundred metres to creeks to breed. Burrows into deep litter or loose soil, emerging to feed or breed after rain.
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings.
Reptiles				

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E	V	Rock crevices & under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves to trees within 200m of escarpment to shelter in hollows.
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V		Found in heath, open forest and woodland.
Birds				
<i>Apus pacificus</i>	Fork-tailed Swift		M, Mar JAMBA / CAMBA / ROKAMBA	Spends winters south to Australia. Preferred habitats include mountains and human habitations, usually near water.
<i>Callocephalon fimbriatum</i>	Gang Gang Cockatoo	V		Occurs within a variety of forest and woodland types. Also utilises less heavily timbered woodlands and urban fringe areas to forage
<i>Callocephalon fimbriatum</i>	Gang Gang Cockatoo Population, Hornsby & Ku-ring-gai LGAs	EP		Occurs within a variety of forest and woodland types. Also utilises less heavily timbered woodlands and urban fringe areas to forage

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Calyptorhynchus lathamii</i>	Glossy Black-cockatoo	V	-	Associated with a variety of forest types containing Allocasuarina species, usually reflecting the poor nutrient status of underlying soils (Environment Australia 2000; NPWS 1997; DECC 2007). Intact drier forest types with less rugged landscapes are preferred (DECC 2007). Nests in large trees with large hollows (Environment Australia 2000).
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	In New South Wales Little Lorikeets are distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Little Lorikeets mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including melaleucas and mistletoes. On the western slopes and tablelands White Box Eucalyptus albens and Yellow Box E. melliodora are particularly important food sources for pollen and nectar respectively.
<i>Hirundapus caudacutus</i>	White-throated Needletail		M, Mar JAMBA / CAMBA / ROKAMBA	Arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. Birds usually feed in rising thermal currents associated with storm fronts and bushfires and they are commonly seen moving with wind fronts. Feeds on flying insects, such as termites, ants beetles and flies.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Lathamus discolor</i>	Swift Parrot	E	E, M	Migrates to the Australian south-east mainland between March and October. Areas where eucalypts are flowering profusely or where there are abundant lerp infestations.
<i>Lophoictinia isura</i>	Square-tailed Kite	V		Variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.
<i>Merops ornatus</i>	Rainbow Bee-eater		M, Mar JAMBA / CAMBA	Open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites.
<i>Monarcha melanopsis</i>	Black-faced Monarch		M, Mar	Rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		M, Mar	Tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.
<i>Ninox connivens</i>	Barking Owl	V		Eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
<i>Ninox strenua</i>	Powerful Owl	V		Range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well.
<i>Petroica rodinogaster</i>	Pink Robin	V		Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.
<i>Ptilinopus superbus</i>	Superb Fruit-dove	V	M	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100 ha survive.
<i>Rhipidura rufifrons</i>	Rufous Fantail		M, Mar	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas.
<i>Tyto novaehollandiae</i>	Masked Owl	V		Dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Habitat
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Note:

TSC Act = *Threatened Species Conservation Act 1995*; EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*;

V = Vulnerable, E = Endangered, EP = Endangered Population, Ex = Extinct, M = Migratory, Mar = Marine, JAMBA = Japan-Australia Migratory Bird Agreement, CAMBA = China-Australia Migratory Bird Agreement

Source: DECC (2008), DEWHA (2008), RBG (2008), Australian Museum (2008)

Appendix G: Aboriginal cultural heritage

- The Trust will continue to liaise and collaborate with those Aboriginal groups and people associated with the Reserve, regarding the management of the area's Aboriginal cultural heritage sites, items and values. This will include the participation of Aboriginal people in management activities relating to these sites or values.
- Protection of the Reserve's known, and as yet unrecorded, Aboriginal cultural heritage sites/values will be largely achieved by retaining the greater majority of the area as natural bushland - to protect any artefacts and cultural heritage sites and materials in-situ within natural landscapes. Other, more active or interventionist, protective management measures for particular sites or areas will be identified in consultation with the respective Land Councils, DECCW and Aboriginal people associated with the Reserve and implemented as/where required.
- The Trust will seek advice from the DECCW on the appropriate conservation techniques for the stencil art at site DMC4 (between Renown Road and the M2 – which means it may be on RTA/Hills M2 Motorway land) and possible conservation techniques for the degraded (from graffiti), faint stencil art remnants at site DMC3 (on Saw Mill Creek), as well any other art sites or significant heritage materials subsequently located within the Reserve.
- The Trust will discuss with the Metropolitan Local Aboriginal Land Council and Aboriginal people associated with the Reserve, and also seek advice from the DECCW, regarding the future management and protection of site DMSF2 once ownership for the site is clearly established.
- Low-key/unobtrusive signs, sited so as not to be visible or draw attention to this overhang from the walking track below, may be installed in site DMSF2. These will advise any independent/unescorted visitors to the site of the feature's archaeological and cultural significance and ask for their respect and assistance in its protection. Site DMSF2 will be a priority area for regular monitoring, and the application – in consultation with the Aboriginal community and DECCW – of additional protective management measures if/when warranted.
- The Trust will regularly review the need for protective on-site management measures at the Reserve's numerous readily accessible Aboriginal cultural heritage sites – such as the rock overhangs along the Murri-yanna and Burruga walking tracks. Triggers for management intervention at these sites will include malicious damage by visitors to the fabric of these sites (notably rock walls/features and floor deposits), escalating inadvertent damage, excessive graffiti and inappropriate or damaging use of fires. Graffiti removal will only be undertaken at those sites where no pigment art has been recorded, or is suspected.

- An adaptive management, or escalating intervention, approach will be employed in the management of Aboriginal cultural heritage sites within the Reserve – notably those subject to visitor access, pressures and impacts. Appropriate measures to be employed may include – among others – low-key/unobtrusive “respect” signage, information signage, low-level “hold point” fencing/barriers, regulatory/enforcement signage, access delineation, promoting a regular management presence, re-routing/rehabilitating walking tracks to make sites less obvious/accessible, patrol and enforcement action, and fencing and signage located out from a site’s curtilage (identifying an area as “no access” or “sensitive area”). The “caging” of sites will generally only be employed as an absolute last resort management measure or if specifically requested by the Aboriginal community and cost-effective.
- Public access to particular Aboriginal cultural heritage sites may be temporarily restricted to enable cultural, archaeological, scientific or conservation/management activities to be undertaken at specific locations.
- A regular “clean-up” programme will be implemented to remove litter, graffiti (but only at sites where no pigment art has been recorded or is suspected), fire-rings and other superficial impacts from the Reserve’s readily accessible Aboriginal cultural heritage sites, particularly rock overhangs/shelters. Special requests may be made to the respective Land Councils or associated Aboriginal people for assistance with site “clean-up” or special protection.
- The Trust will take a precautionary approach to the management of the seven possible scar trees and one grinding groove site recorded within the Reserve. Advice regarding the authenticity and appropriate management of these sites will be obtained from the DECCW as/when warranted.
- Management measures (e.g. signage) will be implemented at the large potential scar tree beside the walking track along Coachwood Creek (near Loch Bruce), site BUND 1, to control visitor access around the tree’s base and prevent further damage to scar.
- Bouldering will not be permitted at site DMC4 (the only remaining, known, largely intact stencil art site in the vicinity of the Reserve – responsibility to be determined between RTA/BRTB), between Renown Road and the M2. The Trust will liaise with bouldering recreation groups to explain the significance of this site and the priority for its protection, as well as to elicit their support for the site’s closure and encourage peer-regulation. This will be supported by on-site signage (information and regulatory), site-clean up, rehabilitating/disguising access “trample tracks, site monitoring and enforcement. If required by continuing use of the site, low-key fencing or other barriers/features (to make the site unattractive or unsuitable for bouldering) will be installed.
- The Trust will liaise with the bouldering recreation groups to explain the Reserve’s Aboriginal heritage significance and values. Groups would be made aware that impacts to Aboriginal objects resulting from bouldering activities would be considered a breach of the *National Parks and Wildlife Act 1974* (NPW Act) and are subject to heavy penalties. Chalking and etching of rock surfaces within rock shelters are considered harm under Section 86 of the NPW Act, which carries fines of between \$275,000 and \$550,000 and imprisonment. Other practices to be avoided in the vicinity of known or suspected

Aboriginal cultural heritage sites include climb marking, site clearing/compaction, track proliferations and litter. Groups would be encouraged to report suspected or newly located possible heritage sites.

- Where supported by Aboriginal people associated with the Reserve the Trust will undertake or encourage the improved presentation, interpretation and educational use of the area's Aboriginal cultural heritage sites, values and associations. These opportunities could – among others – range from on-site interpretive signage (or pod-casts), brochures or web-based information, through guided tours and on-site activity programmes, to curriculum materials for surrounding schools and collaborative programmes with the new Darug Tribal Aboriginal Corporation cultural centre at Seven Hills or DECCW "Discovery Programmes".
- Site DMC3 (on Saw Mill Creek) – where previously visible stencil art has been significantly impacted, to near illegibility, by graffiti – is a highly accessible location where interpretive messages could be presented about the vandalising and continuing loss of Aboriginal heritage with the urban/urban bushland environment (with the potential for very effective 'before' and 'now' photos). However a "negative" message such as this will only be presented with the full support of all Aboriginal organisations and people associated with this site.
- Aboriginal organisations and individuals will be very closely involved in the development and delivery of all on and off site interpretive and educational materials relating to all aspects of the Reserve's Aboriginal cultural heritage places, value and stories – past and present. This will include close involvement in the development of any Interpretative Plan for the Reserve.
- Information regarding "Country", and stressing the continuing importance of the area for Aboriginal people, will be included in Reserve's pre-visit information and entry or on-site welcome and orientation signage.
- Locations proposed for the provision of visitor or management facilities, including the upgrading or formalisation of existing usage areas, will be assessed as to the likelihood of extant Aboriginal heritage sites/values. As a minimum this will include identifying any known sites in the proximity and an inspection of rock overhangs, rocky outcrops/pavements and larger trees by The Hills Council's heritage staff or an Aboriginal person associated with the Reserve – to determine the likelihood of material remaining and the need for further investigations.
- Aboriginal cultural heritage surveys and investigations, including archaeological assessments if appropriate, will be undertaken where required in relation to any major redevelopment/maintenance or new development works carried out within the Reserve – by the Trust, or Council or third parties (including utility agencies) – to ensure that any Aboriginal cultural heritage sites/values are identified and appropriately managed. Priority works for assessment will include those that involve substantial earthworks or soil surface disturbance, vegetation clearing, or are located in rocky terrain with overhangs and outcrops/pavements. These investigations will include the preparation of an Aboriginal cultural heritage assessment report where deemed necessary. Any such investigations will

involve collaboration with relevant Aboriginal people/organisations associated with the Reserve.

- Development consents for works within the Reserve should include appropriate conditions for the protection of known – and unknown – Aboriginal cultural heritage sites/values. This should include employing Aboriginal people, preferably those associated with the reserve, in site monitor roles when required for major works.
- All staff and contractors undertaking management or other works on the Reserve will be given a brief induction regarding the area’s Aboriginal heritage values/significance, any potential sites in their activity area and the relevant management/protection requirements, as well as the identification and protection of any Aboriginal heritage items/values located during such works.
- “Bushcare” volunteers will be trained in the identification of Aboriginal heritage sites, to avoid the inadvertent damage to sites during their activities, and to assist in the location of new sites.
- The Trust will encourage, or undertake as resources permit, further surveys within the Reserve to identify and document material or sites of Aboriginal cultural heritage value. Such survey, research and assessment efforts must be undertaken, or directed, by a suitably qualified or experienced person and involve consultation with, and preferably involvement of, the respective Land Councils or Aboriginal people associated with the Reserve.
- The exact location and nature of Aboriginal cultural heritage sites may be omitted from the Trust’s or The Hills Council’s visitor and community information programmes, and may be subject to stronger confidentiality provisions if requested by the respective Land Councils or other associated Aboriginal people, to protect known sites and deter souveniring, vandalism or other damage as well as to respect cultural sensitivities. Section 36DA of the Local Government Act 1993 permits a Council to keep the location of places and items of Aboriginal significance confidential.
- The location and nature of known recorded Aboriginal cultural heritage sites will be considered in preparation of the Reserve’s Fire Management Plan, to enable appropriate protection measures for these sites to be identified and implemented during fire management planning and operations.
- As well as being held in the Trust’s information collections, all recorded Aboriginal cultural heritage sites known within the Reserve will be provided to The Hills Council to allow these values to be recognised in any future planning, development or on-ground management actions (including those by utility agencies).
- All known Aboriginal cultural heritage sites will, as far practical, be revisited and inspected as part of a general monitoring/management programme – on a maximum five year cycle and more frequently for more accessible or higher profile sites. The respective Land Councils or Aboriginal people associated with the Reserve should be actively involved in this monitoring.



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