



MOUNT BARKER
DISTRICT COUNCIL

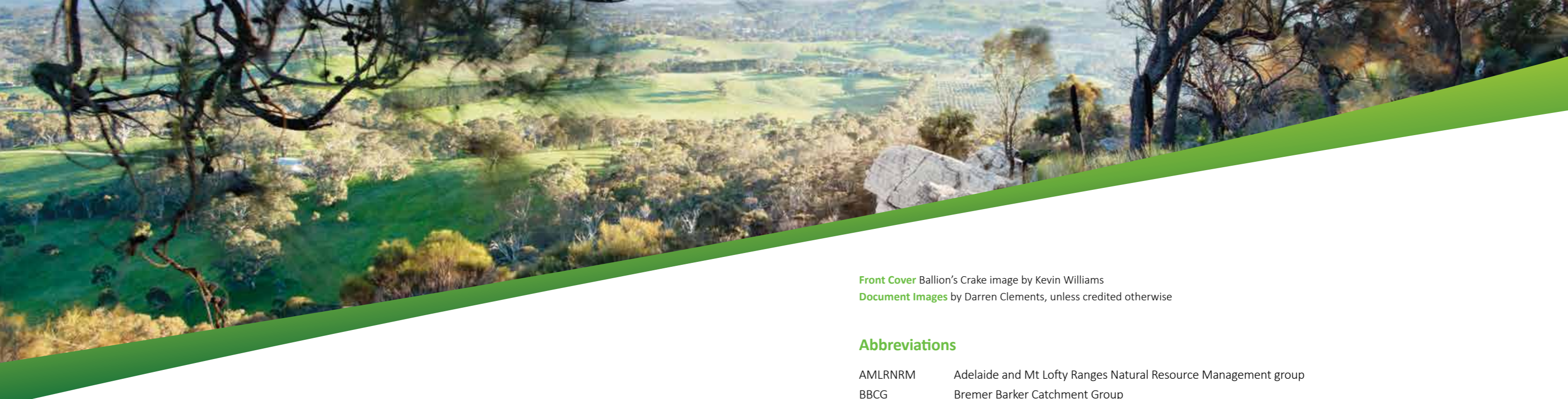
Biodiversity Strategy



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Adopted: 2016



*The Natural Environment
& Sustainable Living*



Front Cover Ballion's Crake image by Kevin Williams

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Contents

| | | |
|--------------------------------|------------|---|
| 4 | | Acknowledgement of Country |
| 6 | | Mayor's Message |
| 8 | | Executive Summary |
| 12 | 1.0 | Introduction |
| 14 | 1.1 | Policy and Legislative Context |
| 16 | 1.2 | What is Biodiversity |
| 18 | 1.3 | Biodiversity Decline |
| 19 | 1.4 | Environmental Setting and Location |
| 23 | 1.5 | Land Uses |
| 24 | 1.6 | Population and Urban Growth |
| 24 | 1.7 | Climate |
| 25 | 1.8 | Pre-European Vegetation |
| 29 | 1.9 | Threats to Biodiversity |
| 30 | 1.10 | Biodiversity Protection Objectives |
| BIODIVERSITY MANAGEMENT | | |
| 32 | 2.0 | Vegetation |
| 33 | 2.1 | Significant Natural Areas - Remant Vegetation |
| 38 | 2.2 | Bush For Life (BFL) Sites |
| 39 | 2.3 | Roadside Vegetation |
| 42 | 2.4 | Related Flora |
| 53 | 2.5 | Veteran and Street Trees |
| 54 | 2.6 | Revegetation and Restoration Sites |
| 57 | 2.7 | Threats to Vegetation |
| BIODIVERSITY MANAGEMENT | | |
| 62 | 3.0 | Wildlife |
| 62 | 3.1 | Human Health and Social Benefits |
| 63 | 3.2 | Economic Benefits |
| 63 | 3.3 | Threats to Fauna |
| 68 | 3.4 | Fauna of Conservation Significance in the District |
| 73 | 3.5 | Fire Control |

| | | |
|------------------------------|------------|-------------------------------------|
| BIODIVERSITY PLANNING | | |
| 86 | 4.0 | Watercourses and Waterbodies |
| 87 | 4.1 | Catchments Within the District |
| 89 | 4.2 | Aquatic Biodiversity |
| 89 | 4.3 | Fish |
| 100 | 4.4 | Altered Aquatic Environments |
| 100 | 4.5 | Riparian Zones |

| | | |
|------------------------------|------------|--|
| BIODIVERSITY PLANNING | | |
| 106 | 5.0 | Monitoring and Evaluation |
| 106 | 5.1 | Ministerial Development Plan Amendment (MDPA) |
| 107 | 5.2 | Flora |
| 122 | 5.3 | Threatened Flora Species |
| 124 | 5.4 | Threatened Ecological Species |
| 124 | 5.5 | Fauna |
| 132 | 5.6 | Fauna Habitats |

| | | |
|------------------------------|------------|----------------------------------|
| BIODIVERSITY PLANNING | | |
| 158 | 6.0 | Partnerships |
| 158 | 6.1 | Organisational Partnerships |
| 160 | 6.2 | Government Partnerships |
| 161 | 6.3 | Community Partnerships |
| 164 | 7.0 | Monitoring and Evaluation |
| 166 | 8.0 | References |

Abbreviations

| | |
|-------------|--|
| AMLRNRM | Adelaide and Mt Lofty Ranges Natural Resource Management group |
| BBCG | Bremer Barker Catchment Group |
| BCM | Bushland Condition Monitoring |
| BDBSA | Biological Database of South Australia (managed by DEWNR) |
| DEH | Department of Environment and Heritage, now DEWNR |
| DENR | Department of Environment and Natural Resources, now DEWNR. |
| DEWNR | Department of Environment, Water and Natural Resources |
| BFL | Bush For Life (Program) |
| DPTI | Department of Planning, Transport and Infrastructure |
| DSEWPaC | Department of Sustainability, Environment, Water, Population and Communities |
| CFS | Country Fire Service |
| EID | Emerging Infectious Diseases |
| EBS Ecology | Environmental and Biodiversity Services |
| EPBC Act | Environment Protection and Biodiversity Conservation Act 1999 |
| GWLAP | Goolwa to Wellington Local Action Planning Group Inc |
| HEA | Hahndorf Environment Association |
| IBRA | Interim Biogeographical Regionalisation of Australia |
| LCU | Landscape Character Unit |
| LGA | Local Government Area |
| MDPA | Ministerial Development Plan Amendment |
| MLR | Mount Lofty Ranges |
| NPW Act | National Parks and Wildlife Act 1972 |
| NPW | National Parks and Wildlife |
| NRM Act | Natural Resources Management Act 2004 |
| NV Act | Native Vegetation Act 1991 |
| NVC | Native Vegetation Council |
| RP | Recreation Park |
| RMS | Roadside Marker Scheme |
| SAMDBNRM | South Australia Murry Darling Basin Natural Resources Management |
| SEB | Significant Environmental Benefit |
| spp. | species (plural) |
| ssp. | subspecies |
| TEC | Threatened Ecological Community |
| TFL | Trees For Life (Program) |

History Of Peramangk People

The Peramangk people lived on the eastern side of the escarpment of the Adelaide Hills in the Districts surrounding Mount Barker. Records indicate that approximately 600 Peramangk living around Mt Barker and at least 1,200 across its Nation and Clan areas at the time of European colonisation. There are still many descendants living today in South Australia.

The whole language of these people has not survived, but there are still many words, names of places and names of the Clans that made up the Peramangk nation.

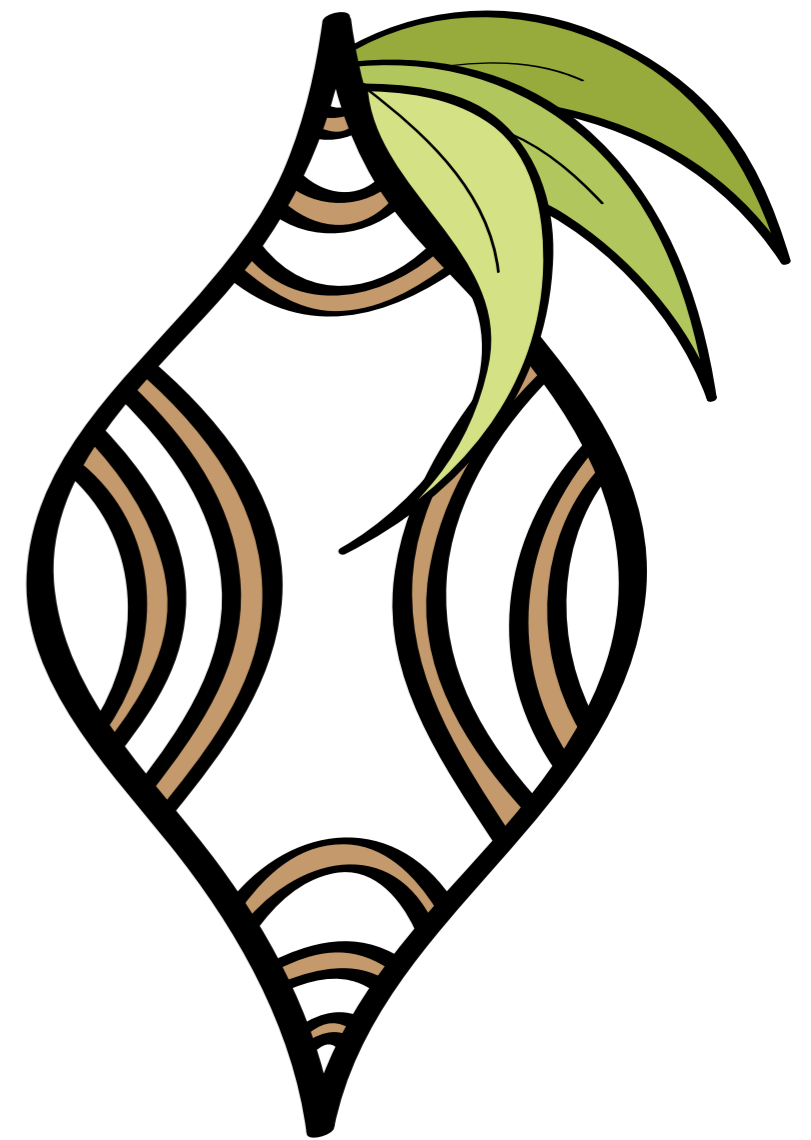
The Peramangk people share close relationships, culture and some language with the Nations of the Kurna to the West, Ngadjuri to the north, Ngarrindjeri to the south & Meru to the east. The Peramangk lived in the strip of country running north from Mount Barker through Harrogate, Gumeracha, Mt Pleasant, and Springton to the Angaston district and south to Strathalbyn. There are also sites along the River Murray where Peramangk people had access to the River. Peramangk place names can still be found

at these places. Peramangk people had relations along the River Murray and areas north of Manunka and around it to Swan Reach. Until settlement the Peramangk always maintained a good supply of water and plentiful amount of food, they rarely needed to move down on to the plains. There was trading between the Peramangk and the Aboriginal people in adjoining Nations, with them supplying: Ochre, flint, quartz, supple whip-stick mallee spears, opossum skins and other items not found on the plains and lower lakes. Within the community, the men would hunt for animal food while the women gathered vegetables, cared for the children and maintained the campsite. They would remain at a campsite for several days before moving, this prevented over use of the area and its food supply/resources thus ensuring the environment stayed the same for future generations over thousands of years. The Peramangk would return to the sites used in previous years depending on the seasons and the condition of the environment. The diet also varied according to the season with vegetables, seeds, honey, eggs, grubs, insects, lizards, snakes, fish, yabbies, opossums, and larger game with kangaroos,

wallabies and emus all included, but depended on traditional laws of season and permissions of access. Peramangk people wore very little clothing, especially in summer, but the women were more likely to wear a cloak of opossum fur or kangaroo skin. Place names within the landscape mark a clear boundary of Peramangk territory and their many Clans, even though they also shared many trade items and dreaming across common ground, water, sky and the stars.

Art sites along the eastern escarpment and the boundaries defined in the Tjilbruke and Ngarrindjeri song-lines that are also part of the Kurna dreaming. The ancient beings that carved out this land and the dreaming stories of these beings is still a living presence and known by many of our Meruwatta- (Country men), Nepo-anna (neighbours) and adjoining Nations- This will never change... even when the surface of the earth we all stand on does.

Ivan-Tiwu Copley





Mayor's Message

The Mount Barker district boasts a wide range of habitats, including Eucalyptus woodlands and forest, grasslands and an extensive range of watercourses.

Our plants, wildlife and terrestrial and aquatic habitats continue to face a number of threats including weed invasion, habitat fragmentation and degradation, risk of fire, and climate change.

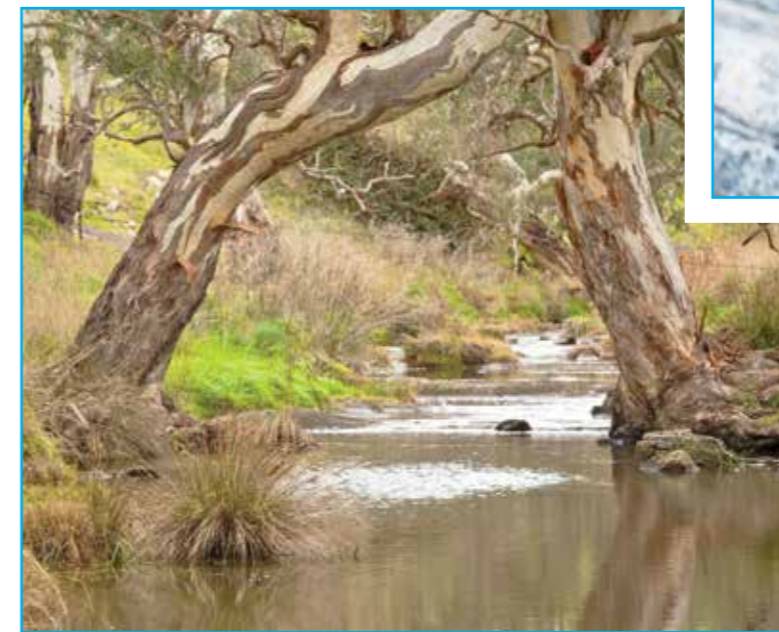
By developing a Biodiversity Strategy, Council can demonstrate that biodiversity is a part of core business and commitment toward conserving biodiversity in the face of a changing landscape and urban growth.

The reduction of biodiversity has the potential to affect economic, ecological, social and cultural values within the District. The implementation of the actions outlined in this strategy will essentially aim to mitigate biodiversity loss and guide a sustainable, adaptive and achievable approach to biodiversity conservation and urban growth.

We share this responsibility with other government agencies, not-for profit organisations, community groups and the dedicated and skilled volunteers that continue to work on Council land and private land.

Our thanks is extended to all the Council staff, elected members, community groups, government agencies, non-government organisations and industry professionals that participated in the development of this Strategy.

Ann Ferguson
Mayor





Biodiversity Strategy Snap Shot

Objectives

Biological diversity or biodiversity is the variety of all life forms on earth – the different plants, animals and micro-organisms, their genes, and the terrestrial, marine and freshwater ecosystems of which they are a part (National Strategy for the Conservation of Australia’s Biological Diversity). The Biodiversity Strategy has:

- Identified current landscape & values within the local government area (LGA);
- Identified threats within the study area;
- Identified responses to the threats;
- Identify actions for effective implementation of the strategy and;
- Identified effective monitoring and evaluation of the strategy.

Biodiversity and Landscape Assets

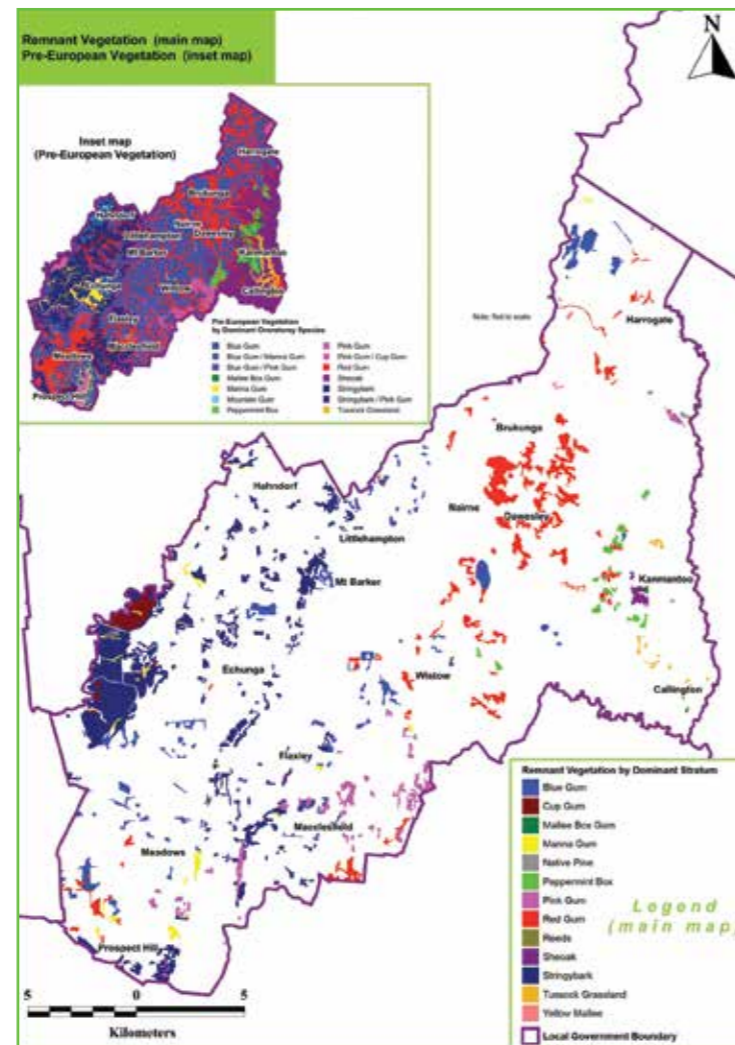
Prior to European settlement the Mount Barker District was covered in forests and woodlands, which supported a diverse range of flora and fauna. These vegetation associations were predominately Red Gum (*Eucalyptus camaldulensis* var. *camaldulensis*) Woodland, Blue Gum (*Eucalyptus leucoxylon*) Woodland, Pink Gum (*Eucalyptus fasciculosa*) Woodland, Drooping Sheoak (*Allocasuarina verticillata*) Woodland and Blue Gum (*Eucalyptus leucoxylon*) and Pink Gum (*Eucalyptus fasciculosa*) Woodland. Smaller patches of forests, woodland and grassland occurred throughout the region including Peppermint Box (*Eucalyptus odorata*) +/- Pink Gum (*Eucalyptus fasciculosa*) Woodland, Scented Mat-rush/ Irongrass (*Lomandra effusa*) Open Tussock Grassland, Messmate Stringybark (*Eucalyptus obliqua*) and Pink Gum (*Eucalyptus fasciculosa*) Woodland, Messmate Stringybark (*Eucalyptus obliqua*) Open Forest, and small patches of Mallee Box (*Eucalyptus porosa*) Low Woodland (Crompton & Williams 1998).

Flora

Undisturbed native vegetation is the result of an extensive evolutionary process. Once this system has been disturbed by anthropogenic influences, it cannot be replicated. Vegetation systems are important for the survival of wildlife and provide ecosystem services for humans. The interactions between different populations of species are directly and/or indirectly interrelated and interdependent.

There is little remaining native vegetation within the District. During the 19th Century, approximately 95% of the original vegetation has been cleared for agricultural use and mining activities (University of Adelaide 2010). Generic Community Land management plans have been developed for all Council reserves and are classified under 3 categories – Natural Areas, Parks and Recreation & Sport. The Natural Area schedule applies to 58 of the community land and contains one or more of the assets that contribute to biodiversity outcomes such as bushland, watercourses, wetlands and grasslands.

- Approximately 25-30 thousand street and reserve trees
- 21 Bush for Life Sites
- There are around 60 nationally listed species, state listed species and/or regionally listed species
- There are two nationally threatened ecological communities that remain in the district: Iron-grass *Lomandra* species Natural Temperate Grassland; and Peppermint Box (*Eucalyptus odorata*) Grassy Woodland.
- Council’s Community Land Register has 393 parcels of community and crown. Many of these community land parcels and road reserves contain remnant native vegetation
- The area has a network of 855 kms of made roads comprising 664 kms of Council roads and 191 kms of Transport SA roads. Over 150 kms of road reserve remain undeveloped. 265 roadsides are protected under the Roadside Marker Scheme (RMS)



Hydrology

Hydrological processes are essential to not only maintain biological diversity, but are also fundamental to the survival of humans (Pert and others 2010). Catchments and watercourses provide habitat for a number of plants and animals particularly in the aquatic environments and riparian zones, the land surrounding or adjoining and influenced by, a body of water.

There are two broad categories of surface water resources within the district. These categories can be distinguished by creeks that drain in a southwest direction and form part of the Onkaparinga Catchment, which includes Echunga Creek, Hahndorf Creek and the Biggs Flat area and those streams and rivers that drain in an easterly direction towards Lake Alexandrina and form part of the River Murray Catchment; this includes the Bremer River and the Angas River.

Flow regime is regarded to be the key driver for river, creek and wetland ecosystems. Flows are the major determinant of habitats in streams, which contributes to the survival of aquatic organisms. Altered flow regimes also facilitate the invasion of exotic species, causing addition predation and competition for native species, particularly in fish, crustaceans and macroinvertebrates (Bunn and Arthington 2002).

Fauna that inhabit aquatic and riparian environments in the watercourses in the district include fish, invertebrates, amphibians, birds, reptiles and mammals.



Fauna

Native animals are important to ecosystems because they act as indicators of healthy ecosystems, waterways and habitats, play important balancing roles in ecosystems, human health and social benefits of being in nature, economic benefits and provision of educational experiences. Wildlife plays an important role in keeping some animals from becoming too numerous (predators), managing vegetation growth (herbivores) or providing food, and recycling organic matter (decomposers).

Mount Barker Local Government Area provides habitat to a number of fauna species including birds, mammals, amphibians, reptiles, fish and insects. A number of these species are listed as threatened at a regional, state and/or national level.

There are approximately 70 nationally listed species and/or regionally listed species in the district.



Image by Kevin Williams



Image by Kevin Williams



- Key
- Themes

Threats to Biodiversity

In general, the following key pressures have been identified for the District, based on the current status information collected:

- Degradation of roadside vegetation;
- Degradation of limited remnant vegetation;
- Fragmentation of habitats and lack of connectivity between remnant vegetation and degradation around the edges of remnants (the 'edge effect');
- Predation by pest species (cats, foxes and stray dogs);
- Grazing competition (rabbits, goats, deer, straying sheep and cattle);
- Illegal hunting of native animals
- Road-kill
- Loss of habitat (terrestrial and aquatic);
- Habitat fragmentation
- Diseases and pollution;
- Habitat alteration
- Weed invasion;
- Pest diseases;
- Fire management regime and changes in fire regimes;
- Occasional seasonal over abundance of native species;
- Competition from introduced birds;
- Recreational impacts (bicycles, off road vehicles, horses);
- Unsustainable land use and natural resources management;
- Change in zoning and land use;
- Changes to water flows and hydrology;
- Reduction of water quality;
- Climate change; and
- Population growth.



Black Cockatoo Image by Kevin Williams



The strategy itself will adopt an adaptive management approach. The implementation of strategy will be an ongoing process where the completed actions are reported annually to council staff, elected members and external stakeholders. This will enable the strategy be qualitatively assessed.

| Key Area | Key Themes | Threats | Objective | Priority Actions |
|--|------------------------------------|--|---|---|
| Biodiversity Management | Habitat Preservation | Degradation of limited remnant | To maintain and enhance good quality and connected habitat of flora and fauna. | Prioritise weed management and integrate with existing programs and projects. Dedicated specialist onground team that are trained and have experience in land conservation and management. Provide an area for rescuing and relocating species (council nursery). Develop a policy to protect vegetation on council land, including creeklines. Developed of a hollow protection and protection policy. Develop conceptual linkages for fauna habitat (& potential habitat). |
| | | Predation by pest species | Develop threatened species and management requirements. | |
| | | Grazing competition | Conduct seasonal surveys. | |
| | | Weed invasion | | |
| | | Pest diseases | | |
| | | Competition from introduced birds | | |
| | | Occasional seasonal over abundance of native species | | |
| Fragmentation of habitats and lack of connectivity between remnant vegetation and degradation around the edges of remnants (the 'edge effect') | | | | |
| Biodiversity Management | Roadside Vegetation | Degradation of roadside vegetation (including road reserves) | Implement best practise roadside vegetation management to support biodiversity goals and road safety. | Review and audit RMS sites Educate adjacent landholders on the importance of native vegetation. Update the roadside vegetation plan. Protection of unmade road reserves. Ensure any works that could impact roadsides and road reserves are assessed, with mitigation strategies developed, in conjunction with Open Space and Environment Team. |
| Biodiversity Management | Bushfire Management | Fire management regime and changes in fire regimes | Maintain native vegetation of habitat and conservation value while reducing bushfire fuel load. | Education on bushfires and how different species (native versus exotic) burns. Manage bushfire risk by developing site specific management plans and timing of slashing etc. Educate regarding bushfire in new resident packs Retain native grasses and encourage proliferation. |
| Biodiversity Planning | Balanced Land Use | Recreational impacts (bicycles, off road vehicles, horses). | To protect and enhance biodiversity outcomes by encouraging and supporting community participation, education and strengthening partnerships. | Provision of enough open space that considers recreation and biodiversity values. Partnerships with recreational clubs Incorporate conservation/biodiversity zones into the planning and development of parks Interpretive signage along trails. |
| Biodiversity Planning | Sustainable Development | Urban Development | To promote urban develop that avoids the loss of biodiversity. | Demonstration sites for backyard biodiversity. Retain native vegetation on roadsides surrounding development Promote retention of native vegetation patches through development sites. |
| | | Change in zoning and land use | To adopt, implement and promote best practise ecological sustainable development principles. Review climate change plan. | Developer checklist/guidelines for best practice Developers to have high energy/water efficient properties (reduce light pollution, solar, Solar passive design, rainwater tanks, native plant Partners to grow advance plants of local Provenance. |
| Biodiversity Planning | Watercourse Health | Changes to water flows | Develop best practise management to optimise physical, chemical and biological state of watercourses in the district. | Harness MDPA watercourses opportunities for managing environment water provision (environmental flow). |
| | | Reduction of water quality | | Develop strategic guidelines for best environmental practise of riparian planting and management Link with Water Sensitive Urban Design for habitat value. |
| Biodiversity Planning | Community Education & Partnerships | Lack of information sharing | To protect and enhance biodiversity outcomes by encouraging and supporting community participation and strengthening partnerships. | Information kit to new home builders on biodiversity Develop a community engagement plan . Communication Plan for roadside vegetation stakeholders Clear guidelines for field council staff and contractors |



1.0 Introduction

The District Council of Mount Barker Local Government Area (LGA) contains substantial biodiversity and has areas located within the “biodiversity hotspot”, Mount Lofty Ranges. Council is responsible for the management of vegetation within council reserves, road reserves and roadsides. By developing a Biodiversity Strategy, Council can demonstrate that biodiversity is a part of core business and commitment toward conserving biodiversity in the face of a changing landscape and urban growth. This is a high priority due to the introduction of the Mount Barker Urban Growth (Ministerial) Development Plan Amendment (MDPA) as part of its 30 year plan for Greater Adelaide.

The reduction of biodiversity has the potential to affect economic, ecological, social and cultural values within the District. The implementation of the actions outlined in this strategy will essentially aim to mitigate biodiversity loss and guide a sustainable, adaptive and achievable approach to biodiversity conservation and urban growth.

The Mount Barker 2035 District Strategic Plan addresses numerous relevant outcomes that relates to the biodiversity strategy. These objectives and corresponding strategies in table 1.1.



| Natural Environment Objectives | | Natural Environment Strategies |
|--|--------|--|
| NE 1 Environmental leadership For stewardship of the environment to be a core commitment and to continuously lead by example in environmental protection and innovation. | NE1.1 | Demonstrate leadership in sustainability, environmental enhancement and protection |
| | NE 1.2 | Lead biodiversity protection and restoration initiatives |
| | NE1.3 | Promote environmental education and awareness |
| | NE1.4 | Support environmental research on local issues |
| NE 2 Ecological footprint and waste management There is a committed and sustained effort to reduce the ecological footprint of Council and community. | NE 2.1 | Commit to a high standard of built and operational sustainability performance in major building projects of Council |
| | NE 2.2 | Limit and reduce carbon and other greenhouse gas emissions in capital investment projects and operational practices |
| | NE 2.3 | Use renewable energy |
| | NE 2.4 | Conserve water, maximise recycled water use and practice appropriate Water Sensitive Urban Design |
| | NE 2.5 | Promote, practice and enable best practice waste minimisation, waste reduction and recycling systems |
| | NE 2.6 | Increase recycling rates |
| NE 3- The promotion and protection of natural areas To respect and protect local natural areas through awareness and involvement. | NE 3.1 | Promote understanding and use of natural areas and provide learning opportunities |
| | NE 3.2 | Integrate human environments with natural areas using urban ecology principles |
| | NE 3.3 | Design buffers and interfaces between built and natural areas |
| | NE 3.4 | Further develop and enhance vegetation corridors |
| | NE 3.5 | Increase community awareness regarding its impact on the natural environment |
| | NE 3.6 | Influence community behaviours and attitudes to achieve global and local environmental targets |
| | NE 3.7 | Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment |
| NE 4 Climate change and resilience To continually adapt to changing local environmental conditions. | NE 4.1 | Ensure up-to-date knowledge and understanding of environmental conditions and context |
| | NE 4.2 | Identify and respond to environmental risks and vulnerabilities |
| | NE 4.3 | Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change |

Table 1.1 Strategic plan objectives and corresponding strategies related to the biodiversity strategy

The Biodiversity Strategy will:

- Identify current landscape & values within the local government area (LGA);
- Identify threats within the study area;
- Identify responses to the threats;
- Identify actions for effective Implementation of the strategy and;
- Identify effective monitoring and evaluation of the strategy.
- Identify remnant native vegetation to the current and pre European vegetation association and species level within the area covered by the Mount Barker, Littlehampton and Nairne MDPA area;
- Identify remnant vegetation to the association level beyond the MDPA area that highlights existing and potential habitat corridors and buffers;
- Provide species lists for each vegetation association, both existing and pre-European.
- Provide an assessment of Vegetation Condition, Conservation Value and Landscape context based on techniques used by the DEWNR Native Vegetation Council;
- Identify conservation ratings of vegetation communities and species;
- Identify and map environmental features such as wetland/bog areas and rocky outcrops that may provide current or potential habitat;
- Identify water dependent ecosystems;
- Identify known fauna species within the MDPA area and their habitat requirements;
- Make recommendations on the design and function of development areas to achieve outcomes that protect and extend biodiversity asset; and
- Align recommendations with relevant policies within Council's Development Plan.

1.1 Policy and Legislative Context

The Biodiversity Strategy considers appropriate legislation and guiding principles within a local, state, federal and global context. There are a series of documents that legislate or set the strategic direction of the management of natural resources and biodiversity at all levels of government. Figure 1.1 shows the key legislation and documents that have been considered in the development of the strategy.



- Environment Protection and Biodiversity Conservation Act (1999)
- Basin Plan and Water Act (Commonwealth) 2007
- Caring for our Country 2013-2018
- National Water Initiative
- National Water Quality Management Strategy
- National Food Plan: Our food future
- National Wildlife Corridors Plan
- Australia's Biodiversity Conservation Strategy (2010 – 2030)
- Australian Weeds Strategy 2007
- Australian Pest Animals Strategy 2007
- National Bushfire Management Policy

Relevant Federal Government Legislation and Documents



- Mount Barker, Littlehampton and Nairne Draft Structure Plan
- Mount Barker Township Expansion Flora and Fauna Assessment
- Mount Barker Threatened Flora Recovery Project: Interim Survey Findings & Management Recommendations
- Landscape Planning Review – Future Growth Corridors for District Council of Mount Barker heading into 2050
- University of Adelaide 2010 – Landscape Planning Report 2010
- Local Natural Resource Management Plan (Flaxley Landcare Group) 2006
- Mount Barker Creek rehabilitation Strategy 2013
- Laratinga Reserve Management Plan (draft) 2011
- Mount Barker Council Strategic Plan

Relevant Local Government Documents



- Native Vegetation Act 1991
- Native Vegetation Regulations 2003
- Mining Act 1971
- Natural Resources Management Act 2004
- Fire and Emergency Services Act (2005)
- Local Government Act 1999
- Development Act 1999
- National Parks and Wildlife Act (1972)
- Crown Land Management Act (2009)
- Environment Protection Act 1993
- River Murray Act 2003 (SA)
- Regional Recovery Plan (AMLR) 2009-2014
- Natural Resources SA MDB Natural Resources Management Plan
- The 30-Year Plan for Greater Adelaide –DPTI
- Threatened Flora Recovery Plan (SAMDB NRM)

Relevant State Government Legislation and Documents



Figure 1.1 Relative policy and legislative context associated with the Biodiversity Strategy.

1.2 What is Biodiversity?

Biological diversity or biodiversity is the variety of all life forms on earth – the different plants, animals and micro-organisms, their genes, and the terrestrial, marine and freshwater ecosystems of which they are a part (National Strategy for the Conservation of Australia’s Biological Diversity).

The concept of biodiversity embraces the various living parts of the world around us. The three levels of biodiversity – species, genetics and community – are interrelated and interdependent. A population of a species is dependent on the genetic variation within it and upon its habitat (ecosystem) for survival, and an ecosystem is dependent on the full variety of the species that comprise it (Williams et al. 2001).

Biodiversity allows human life to exist, as we rely on the resources provided by many species and ecosystems. The understanding and appreciation of biodiversity highlights the benefits of the natural world and allows us take steps to conserve this asset. Biodiversity can be valued by understanding the contribution to economic, recreation, culture, health and science values (Morton and Hill 2014).

“All Australians depend on our biodiversity and the many ecological services provided by our natural environment. Some of us depend directly or indirectly on healthy environments for our livelihoods and culture, some enjoy them for sport and recreation, and some find artistic and spiritual inspiration from nature.”

Australian Biodiversity Conservation Strategy (2010-2020)

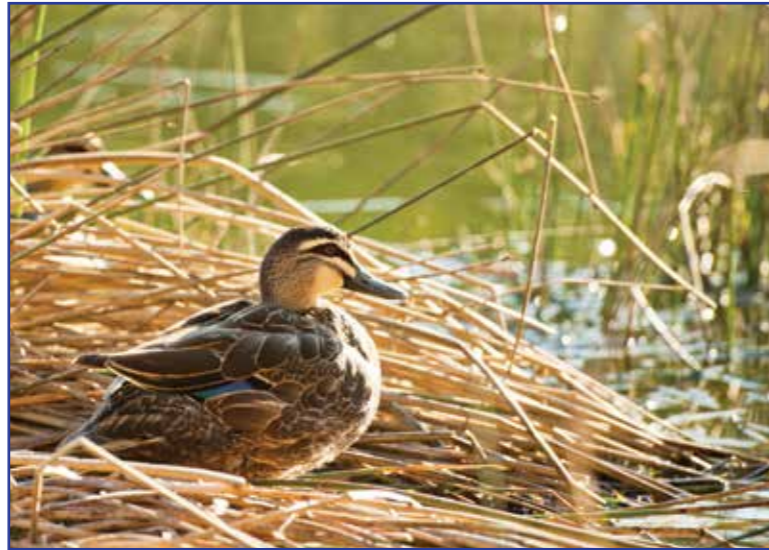
Biodiversity is fundamental to the production of ecosystem services. Ecosystem services are the benefits provided to humans through the transformation of resources and environmental assets, such as water, land, vegetation. Biodiversity directly produces a number of services whilst supporting other services through the role of organisms in energy and material cycles. Healthy ecosystems are based around intact vegetation communities and biodiversity and can provide a number of essential services such as provisioning services, cultural services, supporting services and regulating services. Diverse communities may be more productive because species differ in the way they capture energy and nutrients, so leading to a potentially greater collective uptake. Figure 1.2 shows a summary of the range of services produced by the natural environment.



Figure 1.2 The range of ecosystem services provided by biodiversity.

1.3 Biodiversity Decline

Biodiversity decline can be defined as the loss of variety in living systems. It can be a decline in the number and the range of species in a particular region, the loss of genetic diversity within populations of individual species, or more broadly, the loss of ecosystems. Consequently, biodiversity decline or loss can reduce the efficiency with which ecosystems acquire resources, produce biomass, and decompose it to recycle nutrients. Loss of diversity at multiple levels within a food chain can influence ecosystems more than loss within just one level. Effects of extinction range from undetectable for species having small roles in ecosystem functions, to extreme for those that dominate the working of the ecosystem. Maintaining biodiversity allows ecosystems to keep working in the face of ongoing change and to recover functions more readily after a shock.



1.4 Environmental Setting and Location

The Mount Barker District Council comprises area of 597km². The Local Government Area (LGA) boundary is located approximately 25km from the Adelaide CBD and 33km to the Mount Barker Township. Other townships within the district include, Hahndorf, Meadows, Echunga, Macclesfield, Flaxley, Prospect Hill, Littlehampton, Nairne, Brukunga, Harrogate, Dawsley, Kanmantoo, Wistow and part of Callington. Surrounding Councils include Adelaide Hills Council, Mid Murray Council, The Rural City of Murray Bridge, Alexandrina Council and the City of Onkaparinga.

Approximately 80% of the LGA sits within the South Australian Murray Darling Basin Natural Resource Management region (SAMDBNRM) and the remaining 20% falls within the Adelaide Mount Lofty Ranges Natural Resource Management (AMLRNRM) region.

The Mount Lofty Ranges Regional Plan places the Mount Barker Local Government area partly within the Central Ranges Landscape Character Unit (LCU), and partly within the Western Ranges LCU. The Central Ranges LCU, as defined in the Mount Lofty Ranges Regional Strategy Plan, “is characterised by rolling uplands and open valleys with drainage divides and has a moderate rainfall. Its major land uses are agriculture (cropping, dairying and grazing) and areas of urban development, mainly centred in the Mount Barker, Littlehampton

and Nairne townships”. The Western Ranges LCU is described as an area “generally characterised by high rainfall and corresponds with the Watershed and is associated with extensive drainage networks, ridges and valleys of high relief and open valley basins. It possesses significant areas of vegetation and its major land uses are agriculture (horticulture, dairying), water catchment, conservation and urban development. The Interim Biogeographical Regionalisation of Australia (IBRA) identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. The bioregions are further refined into subregions and environmental associations. The District falls into two bioregions. The first located within the Flinders Lofty Block IBRA bioregion and the Mount Lofty Ranges IBRA subregion and on a finer scale falls within Hahndorf Environmental Association. The second falls within the Kanmantoo IBRA bioregion, Fleurieu IBRA subregion and the Scott Hill Environmental Association (see table 1.2).

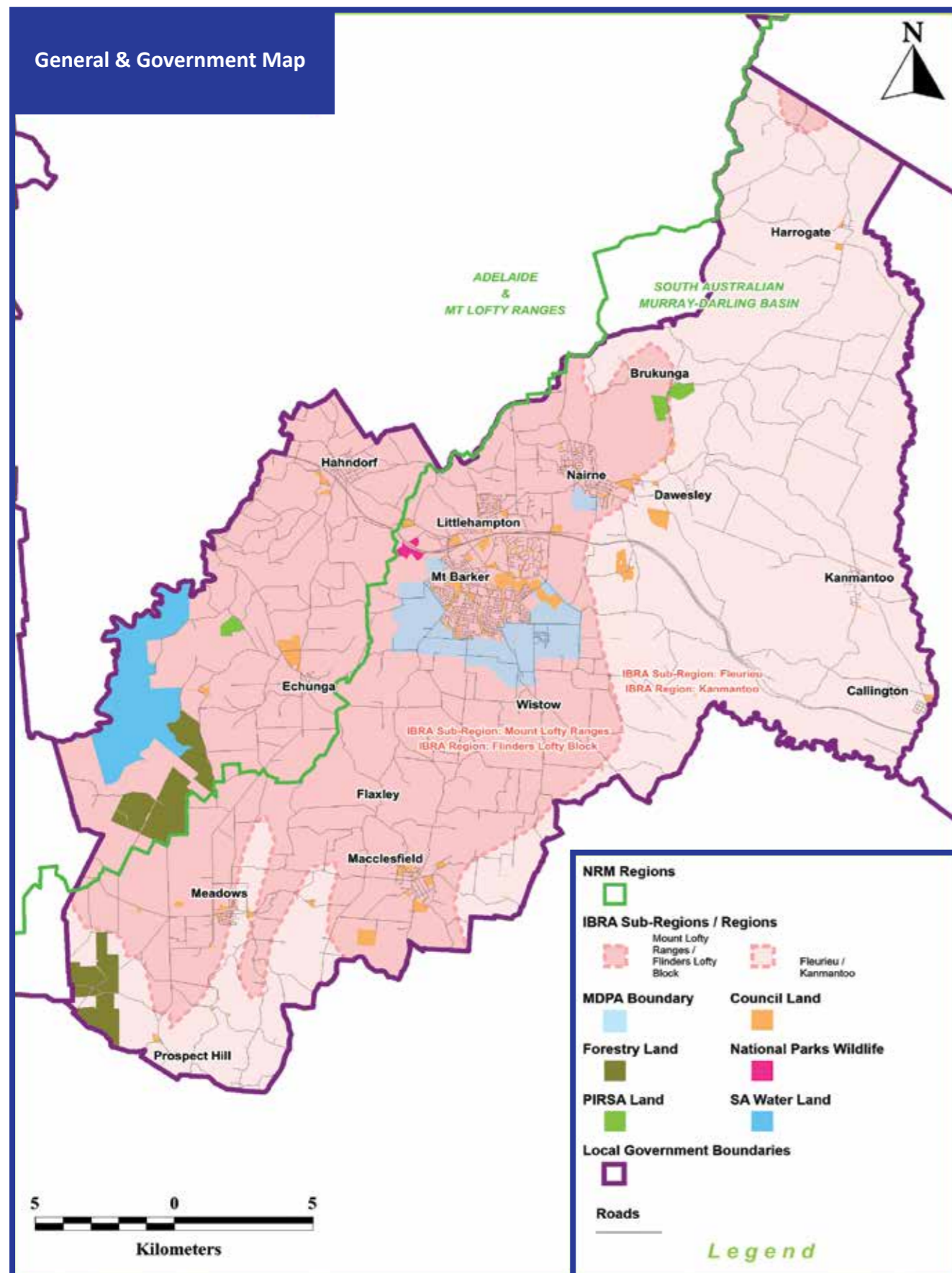
Native vegetation remnancy figures for IBRA subregions and environmental associations are useful for setting regional landscape targets and guiding restoration projects.



| Flinders Lofty Block IBRA bioregion | | Kanmantoo IBRA bioregion | |
|---|--|---|---|
| | Ranges and hills with extensive rock outcrop and shallow soils; stony pediments and small basin plains; some remnants of stony downs; narrow valleys, some with gorges. Ranges and hills in form of hogback ridges in quartzite. | | Temperate, well defined uplands of Cambrian and Late Proterozoic marine sediments, and a lateralisd surface becoming dissected northwards, with open forests and woodlands and heaths on mottled yellow and ironstone gravelly duplex soils. |
| Mount Lofty Ranges (FLB01) IBRA subregion | | Fleurieu (KAN02) IBRA subregion | |
| | This subregion extends from north of the Fleurieu Peninsula to the Barossa Valley, and is predominantly an undulating to low hilly upland with steeper marginal ranges and hills. The Barossa Valley is the lowest area in this subregion and represents a structural basin. The rest of the subregion consists of hilly uplands on sandstone and shale with northerly trending strike ridges and dissected lateritic tableland remnants. Low open woodland commonly dominated by <i>Eucalyptus obliqua</i> and <i>E. baxteri</i> are found in higher rainfall areas on deep, lateritic soils. Shallower or sandy soils support <i>E. fasciculosa</i> , <i>E. cosmophylla</i> , <i>E. leucoxyton</i> and in the northern part of the region <i>E. goniocalyx</i> . <i>E. leucoxyton</i> dominates the woodlands on podsolised soils in the lower rainfall areas, <i>E. viminialis</i> ssp. <i>cygneterensis</i> dominate the wetter and cooler woodlands and <i>E. odorata</i> characterises drier sites. Eucalypts give way to Drooping Sheoak (<i>Allocasuarina verticillata</i>) in the most arid woodlands and in coastal situations on shallow rocky soils. | | This subregion is predominantly an undulating to low hilly upland with steeper marginal ranges and hills. A lateritized surface occurs on the Fleurieu Peninsula and becomes increasingly dissected northward to where only a few remnants survive as rounded crests and summits with mottled-yellow duplex soils. The lowest lying areas are within the Inman Valley where soft glacial and fluvio-glacial deposits have been lowered more quickly than the surrounding sedimentary rocks. Much of the native vegetation has been cleared, however some remains in reserves and small isolated inaccessible areas. Low open woodland commonly dominated by <i>Eucalyptus obliqua</i> and <i>E. baxteri</i> are found in higher rainfall areas on deep, lateritic soils. Shallower or sandy soils support <i>E. fasciculosa</i> , <i>E. cosmophylla</i> and in the northern part of the region <i>E. goniocalyx</i> . <i>E. leucoxyton</i> dominates the woodlands on podzolised soils in the lower rainfall areas, <i>E. viminialis</i> ssp. <i>cygneterensis</i> (Rough-barked Manna Gum) dominates the wetter and cooler woodlands and <i>E. odorata</i> characterises drier sites. Eucalypts give way to <i>Allocasuarina verticillata</i> (Drooping Sheoak) in the most arid woodlands and in coastal situations on shallow rocky soils. |
| Remnant vegetation | Approximately 15% (46342 ha) of the subregion is mapped as remnant native vegetation, of which 27% (12706 ha) is formally conserved | 18 Conservation Parks. Approximately 12.3% of the subregion is mapped as remnant native vegetation, of which 19.5% Protected Areas is protected within NPW reserves (6509ha) and in private Heritage Agreements (1800ha) under the Native Vegetation Act 1991, with an additional 555ha in Forestry reserves. | |
| Landform | Hills and valleys; alternating subparallel hilly ridges and valleys with a general N-S trend in north. In south, hilly dissected tableland | Hills and valleys; alternating sub parallel hilly ridges and valleys with a general N-S trend in north. In south, hilly dissected tableland. | |
| Geology | Dissected lateritized surface in south | Dissected lateritized surface in south. | |
| Soil | Hard setting loams with red clayey subsoils, Highly calcareous loamy earths, Hard setting loams with mottled yellow clayey subsoil, Coherent sandy soils, Cracking clays | Hard setting loams with red clayey subsoils, highly calcareous loamy earths, hard setting loams with mottled yellow clayey subsoil, coherent sandy soils, cracking clays. | |
| Vegetation | Eucalyptus woodlands with a shrubby understorey | Eucalyptus shrublands with a shrubby understorey. | |

| Hahndorf IBRA environmental association | | Scott Hill IBRA environmental association | |
|---|--|--|--|
| Remnant vegetation | Approximately 8% (5091 ha) of the association is mapped as remnant native vegetation, of which 6% (311ha) is formally conserved. | Approximately 0.3% of vegetation remaining from a total area of 97,645 ha. 10% of the association is mapped as remnant native vegetation, where 0.5% is conserved in NPW reserves (48ha) and 0.86% (84 ha) | |
| Landform | Undulating to hilly high plain on shale with narrow, northerly trending quartzite strike ridges. | Structurally controlled ridges with steep slopes, on metasediments. There is a cover of open parkland with an understorey of sown pasture. grass-covered hills, often without any tree growth, frequent rock outcrops, and deeply incised valleys, locally steepening into gorges. | |
| Geology | Shale, laterite, quartzite and alluvium. | Metasediments. | |
| Soil | Hard pedal mottled-yellow duplex soils, hard pedal red duplex soils, reddish weakly structured sandy soils and grey siliceous loams and bleached sands. | Grey-brown weakly structured sandy soils, hard pedal mottled-yellow duplex soils and reddish siliceous loams. | |
| Vegetation | Woodland of SA <i>E. leucoxyton</i> ssp. <i>leucoxyton</i> sometimes with river <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> and open forest of <i>E. obliqua</i> sometimes with Brown Stringybark. | Low woodland of <i>Allocasuarina verticillata</i> and <i>Eucalyptus odorata</i> and low open scrub of <i>Prostanthera aspalathoides</i> (Scarlet Mintbush) and <i>Correa</i> sp. (Mallee Correa). | |

Table 1.2 IBRA Regions, sub-regions, and environmental association environmental landscape summaries for the District. Source: IBRA version 7



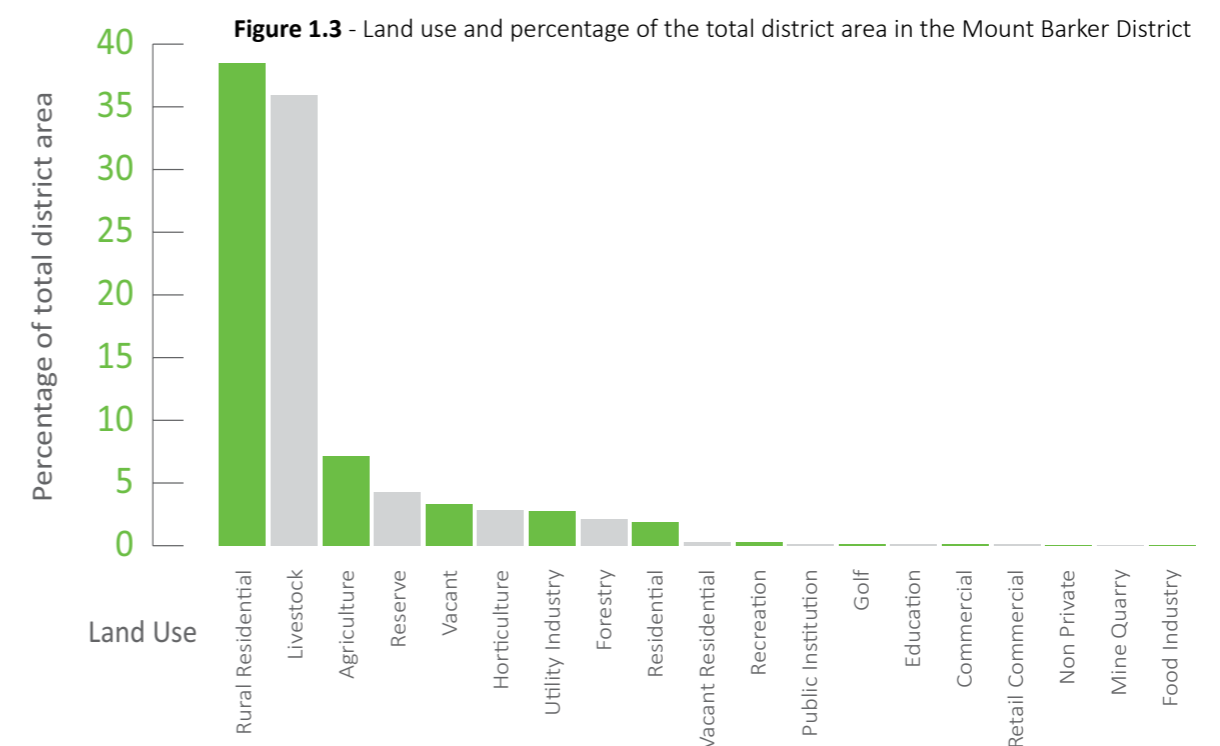
Map 1.2 Mount Barker LGA showing NRM region boundaries, IBRA region boundaries, council land, State owned land and MDPA area.

1.5 Land Uses

There are a large variety of land uses throughout the district; however there are two dominant land categories; rural residential (rural living) and livestock grazing. The current percentage used by each the dominant land use is projected to change as urban expansion increases residential zones and reduces livestock grazing and agricultural land use.

| Land Use Description | Area (Hectares) | District (%) |
|-------------------------|-----------------|---------------|
| Rural Residential | 22923.32 | 38.48 |
| Livestock | 21418.79 | 35.96 |
| Agriculture | 4272.56 | 7.17 |
| Reserve | 2535.07 | 4.26 |
| Vacant | 1947.84 | 3.27 |
| Horticulture | 1697.86 | 2.85 |
| Utility Industry | 1638.41 | 2.75 |
| Forestry | 1277.23 | 2.14 |
| Residential | 1126.77 | 1.89 |
| Vacant Residential | 181.57 | 0.30 |
| Recreation | 153.72 | 0.26 |
| Golf | 82.32 | 0.14 |
| Public Institution | 85.50 | 0.14 |
| Education | 75.38 | 0.13 |
| Commercial | 67.51 | 0.11 |
| Retail Commercial | 53.38 | 0.09 |
| Non Private Residential | 15.29 | 0.03 |
| Mine Quarry | 9.44 | 0.02 |
| Food Industry | 5.62 | 0.01 |
| | 59567.56 | 100.00 |

Table 1.3 – Land use and breakdown of land use in the Mount Barker District



1.6 Population and Urban Growth

Australia's population has increased significantly since the mid 20th century and is expected to increase to around 41 million by 2056 (Department of Environment – Australian Government). There is a relationship between population growth and pressures on the environment. These pressures include the increase of built infrastructure, alteration of natural environments, increase in the use of natural resources, altered flow regimes and tidal zones, increased use of natural areas for recreation, increased greenhouse gas emissions and an increase in non-indigenous organisms.

The 30 Year Plan for Greater Adelaide identified Mount Barker as a regional centre for the eastern Mount Lofty Ranges, highlighting a number of growth areas for urban expansion with approximately 1300 hectares in Nairne and Mount Barker. These growth areas resulted from rezoning by the Ministerial Mount Barker Urban Growth Development Plan Amendment (2010).

The new growth areas for Mount Barker are located along the southern and western fringes of the existing Mount Barker Township. The MDPA land is outlined in the Draft Mount Barker, Littlehampton and Nairne Structure Plan (District Council of Mount Barker 2012), where the intention is to ensure that the impacts associated with the new development on both communities and the environment can be appropriately managed. This takes into consideration issues such as climate change and the need for food production that supports an expanding urban environment (District Council of Mount Barker 2012). The plan identified the need to undertake a detailed biodiversity study of the area as a matter of priority, to better inform good development that adequately addresses these issues associated with the protection and management of biodiversity.

The MDPA biological survey's primary aim is to ensure that new development doesn't further erode the biological health of the region and that opportunities to restore local biodiversity are assisted through the design and function in and around those areas (see chapter 5.0).

1.7 Climate

The climate in the Mt Barker District is generally cooler and wetter than the Adelaide Plains. Mean daily maximum temperatures range from approximately 14°C in winter to 27°C in summer. The mean minimum temperature is approximately 5°C in winter and to 12 °C in the summer. The highest temperature on record is 44.5°C with the lowest being -5.6°C.

The average annual rainfall is 764 mm/yr at Mt Barker, with the highest rainfall months between June and August. Climate varies across the District, with rainfall higher in the western parts of the District (average total annual rainfall of 849 mm /year in Hahndorf) and lower in the eastern portions of the District (average total annual rainfall of 468 mm in Kanmantoo).



1.8 Pre-European Vegetation

Prior to European settlement the Mount Barker District was covered in forests and woodlands, which supported a diverse range of flora and fauna. These vegetation associations were predominately Red Gum (*Eucalyptus camaldulensis* var. *camaldulensis*) Woodland, Blue Gum (*Eucalyptus leucoxylon*) Woodland, Pink Gum (*Eucalyptus fasciculosa*) Woodland, Drooping Sheoak (*Allocasuarina verticillata*) Woodland and Blue Gum (*Eucalyptus leucoxylon*) and Pink Gum (*Eucalyptus fasciculosa*) Woodland. Smaller patches of forests, woodland and grassland occurred throughout the region including Peppermint Box (*Eucalyptus odorata*) +/- Pink Gum (*Eucalyptus fasciculosa*) Woodland, Scented Mat-rush/Irongrass (*Lomandra effusa*) Open Tussock Grassland, Messmate Stringybark (*Eucalyptus obliqua*) and Pink Gum (*Eucalyptus fasciculosa*) Woodland, Messmate Stringybark (*Eucalyptus obliqua*) Open Forest, and small patches of Mallee Box (*Eucalyptus porosa*) Low Woodland (Crompton & Williams 1998).

1.8.1 Red Gum

(*Eucalyptus camaldulensis* var. *camaldulensis*) Woodland

Red Gums form either individually dominant Woodlands or co-dominant Woodlands with Manna Gum (*Eucalyptus viminalis* ssp. *cygnetensis*). Red Gum Woodlands typically occur along creeklines, drainage lines and floodplains or on hill slopes. The soils are mostly loams to clays, silty loam and clay loam. Red Gum Woodlands have an open understorey of grasses, sedges and herbs. The shrub layer is also quite open. Along creeklines, rivers and floodplains, reeds and rushes form the understorey in the waterlogged areas. In valleys, Blue Gum (*Eucalyptus leucoxylon* ssp. *leucoxylon*) and Pink Gum (*Eucalyptus fasciculosa*) are usually present and on hill slopes. The drier eastern slopes of the Mount Barker District originally supported a range of different woodland types. For example, River Red Gum dominated the higher slopes from Wistow, through Dawseley to Brukunga. Hallett Road Reserve in Littlehampton and Mt. Barker Springs, Wistow Nairne still contain remnant Red Gums (Crompton & Williams 1998).

1.8.2 Blue Gum

(*Eucalyptus leucoxylon*) Woodland

Blue Gum (*Eucalyptus leucoxylon* ssp. *leucoxylon*)

Woodlands in the district are generally open with a grassy understorey consisting of Spear-grasses (*Austrostipa* spp.), Wallaby grasses (*Austrodanthonia* spp.) and Kangaroo grasses (*Themeda triandra*) and numerous herbs and bulbous plants. In some areas a sparse cover of shrubs is present consisting of Golden Wattle (*Acacia pycnantha*), Sticky Hop-bush (*Dodonaea viscosa* ssp. *spatulata*) and Sweet Bursaria (*Bursaria spinosa* ssp. *spinosa*). The community is mostly found on crests, ridges or hill slopes on soils ranging from loamy sand to clay loam. Remnants can be seen in Council reserves such as Coppins Bush at Littlehampton, at the Echunga Cemetery and on the lower western slopes of Mt. Barker Summit, Macclesfield Cemetery and Flaxley (Crompton & Williams 1998).

1.8.3 Pink Gum

(*Eucalyptus fasciculosa*) Woodland

Pink Gum (*Eucalyptus fasciculosa*) Woodlands grow on a variety of soil types and habitats where the soil is acidic, phosphorus and nitrogen are low, generally over rock, with rainfall greater than 400mm per annum. The understorey is either mixed shrubs with sedges or more open grassland with herbaceous species and sedges. The dominant understorey shrubs are Golden Wattle (*Acacia pycnantha*), Twiggy Daisy-bush (*Olearia ramulosa*), Heath tea-tree (*Leptospermum myrsinoides*) and Cranberry Heath (*Astroloma humifusum*). Pink gum is usually associated with Blue gum and Manna gum woodlands with pink gum becoming the dominant species in steeper and rockier locations. An important remnant of Pink Gum (*E. fasciculosa*) occurs at the Macclesfield cemetery reserve. Blue Gum (*Eucalyptus leucoxylon* ssp. *leucoxylon*) and Peppermint Box (*Eucalyptus odorata*) are also found in association and are often co-dominant species in Pink Gum Woodlands. The local government area has remaining examples along the ridge between Echunga and Mount Barker, at Macclesfield Cemetery Council and Scrubby Hill Road, Wistow (Crompton & Williams 1998).

1.8.4 Drooping Sheoak

(*Allocasuarina verticillata*) Woodland

Drooping Sheoak (*Allocasuarina verticillata*) Low Woodlands form small stands where soils are stony and drier. Sheoak Woodlands have an open grassy and herbaceous understorey. Dominant understorey includes Cranberry Heath (*Astroloma humifusum*), Pointed Mat-rush (*Lomandra densiflora*), Hard Mat-rush (*Lomandra multiflora* ssp. *dura*) Wallaby grasses (*Austrodanthonia* spp.), and Spear-grasses (*Austrostipa* spp.). Medium sized understorey shrubs include Sweet Bursaria (*Bursaria spinosa* ssp. *spinosa*), Golden Wattle (*Acacia pycnantha*) and Sticky Hop-bush (*Dodonaea viscosa* ssp. *spatulata*). Currently remnants of Sheoak (*Allocasuarina verticillata*) woodland occur on the Back Callington Road, Mount Barker Summit, Scrubby Hill Road and Native Avenue roadsides (Crompton & Williams 1998).

1.8.5 Peppermint Box

(*Eucalyptus odorata*) +/- Pink Gum

(*Eucalyptus fasciculosa*) Woodland

Peppermint Box (*Eucalyptus odorata*) usually forms a distinct woodland community on rocky slopes in sandy loams, sandy clay-loams and clays. Peppermint Box is often found in association with Pink Gums (*Eucalyptus fasciculosa*), Drooping Sheoak (*Allocasuarina verticillata*) and sometimes Blue Gums (*Eucalyptus leucoxylon* ssp. *leucoxylon*). Grasses, sedges and herbs are the dominant understorey, with Hill Raspwort (*Gonocarpus elatus*), Black-anther Flax-lily (*Dianella revoluta*), Sword Sedge (*Lepidosperma* spp.), Mat-rushes/ Irongrasses (*Lomandra* spp.), Spear-grasses (*Austrostipa* spp.) and Wallaby grasses (*Austrodanthonia* spp.). The low shrubs Common Eutaxia (*Eutaxia microphylla*) and Cranberry Heath (*Astroloma humifusum*) are also common. Medium to tall shrubs are sparse with Golden Wattle (*Acacia pycnantha*), Kangaroo Thorn (*Acacia paradoxa*), Sweet Bursaria (*Bursaria spinosa* ssp. *spinosa*) and Twiggy Bush-pea (*Pultenaea largiflorens*). Remnants of Peppermint Box occur on Wooley Road at Harrogate and Daniel Road at Wistow. This vegetation community is listed as threatened under the Environment Protection and Biodiversity Conservation Act 2004 (Crompton & Williams 1998).

1.8.6 Scented Mat-rush/ Irongrass

(*Lomandra effusa*) Open Tussock Grassland

Grasslands contained a wide range of species including grasses, sedges, herbs and often scattered trees or shrubs. Lowland temperate native grasslands and grassy woodlands are recognised as the most threatened natural ecosystem in Australia (Ellis 2000).

The Scented Mat-rush/ Irongrass (*Lomandra effusa*) Open Tussock Grassland community is sometimes as an understorey to Sheoaks (Hyde 1998). Most remnants occur where underlying bedrock is exposed as outcropping stone and the soil profile is generally shallow. This community is often found adjacent to Mallee Box (*Eucalyptus porosa*), Peppermint Box (*Eucalyptus odorata*) or Southern Cypress Pine (*Callitris gracilis*) Woodlands, and these trees may be scattered throughout.

Iron-grass Natural Temperate Grassland is listed as a Critically Endangered ecological community under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC ACT 1999). Small areas can be still be seen at Monarto Quarry and patches through Callington (Crompton & Williams 1998).

1.8.7 Messmate Stringybark

(*Eucalyptus obliqua*) and Pink Gum (*Eucalyptus fasciculosa*) Woodland

The dominant species found in this plant community are Messmate Stringybark (*Eucalyptus obliqua*) and Pink Gum (*Eucalyptus fasciculosa*). The community occurs on the lower hill slopes in soils that range from sandy loam to clay loams. The understorey consists of species such as Golden Wattle (*Acacia pycnantha*), Large-leaf Bush Pea (*Pultenaea daphnoides*), Beaked Hakea (*Hakea rostrata*), Dwarf Hakea (*Hakea rugosa*), Wire Rapier-sedge (*Lepidosperma semiteres*), Cushion Ground-berry (*Acrotriche serrulata*) and Prickly Guinea-flower (*Hibbertia exutiacies*). Jupiter Creek area contains this community (Crompton & Williams 1998).

1.8.8 Messmate Stringybark

(*Eucalyptus obliqua*) Open Forest

Messmate Stringybark (*Eucalyptus obliqua*) Open Forests occur on the highest ridges and hill slopes of the higher rainfall areas on soils ranging from sandy loams, clay loams/ ironstone soils. The dominant tree species is Messmate Stringybark (*Eucalyptus obliqua*) and occurs over a shrub understorey Myrtle Wattle (*Acacia myrtifolia*), Beaked Hakea (*Hakea rostrata*), Narrow-leaf Bitter-pea (*Daviesia leptophylla*), Silver Banksia (*Banksia marginata*), Large-leaf Bush Pea (*Pultenaea daphnoides*) and Yacca (*Xanthorrhoea semiplana* ssp. *semiplana*). In the west of the district there were Stringybark forests with an understorey of healthy shrubs and yacca (*Xanthorrhoea* species). Nearly all of the original Stringybark trees have been felled, although remnants of these forests are evident at Survey Hill Reserve and Stringybark Conservation Reserve and on private land.

Dominant understorey grasses and sedges are Weeping Rice-grass (*Microlaena stipoides* var. *stipoides*) and Wire Rapier-sedge (*Lepidosperma semiteres*). Sporadically, the Common Bearded-heath (*Leucopogon virgatus* var. *virgatus*) occurs. Totness Recreation Park and Jupiter Creek Reserve contain good examples of this community (Crompton & Williams 1998).

1.8.9 Blue Gum

(*Eucalyptus leucoxylon*) and Pink Gum

(*E. fasciculosa*) Woodland

Woodlands dominated by Blue Gum (*Eucalyptus leucoxylon*) and Pink Gum (*Eucalyptus fasciculosa*) can be found on hill slopes on soils ranging from sandy clay loam, silty loam and medium clay. The community consists of Blue Gum and Pink Gum over Golden Wattle (*Acacia pycnantha*) and low shrubs including Silky Guinea-flower (*Hibbertia crinita*), Prickly Guinea Flower (*Hibbertia exutiacies*), Cranberry Heath (*Astroloma humifusum*), Holly Flat-pea (*Platylobium obtusangulum*) and Wire Rapier-sedge (*Lepidosperma semiteres*).

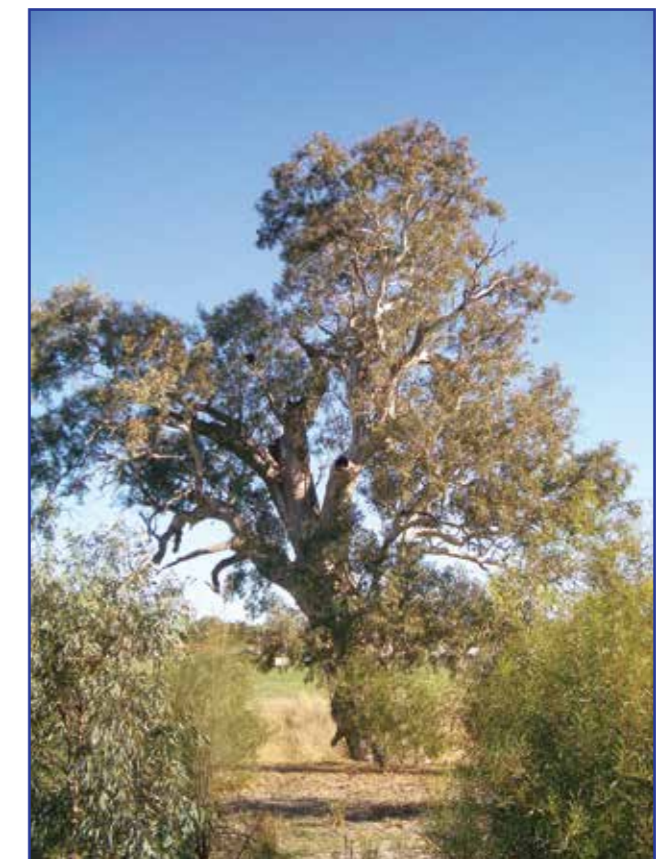
Council land containing this community is at Macclesfield Cemetery near the corner of Macclesfield to Meadows Road and Paris Creek Road between Meadows and Strathalbyn (Crompton & Williams 1998).

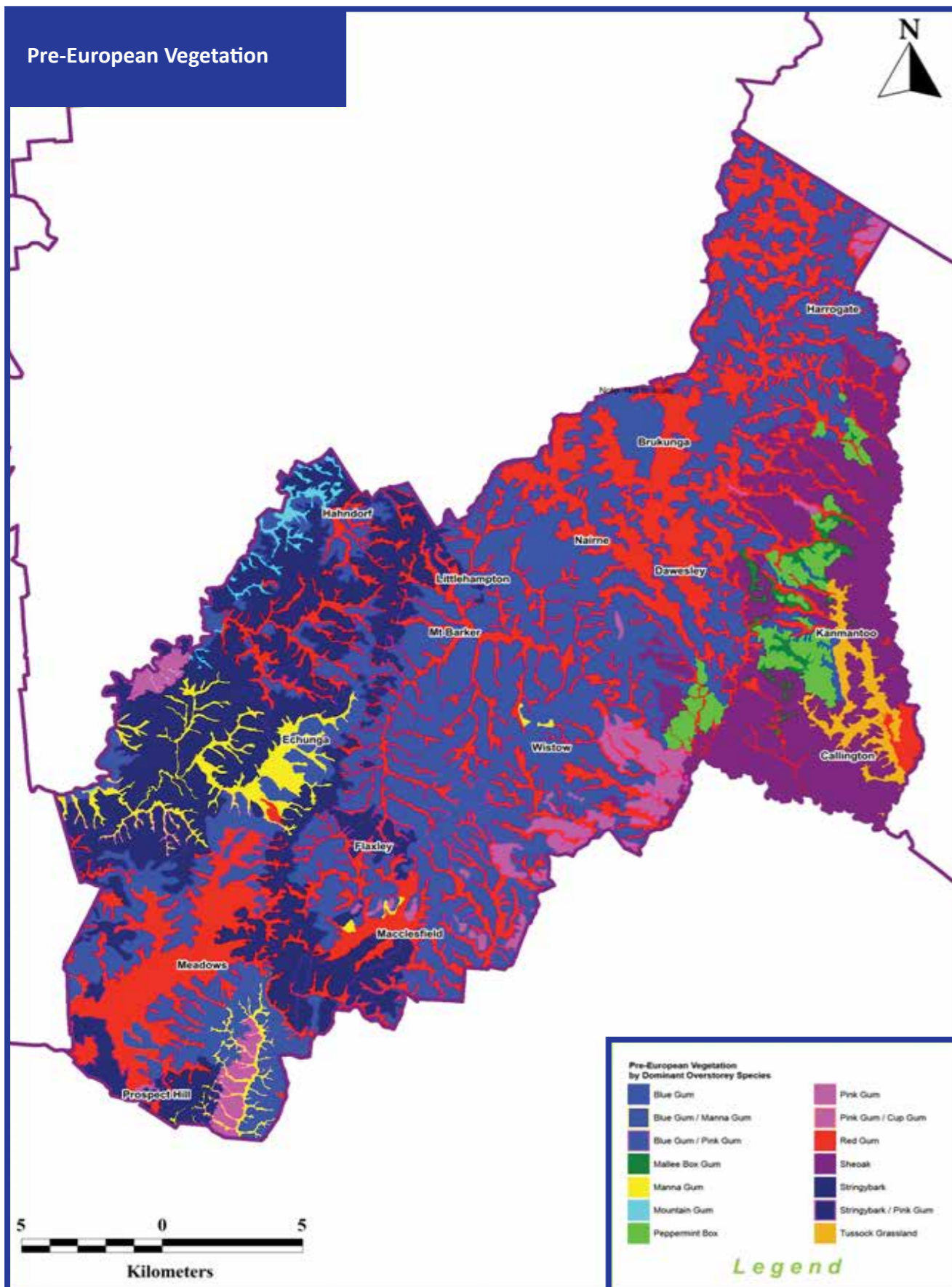
1.8.10 Mallee Box

(*Eucalyptus porosa*) Low Woodland

Mallee Box (*Eucalyptus porosa*) Low Woodland occurs in lower-lying areas on undulating plains with sandy to red-brown clay loam soils. Mallee Box Woodland can often be associated with (*Eucalyptus gracilis*) and Peppermint Box (*Eucalyptus odorata*) on more fertile soils.

Dominant Shrub species are Silver-leaved Wattle (*Acacia argyophylla*), Golden Wattle (*Acacia pycnantha*), and Sweet Bursaria (*Bursaria spinosa* var. *spinosa*) through sheltered lower slopes Wirilda (*Acacia retinodes* var. *retinodes*) and Manna Wattle (*Acacia microcarpa*). This community has a grass and sedge understorey with Kangaroo Grass (*Themeda triandra*), Spear-grass (*Austrostipa* spp.), Wallaby Grass (*Austrodanthonia* spp.), Iron Grass (*Lomandra* spp.) and Heathy Saw-sedge (*Gahnia deusta*). Where areas of granite cropping exist in this community Prickly Dagger Wattle (*Acacia rhigophylla*) is often found. Patches of Mallee woodland were also once distributed in the Mt. Barker District, however only a tiny patch remains, east of Mt. Barker Summit on the Cattle Route (Crompton & Williams 1998).





Map 1.2 The Mount Barker LGA showing pre-European vegetation associations.

1.9 Threats to Biodiversity

Natural Resource priorities in the Mount Barker District are generally based on maintaining and enhancing the vegetation areas that are already in the best quality, as well as focussing on strategic locations, corridors and buffers to existing vegetation.

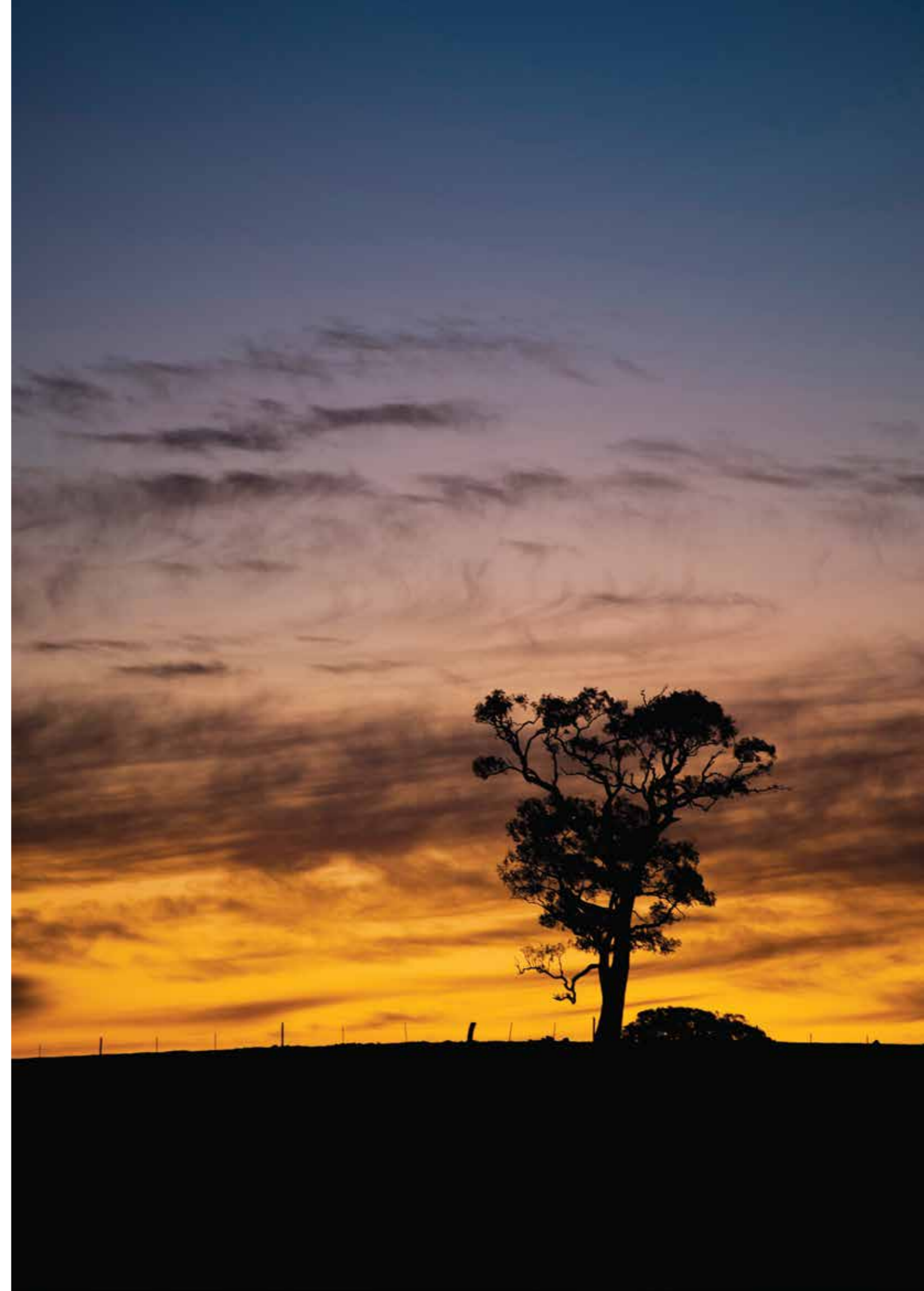
In general, the following key pressures have been identified for the District, based on the current status information collected:

- Degradation of roadside vegetation;
- Degradation of limited remnant vegetation;
- Fragmentation of habitats and lack of connectivity between remnant vegetation and degradation around the edges of remnants (the 'edge effect');
- Predation by pest species (cats, foxes and stray dogs);
- Grazing competition (rabbits, goats, deer, straying sheep and cattle);
- Illegal hunting of native animals
- Road-kill
- Loss of habitat (terrestrial and aquatic);
- Habitat fragmentation
- Diseases and pollution;
- Habitat alteration
- Weed invasion;
- Pest diseases;
- Fire management regime and changes in fire regimes;
- Occasional seasonal over abundance of native species;
- Competition from introduced birds;
- Recreational impacts (bicycles, off road vehicles, horses);
- Unsustainable land use and natural resources management;
- Change in zoning and land use;
- Changes to water flows and hydrology;
- Reduction of water quality;
- Climate change; and
- Population growth.

These pressures, causes and responses will be discussed in more detail in each relevant chapter.

1.10 Biodiversity Protection Objectives

| Threats | Key Area | Key Themes | Objective |
|--|-------------------------|-------------------------|---|
| Degradation of limited remnant | Biodiversity Management | Habitat Preservation | <i>“To maintain and good quality and connected habitat of flora and fauna”</i> |
| Predation by pest species | Biodiversity Management | Habitat Preservation | |
| Grazing competition | Biodiversity Management | Habitat Preservation | |
| Weed invasion. | Biodiversity Management | Habitat Preservation | |
| Pest diseases. | Biodiversity Management | Habitat Preservation | |
| Competition from introduced birds | Biodiversity Management | Habitat Preservation | |
| Occasional seasonal over abundance of native species | Biodiversity Management | Habitat Preservation | |
| Fragmentation of habitats and lack of connectivity between remnant vegetation and degradation around the edges of remnants (the ‘edge effect’) | Biodiversity Planning | Habitat Preservation | |
| Degradation of roadside vegetation (including road reserves) | Biodiversity Management | Roadside Vegetation | <i>“Implement best practise roadside vegetation management to support biodiversity goals and road safety”</i> |
| Fire management regime and changes in fire regimes | Biodiversity Management | Bushfire Management | <i>“Maintain native vegetation of habitat and conservation value while reducing bushfire fuel load”</i> |
| Recreational impacts (bicycles, off road vehicles, horses). | Biodiversity Planning | Balanced Land Use | <i>“To protect and enhance biodiversity outcomes by encouraging and supporting community participation, education and strengthening partnerships”</i> |
| Urban Development | Biodiversity Planning | Sustainable Development | <i>“To promote urban develop that avoids the loss of biodiversity”</i> |
| Change in zoning and land use | Biodiversity Planning | Sustainable Development | <i>“To adopt, implement and promote best practise ecological sustainable development principles”</i> |
| Changes to water flows | Biodiversity Planning | Watercourse Health | <i>“Develop best practise management to optimise physical, chemical and biological state of watercourses in the district”</i> |
| Reduction of water quality | Biodiversity Planning | Watercourse Health | |





BIODIVERSITY MANAGEMENT

2.0 Vegetation

Undisturbed native vegetation is the result of an extensive evolutionary process. Once this system has been disturbed by anthropogenic influences, it cannot be replicated. Vegetation systems are important for the survival of wildlife and provide ecosystem services for humans. The interactions between different populations of species are directly and/or indirectly interrelated and interdependent.

There is little remaining native vegetation within the District. During the 19th Century, approximately 95% of the original vegetation has been cleared for agricultural use and mining activities (University of Adelaide 2010).

Council's Community Land Register has 393 parcels of community and crown space (600ha) and approximately 1000 km of made and unmade road reserve. Many of these community land parcels and road reserves contain remnant native vegetation although it is now fragmented and in declining condition.

Generic Community Land management plans have been developed for all Council reserves and are classified under 3 categories – Natural Areas, Parks and Recreation

& Sport. The Natural Area schedule applies to 58 of the community land and contains one or more of the assets that contribute to biodiversity outcomes such as bushland, watercourses, wetlands and grasslands. Each sub-category identifies core objectives and also considers other environmental, social, economic and cultural values.

A number of these reserves also have site-specific management plans that have been endorsed by Council. Significant natural areas in the Mount Barker District are listed below. There are also a number of water reserves and smaller parcels of land that contribute to the overall biodiversity asset of the Local Government Area (LGA). This remaining vegetation is represented in Map 2.1. The Development Plan Amendment (DPA) 2015 has an expanded conservation zone incorporating Mount Barker Summit Conservation Reserve, Stringybark Conservation Reserve, Yantaringa Reserve, Jupiter Creek Gold Diggings, Kuitpo forest, Emerald Quarry, Mount Bold, Stone Reserve and Survey Hill. This will prevent any development in the zones and provide protection of rare and significant vegetation and habitats.

2.1 Significant Natural Areas – Remnant Vegetation

2.1.1 Mount Barker Summit Conservation Reserve

The Mount Barker Summit Conservation Reserve is an area of Crown land, under part care and control of the Mount Barker District Council. The reserve is located east of the Mount Barker Township, in the Mount Lofty Ranges of South Australia. The summit (517m) is a major geographical and biological feature that is also valued for its Aboriginal and European heritage. The "Mount Barker Summit Conservation Reserve Management Plan" was prepared in 2011 (Milne), which prioritises actions for management.

The reserve provides facilities for passive recreation, tourism and education. In recognition of its high conservation value, including significant plant species diversity and contains flora and fauna species of conservation significance. Council is currently investigating placing the Mount Barker Summit Conservation Reserve under Heritage Agreement with the Minister for Environment and Conservation. The reserve has also been approved as a "Credit Bank" by the Native Vegetation Council to utilise as an offset for future native vegetation clearance required for various developments.

As a whole, the reserve is described by Milne 2011, as a *Eucalyptus viminalis ssp. viminalis* (Manna Gum), *E.viminalis ssp. cygnetensis* (Rough-barked Manna Gum), *E. leucoxylon ssp. leucoxylon* (South Australian Blue Gum) +/- *E. camaldulensis var. camaldulensis* (River Red Gum) Open Woodland to Very Open Woodland with small areas of *Allocasuarina verticillata* (Drooping Sheoak) Woodland. A subcanopy layer is present in most of the Eucalypt

woodland areas in the form of *A. verticillata* (Drooping Sheoak). The understorey varies from a dense shrub layer characterised by *Acacia pycnantha* (Golden Wattle), *A. paradoxa* (Kangaroo Thorn), *Correa glabra var. turnbullii* (Rock Correa) and *Dodonaea viscosa ssp. spatulata* (Sticky Hopbush) to a very sparse shrub component of mainly *A. pycnantha* and/or *Olearia ramulosa*. Also present is scattered individuals and patches of native grass e.g. *Themeda triandra* (Kangaroo Grass), *Austrodanthonia racemosa var. racemosa* (Slender Wallaby Grass) and *Austrostipa setacea* (Corkscrew Speargrass)). Additional groundcover dominants, some seasonal, are *Cheilanthes austrotenuifolia* (Rock Fern), *Gonocarpus elatus* (Hills Raspwort), *Hibbertia crinita* (Guinea-flower), *Astroloma humifusum* (Native Cranberry), *Lomandra densiflora* (Soft Tussock Mat Rush), and *Caesia calliantha* (Blue-grass Lily). The Reserve is providing habitat for many wildlife species due largely to its large size and diverse structure. A search of the Biological Databases of SA for the Summit Reserve and immediate surrounds resulted in 184 wildlife Species. The reserve has been identified as providing suitable habitat for the following bird species of state conservation significance: Painted Button-quail (*Turnix varia*, rated State Rare), Elegant Parrot (*Neophema elegans*, rated State Rare), Scarlet Robin (*Petroica boodang*, rated State Rare) and Diamond Firetail (*Stagonopleura guttata*, rated State Vulnerable). The latter two have been recorded in or near the reserve. The Brown Toadlet (*Pseudophryne bibronii*) and Common Brushtail Possum (*Trichosurus vulpecula*) have also been recorded in or near the reserve. Both are rated State Rare.

2.1.2 Totness Recreation Park (State Government Owned)

Totness Recreation Park was declared in 1970 and covers an area of 43 ha. It is located between Hahndorf and Mount Barker in the Southern Mount Lofty Ranges and is divided by the South Eastern Freeway. The park falls within the 'country' of the Peramangk Aboriginal people, however the archaeology of the park has yet to be surveyed.

There is a dam in the northern section of the park that was used to service steam trains until 1944, and was then used to supply water to Mount Barker. The park is among the few significant areas of natural vegetation remaining in the District and contains a number of rare and threatened species of high conservation significance. There are two major woodland types in the park dominated by either stringybark (*Eucalyptus obliqua*) trees or blue gums (*Eucalyptus leucoxylon*). There is also a small area of river red gum woodland associated with the wetlands in the northern section. The regeneration of river red gums and acacia species is occurring within this section of the park, amongst the introduced grasses. In the 30 ha southern section of the park there is stringybark woodland that has diverse understorey and is in good condition. This area was burnt in the Ash Wednesday bushfires, but most of the vegetation has been regenerating ever since.

Twenty-seven species of bird fauna have been recorded in the park with large Eucalypts (northern section) providing important nesting sites for Crimson rosellas and Kookaburras. The dam provides habitat for a range of waterfowl including ducks, herons and cormorants. Small numbers of kangaroos, echidnas and bats are known to exist in the park. There is a possibility that bandicoots are present, however no sightings have been recorded. Major impacts on park fauna include, nearby urbanisation, habitat destruction and bushfire.

2.1.3 Stringybark Conservation Reserve

This small reserve (10.3 ha) is located near Echunga and falls within the Hahndorf Environment Association (HEA). Less than 1% of the indigenous vegetation of the HEA remains. The main communities in the reserve include regrowth messmate stringybark open forest and mixed manna gum/ river redgum woodland (*E. viminalis/E. camaldulensis*) (Crawford 1995b).

During a survey in 1995, a total of 115 plant species were recorded, of which 8 are listed as having particular conservation significance including the Crested sun-orchid (*T. irregularis*) which is considered endangered at a State level.

Fauna were not surveyed in 1995, however Western grey kangaroos, abundant birdlife, termite mounds (attractive to echidnas), possum scats and rabbits were observed during the preparation of the management plan.



Stringy Bark Reserve- Image by Angela Cullen



2.1.4 Yantaringa Reserve – Hahndorf

This small reserve (8.4 ha) is located close to Hahndorf and has been a Bush For Life Site since 1996. The reserve has had varied land use, such that some sections have been severely modified and others retain remnant vegetation in good condition with diverse understorey and several species of regional and state conservation significance. There are 11 plant species of conservation significance that occur in the reserve including the Candle bark (*Eucalyptus rubida*), which is considered rare both in the Lofty Region and in South Australia, and the pink gum Eucalyptus .fasciculosa, which is also considered rare in the state. Regionally listed species that have been noted at the reserve include Lobed Wallaby-grass (*Austrodanthonia auriculata*), Hibbertia crinite, Juncus sarophorus, Yellow Star (*Hypoxis vaginata var. vaginata*), Little Sword-sedge (*Lepidosperma curtisiae*, Mount Lofty Mat-rush (*Lomandra fibrate*), Weeping Rice-grass (*Microlaena stipoides var. stipoides*), Rayless Daisy-bush (*Olearia tubuliflora*) and Prickly Geebung (*Persoonia juniperina*).

Fauna at this reserve have not been surveyed, but the management plan provides a species list for mammals, reptiles and birds that inhabit the Engelbrook Reserve at Bridgewater (located 4.5 km NW of Yantaringa Reserve), which may have similar species to this reserve.

Restoration of the remnant vegetation in this reserve is a priority given that the area has the potential to provide suitable habitat for wildlife (diverse flora, dense understorey, old eucalyptus forming nesting hollows) and the proximity of other larger remnant areas of vegetation (Engelbrook Reserve, Mylor Recreation Reserve, Hahndorf Cemetery Reserve and Totness Conservation Park).



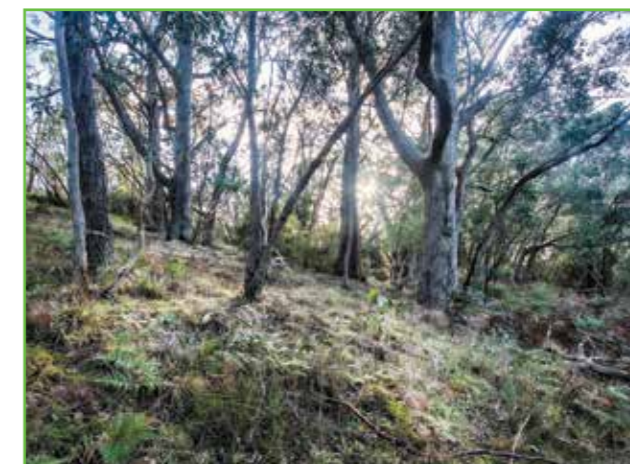
Yantaringa Reserve - Image by Angela Cullen

2.1.5 Survey Hill Reserve

This small reserve (1.25 ha) occurs on a hilltop southeast of Prospect Hill and has been a Bush For Life Site since 2005. The area is valued for its indigenous vegetation and historic significance. The reserve supports tall Messmate stringybark open forest that is a remnant of the Bull Knob Environment Association of which 5% remains. This area is vulnerable to pest plant invasions, but the summit section is in good condition. Weeds have become established in the area in disturbed roadside frontages (Crawford 1995c).

Ninety-three indigenous flora species have been recorded in this reserve since 1995, with one state listed species, Eucalyptus fasciculosa. Other dominant canopy species include Messmate stringybark, (*Eucalyptus obliqua*), Blue gum (*Eucalyptus leucoxylon*) and Rough-barked manna gum (*Eucalyptus viminalis ssp cygnetensis*). Three species have been listed in the Southern Lofty herbarium region; Creeping/tiny cudweed (*Gnaphalium gynocephalum/ indutum*), Guinea-flower (*Hibbertia crinita*) and Austral indigo (*Indigofera australis var australis*).

Fauna have not been surveyed in this reserve, however during preparation of the Management Plan in 1995, Western Grey Kangaroos (*Macropus fuliginosus*), abundant birdlife, termite mounds (attractive to echidnas, Tachyglossus aculeatus) and evidence of rabbits were observed. The large dead eucalypts on the reserve form valuable habitat for a variety of wildlife.



Survey Hill - Image by Angela Cullen

2.1.6 The Macclesfield Parklands

Lord Robinson Park

The reserve contains a red gum *Eucalyptus camaldulensis*, manna gum, *Eucalyptus viminalis*, and blue gum *Eucalyptus leucoxylon* woodland, with sheoaks, acacias, native grasses including wallaby grass, kangaroo grass and microlaena. Along the river there is woolly tea tree *leptosperum lanigerum*, sedges and rushes. The park is home to a variety of birds including ducks, coots, kingfishers, honeyeaters and blue wrens. The native fish mountain galaxias are found in the river as well as long necked tortoise and native water rats. Western grey kangaroos and echidnas may be seen.

The Night Paddock

Riparian vegetation consisting of ancient manna gums and red gums, acacia species and native grasses including wallaby grass and kangaroo grass and sedges along the river.

The Day Paddock

Named from historic practice of agisting during the day, a milking cow or horse that is used for transport. The Day Paddock Park is a conservation reserve with a walking trail which contains prolific wild flowers including a variety of native orchids in spring. The reserve contains significant remnant native vegetation consisting of open forest of stringy barks (*Eucalyptus obliqua*), manna gum (*Eucalyptus viminalis*), red gum (*Eucalyptus camaldulensis*) and blue gum (*Eucalyptus leucoxylon*). The dense understorey includes acacias, pultanea, bursaria, lomandra and native grasses. The site was established as a “Bush for Life” site.

All of the reserves located in the Macclesfield Parklands are cared for by local volunteers involved in bush regeneration.

2.1.7 Turner’s Bush Reserve

Turner’s Bush is a council reserve that is approximately 1 hectare of open Blue Gum woodland, similar to nearby Coppin’s Bush. There are 45 species of native vegetation growing within this Reserve. Turners Bush was established as a Bush For Life Site in 1996.

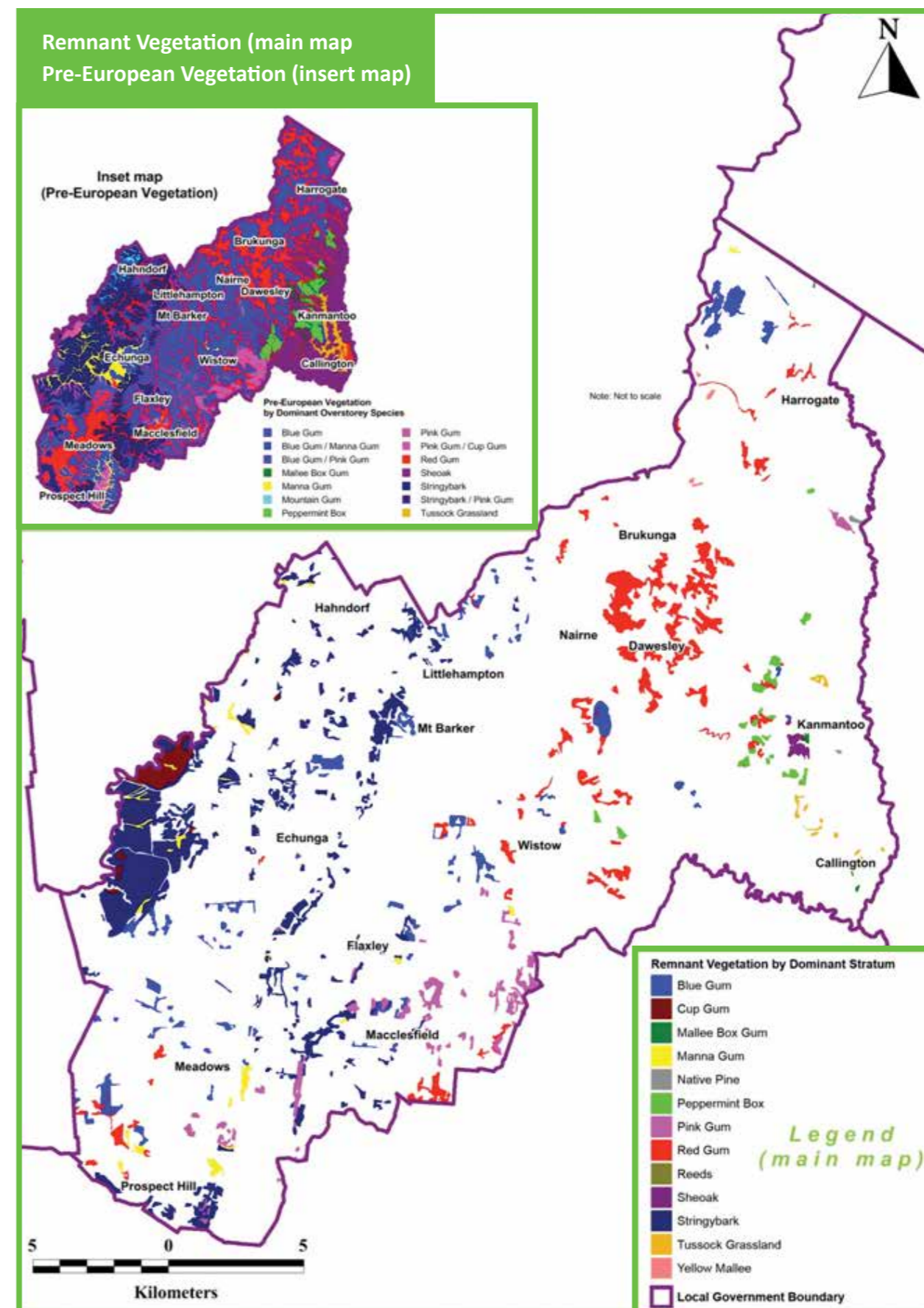
2.1.8 Coppin’s Bush

The Reserve is part of a large block, which was originally bounded by four roads. It was owned by Mr Henry Coppin, Storekeeper of Main Road, Littlehampton.

A freestone quarry once operated there, although in 1996 the scrub portion to the block was given to the Littlehampton Community Association for use as a Flora Reserve, with Littlehampton Primary School taking on the development as an educational and community project by the Dept. of Transport as a Flora Reserve. The “Friends of Coppins Bush” group was established in 1997 and has members from the District council of Mount Barker, Littlehampton Community Association, Littlehampton Primary School and the general community. In 2011, the site became a Bush for Life Site. Coppin’s Bush consists of a low Blue Gum woodland with 116 native species of vegetation, providing habitats for a variety of biodiversity.

2.1.9 Cemeteries

There are a number of cemeteries within the district that contain remnant vegetation and are valued habitat. These are located at Macclesfield, Archer Hill Road, Mount Emphraim and Echunga. Other significant areas of native vegetation that are not under Council’s care and control include Totness Recreation Park (NPWS) Jupiter Creek reserve (PIRSA), Mount Bold Reservoir (SA Water) and Kuitpo Forest (Forestry SA). This remainder of vegetation is shown in Map 2.1.



Map 2.1 Pre-European vegetation and remaining vegetation

2.2 Bush For Life (BFL) Sites

Council allocates budget towards the management of sites with remnant native vegetation on an annual basis. Part of this allocation is directed towards supporting the Bush For Life (BFL) program. There are currently 21 BFL sites within the district which form part of the overall biodiversity management strategy. These sites are located on community land, road reserves and cemeteries. There are also four BFL sites located on private or corporate land.

The BFL program uses minimal disturbance bushcare techniques to help protect and rehabilitate bushland areas, mostly targeted at weed management. These techniques include hand weeding, selective brushcutting to reduce the prevalence of weed grasses, use of herbicide to control weeds, release of biological control agents where safe and appropriate, compilation of species lists and development of bush action plans, specific work to protect rare and threatened species and monitoring and recording of works undertaken.. The BFL sites are shown in Map 2.2 and are listed below.

| SITE NAME | LOCATION | NRM | SIZE (HA) | ESTABLISHED |
|------------------|---------------------|-----|-----------|-------------|
| CALLINGTON ROAD | PETWOOD | MDB | 0.3 | 01/05/96 |
| SCHMIESS ROAD | ECHUNGA | MLR | 0.6 | 01/05/96 |
| YANTARINGA RES. | HAHNDORF | MLR | 5.7 | 01/05/96 |
| TURNERS BUSH | LITTLEHAMPTON | MDB | 0.9 | 01/05/96 |
| THE DAY PADDOCK | MACCLESFIELD | MDB | 9.2 | 23/08/06 |
| DAWESLEY | BRUKUNGA | MDB | 2.8 | 02/09/99 |
| KANMANTOO | KANMANTOO | MDB | 0.8 | 02/09/99 |
| ARCHER HILL CEM | BUGLE RANGES | MDB | 1.1 | 27/06/00 |
| M'FIELD QUARRY | GREEN HILLS RANGE | MDB | 1.3 | 01/05/00 |
| HACK RANGE RD | ECHUNGA | MDB | 1.0 | 01/05/00 |
| ECHUNGA RD | ECHUNGA | MDB | 2.9 | 10/06/02 |
| HARROGATE RES | HARROGATE | MDB | 3.4 | 25/06/04 |
| PINEY RIDGE RD | NAIRNE | MDB | 2.3 | 15/12/04 |
| MT EPHRAIM CEM | PROSPECT HILL | MDB | 0.5 | 19/04/05 |
| RED GUM RD | FLAXLEY | MDB | 5.7 | 19/04/05 |
| SURVEY HILL | PROSPECT HILL | MDB | 2.2 | 19/04/05 |
| ECHUNGA CEM | ECHUNGA | MLR | 6.3 | 19/04/05 |
| MT BARKER SUMMIT | MOUNT BARKER SUMMIT | MDB | 6.2 | 25/01/08 |
| COPPINS BUSH | LITTLEHAMPTON | MDB | 3.4 | 29/07/11 |
| BURNBRAE RD | HARROGATE | MDB | 1.8 | 29/07/11 |
| STONE RESERVE | MACCLESFIELD | MDB | 3.1 | 15/05/13 |

Table 2.1 Bush For Life Sites within the District

2.3 Roadside Vegetation

The District Council of Mount Barker currently has a network of 855 kms of made roads comprising 664 kms of Council roads and 191 kms of Transport SA roads. Over 150 kms of road reserve remain undeveloped. The length of made roads will increase as urban growth will require additional thoroughfares through the district. The majority of road reserves are 20 metres wide and are highly valued due to the remaining vegetation (District Council of Mount Barker Road Reserve Vegetation Management Plan 2004).

Large-scale land clearing for agriculture has occurred in rural areas and consequently road reserves often support the only remaining remnant vegetation. Current demands for land division and urban settlement continue to erode patches of native vegetation, particularly in the urban growth zone. As a consequence, this remnant vegetation has become an important environmental asset in urgent need of protection. Roadside vegetation should be protected as it provides numerous benefits such as functional benefits including functional, conservation and social benefits.

Roadside vegetation in the District of Mount Barker is classed into categories from 1-5 according to remnant vegetation (canopy cover, understory flora and strata, ground cover,) weed invasion, mechanical disturbance, natural ecosystem stability and biodiversity and habitat integrity. Category 1 is the most intact with category 5 being the most disturbed. The classification system is based on the representation of remaining vegetation and the evidence of weed invasion. Category 1 areas are classed as a priority for conservation because remaining vegetation is high and weed infestation is low hence the likelihood of successful rehabilitation is higher. The study also identified a range of influences damaging remnant vegetation and/or leading to weed invasion:

- Roadworks and service provision
- Battering roadsides
- Construction and maintenance of drain culverts
- Stockpiling of road metal and fill
- Road grading
- Use of vegetated verges to turn, park and service machinery
- Over-clearing (e.g. in a specified work-zone for visibility)
- Pruning of trees by using inappropriate methods
- Service trenches
- Off-target herbicide damage
- Roadside slashing
- Landscaping
- Rubbish dumping and using reserves as junkyards
- Grazing
- Ploughing firebreaks
- Firewood collection
- Horse riding
- Off-road vehicles
- Driveways

Crompton and Williams (1998) surveyed the vegetation of 263 (including two railway reserves) roads in the District, of which 31 (11.8%) (including one railway reserve) were classed as Category 1.

In April 2010 Council endorsed a Road Reserve Vegetation Management Plan. The plan addresses a broad range of issues involved in road reserve management throughout



the district and sets up procedures whereby future conflicts between road use and maintenance and vegetation management can be addressed. Council is currently involved in the Roadside Marker System (RMS) to assist with on ground management of key roadside remnants and also has a Roadside Vegetation Management Plan/Strategy (1996). The Roadside Marker System is modelled on the TSA system. The initiative allows responsible authorities, such as council, Transport SA and community groups, to identify and maintain good quality patches of roadside vegetation. Significant patches of vegetation are identified by distinctive blue and white signage that allows sites to be quickly identified by work crews. Protective actions related to the category of roadside patch are then to be followed by roadside workers. There are also signs used to indicate the end of the RMS zone.



In addition, a few pockets of category 1 roadside vegetation were contiguous with privately maintained native vegetation remnants on adjacent property. The roads where this occurs include: Kangaroo Reef Rd and Haines Fire Track (Hahndorf); Cleggett Rd and Windsor Ave (Littlehampton); Frampton Rd, Native Ave and Summit Track (Wistow); Hack Range Rd and Liebelt Rd (Echunga); Harper Rd (Meadows) and Magins Rd (Macclesfield) (Crompton & Williams 1998).

The Road Reserve Vegetation Management Plan will be updated in 2016/2017. The revised plan will include a thorough audit of existing RMS sites, identify any new sites and include Bushland Condition Monitoring (BCM) as an effective way to monitor trends.



Map 2.2 The Mount Barker LGA showing BFL sites, roadside vegetation (category 1&2) and road reserves.

2.4 Rated Flora

In South Australia, a Regional Species Conservation Assessment framework was developed by the Department of Environment, Water and Natural Resources (DEWNR) to contribute to the knowledge base and management of threatened species and ecological communities at a regional level. The aim was to provide a standardised approach to assessing and prioritising SA's native species to guide species conservation and recovery, in each of the Natural Resource Management (NRM) region across the state. Each region was assessed according to the Interim Biogeographical Regionalisation for Australia (IBRA) subregions falling within or across the regional boundary.



2.4.1 Nationally Threatened Ecological Communities

There are two nationally threatened ecological communities that remain in the district:

- Iron-grass (*Lomandra species*) Natural Temperate Grassland; and
- Peppermint Box (*Eucalyptus odorata*) Grassy Woodland.

“The Iron-grass Natural Temperate Grassland of South Australia is an ecological community in which Iron-grasses (*Lomandra species*) are a characteristic and dominant part of the vegetation. In South Australia, Stiff Iron-grass (*Lomandra multiflora subsp. dura*) and Scented Iron-grass (*Lomandra effusa*) commonly occur in grassland communities, in association with perennial, tussock-forming native grasses Iron-grass Natural Temperate Grassland is considered endemic to South Australia. The Iron-grass Natural Temperate Grassland occurs to the East of the district around Kanmantoo and Callington. The presence of mature Iron-grass tussocks generally indicates areas not previously disturbed by ploughing: such areas are important refuges for species sensitive to cultivation and fertilizers, such as orchids and soil-dwelling insects, spiders and reptiles (Threatened Species Scientific Committee, 2007)

Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia ecological community has the woodland form of *Eucalyptus odorata* as the characteristic and dominant tree species. Peppermint Box Grassy Woodland is endemic to South Australia. The ecological community occurs around Kanmantoo with small patches near Harrogate, Callington and Wistow. It occurs mainly on loam to clay loam soils, on gentle to steep slopes of hills and ridgelines. Peppermint Box Grassy Woodland has a sparse to dense tree over an open native grass and herb understorey with scattered shrubs. Mosses, lichens, leaf litter and bare ground are common and important features of the ground layer. Many plants and animals of the ecological community are grassy habitat specialists or woodland-dependent species (Turner 2012).

2.4.2 Threatened Flora Species

Table 2.2 displays the threatened flora species that are listed within the district. Conservation status of a species can be as listed at a national, state or regional level.

Council is a stakeholder of the South Australian Murray Darling Basin threatened flora recovery team, which contributes to the recovery of nine nationally threatened species. The Mount Barker District contains two of the nine species that are listed in the plan; coloured spider-orchid (*Caladenia colorata*) and Silver daisy bush (*olearia pannosa ssp pannosa*).



Peppermint Box - Image by Mark Mills



Irongrass Grassland - Image by Ben Simon

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|--------------|--|----------------------------|---------------------|----|-----|--------------------|--|
| | | | AMLR | SA | AUS | | |
| LEGUMINOSAE | <i>Acacia acinacea</i> | Wreath Wattle | RA | | | 2014 | Medium sized spindly shrub prefers grassy woodland communities. Observed along Hunt Road within the road reserve, the species is associated with <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> / <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> / <i>E. viminialis</i> ssp. <i>cygnensis</i> woodland. |
| LEGUMINOSAE | <i>Acacia gunnii</i> | Ploughshare Wattle | RA | R | | 1968 | |
| LEGUMINOSAE | <i>Acacia provincialis</i> | Swamp Wattle | NT | | | 2008 | |
| LEGUMINOSAE | <i>Acacia retinodes</i> | Wirilda | RA | | | 2008 | |
| LEGUMINOSAE | <i>Acacia rupicola</i> | Rock Wattle | RA | | | 1971 | |
| LEGUMINOSAE | <i>Acacia verniciflua</i> | Varnish Wattle | RA | | | 1987 | |
| LEGUMINOSAE | <i>Acacia verticillata</i> ssp. <i>ovoides</i> | Prickly Moses | NT | | | 2005 | A medium sized shrub, preferring damp sites. Found along Native Avenue road reserve associated with high quality <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodland. Outside of MDPa boundary. |
| ROSACEAE | <i>Acaena ovina</i> | Downy Sheep's Burr | NT | | | 2014 | A low growing herb found in the understorey of <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> and <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodlands. Found along Hunt and Martin Roads and along the Western Flat Creek and other small watercourses. |
| EPACRIDACEAE | <i>Acrotriche depressa</i> | Native Currant | RA | | | 1981 | |
| EPACRIDACEAE | <i>Acrotriche fasciculiflora</i> | Mount Lofty Ground-berry | RA | | | 1961 | |
| GRAMINEAE | <i>Amphibromus nervosus</i> | Veined Swamp Wallaby-grass | NT | | | 2005 | |
| ROSACEAE | <i>Aphanes australiana</i> | Australian Piert | RA | | | 1958 | |
| UMBELLIFERAE | <i>Apium prostratum</i> var. <i>prostratum</i> | Native Celery | RA | | | 1996 | |
| GRAMINEAE | <i>Aurolia densiflora</i> | Fox-tail Spear-grass | RA | R | | 1943 | |
| GRAMINEAE | <i>Aurolia gibbosa</i> | Swollen Spear-grass | VU | R | | 1900 | |
| GRAMINEAE | <i>Aurolia nitida</i> | Balcarra Spear-grass | RA | | | 1993 | |
| GRAMINEAE | <i>Aurolia oligostachya</i> | Fine-head Spear-grass | EN | E | | 1941 | |
| GRAMINEAE | <i>Aurolia scabra</i> ssp. <i>scabra</i> | Rough Spear-grass | NT | | | 2014 | More often associated with grasslands, shrublands and mallee communities and rarely woodlands (Jessop et al., 2006). On the MDPa land, the species was found along a minor watercourse in close proximity to the Victor Harbor railway line and further south along the rail reserve in association with scattered <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> . |
| GRAMINEAE | <i>Aurolia setacea</i> | Corkscrew Spear-grass | NT | | | 2014 | Known principally from grassland and grassy woodland communities, the species is often associated with <i>E. porosa</i> or <i>E. fasciculosa</i> . On site it was recorded from along a small watercourse in association with a degraded <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> remnant in close proximity to the Victor Harbor railway line. |
| GRAMINEAE | <i>Aurolia tenuifolia</i> | | RA | R | | 1953 | |
| PROTEACEAE | <i>Banksia ornata</i> | Desert Banksia | RA | | | 1986 | |

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|--------------|--|----------------------------|---------------------|----|-----|--------------------|--|
| | | | AMLR | SA | AUS | | |
| PITTOPOACEAE | <i>Billardiera versicolor</i> | Yellow-flower Apple-berry | VU | | | 2014 | A climbing shrub, found along Native Avenue road reserve associated with high quality <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodland. Outside of MDPa boundary. |
| CYPERACEAE | <i>Bolboschoenus caldwellii</i> | Salt Club-rush | RA | | | 2010 | A small clump of the rhizomatous perennial sedge was recently found along degraded creekline close to the Victor Harbor railway line and associated with a small remnant <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> patch. Last DBBSA record from 1943. |
| RUTACEAE | <i>Boronia edwardsii</i> | Edwards' Boronia | EN | | | 1900 | |
| LILIACEAE | <i>Bulbine bulbosa</i> | Bulbine-lily | NT | | | 2014 | An annual lily recorded from a number of areas containing intact eucalypt woodlands with reasonable understorey. Hunt Road, Harrop Road, Native Avenue and larger remnants in close proximity to Totness RP. |
| ORCHIDACEAE | <i>Caladenia argocalla</i> | White Beauty Spider-orchid | CR | E | EN | 1937 | Endemic to SA. Preferred habitat is open grassy woodland on relatively fertile soil (Willson & Bignall, 2009). The species is known from 13 sub-populations, the closest records being west of Harrogate in 200 by R. Bates. There is an historical record from the northern side of Mt Barker Creek near the intersection of Springs and Dutton Road. It is unlikely that the species would exist in MDPa land given the degraded nature of the understorey, however it may be present in more undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodlands west of the MDPa land. |
| ORCHIDACEAE | <i>Caladenia behrii</i> | Pink-lip Spider-orchid | EN | E | EN | 1995 | Prior to European settlement the species was probably widespread and relatively common throughout the MLR (Bates 1994). Grows in fertile, shallow loams, amongst <i>E. goniocalyx</i> / <i>E. fasciculosa</i> woodland and <i>E. obliqua</i> / <i>E. microcarpa</i> / <i>E. leucoxyloides</i> and <i>Xanthorrhoea semiplana</i> . The understorey is usually open and shrubby. Several records from mid 1990's from approximately 2kms west of Totness RP. It is unlikely that the species would exist in MDPa land given the degraded nature of the understorey, however it may be present in more undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> / <i>E. obliqua</i> woodlands west of the MDPa land. |
| ORCHIDACEAE | <i>Caladenia latifolia</i> | Pink Caladenia | NT | | | 1900 | |
| ORCHIDACEAE | <i>Caladenia rigida</i> | Stiff White Spider-orchid | EN | E | EN | 1967 | The species occurs in Eucalyptus obliqua, <i>E. fasciculosa</i> , <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> , <i>E. goniocalyx</i> , <i>E. microcarpa</i> open forests with a relatively open shrub layer (Willson & Bignall, 2009). Several historical records near Echunga whilst a large population at Mt Bold Reservoir was discovered in 2008. It is possible that the species may exist in the undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> / <i>E. obliqua</i> woodlands west of the MDPa land, but probably unlikely in the disturbed woodland communities in the MDPa land. |
| MYRTACEAE | <i>Callistemon rugulosus</i> | Scarlet Bottlebrush | RA | | | 1900 | |
| MYRTACEAE | <i>Callistemon sieberi</i> | River Bottlebrush | VU | | | 1900 | |
| ORCHIDACEAE | <i>Calochilus robertsonii</i> | Purplish Beard-orchid | VU | | | 1990 | |
| CYPERACEAE | <i>Carex bichenoviana</i> | Notched Sedge | RA | | | 2010 | Recently found along degraded creekline close to the Victor Harbor railway line and associated with a small remnant <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> patch. |
| CYPERACEAE | <i>Carex inversa</i> var. <i>inversa</i> | Knob Sedge | VU | | | 2005 | |

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|--------------|--|----------------------------|---------------------|----|-----|--------------------|--|
| | | | AMLR | SA | AUS | | |
| PITTOPOACEAE | <i>Billardiera versicolor</i> | Yellow-flower Apple-berry | VU | | | 2014 | A climbing shrub, found along Native Avenue road reserve associated with high quality <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodland. Outside of MDPA boundary. |
| CYPERACEAE | <i>Bolboschoenus caldwelii</i> | Salt Club-rush | RA | | | 2010 | A small clump of the rhizomatous perennial sedge was recently found along degraded creekline close to the Victor Harbor railway line and associated with a small remnant <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> patch. Last DBBSA record from 1943. |
| RUTACEAE | <i>Boronia edwardsii</i> | Edwards' Boronia | EN | | | 1900 | An annual lily recorded from a number of areas containing intact eucalypt woodlands with reasonable understorey. Hunt Road, Harrop Road, Native Avenue and larger remnants in close proximity to Totness RP. |
| LILIACEAE | <i>Bulbine bulbosa</i> | Bulbine-lily | NT | | | 2014 | Endemic to SA. Preferred habitat is open grassy woodland on relatively fertile soil (Willson & Bignall, 2009). The species is known from 13 sub-populations, the closest records being west of Harrogate in 200 by R. Bates. There is an historical record from the northern side of Mt Barker Creek near the intersection of Springs and Dutton Road. It is unlikely that the species would exist in MDPA land given the degraded nature of the understorey, however it may be present in more undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodlands west of the MDPA land. |
| ORCHIDACEAE | <i>Caladenia argocalla</i> | White Beauty Spider-orchid | CR | E | EN | 1937 | Prior to European settlement the species was probably widespread and relatively common throughout the MLR (Bates 1994). Grows in fertile, shallow loams, amongst <i>E. goniocalyx</i> / <i>E. fasciculosa</i> woodland and <i>E. obliqua</i> / <i>E. micracarpa</i> / <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodland. Also recorded amongst <i>E. fasciculosa</i> and <i>Xanthorrhoea semiplana</i> . The understorey is usually open and shrubby. Several records from mid 1990's from approximately 2kms west of Totness RP. It is unlikely that the species would exist in MDPA land given the degraded nature of the understorey, however it may be present in more undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> / <i>E. obliqua</i> woodlands west of the MDPA land. |
| ORCHIDACEAE | <i>Caladenia behrii</i> | Pink-lip Spider-orchid | EN | E | EN | 1995 | The species occurs in Eucalyptus obliqua, <i>E. fasciculosa</i> , <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> , <i>E. goniocalyx</i> , <i>E. micracarpa</i> open forests with a relatively open shrub layer (Willson & Bignall, 2009). Several historical records near Echunga whilst a large population at Mt Bold Reservoir was discovered in 2008. It is possible that the species may exist in the undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> / <i>E. obliqua</i> woodlands west of the MDPA land, but probably unlikely in the disturbed woodland communities in the MDPA land. |
| ORCHIDACEAE | <i>Caladenia latifolia</i> | Pink Caladenia | NT | | | 1900 | |
| ORCHIDACEAE | <i>Caladenia rigida</i> | Stiff White Spider-orchid | EN | E | EN | 1967 | |
| MYRTACEAE | <i>Callistemon rugulosus</i> | Scarlet Bottlebrush | RA | | | 1900 | |
| MYRTACEAE | <i>Callistemon sieberi</i> | River Bottlebrush | VU | | | 1900 | |
| ORCHIDACEAE | <i>Calochilus robertsonii</i> | Purplish Beard-orchid | VU | | | 1990 | |
| CYPERACEAE | <i>Carex bichenoviana</i> | Notched Sedge | RA | | | 2010 | Recently found along degraded creekline close to the Victor Harbor railway line and associated with a small remnant <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> patch. |
| CYPERACEAE | <i>Carex inversa</i> var. <i>inversa</i> | Knob Sedge | VU | | | 2005 | |

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|----------------|--|--|---------------------|----|-----|--------------------|--|
| | | | AMLR | SA | AUS | | |
| Lauraceae | <i>Cassytha melantha</i> | Coarse Dodder-laurel | NT | | | 2014 | A climbing species recorded from <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> / <i>E. obliqua</i> associations characterised by the larger remnants in close proximity to Totness RP. Outside of the MDPA boundary. |
| COMPOSITAE | <i>Chrysocephalum semipapposum</i> | Clustered Everlasting | NT | | | 1942 | |
| CONVOLVULACEAE | <i>Convolvulus angustissimus</i> ssp. <i>angustissimus</i> | Australian Bindweed | NT | | | 2014 | Recorded from a number of locations within remnant eucalypt woodlands along roadsides and Victor Harbor railway corridor, including Martin Road, Harrop Road and Hunt Road BFL site. |
| RUTACEAE | <i>Correa glabra</i> var. <i>turnbullii</i> | Rock Correa | RA | | | 1967 | |
| CRASSULACEAE | <i>Crassula helmsii</i> | Swamp Crassula | NT | | | 2014 | Recently recorded from degraded sections of Western Flat Creek associated with scattered <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> . |
| COMPOSITAE | <i>Cymbonotus preissianus</i> | Austral Bear's-ear | RA | | | 1900 | |
| BORAGINACEAE | <i>Cynoglossum suaveolens</i> | Sweet Hound's-tongue | NT | | | 2010 | Recorded along good patches of remnant eucalypt woodland within the road reserves of Harrop Road and Hunt Road BFL site. |
| GRAMINEAE | <i>Deyeuxia densa</i> | Heath Bent-grass | RA | R | | 2000 | |
| LILIACEAE | <i>Dianella longifolia</i> var. <i>grandis</i> | Pale Flax-lily | VU | R | | 2014 | SA records mainly from the ranges and known as a grassy woodland specialist. Three individuals were recorded along Barker Road reserve in <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> and <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> woodlands. |
| ORCHIDACEAE | <i>Diuris behrii</i> | Behr's Cowslip Orchid | VU | V | | 1989 | |
| GRAMINEAE | <i>Echinopogon ovatus</i> | Rough-beard Grass | EN | R | | 2000 | |
| ONAGRACEAE | <i>Epilobium billardierianum</i> ssp. | Robust Willow-herb | NT | | | 2014 | Recorded from degraded section of the Victor Harbor railway corridor, associated with scattered <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> , <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> and <i>E. viminalis</i> ssp. <i>cygnetensis</i> overstorey. |
| UMBELLIFERAE | <i>Eryngium ovinum</i> | Blue Devil | EN | V | | 1973 | |
| MYRTACEAE | <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> | River <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> | NT | | | 2014 | Forming pure <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> woodlands and frequently interspersing with other eucalypt species such as <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> and <i>E. viminalis</i> ssp. <i>cygnetensis</i> . Also studied throughout open paddocks as scattered trees and small remnant groups. |
| MYRTACEAE | <i>Eucalyptus dalrympleana</i> ssp. <i>dalrympleana</i> | Candlebark Gum | VU | R | | 1965 | |
| MYRTACEAE | <i>Eucalyptus diversifolia</i> ssp. <i>diversifolia</i> | Coastal White Mallee | RA | | | 2014 | Recorded from degraded section of the Victor Harbor railway corridor, probably planted. |
| MYRTACEAE | <i>Eucalyptus fasciculosa</i> | <i>E. fasciculosa</i> | NT | R | | 2014 | Recorded, it is commonly scattered throughout <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> , <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> , <i>E. obliqua</i> and <i>E. viminalis</i> ssp. <i>cygnetensis</i> woodlands and also found in association with the Native Pine remnant east of Wellington Road. Also found as scattered trees in paddock environments. |
| MYRTACEAE | <i>Eucalyptus leptophylla</i> | Narrow-leaf Red Mallee | RA | | | 1964 | |
| MYRTACEAE | <i>Eucalyptus leucoxyloides</i> ssp. <i>leucoxyloides</i> | South Australian <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> | NT | | | 2014 | Forming pure woodlands and frequently interspersing with other eucalypt species such as <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> , <i>E. obliqua</i> , <i>E. fasciculosa</i> and <i>E. viminalis</i> ssp. <i>cygnetensis</i> . Also studied throughout open paddocks as scattered trees and small remnant groups. |

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|----------------|---|-------------------------|---------------------|----|-----|--------------------|--|
| | | | AMLR | SA | AUS | | |
| JUNCACEAE | <i>Juncus pauciflorus</i> | Loose-flower Rush | NT | | | 2010 | Fine rush species recently recorded from Martin Road under degraded <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> / <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodland. |
| GRAMINEAE | <i>Lachnagrostis aemula</i> | Blown-grass | NT | | | 2014 | Recently recorded from degraded sections of Western Flat Creek associated with scattered <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> . |
| STERCULIACEAE | <i>Lasiopetalum behrii</i> | Pink Velvet-bush | VU | | | 1937 | |
| CYPERACEAE | <i>Lepidosperma concavum</i> | Spreading Sword-sedge | NT | | | 1922 | |
| CYPERACEAE | <i>Lepidosperma congestum</i> | Little Sword-sedge | RA | | | 1968 | |
| CYPERACEAE | <i>Lepidosperma curtisiae</i> | Little Sword-sedge | NT | | | 2014 | A small tufted perennial, the species often grows in exposed situations at higher altitudes, also in heath and woodland. Recorded from a number of locations within remnant eucalypt woodlands west of the MDPA land in a Heritage Agreement and along roadsides, including Flaxley Road, Harrop Road, Native Avenue and Hunt Road BFL site. |
| MYRTACEAE | <i>Leptospermum lanigerum</i> | Silky Tea-tree | RA | | | 1952 | |
| EPACRIDACEAE | <i>Leucopogon concurrens</i> | Scrambling Beard-heath | NT | | | 1961 | |
| LINDSAEACEAE | <i>Lindsaea linearis</i> | Screw Fern | NT | | | 1993 | |
| LOGANIACEAE | <i>Logania recurva</i> | Recurved Logania | NT | | | 1987 | |
| LILIACEAE | <i>Lomandra collina</i> | Sand Mat-rush | RA | | | 2014 | |
| LILIACEAE | <i>Lomandra fibrata</i> | Mount Lofty Mat-rush | NT | | | 2014 | Forms dense understorey mats in high rainfall areas of the Mt Lofty Ranges. Recorded from good quality <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> / <i>E. obliqua</i> woodland remnants in and around Totness RP west of the MDPA land. |
| LILIACEAE | <i>Lomandra sororia</i> | Sword Mat-rush | NT | | | 2014 | Small Irongrass species recorded from a number of locations within remnant eucalypt woodlands along roadsides, including Martin Road, Harrop Road, Native Avenue and Hunt Road. |
| JUNCACEAE | <i>Luzula densiflora</i> | Dense Wood-rush | RA | | | 1964 | |
| PITTOSPORACEAE | <i>Marianthus bignoniaceus</i> | Orange Bell-climber | NT | | | 1979 | |
| MYRTACEAE | <i>Melaleuca brevifolia</i> | Short-leaf Honey-myrtle | VU | | | 1952 | |
| MYRTACEAE | <i>Melaleuca decussata</i> | Totem-poles | NT | | | 2014 | Recorded along Martin Road, Harrop Road, and Hunt Road. Possibly planted |
| LABIATAE | <i>Mentha diemenica</i> | Slender Mint | VU | R | | 2005 | |
| COMPOSITAE | <i>Millotia muelleri</i> | Common Bow-flower | NT | | | 1967 | |
| COMPOSITAE | <i>Millotia perpusilla</i> | Tiny Bow-flower | VU | | | 1967 | |
| COMPOSITAE | <i>Minuria leptophylla</i> | Minnie Daisy | RA | | | 1906 | |
| COMPOSITAE | <i>Olearia tubuliflora</i> | Rayless Daisy-bush | VU | | | 2008 | |
| RUBIACEAE | <i>Opercularia ovata</i> | Broad-leaf Stinkweed | RA | | | 1981 | |
| RUBIACEAE | <i>Opercularia turpis</i> | Twiggy Stinkweed | NT | | | 1988 | |
| GRAMINEAE | <i>Pentapogon quadrifidus</i> var. <i>quadrifidus</i> | Five-awn Spear-grass | VU | R | | 1936 | |
| PROTEACEAE | <i>Persoonia juniperina</i> | Prickly Geebung | NT | | | 1987 | |
| THYMELAEACEAE | <i>Pimelea glauca</i> | Smooth Riceflower | NT | | | 1937 | |

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|------------------|--|-----------------------|---------------------|----|-----|--------------------|--|
| | | | AMLR | SA | AUS | | |
| GRAMINEAE | <i>Poa labillardieri</i> var. <i>labillardieri</i> | Common Tussock-grass | NT | | | 2014 | Widespread from the coast to the ranges. Associated with open forests and woodlands with <i>E. obliqua</i> and <i>E. fasciculosa</i> . Recorded south of the MDPA land along the Native Avenue Road reserve. |
| POTAMOGETONACEAE | <i>Potamogeton crispus</i> | Curly Pondweed | RA | | | 2014 | A freshwater aquatic plant that floats in mats on the surface, with leaves submerged, and rooted in mud. Recently recorded from degraded sections of Western Flat Creek associated with scattered <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> . |
| POTAMOGETONACEAE | <i>Potamogeton ochreatus</i> | Blunt Pondweed | RA | R | | 2014 | Listed in the AMLR Regional Recovery Plan, this species is a freshwater aquatic plant that floats in mats on the surface, with leaves submerged, and rooted in mud. The species is known to occur in perennial streams of the Onkaparinga River catchment, and has a limited and declining habitat in the region (Willson & Bignall, 2009). It was recently recorded from ephemeral waterholes along degraded sections of Western Flat Creek associated with scattered <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> . |
| ORCHIDACEAE | <i>Prasophyllum australe</i> | Austral Leek-orchid | EN | R | | 1910 | |
| ORCHIDACEAE | <i>Prasophyllum odoratum</i> | Scented Leek-orchid | NT | | | 1929 | |
| ORCHIDACEAE | <i>Prasophyllum pallidum</i> | Pale Leek-orchid | EN | R | VU | 1967 | Endemic to SA. Grows singly or in small groups on the more fertile soils of woodland and well-grassed open forests, often comprising <i>E. leucoxyloides</i> , <i>E. fasciculosa</i> , <i>E. gomicalyx</i> , <i>Callitris gracilis</i> and <i>Allocasuarina verticillata</i> . Historically recorded 3kms east of Hahndorf and more recently from near Harrogate. It is unlikely that the species would exist in MDPA land given the degraded nature of the woodland understorey, however it may be present in more undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodlands west of the MDPA land. |
| ORCHIDACEAE | <i>Prasophyllum pruinosum</i> | Plum Leek-orchid | EN | V | EN | 1976 | The species is endemic to the AMLR where its preferred habitat is open woodland and grassy forest with <i>Callitris gracilis</i> , <i>Eucalyptus leucoxyloides</i> and <i>E. fasciculosa</i> . Occurs in the open or in the shelter of broom-like shrubs in well-drained fertile loams and sandy soils, usually with other leek-orchids (Willson & Bignall, 2009). Record from the 1970's was collected from Mylor. It is unlikely that the species would exist in MDPA land given the degraded nature of the woodland understorey. |
| LABIATAE | <i>Prostanthera eurybioides</i> | Monarto Mintbush | EN | E | EN | 1938 | |
| ORCHIDACEAE | <i>Pterostylis curta</i> | Blunt Greenhood | VU | R | | 1900 | |
| ORCHIDACEAE | <i>Pterostylis robusta</i> | Large Shell-orchid | NT | | | 1953 | |
| AMARANTHACEAE | <i>Ptilotus erubescens</i> | Hairy-tails | | R | | 1983 | |
| LEGUMINOSAE | <i>Pultenaea involucreata</i> | Mount Lofty Bush-pea | NT | | | 1905 | |
| LEGUMINOSAE | <i>Pultenaea laxiflora</i> | Loose-flower Bush-pea | NT | | | 1974 | |
| LEGUMINOSAE | <i>Pultenaea pedunculata</i> | Matted Bush-pea | NT | | | 2014 | Low growing prostrate shrub associated with open areas in forests and woodlands (Prescott, 1989). The species was recorded from areas containing intact eucalypt woodlands with reasonable understorey along Flaxley Road and Native Avenue, larger remnants in close proximity to Totness RP and an <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodland remnant under Heritage Agreement west of the MDPA land. |

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|---------------|--------------------------------|-----------------------|---------------------|----|-----|--------------------|--|
| | | | AMLR | SA | AUS | | |
| RANUNCULACEAE | <i>Ranunculus amphitrichus</i> | Small River Buttercup | RA | | | 2014 | Recently recorded from degraded sections of Western Flat Creek associated with scattered <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> . |
| RANUNCULACEAE | <i>Ranunculus inundatus</i> | River Buttercup | EN | R | | 1987 | Aquatic or semi-aquatic perennial species found in mud or shallow fresh water with leaves floating or submerged (Wilson & Bignall, 2009). Recorded in 1987 from degraded sections of Western Flat Creek near the culvert at the Old Mount Barker Road. May have been removed with construction of new culvert (Crompton pers. comm, 2015) |
| POLYGONACEAE | <i>Rumex dumosus</i> | Wiry Dock | EN | R | | 1943 | |
| GRAMINEAE | <i>Rytidosperma erianthum</i> | Hill Wallaby-grass | NT | | | 2014 | A widespread species from a range of habitats including grasslands, woodlands and open forests (Jessop et al., 2006). Has been recently recorded from areas containing intact <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> and <i>E. viminalis</i> ssp. <i>cygneterensis</i> woodlands with reasonable understorey along Flaxley Road and Native Avenue. |
| GRAMINEAE | <i>Rytidosperma fulvum</i> | Leafy Wallaby-grass | VU | | | 2014 | Normally associated with wet areas and heavy soils, often in grasslands, but sometimes in woodlands (Jessop et al., 2006). Recorded from along the degraded section of the Victor Harbor railway reserve and from the degraded sections of Western Flat Creek. |
| GRAMINEAE | <i>Rytidosperma laeve</i> | Smooth Wallaby-grass | RA | R | | 2014 | The species is recorded from woodlands on heavy loam soils often in damp sites such as ephemeral drainage lines and damp woodlands (Jessop et al., 2006). On the MDPA land the species was recently recorded found along a small degraded creekline close to the Victor Harbor railway line and associated with a small remnant <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> patch. |
| GRAMINEAE | <i>Rytidosperma pilosum</i> | Velvet Wallaby-grass | NT | | | 2010 | Occurs in a wide range of habitats including open grasslands, sclerophyll shrub and woodlands. Recorded within remnant eucalypt woodlands along Native Avenue roadside reserve and the Victor Harbor railway reserve within the MDPA land. |
| PRIMULACEAE | <i>Samolus repens</i> | Creeping Brookweed | NT | | | 1935 | |
| CYPERACEAE | <i>Schoenoplectus validus</i> | River Club-rush | NT | | | 1943 | |
| CYPERACEAE | <i>Schoenus laevigatus</i> | | VU | R | | 1961 | |
| CYPERACEAE | <i>Schoenus nitens</i> | Shiny Bog-rush | RA | | | 2014 | Grows in brackish coastal swamps and in damp places. On the MDPA land the species was recently recorded found along a small degraded creekline close to the Victor Harbor railway line and associated with a small remnant <i>E. camaldulensis</i> ssp. <i>camaldulensis</i> patch. |
| COMPOSITAE | <i>Senecio phelleus</i> | Woodland Groundsel | NT | | | 2014 | Recorded in intact <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> woodland with intact understorey along Native Avenue in remnant under Heritage Agreement west of the MDPA land. |
| COMPOSITAE | <i>Senecio prenanthoides</i> | | RA | | | 1993 | |
| COMPOSITAE | <i>Senecio spanomerus</i> | | NT | | | 1900 | |
| COMPOSITAE | <i>Senecio squarrosus</i> | Squarrose Groundsel | RA | | | 2014 | A stalked shrub to waist high, the species prefers heavy, wet soils, grassy sites in forests (Prescott, 1989). Recorded along a degraded section of the Victor Harbor railway reserve within the MDPA land. |
| COMPOSITAE | <i>Sonchus hydrophilus</i> | Native Sow-thistle | NT | | | 2008 | |

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|-----------------|--|------------------------|---------------------|----|-----|--------------------|---|
| | | | AMLR | SA | AUS | | |
| STACKHOUSIACEAE | <i>Stackhousia monogyna</i> | Creamy Candles | NT | | | 1999 | |
| STYLIDIACEAE | <i>Stylidium calcaratum</i> | Spurred Trigger-plant | NT | | | 1980 | |
| ORCHIDACEAE | <i>Thelymitra arenaria</i> | | RA | | | 1963 | |
| ORCHIDACEAE | <i>Thelymitra grandiflora</i> | Great Sun-orchid | NT | R | | 1946 | |
| ORCHIDACEAE | <i>Thelymitra ixioides</i> | Spotted Sun-orchid | | | E | 1998 | Occurs singly or in small numbers in forest clearings, woodland, rough scrub and heaths in sandy or gravelly loams receiving greater than 750 mm mean annual rainfall (Bates, 2009). |
| ORCHIDACEAE | <i>Thelymitra latifolia</i> | Blue Star Sun-orchid | RA | V | | 2005 | Recent records are from Mt Bold and Kuitipo and north of the South Eastern Freeway near Hahndorf. It is possible that the species may exist in the undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides/obliqua</i> woodlands west of the MDPA land, but probably unlikely in the disturbed woodland communities in the MDPA land. |
| ORCHIDACEAE | <i>Thelymitra luteociliium</i> | Yellow-tuft Sun Orchid | NT | | | 1964 | A widespread species found in woodlands in various soil types from leached pale sands to yellow gravelly clays and may occur near swamps (Bates, 2010). Recent records within the district are located south of Echunga, Scott Creek, Mt Bold Reservoir and west of Meadows. It is possible that the species may exist in the undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides/obliqua</i> woodlands west of the MDPA land, but probably unlikely in the disturbed woodland communities in the MDPA land. |
| ORCHIDACEAE | <i>Thelymitra nuda</i> | Scented Sun-orchid | RA | | | 2014 | |
| ORCHIDACEAE | <i>Thelymitra peniculata</i> | Blue Star Sun-orchid | VU | V | | 1969 | A widespread and locally common species, it occurs in small to quite extensive numbers in well drained soils in open locations in areas receiving more than 200 mm mean annual rainfall (DEWNR, 2007). Preferred habitat includes forest clearings, woodland and scrubby ridges (Bates, 2009). Recent records from the Kuitipo and Echunga areas. It is possible that the species may exist in the undisturbed <i>E. leucoxyloides</i> ssp. <i>leucoxyloides/obliqua</i> woodlands west of the MDPA land, but probably unlikely in the disturbed woodland communities in the MDPA land. |
| JUNCAGINACEAE | <i>Triglochin procera</i> | Water-ribbons | NT | | | 2015 | |
| COMPOSITAE | <i>Triptilodiscus pygmaeus</i> | Small Yellow-heads | NT | | | 1921 | A riparian species which grows in stationary or flowing freshwater habitats including swamp scrub and riparian woodlands. Recorded within small waterholes associated with the Western Flat Creek, and from several locations along a small tributary of the Mt Barker Creek. Also widespread in Laratinga wetlands. |
| GOODENIACEAE | <i>Velleia paradoxa</i> | Spur Velleia | RA | | | 2014 | |
| LEGUMINOSAE | <i>Viminaria juncea</i> | Native Broom | VU | R | | 1935 | A short-lived perennial herb commonly found in sclerophyll forests, grasslands and grassy woodlands. Recorded along Native Avenue in good quality <i>E. leucoxyloides</i> ssp. <i>leucoxyloides</i> remnant. |
| VIOLACEAE | <i>Viola betonicifolia</i> ssp. <i>betonicifolia</i> | Showy Violet | CR | E | | 1900 | |

| Family | Species name | Common name | Conservation status | | | Latest record date | Comments |
|---------------|-----------------------------------|-------------------------------|---------------------|----|-----|--------------------|---|
| | | | AMLR | SA | AUS | | |
| COMPOSITAE | <i>Vittadinia blackii</i> | Narrow-leaf New Holland Daisy | RA | | | 1961 | |
| CAMPANULACEAE | <i>Wahlenbergia luteola</i> | Yellow-wash Bluebell | RA | | | 1935 | |
| LILIACEAE | <i>Xanthorrhoea quadrangulata</i> | Rock Grass-tree | RA | | | 1998 | |
| COMPOSITAE | <i>Xerochrysum bracteatum</i> | Golden Everlasting | RA | | | 2014 | A tall daisy species commonly found in open woodlands or forests. Closest records were from larger <i>E. leucoxyton</i> ssp. <i>leucoxyton</i> / <i>E. obliqua</i> remnants associated with Totness RP. |

Table 2.2 Regional, State and National listed flora species within the District.



2.5 Veteran and Street Trees

It is estimated that there is approximately 25-30 thousand street and reserve trees. Street and reserve trees provide very important social and economic benefits as well as provide essential environmental services in our urban environments.

Amongst our extensive remnant tree population there are some trees of an age class classified as ‘veteran trees’ that provide habitat for a variety of birds, mammals, reptiles, insects and fungi. Where these trees are located in urban areas they provide highly public biodiversity nodes.

The term ‘veteran’ predominantly refers to the structure and form of a tree and indeed infers a tree has been around for a very long time, possibly centuries. More often than not veteran trees have an extensive stem and branch failure history.

They remain standing with a hollowed and obscure structure, appearing quite striking and adding great interest to a landscape. Often these trees have a very high biodiversity value due to the varied habitat they offer to hollow dependent fauna and various fungal associations they may have.

Typically a veteran tree is a tree that has a large trunk diameter and evidence of numerous branch failures. It may have a substantially reduced form displaying the remnants of what it once was.

There are trees within this class which are already naturally formed as veteran trees, however trees of other age classes and types may become candidates for transformation into ‘veterans’ and through appropriate targeted branch management become ‘veteranised’. This term may be considered new popular English or vocabulary and essentially derived amongst tree managers who through appropriate measures essentially fast forward the morphology of a younger tree into a much older one rather than removing it all together.

The term ‘venerable tree’ can refer to a tree of great stature or a tree with special merit or of a tree in good condition and of a certain age class. Often a veteran tree is venerable due to its size or special merit. Most naturally occurring veteran trees are venerable in some way and are therefore highly valuable environmentally, aesthetically and sometimes even culturally. However, not every veteran tree is of great stature or of special merit and therefore not every specimen maybe considered venerable. The same applies in reverse, not every venerable tree maybe considered a ‘veteran’ as ‘veteran’ predominantly refers to compromised structure and /or health rather than other features of a venerable tree which may be largely intact and still with robust vascular health.

A large tree, which may not be of an age class of a typical veteran but has experienced substantial structural compromise through either storm damage or hot weather, decay related failure, can be managed and retained in a highly altered state if it still has its primary scaffold stem and branch system remaining largely intact. Where trees in this situation are not heavily reduced further failures can be expected during wind events from the naturally imposed altered canopy dynamics. Or they can fail at a later point simply from a torn and decayed structure no longer ‘engineered’ to resist gravity. In some cases whole trees that have failed may be retained as veterans to form the ultimate horizontal landscape feature or habitat zone. Alive or dead these are too valuable to be cut into firewood. Individuals in this case maybe suited to being converted into ‘veterans’ where either they have a long failure history with pre-existing hollows or they have an upper canopy in vascular decline or both.

A declined upper canopy often gives way to a secondary lower canopy sometimes flush with mature ‘elite’ epicormic growth, which is suitable to prune down to. By reducing the overall canopy size the potential for failure is reduced. The mature epicormics can be managed and periodically pruned. Trees with hollows and failure history can have structural inadequacies utilised for hollow dependent fauna.

2.6 Revegetation and Restoration Sites

Typically, efforts to protect biodiversity have focused on large and relatively undisturbed habitats (Alvey 2006). The increase of urbanisation has resulted in the loss of habitat and the resultant remaining natural areas to become fragmented. The use of all types and conditions of greenspaces is important for biodiversity refuge and connectivity. In an urban setting and for the purposes of this plan, greenspace is defined as areas of remnant vegetation, parks, reserves, sporting fields, green corridors, irrigated agricultural areas and private gardens in residential, industrial and commercial areas (Taylor, 2013). Those located near significant habitat locations are particularly important in providing corridors for wildlife (Goddard, Dougill & Benton 2010) in urbanised areas. Urban greenspace not only provides areas for social interaction and physical activity, it also plays an important functional role in urban landscapes by providing services such as the mitigation of flooding and erosion, the collection of airborne and waterborne contaminants, and provision of wildlife habitat (Barnett G, Doherty M & Beaty M, n.d).

Not only has greenspace been identified as an important resource for human social and health benefits, greenspaces within urban areas have been recognised as high value for providing habitat for rare and endangered species. (Gairola and Noresah, 2010). The continuing consideration of biodiversity in urban greenspaces will contribute to reducing biodiversity loss, as urbanisation claims more natural environments suited to habitat. (Gairola and Noresah, 2010).

Council has developed an extensive revegetation program that aims to contribute to biodiversity outcomes aesthetics and beautification of the area. The program relies and forms strong partnerships with community groups and volunteers. The program attracts an average of 800 volunteers, with around 10,000 native seedlings planted each year. Perhaps the most successful rehabilitation site is Laratinga Wetland and Reserve.

2.6.1 Laratinga Wetland and Reserve

Laratinga Wetland is an artificially created wetland that serves to remove nutrients from the treated effluent from the adjacent Springs Road wastewater treatment plant (WWTP). Recycled water that has passed through the wetland has been used for irrigation of Council reserves, local agricultural industries, Hillgrove Mine and private properties. The reserve has a total area of approximately 50ha and includes the wetland itself comprising of three large connected wetland basins covering 10.7 ha, wetland reserve including BBQ, picnic and toilet facilities, the undeveloped space to the East of the Mount Barker Creek, and the Mount Barker Creek.

Laratinga Reserve is a highly valued environmental and recreational area. The following threatened fauna species have been recorded from Laratinga Wetland since 1985:

- 5 migratory bird species listed under the EPBC Act
- 19 State threatened bird species
- 1 State threatened mammal

A further 17 bird species considered threatened at a regional level in the Mount Lofty Ranges (Willson and Bignall 2009) have been recorded at Laratinga.



| Common Name | Scientific Name | Aus | SA | Currently Known from Laratinga |
|------------------------------|---------------------------------|--------------|----|--------------------------------|
| BIRD | | | | |
| Australasian Bittern | <i>Botaurus poiciloptilus</i> | | V | ✓ |
| Australasian Darter | <i>Anhinga novaehollandiae</i> | | R | ✓ |
| Australasian Shoveler | <i>Anas rhynchos</i> | | R | ✓ |
| Australian Little Bittern | <i>Ixobrychus dubius</i> | | E | ✓ |
| Blue-billed Duck | <i>Oxyura australis</i> | | R | ✓ |
| Common Sandpiper | <i>Actitis hypoleucos</i> | | R | ✓ |
| Crested Shrike-tit | <i>Falcunculus frontatus</i> | | R | ✓ |
| Freckled Duck | <i>Stictonetta naevosa</i> | | V | ✓ |
| Glossy Ibis | <i>Plegadis falcinellus</i> | | R | ✓ |
| Great Crested Grebe | <i>Podiceps cristatus</i> | | R | ✓ |
| Great Egret | <i>Ardea alba</i> | Mi(Ma),Mi(W) | | ✓ |
| Jacky Winter | <i>Microeca fascinans</i> | | R | ✓ |
| Latham's Snipe | <i>Gallinago hardwickii</i> | Mi(W) | R | ✓ |
| Lewin's Rail | <i>Lewinia pectoralis</i> | | V | ✓ |
| Long-toed stint | <i>Calidris subminuta</i> | Mi(W) | R | ✓ |
| Musk Duck | <i>Biziura lobata</i> | | R | ✓ |
| Peregrine Falcon | <i>Falco peregrinus</i> | | R | ✓ |
| Rainbow Bee-eater | <i>Merops ornatus</i> | Mi(T) | | ✓ |
| Spotless Crake | <i>Porzana tabuensis</i> | | R | ✓ |
| Striped Honeyeater | <i>Plectorhyncha lanceolata</i> | | R | ✓ |
| White-bellied Sea-Eagle | <i>Haliaeetus leucogaster</i> | Mi(T) | E | ✓ |
| Wood Sandpiper | <i>Tringa glareola</i> | | R | ✓ |
| Yellow-tailed Black-Cockatoo | <i>Calyptorhynchus funereus</i> | | V | ✓ |
| MAMMAL | | | | |
| Common Brushtail Possum | <i>Trichosurus vulpecula</i> | | R | ✓ |

Table 2.3 State and migratory species known from Laratinga Wetland

Regions: AUS: Australia (Environment Protection and Biodiversity Conservation Act 1999); SA: South Australia (National Parks and Wildlife Act 1972). Conservation Codes: CE: Critically Endangered; EN/E: Endangered; VU/V: Vulnerable; R: Rare; Mi(Ma): Migratory Marine; Mi(W): Migratory Wetland; Mi(T): Migratory Terrestrial.



Approximately 160 bird species have been recorded over the past 10 years by local birdwatchers and Birds SA.

Five frog species are confirmed from Laratinga Reserve including the Common Froglet (*Crinia signifera*), Eastern Banjo Frog (*Limnodynastes dumerili*), Spotted Grass Frog (*Limnodynastes tasmaniensis*), Brown Tree Frog (*Litoria ewingi*) and Peron's Tree Frog (*Litoria peronei*).

The Common Brushtail Possum, Ringtail Possum, House Mouse (*Mus musculus*), Koala and Black Rat (*Rattus rattus*) are also noted from the site. At least eight species of microbat have been identified. The common long neck tortoise is also commonly seen bathing on logs and the native water rat (*Hydromys chrysogaster*).

| Common Name | Scientific Name |
|----------------------------|---|
| Gould's Wattled Bat | <i>Chalinolobus gouldii</i> |
| Chocolate Wattled Bat | <i>Chalinolobus morio</i> |
| Southern Freetail-bat | <i>Mormopterus species 4 "big dick"</i> |
| Lesser Long-eared Bat | <i>Nyctophilus geoffroyi</i> |
| White-striped Freetail-bat | <i>Tadarida australis</i> |
| Large Forest Bat | <i>Vespadelus darlingtoni</i> |
| Southern Forest Bat | <i>Vespadelus regulus</i> |
| Little Forest Bat | <i>Vespadelus vulturnus</i> |

Table 2.4 Microbats recorded at Laratinga wetland



Two introduced species, Mosquito Fish (*Gambusia holbrooki*) and Carp (*Cyprinus carpio*) The wetland was dried in 2010 in an attempt to eradicate or reduce the both introduced species. The numbers of mosquito fish were reduced and the carp population was not noted until 2014. There is no sign of establishment for the released population of the native species Flathead Gudgeon (*Philypnodon grandiceps*). The flora of Laratinga Reserve has been classified into six broad vegetation associations:

- Creek line – Remnant *Eucalyptus camaldulensis* +/- Planted Mixed Woodland;
- Mixed Planted *Eucalyptus sp.* +/- *Acacia sp.* Low Closed Forest;
- Common Reed (*Phragmites australis*) +/- Bulrush (*Typha sp.*) Sedgeland ;
- Exotic Grassland;
- Mixed Aquatic Reeds and Rushes; and
- Scattered Trees.
- The wetlands support three primary wetland ecological units. These ecological units are:
 - Dense reed beds of *Phragmites australis* +/- *Typha sp*
 - Mixed emergent reeds and rushes and open Water

2.7 Threats to Vegetation

2.7.1 Pest Diseases

Land development, soil disturbance and the introduction of new species have resulted in the introduction of diseases and invertebrate pests that threaten the health of agricultural and natural systems. A widespread concern to both natural and agricultural systems is the root-rot fungus, *Phytophthora* and the less understood Mundulla Yellows that has only been reported in degraded natural ecosystems.

Phytophthora is the main plant disease impacting the MLR and Greater Adelaide Region. In South Australia more than thirteen species of *Phytophthora* have been identified, with three of these in native vegetation: *Phytophthora cinnamomi*, *P. citricola*, and *P. cryptogea*.

This fungus lives in the soil attacking plant roots and is often difficult to detect and its impact may be significant before it is detected. Depending upon environmental conditions and plant susceptibility (e.g. Banksia species, Yacca species, myrtle wattle, cone-bush, beaked hakea), the pathogen can destroy vegetation communities and plant species with extinction by reducing the plant's ability to take up water and nutrients, eventually rotting the root system of the plant and leading to the plant's death. *Phytophthora* can be spread by infested soil, gravel and plant material on vehicles, heavy machinery, by bushwalkers, bicycles or animals and is spread most rapidly when rainfall coincides with warm temperatures (DEH 2000; MLRIINRMG 2002; DEH Newsletter 2003).



2.7.2 Declared Weeds

Declared plants are weeds that are regulated under the Natural Resources Management Act 2004 due to their threat to primary industry, the natural environment and public safety.

Plants are declared under the provisions of the Act relating to:

1. Controlling the movement of declared plants– Some declared plants must not be moved on a public road. Accidental movement of the plant on animals, soil, vehicles, machinery or produce may also be illegal.
2. Prohibition of Sale – Many declared plants must not be sold at any outlet including nurseries, pet shops and market stalls. Sale of any animal, soil, vehicle, machinery or produce contaminated with the plant may also be illegal.
3. Notification to relevant NRM board- The presence and locations of some declared plants must be reported to the regional NRM board.
4. Control of declared plants- action to destroy or control many declared plant species present on properties, regardless of whether it is used as a business, residence or for other purposes.

There are currently over 100 weeds that are declared under the Natural Resources Management Act 2004 and both Boards have programs to manage weeds on public lands and roadsides.

Some reserves within the District have Management Plans that suggest various methods to control and eradicate weeds and also include specific methods for specific weed types. Council undertakes annual weed control programs on reserves and roadsides and weeds have been reduced significantly in targeted areas.

2.7.3 Environmental Weeds

Environmental weeds are plants that have a negative impact on natural landscapes, generally due to them causing a reduction in biodiversity. Biodiversity can be impacted directly and indirectly by environmental weeds. Direct impacts include competition for resources with native plants. Indirect impacts include the loss of habitat for fauna, soil and water profiles, changes in fire intensity, water flow and water pollution (Weed Management Society of South Australia). Not all environmental weeds are declared plants.

2.7.4 Weeds of National Significance (WoNS)

WoNS are plants that high invasive traits and potential to spread causing social, environmental and economic impacts of national concern (WMSSA). There are 6 WoNS in the District out of the top ranking 20 WoNS.

| Scientific Name | Common Name | Known from District | Environmental Weed | Declared | Weed of National Significance (WoNS) |
|------------------------------------|-----------------------|---------------------|--------------------|----------|--------------------------------------|
| <i>Asclepias rotundifolia</i> | Cotton bush | ✓ | | | |
| <i>Asparagus asparagoides</i> | Bridal Creeper | ✓ | ✓ | ✓ | ✓ |
| <i>Atriplex prostrata</i> | Creeping Saltbush | | | | |
| <i>Bromus sp.</i> | Brome | | | | |
| <i>Centaurium sp.</i> | Centaury | | | | |
| <i>Chamaecytisus proliferus</i> | Tree Lucerne | ✓ | | | |
| <i>Chrysanthemoides monilifera</i> | Boneseed | | ✓ | | ✓ |
| <i>Chenopodium murale</i> | Green Fat Hen | ✓ | | | |
| <i>Chichorium intybus</i> | Chicory | ✓ | | | |
| <i>Cirsium vulgare</i> | Spear Thistle | ✓ | | ✓ | |
| <i>Cotula coronopifolia</i> | Waterbuttons | ✓ | | | |
| <i>Cynodon dactylon var.</i> | Couch | | | | |
| <i>Cytisus scoparius</i> | English Broom | ✓ | ✓ | ✓ | ✓ |
| <i>Delairea odorata</i> | Cape ivy | ✓ | | | |
| <i>Digitaria sp.</i> | Summer-grass | | | | |
| <i>Echinochloa crus-galli</i> | Common Barnyard Grass | ✓ | | | |
| <i>Echium plantagineum</i> | Salvation Jane | | | ✓ | |
| <i>Ehrharta longiflora</i> | Annual Veldt Grass | | | | |
| <i>Foeniculum vulgare</i> | Fennel | ✓ | | | |
| <i>Fraxinus angustifolia</i> | Desert Ash | | | | |
| <i>Fumaria capreolata</i> | White-flower Fumitory | | | | |
| <i>Galium aparine</i> | Cleavers | | | | |

| | | | | | |
|---------------------------------------|------------------------------|---|---|---|---|
| <i>Genista monspessulana</i> | Montpellier broom/Cape Broom | ✓ | ✓ | ✓ | ✓ |
| <i>Heliotropium europaeum</i> | Common Heliotrope | ✓ | | | |
| <i>Helminthotheca echioides</i> | Ox-tongue | | | | |
| <i>Homeria spp</i> | Cape Tulip | ✓ | | ✓ | |
| <i>Hordeum vulgare</i> | Barley Grass | ✓ | | | |
| <i>Lolium rigidum</i> | Annual Rye Grass | ✓ | | | |
| <i>Malva parviflora</i> | Small Flowered Marshmallow | ✓ | | | |
| <i>Medicago sp.</i> | Medic | | | | |
| <i>Monadenia bracteata</i> | South African weed orchid | ✓ | | ✓ | |
| <i>Olea europea</i> | Olive trees | ✓ | | ✓ | |
| <i>Oxalis pes-caprae</i> | Sour sob | ✓ | | | |
| <i>Panicum capillare</i> | Witch-grass | | | | |
| <i>Paspalum distichum</i> | Water Couch | ✓ | | | |
| <i>Pennisetum clandestinum</i> | Kikuyu grass | ✓ | ✓ | | |
| <i>Pentstemonis pallida</i> | Pussy Tails | ✓ | | | |
| <i>Phalaris aquatica</i> | Phalaris | ✓ | | | |
| <i>Pinus radiata</i> | Monterey pine | ✓ | | | |
| <i>Plantago lanceolata var.</i> | Ribwort | | | | |
| <i>Polygonum aviculare</i> | Wireweed | ✓ | | | |
| <i>Polygonum monspeliensis</i> | Annual Beard Grass | ✓ | | | |
| <i>Portulaca oleracea</i> | Common Purslane | | | | |
| <i>Rapistrum rugosum ssp. rugosum</i> | Turnip Weed | | | | |
| <i>Rorippa nasturtium aquaticum</i> | Watercress | ✓ | | | |
| <i>Rosa canina</i> | Dog Rose | | | ✓ | |
| <i>Rubus fruticosus</i> | Blackberry | ✓ | ✓ | ✓ | ✓ |
| <i>Rumex sp.</i> | Dock | | | | |
| <i>Scabiosa atropurpurea</i> | Pincushion | | | | |
| <i>Senecio pterophorus</i> | South African Daisy | ✓ | | | |
| <i>Silybum marianum</i> | Variagated Thistle | ✓ | | | |
| <i>Solanum nigrum</i> | Black Nightshade | ✓ | | | |
| <i>Sonchus oleraceus</i> | Common Sow-thistle | ✓ | | | |
| <i>Tragopogon porrifolius</i> | Salsify | | | | |
| <i>Ulex europaeus</i> | Gorse | ✓ | | ✓ | ✓ |
| <i>Watsonia bulbilera</i> | Bulbil Watsonia | ✓ | ✓ | ✓ | |
| <i>Xanthium spinosum</i> | Bathurst Burr | ✓ | | ✓ | |

Table 2.5- Declared weeds, environmental weeds and weeds of nation significance (WoNS) within the District

2.7.8 Fire management regime and changes in fire regimes;

Many plants in the district have adapted to fire such as *Xanthorrhoea* spp, Eucalyptus, Banksia and Hakeas. The community that has formed in a particular area before a fire may not be the same species that recolonise it after a fire. Certain species respond well to fire, not necessarily restricted to species that have adapted, but also due to life-form and reproductive opportunities. The species that respond well are becoming more dominant in areas that are frequently affected by bushfire. The impacts of fire on the environment depends on the fire history or fire regime; the interval between fires, the time of year fires occur, how intense fires are and the amount and arrangement of burnt and unburnt patches in an area (Department of Environment, Water and Natural Resources).

2.7.9 Recreational impacts

Ecological research has strongly suggested that air pollution can adversely affect biota and ecosystems (Barker and Tingey 1992). Commonly used industrial, agricultural and domestic chemicals pose a risk to fauna and flora. Air pollution can impact both terrestrial and aquatic environments, which can cause death of species, pollution tolerant species dominance by a few species, altered food webs and opportunity for invasive species to infiltrate ecosystems.

2.7.10 Unsustainable land use and natural resources management;

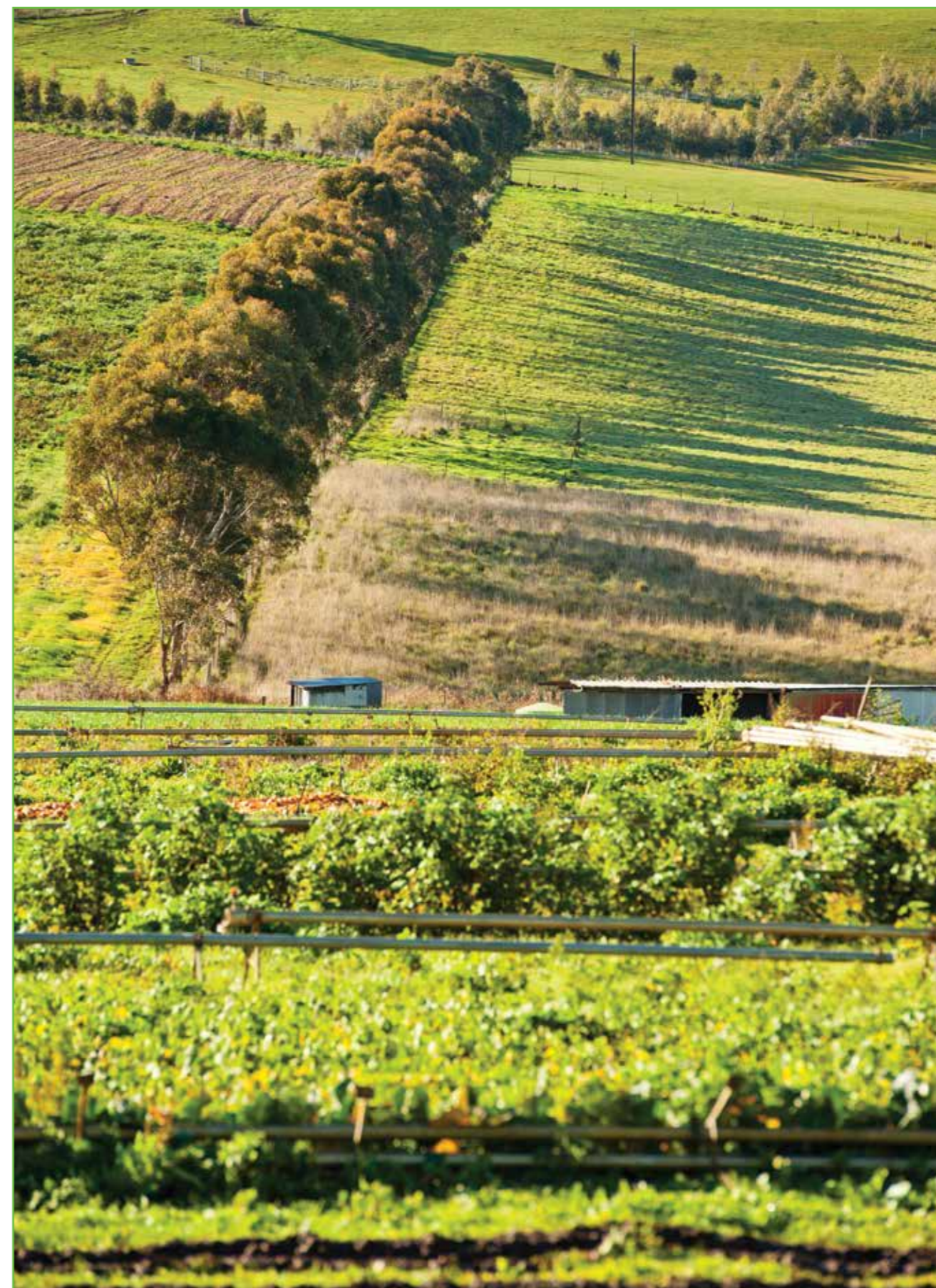
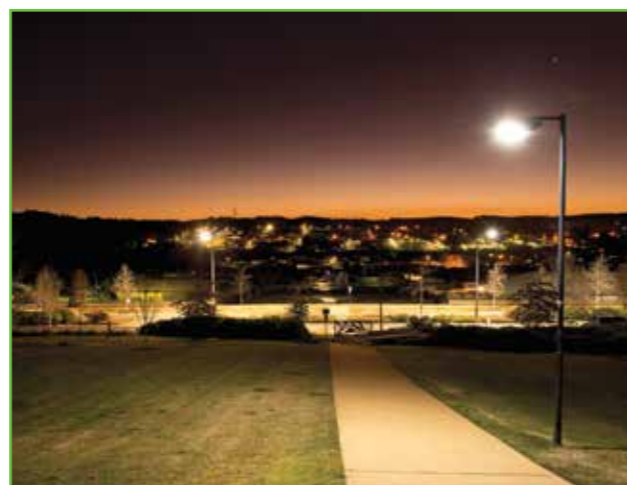
Transformation of Australian landscapes from deep-rooted woody vegetation systems to shallow-rooted annual cropping systems has resulted in the severe loss of biodiversity. This loss has been worsened by rising ground waters that has untimely mobilised stored salts, causing land and soil salinity. Sustainable agriculture has the opportunity to maintain food and fibre production, improve salinisation, reduce biodiversity decline and assist in mitigating climate change.

2.7.11 Change in zoning and land use

Habitat loss due to vegetation clearance is amongst the important cause for biodiversity loss (Woinarski et al 2011). Large shifts in land management, use and zoning since European settlement has resulted in rapid human population growth and consequently substantial habitat loss.

2.7.12 Climate change

To date, changes in the Australian climate have been relatively moderate. Despite this, the distribution, behaviour and timing of events of some species have already been observed (Cabrelli, Beaumont & Hughes 2015). In South Australia, the expected changes to the climate include an increase in carbon dioxide levels, mean temperature, high fire danger days and extreme weather events. A decrease in rainfall is expected as well as seasonal weather patterns. (DEWNR 2010).





BIODIVERSITY MANAGEMENT

3.0 Wildlife

Mount Barker Local Government Area provides habitat to a number of fauna species including birds, mammals, amphibians, reptiles, fish and insects. A number of these species are listed as threatened at a regional, state and/or national level.

Native animals are important to ecosystems because they act as indicators of healthy ecosystems, waterways and habitats, play important balancing roles in ecosystems, human health and social benefits of being in nature, economic benefits and provision of educational experiences. Wildlife plays an important role in keeping some animals from becoming too numerous (predators), managing vegetation growth (herbivores) or providing food, and recycling organic matter (decomposers). For example bats in this region use hollows to roost during the day, but forages for insects at night. This reduces the spread of diseases due to mosquito borne diseases and stabilises the mosquito population. Collectively, birds can assist in controlling insects, pollinating seeds, cycling of nutrients, provision of food, provision of feathers, cleaning of carcasses, contributing to soil formation.

3.1 Human Health and Social Benefits

Birds are important when it comes to the beneficial services provided to humans and the environment, both natural and human-dominated environments. Some species provide services in an urbanised environment, where other species will not survive. Birds provide recreation to bird watchers and have strong links to art and religion. Wildlife can provide opportunities for educational experiences. Laratinga Wetland is an example of nature and wildlife, providing extensive environmental education. With rich biodiversity, interpretive signage and revegetation projects and bird and frog monitoring, the wetland attracts the local visitors as long as interstate and international tourists. Public urban greenspaces that have resulted in the increased provisions of habitat for wildlife has also been shown to provide quantifiable psychological and physical benefits to uses of greenspace, particularly with high species richness (Fuller and others, 2007).

3.2 Economic Benefits

Fauna can provide financial benefits such as tourism and provision service. Each year, thousands of tourists visit the region to see native plants and animals. The vast majority of local residents enjoys seeing wildlife and values their presence in our landscapes. In addition, the presence of wildlife can increase “livability” and therefore increase property values.

3.3 Threats to Fauna

Anthropogenic environmental change has a clear and defined impact on wildlife populations, with an unprecedented decline caused by habitat loss, fragmentation and biodiversity decline (Daszak, Cunningham & Hyatt 2001). Other threats include pollution, disease, competition, predation and human impacts.

3.3.1 Habitat loss and habitat fragmentation

Native vegetation provides habitat for wildlife and is the result of an extensive and complex evolutionary process. Once this system has been disturbed, it cannot be restored to its original condition. Vegetation systems are essential to the survival of wildlife. Habitat loss due to vegetation clearance is amongst the important cause for fauna extinction and population reduction (Woinarski et al 2011). Large shifts in land management since European settlement has resulted in substantial habitat loss. Rapid population growth, particularly with extensive (relative)

land clearance can cause biodiversity decline.

There is little remaining native vegetation within the District. During the 19th Century, approximately 95% of the original vegetation was been cleared for agricultural use and mining activities (University of Adelaide 2010). The remaining native vegetation throughout the district is heavily degraded. These pockets of vegetation are essential for the survival of native fauna, however the fragmentation of vegetation affects species’ ability to move freely and disperse across the landscape, utilise seasonal food resources, and take refuge from natural events such as bushfire and flooding. For many species, vegetation reduction and fragmentation means that there is insufficient habitat and/or fragments are too small and isolated to support viable populations. (DEH, 2009).

Identifying and mapping habitat and potential linkages to connect and expand habitat, will enable Council to prioritise resources and activities. Green corridors can incorporate remnant and restored vegetation areas, wetlands, rivers, creeklines, railway lines, RMS sites, unmade road reserves, infrastructure easements, Heritage Agreements with the NVC and private landowner agreements with Natural Resources AMLR & SAMDB. Linkages and connectivity also extend beyond the Council boundaries to connect to neighbouring council areas including Onkaparinga, Alexandrina, Adelaide Hills and Rural City of Murray Bridge.

3.3.2 Habitat alteration and degradation

Fauna rely on habitat for protection, food, breeding and other ecological aspects. If habitat is threatened, for example by degradation, fragmentation, human impacts, introduced pest species or inappropriate fire regimes, then fauna may be threatened or impacted. In order to protect fauna and threatened species, in particular habitat needs to be maintained and protected.

Degradation of vegetation has serious implications on habitat for fauna, but there are other less obvious threats that can affect habitat such as removal of moss rocks or dead timber. Removal of both moss rocks and dead timber reduces habitat for native fauna, including vertebrate and invertebrate species; reduces lichen, moss and fungi species; allows the potential for increased erosion and reduces natural landscape detail. The removal of dead timber for firewood is a significant issue throughout the District, especially close to major population centres. The most preferred firewood is also often the preferred habitat for many wildlife species. Fallen timber provides refuge, forage substrate and homes for many fauna species. Dead branches and dead trees provide perches, nesting hollows and habitat for birds, mammals, amphibians, reptiles and invertebrates.

Among the existing agricultural and rural zones throughout the District, there are often intact vegetation and/or significant scattered tree. Many large and significant trees, mainly from the Eucalypt genus in Australia, contain cavities or hollows. Natural hollows take approximately 100 years to form and occur when a combination of invertebrates and external impacts such as fire, lightning, wind, heat or rain. Hollows are valuable regardless of size. The size of the hollow can vary from a small crack that is a few millimetres large to deep and wide cavities. They also have different orientations and heights and provide an extremely important habitat function for wildlife.

The most common trees that contain hollows within the area are blue gums (*Eucalyptus leucoxylon*) and rough-barked manna gums (*Eucalyptus vimminalis*) and pink

gums (*Eucalyptus fasciculosa*). There are a number of other hollow bearing species that exist through the remainder of the district including messmate stringybark (*Eucalyptus obliqua*) and peppermint box (*Eucalyptus odorata*).

Some of the wildlife that utilise hollows for protection, roosting and breeding have very specific requirements. Hollow-dependent wildlife is especially vulnerable as habitat loss occurs due to clearance for urban expansion (Stojanovic & others 2014). There are over 300 Australian natives animals that use tree hollows. These include birds, marsupials, bats, insects, reptiles, and amphibians. Table 3.1 shows the likely species within the district that would utilise hollows.

3.3.3 Predators

Invasive species have reshaped the function and composition of many ecosystems with substantial cost and effort associated with minimising ecological, social and economic. The most damaging invasive species are the mammalian predators. Through predation, competition, hybridisation and disease, invasive mammalian predators are among the most damaging of all invasive species, contributing heavily to the decline of biodiversity and extinction of species impacts (Doherty, Dickman, Nimmo, Ritchie 2015). Amongst the most damaging predatory invasive species include the domestic cat (*Felis catus*) and the red fox (*Vulpes vulpes*). These species have a disproportionate impact on global biodiversity.

The main methods currently used to control invasive species are the combination of exclusion fencing and lethal control; culling and the implementation of baiting programs. These methods focus on removing individual species to reduce or eliminate predation pressure on wildlife. Some of these programs have reduced predator impact they have not arrested the ongoing declines of native fauna.

Effective control of foxes and cats must be carried out in conjunction with rabbit control. The decreased predation from foxes and cats results in increased rabbit numbers.

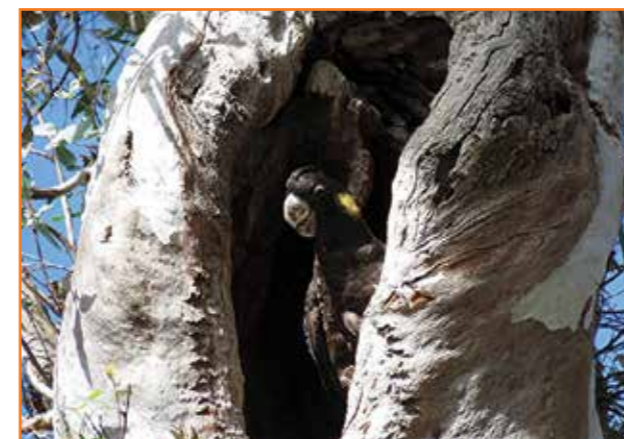
Foxes are controlled using 1080 fox bait, which are available to landholders through coordination with the SA MDB and AMLR NRM Boards.

Further understanding of invasive predator management, including trialing alternative methods of control will aid in reducing the impact of invasive predators on native biodiversity.

Animal management is the responsibility of the Adelaide and Mount Lofty ranges and SA Murray Darling Basin NRM boards and through specific programs operating in the area. Both NRM boards have developed NRM plans for their regions with the following key resource conditions and management action targets.

| Common name | Scientific name | Species requirements (habitat, diet, breeding) |
|--|---|--|
| BIRDS | | |
| Parrots | Rainbow lorikeet, eastern rosella, crimson rosella, bluebonnet (nationally threatened), little lorikeet, Australian ringneck parrot, bluewinged parrot ringneck parrot, bluewinged parrot (vulnerable in South Australia), budgerigar, musk lorikeet, purple crowned lorikeet, red-rumped parrot, mulga parrot, elegant parrot. | Breeding/refuge at night |
| Birds of prey | Nankeen kestrel, peregrine falcon | Breeding/refuge at night |
| Cockatoos | Yellow-tailed black cockatoo (vulnerable in south Australia), galah, cockatiel, little corella, sulfur- crested cockatoo | Breeding/refuge at night |
| Song Birds/smaller birds | Grey shrike-thrush, striated pardalote, spotted pardalote, brown tree creeper, tree martin. | Breeding/refuge at night |
| Frogmouths and nightjars | Australian owlet-nightjar, boobook owl, masked owl, eastern barnowl. | Refuge during the day/breeding |
| Waterbirds | Chestnut teal, pacific black duck, wood duck | Breeding/refuge at night |
| Kingfishers | Kookaburra | Breeding/refuge at night |
| MARSUPIALS | Brush-tail possum, ringtail possum, pygmy possum | Refuge during the day/breeding |
| BATS | Microbats – chocolate wattled bat, inland freetail bat, lesser long-eared bat, little forest bat. | Refuge during the day |
| REPTILES, AMPHIBIANS & FISH | | If appropriate in the environment i.e. fallen on ground or in waterbody. |
| INSECTS | Bee and numerous invertebrates | Bee Hive |

Table 3.1 Local fauna that are hollow dependent or hollow associated.



Black Cockatoo Image by Kevin Williams



3.3.4 Diseases

Emerging infectious diseases (EID) in wildlife populations are increasing due to anthropogenic environmental change. The driving factor of this increase is due to the movement of populations triggered by a change in climate and a reduction of suitable habitat. These infectious diseases in wildlife ultimately cause direct and indirect loss of overall biodiversity in an ecosystem (Daszak, Cunningham & Hyatt 2001).

3.3.5 Grazing competition

Damage caused by rabbits is a major concern throughout the District and there has been an increase in rabbits finding safe refuge in urban areas. Rabbits occur in high numbers and provide direct competition with grazing animals, domestic livestock, and native fauna. For example, eight rabbits exert the same grazing pressure as one sheep equivalent. A number of studies on rabbit grazing have been undertaken which indicate that rabbits have a severe impact on native grasslands and the regeneration of some species.

Hares are more difficult to control than rabbits since they do not live in burrows and cannot be controlled by baiting.

Deer occur in limited numbers in some areas of native vegetation and forests in Adelaide Hills, and are controlled by shooting in conjunction with the relevant NRM board.

Feral goats also occur in low numbers and are localised in their distribution.

3.3.6 Competition from introduced birds

Introduced birds occur when they have been transported to an area in which they do not originate. These birds can compete with native birds for space, nests, food and water. This can be discouraged by planting native species that are less utilised by introduced birds, and reducing invasive weed species as a food source.

3.3.7 Occasional seasonal over abundance of native species

Conflict between animals and humans usually occur when animals move closer to humans and in greater numbers, which are usually due to the lack of suitable native habitat elsewhere (Guy and Banks 2012). Changing land use and urban expansion sometimes results with certain species competing with humans for food, water, refuge and space. Wildlife management includes managing conflict between wildlife and human interests (DEWNR, 2015).

Native species can cause significant concern when they occur in large numbers. Overabundant species in the area include galahs, little corellas, long-billed corellas and sulphur-crested cockatoos. An emerging local issue is the abundance of the Little Corella. Like other Australian parrots, the Little Corella population has noticeably increased, and consequently is now described as an overabundant species. Problems occur when some species become overabundant and the flock collectively utilises the majority of available resources that other species also require for survival. Some of these species are listed as threatened. Little Corellas are granivores and like to eat seed, fruit and grain. This can cause issues for farmers in agricultural areas, resulting in the loss of crops and damage to property. In urban areas, the two most common complaints tend to be firstly, damage caused to trees and secondly, the noise produced by corellas. There have been minimal studies of overabundant Australian parrots in urban areas and agricultural areas. The studies that have been undertaken highlight that additional information is required regarding factors that have influenced the expansion of these populations into urban areas. Climate change, rainfall patterns, drought, flooding and bushfires are amongst some of the factors being considered to be influencing the population increase and expansion of the Little Corella.

Conservative approaches to wildlife management include the use of firearms to scare animals, use of gas guns, or other commercial scaring devices to scare animals, modifying habitat or removing resources, placement of nest boxes in trees to provide refuge for hollow-dependent animals, create alternate roosting sites for displaced species, create alternative fencing or gates for wildlife, netting high value crops, planting decoy crops and tree collaring (DEWNR, 2015).

3.3.8 Illegal hunting of native animals

As the urban environment expands, conflict between wildlife and humans can occur when fauna is seeking food, water, shelter and space. Examples of the impact wildlife can have on humans in the district include:

- aggressive animal behaviour, usually birds swooping to defend their young in the nest;
- damage to the property and assets;
- damage to vegetation (overgrazing and damage to trees); and
- damage to crops, produce and horticulture.

By understanding the behaviour of wildlife, it is often possible to live amicably with them. The Department of Environment, Water and Natural Resources promotes a “living with wildlife” approach. This approach aims to:

- promote positive attitudes toward wildlife;
- encourage people to understand the necessity of wildlife conservation;
- consider the welfare of all wildlife; and
- promote humane and non lethal methods as the way to manage problems with wildlife.

3.3.9 Road kill

Urban growth demands the increase of infrastructure, services and facilities to meet the requirements of a growing population. Unmade road reserves are ultimately sealed to provide thoroughfares for the community. Roads can be a source of mortality for wildlife, particularly certain species that use roads as a migration pathway, basking and foraging for seed. The variety of wildlife that is killed on Australian roads is diverse with birds, mammals, reptiles, amphibians and invertebrates. Larger animals with restricted and declining distributions are at particularly at risk of a negative population impact. Fauna sensitive road designs should be investigated when threatened and declining populations are at risk. This can include the consideration of fences with underpasses or culverts (QLD Government, n.d).



3.3.10 Air Pollution

Ecological research has strongly suggested that air pollution can adversely affect biota and ecosystems (Barker and Tingey 1992). Commonly used industrial, agricultural and domestic chemicals pose a risk to fauna and flora. Air pollution can impact both terrestrial and aquatic environments, which can cause death of species, pollution tolerant species dominance by a few species, altered food webs and opportunity for invasive species to infiltrate ecosystems.

3.3.11 Light and Noise Pollution

Development as a part of expanding cities in urban and peri-urban environments can significantly effect biodiversity (Newport, Shorthouse & Manning 2014). Noise and light pollution are impacts of urbanisation that have the potential to impact the physiology, behaviour and reproduction of a range of animal taxa.

Artificial light pollution can be defined as any artificial light that alters the natural light and dark of ecosystems and therefore the biological rhythms of fauna. The main three categories of light pollution include:

- street, house and public area lighting;
- floodlights/car lights; and
- direct glare from reflective surfaces.

Noise pollution is any man made sound that alters behaviour and interferes with the functioning of wildlife. The three broad categories of noise pollution source are:

- vehicular traffic;
- human voice; and
- game (sporting) sirens.

Despite the potential consequences of these impacts on biodiversity, an increase in the understanding of these disturbances and possible mitigation strategies need to be explored.

3.3.12 Climate change

To date, changes in the Australian climate have been relatively moderate. Despite this, the distribution, behaviour and timing of events of some species have already been observed (Cabrelli, Beaumont & Hughes 2015). In South Australia, the expected changes to the climate include an increase in carbon dioxide levels, mean temperature, high fire danger days and extreme weather events. A decrease in rainfall is expected as well as seasonal weather patterns. This will ultimately impact wildlife by altering breeding patterns, migration timing and distribution patterns (DEWNR 2010).

3.4 Fauna of Conservation Significance in the District.

In South Australia, a Regional Species Conservation Assessment framework was developed in two phases to contribute to the knowledge base and management of threatened species and ecological communities at a regional level. The aim was to provide a standardised approach to assessing and prioritising SA's native species to guide species conservation and recovery, in each of the Natural Resource Management (NRM) regions across the state. Each region was assessed according to the Interim Biogeographical Regionalisation for Australia (IBRA) subregions falling within or across the regional boundary.

A search of the EPBC Act online database provides an indication of the threatened fish, frog, mammal and bird species that may occur in the district. These species are listed in table below. The South Australian Museum also holds a database of observational records for birds, reptiles and amphibians, and mammals found across the state.

| Common name | Scientific name | Aus (EPBC) | SA | AMLR | Recently Recorded within District |
|---|--|--------------|----|------|-----------------------------------|
| AMPHIBIAN | | | | | |
| Brown Toadlet | <i>Pseudophryne bibronii</i> | | R | V | 2002 |
| Southern Bell Frog | <i>Litoria raniformis</i> | V | | | Last record 1974 |
| BIRD | | | | | |
| Australasian Bittern | <i>Botaurus poiciloptilus</i> | EN | V | V | ✓ |
| Australasian Darter | <i>Anhinga novaehollandiae</i> | | R | | ✓ |
| Australasian Shoveler | <i>Anas rhynchotis</i> | | R | | ✓ |
| Australian Little Bittern | <i>Ixobrychus dubius</i> | | E | | ✓ |
| Australian Painted Snipe | <i>Rostratula australis</i> | EN | | | |
| Baillon's Crane | <i>Porzana pusilla</i> | | | R | ✓ |
| Bassian Thrush | <i>Zoothera lunulata</i> | | R | V | ✓ (2005) |
| Beautiful Firetail | <i>Stagonopleura Bella</i> | | R | | 2000 |
| Blue-billed Duck | <i>Oxyura australis</i> | | R | | ✓ |
| Brown Quail | <i>Coturnix ypsilophora</i> | | V | V | |
| Brown Treecreeper | <i>Climacteris picumnus</i> | | | V | |
| Brown-headed Honeyeater | <i>Melithreptus brevirostris</i> | | | U | ✓ |
| Brush Bronzewing | <i>Phaps elegans</i> | | | U | |
| Buff-banded Rail | <i>Gallirallus philippensis</i> | | | V | ✓ |
| Cape Barren Goose | <i>Cereopsis novaehollandiae</i> | | R | | |
| Cattle Egret | <i>Ardea ibis</i> | Mi(Ma) Mi(W) | R | | ✓ (1987) |
| Chestnut-rumped Heathwren | <i>Calamanthus (hylacola) Pyrrhopygius</i> | EN | | | |
| Chestnut-rumped Heathwren (ML Ranges ssp) | <i>Calamanthus (hylacola) Pyrrhopygius Parkeri</i> | | E | | |
| Common Sandpiper | <i>Actitis hypoleucos</i> | | R | | ✓ |
| Crested Shrike-tit | <i>Falcunculus frontatus</i> | | R | V | ✓ |
| Diamond Firetail | <i>Stagonopleura guttata</i> | | V | V | ✓ (2003) |
| Elegant Parrot | | | R | | ✓ |
| Fairy Martin | <i>Petrochelidon ariel</i> | | | U | ✓ |
| Fan-tailed Cuckoo | <i>Cacomantis flabelliformis</i> | | | V | ✓ |
| Flame Robin | <i>Petroica phoenicea</i> | | V | | Last recorded 2001 |
| Fork-tail swift | <i>Apus pacificus</i> | Mi(Ma) | | | |
| Freckled Duck | <i>Stictonetta naevosa</i> | | V | | ✓ |
| Chestnut-rumped Heathwren | <i>Hyloacola pyrrhopygia parkeri</i> | EN | | | |
| Glossy Black-cockatoo (South Australian) | <i>Calyptorhynchus lathami halmaturinus</i> | EN | | | |
| Glossy Ibis | <i>Plegadis falcinellus</i> | | R | | ✓ |
| Great Crested Grebe | <i>Podiceps cristatus</i> | | R | | ✓ |
| Great Egret | <i>Ardea alba</i> | Mi(Ma)Mi(W) | | | |
| Grey Currawong | <i>Strepera Versicolor</i> | | | | ✓ |
| Hooded Robin | <i>Melanodryas Cucullata</i> | | | | |
| Horsfield's Bronze-Cuckoo | <i>Chalcites basalis</i> | | | V | ✓ |
| Intermediate Egret | <i>Ardea intermedia</i> | | R | | ✓ (2001) |

| Common name | Scientific name | Aus (EPBC) | SA | AMLR | Recently Recorded within District |
|----------------------------|---|-------------|----|------|-----------------------------------|
| Jacky Winter | <i>Microeca fascinans</i> | | R | V | ☒ |
| Latham's Snipe | <i>Gallinago hardwickii</i> | Mi(Ma)Mi(W) | R | | ✓ |
| Lewin's Rail | <i>Lewinia pectoralis</i> | | V | V | ✓ |
| Little Lorikeet | <i>Glossopsitta pusilla</i> | | E | | |
| Little Wattlebird | <i>Anthochaera chrysoptera</i> | | | U | ✓ |
| Malleefowl | <i>Leipoa ocellata</i> | V | | | |
| Musk Duck | <i>Biziura lobata</i> | | R | | ✓ |
| Painted Buttonquail | <i>Turnix varius</i> | | R | | Last recorded 1985 |
| Painted Snipe | <i>Rostratula benghalensis</i> | Mi (W) | | | |
| Pallid Cuckoo | <i>Cacomantis pallidus</i> | | | V | ✓ |
| Peregrine Falcon | <i>Falco peregrinus</i> | | R | R | ✓ |
| Rainbow Bee-eater | <i>Merops ornatus</i> | Mi(T) | | | ✓ |
| Red-capped Robin | <i>Petroica goodenovii</i> | | | V | ✓ |
| Red-rumped Parrot | <i>Psephotus haematonotus</i> | | | U | ✓ |
| Regent Honeyeater | <i>Anthochaera phrygia</i> | EN | E | | 1900 |
| Restless Flycatcher | <i>Myiagra inquieta</i> | | R | E | ✓(1995) |
| Rufous Fantail | <i>Rhipidura rufifrons</i> | Mi(T) | | | |
| Rufous Whistler | <i>Pachycephala rufiventris</i> | | | U | ✓ |
| Satin Flycatcher | <i>Myiagra cyanoleuca</i> | Mi(T) | | | |
| Sacred Kingfisher | <i>Todiramphus sanctus</i> | | | U | ✓ |
| Scarlet Robin | <i>Petroica boodang</i> | | R | V | ✓ |
| Shining Bronze-Cuckoo | <i>Chalcites lucidus</i> | | | R | |
| Southern Emu-wren | <i>Stipiturus malachurus intermedius</i> | EN | | | |
| Southern Whiteface | <i>Aphelocephala leucopsis</i> | | | V | |
| Spotted Quail-thrush | <i>Cinlosoma punctatum</i> | CE | | | |
| Spotless Crake | <i>Porzana tabuensis</i> | | R | U | ✓ |
| Striped Honeyeater | <i>Plectorhyncha lanceolata</i> | | R | | ✓ |
| Tawny Frogmouth | <i>Podargus strigoides</i> | | | U | ✓ |
| Tree Martin | <i>Petrochelidon nigricans</i> | | | U | ✓ |
| Varied Sittella | <i>Daphoenositta chrysoptera</i> | | | U | |
| Western Whipbird | <i>Psophodes nigrogularis leucogaster</i> | V | | | |
| Whistling Kite | <i>Haliastur sphenurus</i> | | | U | ✓ |
| White-bellied Sea-Eagle | <i>Haliaeetus leucogaster</i> | Mi(T) | E | | ✓ |
| White-browed Babbler | <i>Pomatostomus superciliosus</i> | | | U | |
| White-fronted Chat | <i>Epthianura albifrons</i> | | | U | |
| White-naped Honeyeater | <i>Meliphreptus lunatus</i> | | | U | ✓ |
| White-throated Gerygone | <i>Gerygone olivacea</i> | | R | | Last recorded 1998 |
| White-throated Needletail | <i>Hirundapus caudacutus</i> | Mi (T) | | | |
| White-throated Treecreeper | <i>Cormobates leucophaea</i> | | | | |
| White-winged Chough | <i>Corcorax melanorhamphos</i> | | R | V | ✓ |
| Wood Sandpiper | <i>Tringa glareola</i> | | R | | ✓ |

| Common name | Scientific name | Aus (EPBC) | SA | AMLR | Recently Recorded within District |
|---|------------------------------------|-------------|----|------|-----------------------------------|
| Yellow Thornbill | <i>Acanthiza nana</i> | | | U | ✓ |
| Yellow-rumped Thornbill | <i>Acanthiza chrysorrhoa</i> | | | U | |
| Yellow-tailed Black-Cockatoo | <i>Calyptorhynchus funereus</i> | | V | V | ✓ |
| Zebra Finch | <i>Taeniopygia guttata</i> | | | U | |
| FISH | | | | | |
| Murray Hardyhead | <i>Craterocephalus fluviatilis</i> | EN | | | |
| Murray Cod | <i>Maccullochella peelii</i> | V | | | |
| MAMMAL | | | | | |
| Common Brushtail Possum | <i>Trichosurus vulpecula</i> | | R | | ✓ |
| Southern Brown Bandicoot (SA mainland and KI ssp) | <i>Isodon obesulus obesulus</i> | EN | V | V | ✓(2004) |
| Western Pygmy-possum | <i>Cercartetus concinnus</i> | | | V | |
| Yellow-footed Antechinus | <i>Antechinus flavipes</i> | | V | | Last record 2000 |
| REPTILE | | | | | |
| Cunningham's Skink | <i>Egernia cunninghami</i> | | E | | |
| Eastern Tiger Snake | <i>Notechis scutatus</i> | | | V | |
| Flinders Worm-lizard | <i>Aprasia pseudopulchella</i> | | V | | |
| Heath Goanna | <i>Varanus rosenbergi</i> | | V | V | ☒ |
| Pygmy Blue-tongue Lizard | <i>Tiliqua adelaidensis</i> | EN | | | |
| Pygmy Copperhead | <i>Austrelaps labialis</i> | | | V | |

Table 3.2 Regional, state and nationally threatened species with the district.

Conservation Status:

Aus: Australia (Environment Protection and Biodiversity Conservation Act, 1999);

EX = Extinct

CE = Critically Endangered. Species is facing an extremely high risk of extinction in the wild in the immediate future.

EN = Endangered. Species is not critically endangered, but is facing a very high risk of extinction in the wild in the near future.

VU = Vulnerable. Species is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium-term future.

Mi(Ma): Migratory Marine; Mi(W): Migratory Wetland; Mi(T): Migratory Terrestrial.

SA: South Australia (National Parks and Wildlife Act, 1972).

E = Endangered. Taxa that are likely to become extinct in SA unless the circumstances and factors threatening their abundance, survival or evolutionary development cease to operate.

V = Vulnerable. Taxa that are likely to move into the Endangered category in SA in the near future unless the circumstances and factors threatening their abundance, survival or evolutionary development cease to operate.

R = Rare. Taxa that occur in small populations in South Australia, that are not at present endangered or vulnerable but are at some risk due to their low numbers.

These taxa are usually localised within restricted geographical areas or are thinly scattered over a more extensive range. This may include taxa which are perceived to be at risk for which there is insufficient information available to assign them to any other category, and taxa that are considered to be dependent on ongoing conservation programs to prevent them moving into the endangered or vulnerable categories. Populations of rare taxa in SA may be contiguous with populations interstate that are considered to be secure. The rare category does not include taxa that are considered to be vagrants in South Australia.

Note that freshwater fish are not currently listed under the NPW Act Schedules,

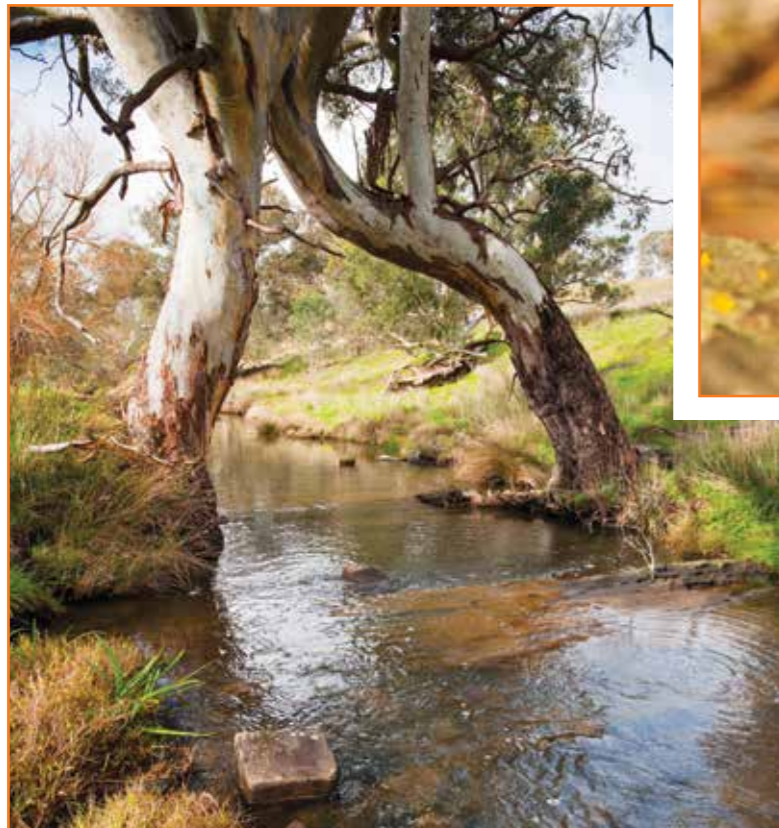
AMLR: Regional rating for Adelaide and Mount Lofty Ranges (AMLR) sourced from Wilson based on Willson and Bignall (2009)

E = Endangered. In danger of becoming extinct in the wild in the immediate future given current trends in populations and reasons for decline.

V = Vulnerable. Likely to become Endangered in the immediate future given current trends in populations and reasons for decline.

R = Rare. At risk due to low numbers of individuals even though no or little decline in distribution has been detected.

U = Uncommon. Animals or vegetation types which are inadequately conserved or declining but are not yet sufficiently threatened to be listed as rare.



Frog Image by Kevin Williams

3.5 Fire Control

Fire has an important role in reproduction of many Australian plants, although their responses to fire are variable and not always well understood. Changes to the natural fire regime, particularly since human settlement, have greatly reduced a number of ecological processes, potentially reducing regeneration of some species.

Fire prevention focuses on the protection of both urban developments and natural assets (e.g. remnant patches of vegetation); however this can have implications for natural ecosystem processes. In the MLR fire prevention works often involve regular clearance of potential fire fuels by mechanical removal, grazing by stock, or by regular prescribed fire use, however these actions can significantly impact upon natural ecosystems. Alternatively, in other areas where there has been prolonged use of fire and other fire prevention measures, a build up of fuel loads has occurred, primarily comprising woody weeds such as broom, gorse, olives and blackberry.

Council slashes roadsides in the lead up to the fire season. Strategic/Main Arterial roads are cut to the fence where possible. All other sealed roads are cut to the white posts. Gravel roads may be cut if they are included on the priority roadside list, which was developed in conjunction with the local CFS. The CFS may conduct roadside fuel reduction burning in strategic areas to create fuel reduced

Council does not have a high frequency of extensive uncontrolled fires. The most recent fire of note was in Mt Bold in 2007 threatening homes in Kangarilla and Echungu burning some 2000 hectares, one house, numerous sheds, livestock, horses and equipment. While the fires do occur annually, detection and response occurs quickly. Incidents generally impact rural properties and associated infrastructure such utilities, also livestock, fencing and implement sheds.

Other fires in the Mount Barker District area were the Wistow fires of November 1983 and January 1985, and the Ash Wednesday fires of February 1980 and February 1983. Since these horrific fires the District has been spared any major infernos. These fires occurred in drought years and were fanned by hot, dry winds, which appear to be the catalysts for large fires. The statistics show that the causes of fire in the District are relatively constant, with more fires occurring during the two months of autumn, when people tend to become complacent, than during the hotter months. Current expectations are for approximately 30-40 vegetation fires in an average year during the fire danger season. Of these usually only 5-10 burn in excess of 1 ha and only a very small number in excess of 10 ha. There are no specific trends as to size and location of fires, although arsonists target roadsides, but this occurs over the whole district and not in any specific location (District Council of Mount Barker Bushfire Prevention Plan 1999).

With greater concern and awareness on the potential catastrophic impacts of bushfire it remains important that biodiversity assets are not unnecessarily degraded through inappropriate fire prevention activities (e.g. indiscriminate clearance and frequent burning).

Important factors in determining whether fire is beneficial or disadvantageous to a habitat include: fire frequency, intensity and timing, the ecosystems involved and the degree of disturbance already occurring in the area (e.g. by weeds).



BIODIVERSITY MANAGEMENT | KEY THEME 1: HABITAT PRESERVATION AND CONNECTIVITY |

“To maintain and good quality habitat for flora and fauna”

| | Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|-----|---|-----------|-----------|--|---|---|---|
| HP1 | Develop conceptual linkages for fauna to habitat (and potential habitat) | Very High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) It Systems (CORPORATE SERVICES) | - | Staff Time | NE 3.2 Integrate human environments with natural areas using urban ecology principles NE 3.3 Design buffers and interfaces between built and natural areas NE 3.4 Further develop and enhance vegetation corridors |
| HP2 | Seasonal surveys to capture all species (spring) | Very High | Yearly | Open Space & Environment (PLANNING & DEVELOPMENT) | NRM Bush For Life Goolwa To Wellington Local Action Planning Inc Landcare & Bushcare Groups | Existing Budget Lines (& Proposed Biodiversity Plan Budget) | NE 4.1 Ensure up-to-date knowledge and understanding of environmental conditions and context |
| HP3 | Education on importance of habitats of listed species (events, brochures etc.) | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Community & Customer Service (COUNCIL SERVICES) | - | Staff Time \$2500 design & printing (WO289) | NE 1.3 Promote environmental education and awareness NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets |
| HP4 | Value and protect revegetation projects, especially those involving funding and volunteer participation. | High | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | Bush For Life Goolwa To Wellington Local Action Planning Inc NRM Landcare & Bushcare Groups | Included in existing budgets (FIELD SERVICES) | NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.7 Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment |
| HP5 | Prioritise weed management and integrate with existing programs and projects | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | NRM Bush For Life Landcare & Bushcare Groups Department of Transport, Planning & Infrastructure | Proposed Biodiversity Implementation Plan Budget maintenance budgets) | NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2 Lead biodiversity protection and restoration initiatives |
| HP6 | Dedicated specialist on-ground team that are trained and have experience in land conservation and management. | High | 2017/218 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | - | Existing Budgets | NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.2 Integrate human environments with natural areas using urban ecology principles |

| | Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|------|--|----------|-----------|--|------------------|--------------------------------|--|
| HP7 | Seek greater community engagement in environmental management | Low | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) | Wider community | Staff time | NE 1.3 Promote environmental education and awareness NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets NE 3.7 Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment |
| HP8 | Weed management guidelines (protecting native plants, identification of native species) | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | NRM | Existing budgets | NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.4 Further develop and enhance vegetation corridors NE 3.2 Integrate human environments with natural areas using urban ecology principles NE 4.1 Ensure up-to-date knowledge and understanding of environmental conditions and context |
| HP9 | Maintain partnerships with state governments and organisations in regard to projects that Council has limited control. | Medium | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) | State Government | Staff Time | NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2 Lead biodiversity protection and restoration initiatives NE 4.2 Identify and respond to environmental risks and vulnerabilities |
| HP10 | Information to developers, nursery and residents on environmental weeds/species | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) | NRM | Existing budgets Staff time | NE 1.3 Promote environmental education and awareness NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets |

| | Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|------|--|-----------|-----------|--|--|--------------------------------|---|
| HP11 | Alert and respond to emerging weeds | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) | NRM | Existing budgets Staff time | <p>NE 3.4 Further develop and enhance vegetation corridors</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 4.1 Ensure up-to-date knowledge and understanding of environmental conditions and context</p> |
| HP12 | Provide an area for rescuing and relocating species (council nursery) | Very high | 2015/2016 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | Developers Threatened Plant Action Group | Existing facility and budgets | <p>NE1.1 Demonstrate leadership in sustainability, environmental enhancement and protection</p> <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 4.2 Identify and respond to environmental risks and vulnerabilities</p> |
| HP13 | Partner with external and research organisations to trial alternative invasive species control programs. | Medium | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) | Universities NRM Boards | As project opportunities arise | <p>NE 1.4 Support environmental research on local issues</p> <p>NE 3.1 Promote understanding and use of natural areas and provide learning opportunities</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 4.1 Ensure up-to-date knowledge and understanding of environmental conditions and context</p> |
| HP14 | Encourage and support landowners that have remnant vegetation to protect these areas by providing information and support. | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | NRM Boards Goolwa To Wellington Local Action Planning Inc | Existing budgets | <p>NE 1.3 Promote environmental education and awareness</p> <p>NE 3.5 Increase community awareness regarding its impact on the natural environment</p> <p>NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets</p> |

| | Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|------|---|----------|-----------|---|--|------------------|--|
| HP15 | Continue and expand environmental volunteer programs | Medium | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) Community & Customer Services (COUNCIL SERVICES) | Bush For Life Goolwa To Wellington Local Action Planning Inc NRM Landcare & Bushcare Groups Wider Community | Existing budgets | <p>NE 1.3 Promote environmental education and awareness</p> <p>NE 3.5 Increase community awareness regarding its impact on the natural environment</p> <p>NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets</p> <p>NE 3.7 Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment</p> |
| HP16 | Collect and propagate local seed for revegetation projects and for community use. | Low | 2018/2019 | Open Space & Environment (PLANNING & DEVELOPMENT) | Bush For Life Goolwa To Wellington Local Action Planning Inc NRM Landcare & Bushcare Groups | Existing budgets | <p>NE 1.3 Promote environmental education and awareness</p> <p>NE 3.5 Increase community awareness regarding its impact on the natural environment</p> <p>NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets</p> <p>NE 3.7 Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment</p> |
| HP17 | Develop a policy to protect vegetation on council land, including creeklines. | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) | - | Staff time | <p>NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection</p> <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 2.4 Conserve water, maximise recycled water use and practice appropriate Water Sensitive Urban Design</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.3 Design buffers and interfaces between built and natural areas</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> <p>NE 4.2 Identify and respond to environmental risks and vulnerabilities</p> |

| | Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|------|--|-----------|-----------|--|--|---------------------------------|---|
| HP18 | Develop threatened species and management requirements within the district. | Very High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) | NRM Boards | Staff time and existing budgets | <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.3 Design buffers and interfaces between built and natural areas</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> <p>NE 4.2 Identify and respond to environmental risks and vulnerabilities</p> <p>NE 4.3 Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change</p> |
| HP19 | Use local Eucalypts as street trees where possible. | Low | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) | - | Staff time and existing budgets | <p>NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> <p>NE 4.3 Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change</p> |
| HP20 | Replace exotic grass with native grasses in areas adjacent and in natural areas. | Low | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | Bush For Life Goolwa To Wellington Local Action Planning Inc NRM Landcare & Bushcare Groups | Staff time and existing budgets | <p>NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> <p>NE 4.3 Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change</p> |

| | Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|------|---|-----------|-----------|--|--|---------------------------------|--|
| HP21 | Developed of a hollow protection and protection policy | Very High | 2015/2016 | Open Space & Environment (PLANNING & DEVELOPMENT) | - | Staff time and existing budgets | <p>NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection</p> <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 4.2 Identify and respond to environmental risks and vulnerabilities</p> <p>NE 4.3 Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change</p> |
| HP22 | Provision of nest boxes when removal of trees might provide hollows/drays/nests. | Very High | 2015/2016 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | Developers | \$5000 | <p>NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection</p> <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 4.2 Identify and respond to environmental risks and vulnerabilities</p> |
| HP23 | Develop and adopt policies and procedures for minimal disruption when undertaking tree maintenance. | Medium | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | Department of Planning, Transport & Infrastructure | Staff time | <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> |

| Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|--|----------|---------------------------------------|---|--|---|---|
| HP24 Develop education brochures on biodiversity (chemicals, wildlife, wildlife & humans, domestic animals) | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) | - | \$5000 | <p>NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection</p> <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 1.3 Promote environmental education and awareness</p> <p>NE 3.1 Promote understanding and use of natural areas and provide learning opportunities</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principle</p> <p>NE 3.3 Design buffers and interfaces between built and natural areas</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> <p>NE 3.5 Increase community awareness regarding its impact on the natural environment</p> <p>NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets</p> |
| HP25 Ensure fauna have adequate habitat (dense understory) to protect themselves against invasive species such as the fox and feral cats. | High | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | Bush For Life Goolwa To Wellington Local Action Planning Inc NRM Landcare & Bushcare Groups | Existing budgets and staff time | <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.3 Design buffers and interfaces between built and natural areas</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> |
| HP26 Fauna sensitive road designs should be investigated when threatened and declining populations are at risk. | High | Ongoing As per project opportunity | Open Space & Environment (PLANNING & DEVELOPMENT) (Capital Programs) PROJECTS & INFRASTRUCTURE | Department of Planning, Transport & Infrastructure (DPTI) | Considered and incorporated in project scopes | <p>NE 1.1 Demonstrate leadership in sustainability, environmental enhancement and protection</p> <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.3 Design buffers and interfaces between built and natural areas</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> <p>NE 4.2 Identify and respond to environmental risks and vulnerabilities</p> |

BIODIVERSITY MANAGEMENT | KEY THEME 2: ROAD RESERVE AND ROADSIDE VEGETATION

“Implement best practise roadside vegetation management to support biodiversity goals and road safety”

| Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|--|-----------|-----------|--|---|----------------|---|
| RV1 Review and audit RMS sites (all to be marked by blue or green) | Very High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | - | Staff time | <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.3 Design buffers and interfaces between built and natural areas</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> |
| RV2 Update the roadside vegetation plan | Very High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | - | Staff time | <p>NE 1.2 Lead biodiversity protection and restoration initiatives</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.3 Design buffers and interfaces between built and natural areas</p> <p>NE 3.4 Further develop and enhance vegetation corridors</p> |
| RV3 Implement a process to ensure communication between all stakeholders that may modify roadside vegetation. | High | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | Department of Planning, Transport & Infrastructure Bush For Life Landholders Utilities | Staff time | <p>NE 1.3 Promote environmental education and awareness</p> <p>NE 3.1 Promote understanding and use of natural areas and provide learning opportunities</p> <p>NE 3.2 Integrate human environments with natural areas using urban ecology principles</p> <p>NE 3.5 Increase community awareness regarding its impact on the natural environment</p> <p>NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets</p> <p>NE 3.7 Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment</p> |

| | Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|------------|---|----------|-----------|--|-----------------------------------|----------------|--|
| RV4 | Develop an internal system to GPS, map and register listed flora species | High | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) IT Systems (CORPORATE SERVICES) | NRM Threatened Plant Action Group | Staff time | NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.2 Integrate human environments with natural areas using urban ecology principles NE 3.3 Design buffers and interfaces between built and natural areas NE 3.4 Further develop and enhance vegetation corridors |
| RV5 | Develop a citizen science project for tree register | Low | 2018/2019 | Open Space & Environment (PLANNING & DEVELOPMENT) | NRM | \$5000 | NE 1.3 Promote environmental education and awareness NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets NE 3.7 Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment |
| RV6 | Information kit on vegetation to new residents | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) | - | Staff time | NE 1.3 Promote environmental education and awareness NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets |
| RV7 | Implement a process to alert the open space and environment team on new land purchases. | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) Development Services (PLANNING & DEVELOPMENT) | - | Staff time | NE 1.3 Promote environmental education and awareness NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets |

| | Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|-------------|--|----------|-----------|--|--|----------------|--|
| RV8 | Education on bushfires and how different species (native versus exotic) burns | Low | 2018/2019 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services – Fire Prevention (COUNCIL SERVICES) | - | \$2000 | NE 1.3 Promote environmental education and awareness NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets |
| R9 | Roadsides within developed areas are identified as a “no access”. | Low | 2018/2019 | Open Space & Environment (PLANNING & DEVELOPMENT) | - | Staff time | NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.2 Integrate human environments with natural areas using urban ecology principles NE 3.3 Design buffers and interfaces between built and natural areas NE 3.4 Further develop and enhance vegetation corridors |
| RV10 | Protection of unmade road reserves (new development areas having road and water reserves need to be claimed) | High | 2018/2019 | Open Space & Environment (PLANNING & DEVELOPMENT) | - | Staff time | NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.2 Integrate human environments with natural areas using urban ecology principles NE 3.3 Design buffers and interfaces between built and natural areas NE 3.4 Further develop and enhance vegetation corridors |
| RV13 | Develop agreement between the Council and DPTI for roadside vegetation management | Medium | 2018/2019 | Open Space & Environment (PLANNING & DEVELOPMENT) | Department of Planning, Transport & Infrastructure | Staff time | NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.2 Integrate human environments with natural areas using urban ecology principles NE 3.3 Design buffers and interfaces between built and natural areas NE 3.4 Further develop and enhance vegetation corridors |

BIODIVERSITY PLANNING | KEY THEME 3: FIRE MANAGEMENT

“Maintain native vegetation of habitat and conservation value while reducing bushfire fuel load”

| Action | Priority | Timeframe | Responsibility | Partners | Funding Source | Link to Strategic Plan |
|---|----------|-----------|--|--|-------------------------------|---|
| FM1 RV8) Education on bushfires and how different species (native versus exotic) burns | Low | 2018/2019 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services – Fire Prevention (COUNCIL SERVICES) | CFS | \$2000 | NE1.3 Promote environmental education and awareness NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets |
| FM2 Educate and communicate in conjunction with CFS | Medium | 2018/2019 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services – Fire Prevention (COUNCIL SERVICES) | CFS | Staff time & existing budgets | NE1.3 Promote environmental education and awareness NE 3.1 Promote understanding and use of natural areas and provide learning opportunities NE 3.5 Increase community awareness regarding its impact on the natural environment NE 3.6 Influence community behaviours and attitudes to achieve global and local environmental targets |
| FM3 Liaise with bushfire officer and CFS and direct toward highly flammable low biodiversity areas | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services – Fire Prevention (COUNCIL SERVICES) | CFS | Staff time & existing budgets | NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.2 Integrate human environments with natural areas using urban ecology principles |
| FM4 Manage bushfire risk by developing site specific management plans and timing of slashing etc. | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services – Fire Prevention (COUNCIL SERVICES) | CFS | Staff time & existing budgets | NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.2 Integrate human environments with natural areas using urban ecology principles |
| FM5 Buffer against adjacent zones surrounding residential (high conservation zones i.e. Totness) - explore options for natives species in bushfire buffer zones. | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services – Fire Prevention (COUNCIL SERVICES) | CFS NRM Department of Environment, Water & Natural Resources | Staff time & existing budgets | NE 1.2 Lead biodiversity protection and restoration initiatives NE 3.2 Integrate human environments with natural areas using urban ecology principles NE 3.3 Design buffers and interfaces between built and natural areas |





BIODIVERSITY PLANNING

4.0 Watercourses and Waterbodies

Hydrological processes are essential to not only maintain biological diversity, but are also fundamental to the survival of humans (Pert and others 2010). Catchments and watercourses provide habitat for a number of plants and animals particularly in the aquatic environments and riparian zones, the land surrounding or adjoining and influenced by, a body of water. A catchment is an area of land that collects water, which drains to the lowest point in an area. As rain falls, it makes its journey to that lowest creek via creeks, rivers, lakes and dams. It also includes groundwater, stormwater, wastewater and water related infrastructure (Onkaparinga Waterwatch Network).

There are two broad categories of surface water resources within the district. These categories can be distinguished by creeks that drain in a southwest direction and form part of the Onkaparinga Catchment; which includes Echunga Creek, Hahndorf Creek and the Biggs Flat area, and those streams and rivers that drain in an easterly direction towards Lake Alexandrina and form part of the River Murray Catchment; this includes the Bremer River and the Angas River. Council is responsible for sections of watercourses throughout the District;

however, there is also a large portion that is located on private land. The management of creeks and riparian zones is therefore inconsistent and uncoordinated due to multiple land ownership.



4.1 Catchments within the District

4.1.1 Murray River Catchment

In general remaining vegetation in the Bremer Barker catchment is restricted to roadside verges or rocky gullies that are inaccessible to stock, for example along sections of the Mount Barker Creek. In most agricultural areas, remnant vegetation only comprises isolated mature trees (BBCG 1996b).

The Angas River Catchment has great diversity in soil types, topography, and climate; hence this diversity is reflected in the native vegetation of the area. Along the river there is a fringing canopy of red gums, over wetland plants that are dominated by reeds (*Phragmites australis*) and bulrushes (*Typha domingensis*). Various sedges, rushes, grasses, and smaller herbaceous native plants are also found along the river. In the upper Angas River catchment (near Macclesfield) there are woodland or open forest associations. In the higher rainfall sections the canopy is dominated by stringy bark (*E. obliqua* and *E. baxteri*). Blue gums are also dominant, with Manna gum and red gum also occurring, but as less dominant species. The understorey comprises wattles such as golden wattle and kangaroo thorn, and hakeas such as *H. carinata*, *H. rostrata* and *H. rugosa* (Dowie 1998). There is no precise estimate for the amount of remnant vegetation remaining in the Angas River catchment, but an estimate made by the Department for Environment and Heritage suggests that 98% of vegetation has been cleared. Very little of

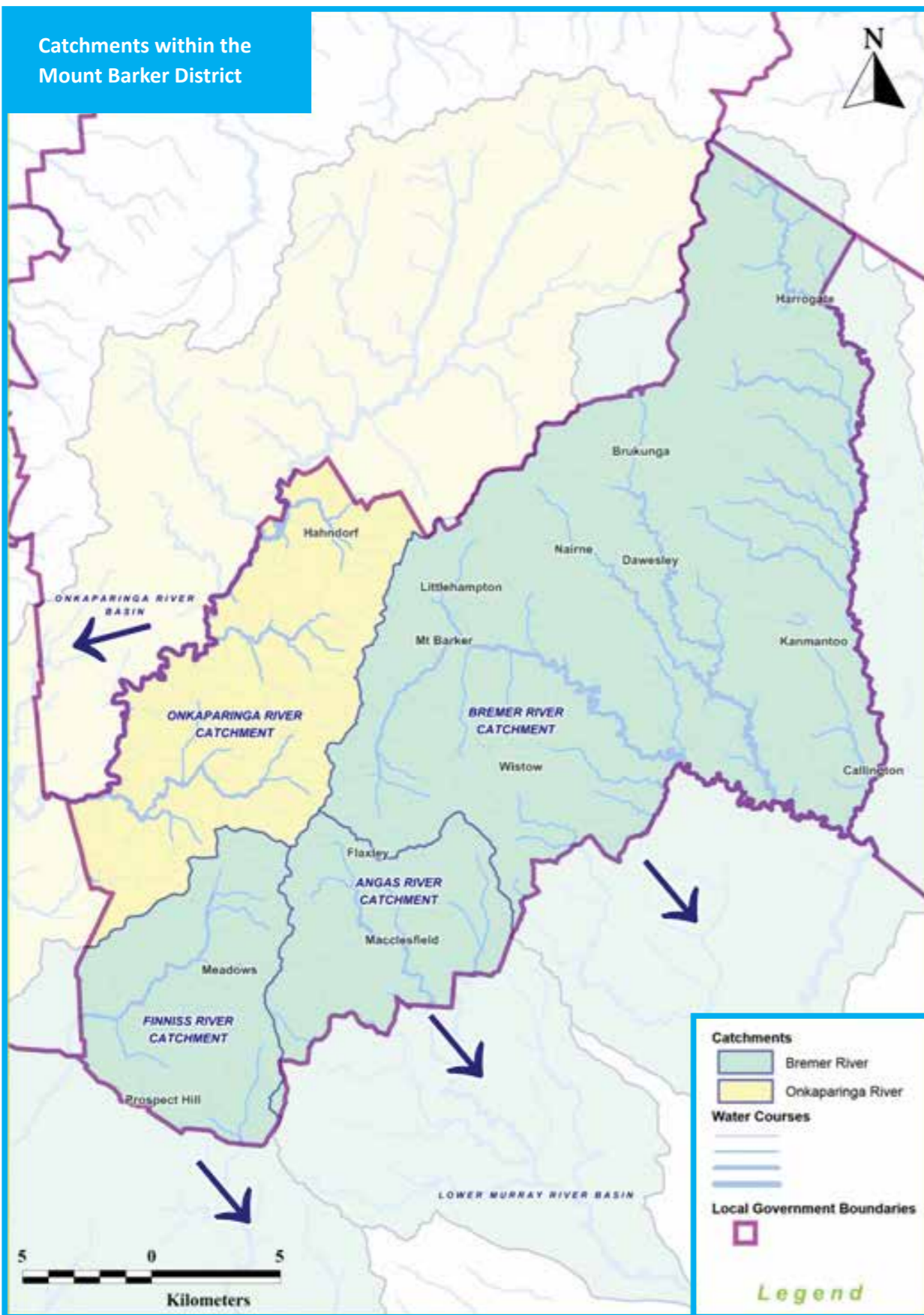
the remaining vegetation has secure conservation status, although some is secured within Heritage Agreement areas (Dowie 1998).

4.1.2 Onkaparinga Catchment

The Onkaparinga Catchment enters the Mount Barker District Council at the Onkaparinga River at Hahndorf before it flows into Mt Bold Reservoir. Water is then released downstream of Mt Bold Reservoir to Clarendon Weir where it is diverted to Happy Valley Reservoir for filtration and water treatment before being supplied for metropolitan consumption (SKM 2003). Before European settlement, the upper portion of the Onkaparinga River was ephemeral. The hydrology today is influenced by the operation of the Metropolitan Adelaide Water Supply System.

The catchment includes the Mount Barker LGA townships of Hahndorf and Echunga. This area is semi-rural including land uses such as viticulture, horticulture, grazing. These land use practises has resulted in degradation, isolation and fragmentation of ecosystems which contribute to a decrease in biodiversity in the Onkaparinga Catchment (SKM 2003).

The environmental condition of the Hahndorf Creek, Echunga Creek and Biggs Flat area is described as poor, heavily impacted and modified by historic and current development (SKM 2003).



Map 4.1 Catchments within the Mount Barker Local Government Area

4.2 Aquatic Biodiversity

Flow regime is regarded to be the key driver for river, creek and wetland ecosystems. Flows are the major determinant of habitats in streams, which contributes to the survival of aquatic organisms. Altered flow regimes also facilitate the invasion of exotic species, causing addition predation and competition for native species, particularly in fish, crustaceans and macroinvertebrates (Bunn and Arthington 2002).

Fauna that inhabit aquatic and riparian environments in the watercourses in the district include fish, invertebrates, amphibians, birds, reptiles and mammals. Table 4.1 describes an array of water dependant and water associated species and their specific requirements.

4.3 Fish

Native fish are an important component of ecosystems and of aquatic biodiversity; hence they can be good indicators of habitat quality (Hammer 2007). Large scale hydrologic modifications have resulted in the reductions in fish populations. There are many factors associated with this decline, although the presence of alien fish species is a major contributing factor. Carp is often seen as the dominant fish species in the Murray Darling Basin systems. In addition another introduced species, mosquito fish (*Gambusia hollbrooki*) are abundant in the system and are resilient against low flows. Additional threats to fish in the district include habitat degradation, reduced water quality barriers, exploitation of fish, disease and translocation of stock.

In 2009, Hammer completed an Environmental Flow Requirements for the Eastern Mount Lofty Region that included monitoring of the Bremer River Catchment (Mt Barker Creek sub catchment that includes Mt Barker, Western Flat, Nairne, Dawesley creeks) and Rodwell Creek; and the Angas River Catchment (Quarry Road).

The main ecological asset identified in Mount Barker Creek Sub Catchment is mountain galaxias (river blackfish also occurred historically), with a monitoring site on Mt Barker Creek just below Adelaide Road. Significant pollution has occurred as a result of mining activities along-side Dawesley Creek at Brukunga and stock access is commonplace in areas that are not urbanised.

The ecological assets in Rodwell Creek are under increasing threat and river blackfish would more than likely have been lost without artificial watering. Much of the land in the Angas River Catchment has been cleared and dedicated to stock grazing, dairy or viticulture. Much of the catchment consists of alluvial red gum lined tributaries, with spring fed upper reaches near Macclesfield. Mount galaxias have strong recruitment but low survivorship at the Quarry Road monitoring site.

The watercourses through the Finnis River Catchment including Meadows Creek, Eastern Creek and Western Creek are dominated by exotic vegetation with scattered River Red Gums (Miles 2007). Fifteen native fish species were recorded near Meadows including Mountain Galaxias, Flathead Gudgeons and Southern Pygmy Perch. The Meadows Creek Rehabilitation Plan will address weed control, stock exclusion and revegetation.

Further monitoring, with relevant native fish experts is recommended, with the development of a specific fish action plan for the watercourses within the District.



| Common name | Scientific name | Aus | SA | AMLR | Recorded within DCMB | Water associated? | Water Dependent? | Species requirements (habitat, diet, breeding) |
|------------------|--------------------------------|-----|----|------|----------------------|-------------------|------------------|---|
| AMPHIBIAN | | | | | | | | |
| Banjo Frog | <i>Limnodynastes dumerilii</i> | | | | ✓ | ✓ | ✓ | A common inhabitant of wetlands and rivers across a range of habitats. It burrows in loamy soils. During dry periods it spends its time in the burrow and emerges to feed and breed after rains. Commonly seen crossing roads on rainy nights in the Adelaide Hills. It is often dug up in urban gardens. Breeds in spring, laying a large foam nest containing up to 4000 eggs in water, often attached to aquatic vegetation. Females have special flaps of skin on their first two fingers called flanges, which are used to carry air bubbles from the surface of the water into the foam nest. |
| Brown Toadlet | <i>Pseudophryne bibronii</i> | R | | V | | ✓ | | Largely terrestrial. Generally found singularly or in low numbers under stones, logs, leaf litter and grassy debris, not necessarily in the presence of permanent water. Found on lightly forested hillsides, edges of small ephemeral creeks and depressions where leaf-litter and grassy-debris has accumulated. Occasionally utilises small, temporary dams and vegetated roadside drainage lines and ditches, which are characterised by a build up of deep leaf-litter and grassy-debris. Generally call from February through to August, especially after heavy rain (although may call throughout the year). Breeding usually takes place between February and May. The female lays approximately 200 large eggs in damp areas (above water level e.g. beside swamps, creeks and ditches) usually under logs, rocks or leaf litter. Hatching occurs after sufficient rains flood the area. Tadpoles complete their development in pools of water formed near the nest site. It is uncertain if populations are stable or continuing to decrease in size and range. |
| Brown Tree Frog | <i>Litoria ewingii</i> | | | | ✓ | ✓ | ✓ | Occupies a wide variety of habitats, and is commonly associated with human habitation. Often found on the ground, in vegetation, under rocks near permanent waterbodies and in urban gardens. Lives in a variety of different bush habitats and also in urban gardens. Breeds anytime during the year, following heavy rains. Eggs are deposited in numerous small clumps of 10-40, usually in still water, on submerged vegetation, underwater stems or leaves of plants. Spawn is laid in many clumps, each containing 10-40 eggs. |
| Burrowing frog | <i>Neobatrachus pictus</i> | | | | | ✓ | ✓ | Found in a wide variety of habitats, including woodland, mallee, open grassland and disturbed areas. Burrows underground and emerges to feed at night. Can burrow down several metres below ground level to escape from dry summer conditions. Opportunistic breeder that breeds after heavy rains (generally autumn). About 1000 yellow eggs are laid in a chain entwined with submerged vegetation. |

| | | | | | | | | |
|----------------------|-----------------------------------|---|--|---|---|---|---|---|
| AMPHIBIAN | | | | | | | | |
| Common Froglet | <i>Crinia signifera</i> | | | | ✓ | ✓ | ✓ | Rocks, vegetation and debris at the edge of creek, wetland and areas of seepage. May be found away from water sources during dry periods. Breeds throughout the year except mid-summer, with eggs laid on submerged vegetation in shallow, still or slow moving water. Development from egg to frog takes approximately one month. |
| Peron's Tree Frog | <i>Litoria peronii</i> | | | | ✓ | ✓ | ✓ | Adults frequent wet and dry forest, woodlands, shrublands, and open areas; often long distances from the water where they spawn during breeding season. Eggs and tadpoles are found in still water in swamps, dams, streamside ponds, and lagoons. |
| Spotted Marsh Frog | <i>Limnodynastes tasmaniensis</i> | | | | ✓ | ✓ | ✓ | Marshy country, creek edges and wetlands. Shelters under logs, stones, debris and grass on the edges of permanent and temporary water (e.g. swamps, pools and creeks). Often found in large numbers under rocks in dry periods. Any time of the year, particularly between August and March. A foam nest of 90-1300 eggs is laid floating in water attached to submerged vegetation. |
| BIRD | | | | | | | | |
| Australasian Bittern | <i>Botaurus poiciloptilus</i> | V | | V | ✓ | ✓ | ✓ | Forages in shallows or hunts in deeper waters from platforms of bent-over reeds. Prefers heavy vegetation of flooded shrubbery, reedbeds and sedges. Fairly narrow habitat preferences, preferring shallow, vegetated freshwater or brackish swamps. Most frequently in exceptionally wet years, possibly because the population size increases and they occupy isolated ephemeral wetlands. Forage mainly at night on a wide range of small animals, including birds, mammals, fish, frogs, yabbies, snails, insects and spiders. Breed Sep-Dec. Nests are well-constructed cups made of reed, in reed beds. |
| Australasian Darter | <i>Anhinga novaehollandiae</i> | R | | | ✓ | ✓ | ✓ | Fresh or brackish wetlands that have tree lined or vegetated banks. Occur less commonly in estuaries and sheltered bays. The Darter is usually a solitary bird, forming pairs only while breeding. Breeding is erratic, happening whenever water levels and food supplies are suitable, but most often occurs in spring and summer. Nests are usually solitary, but Darters may nest within loose colonies with other water birds that nest in trees, such as cormorants, spoonbills and ibis. They commonly build nests in trees that are standing in water, and will move nest sites to deeper waters if the waters begin to dry up. It prefers smooth, open waters, for feeding, with tree trunks, branches, stumps or posts fringing the water, for resting and drying its wings. Most often seen inland, around permanent and temporary water bodies at least half a meter deep, as they require open waters with sparse vegetation for foraging. Because Darters often feed on introduced fish species such as Carp, and Red-fin Perch, they may be adversely affected by attempts to reduce numbers of these fish species. |

| Common name | Scientific name | Aus | SA | AMLR | Recorded within DCMB | Water associated? | Water Dependent? | Species requirements (habitat, diet, breeding) |
|---------------------------|------------------------------------|-----|----|------|----------------------|-------------------|------------------|--|
| BIRD | | | | | | | | |
| Australasian Grebe | <i>Tachybaptus novaehollandiae</i> | | | | ✓ | ✓ | ✓ | Usually wetlands with abundant aquatic vegetation. After breeding, often gathers in large numbers on open waters. Widespread and common. Breeding varies, follows regular winter rain Sep – Jan. Nest is small pile of floating aquatic vegetation anchored by reeds, submerged branches, waterlilies, plant debris. |
| Australasian Pipit | <i>Anthus novaeseelandiae</i> | | | | | | | Grassland, forest clearings, grassy woodland, grassy roadsides. Feeds, roosts and nests on the ground. Sedentary or locally nomadic. Common. |
| Australasian Shoveler | <i>Anas rhynchos</i> | | R | | ✓ | ✓ | ✓ | Found in all kinds of wetlands, preferring large undisturbed heavily vegetated freshwater swamps. It is also found on open waters and occasionally along the coast. Dispersive, but little is known about their movements. Filter feeder, for insects, crustaceans and a variety of plants from the water. This specialised bill limits the Shoveler's foraging range to aquatic habitats on open water or soft mud in fertile wetlands. |
| Australian Little Bittern | <i>Ixobrychus dubius</i> | | E | | ✓ | ✓ | ✓ | A small secretive bittern. Only catch rare glimpses through reeds. Skulks through dense vegetation at water's edge; rarely emerges in open. Inhabits freshwater wetlands with dense reedbeds, tall sedges and well vegetated margins. |
| Australian Magpie | <i>Gymnorhina tibicen</i> | | | | ✓ | ✓ | | Usually eucalypt woodland, vicinity of tree-lined rivers, partly cleared lands. Live in family groups, defending territory. Breed Jun-Dec. Builds in upright forks of slender upper branches, in or near foliage of crown, occasionally in dead tree or on power pole, usually 5 to 20 m up. |
| Australian Pelican | <i>Pelecanus conspicillatus</i> | | | | ✓ | ✓ | ✓ | Gregarious. Nomadic, dispersive. Breeds Aug-Nov, and when heavy rain lifts water levels. Breeds on small islands, estuaries. Will use any large or small area of water. |
| Australian Raven | <i>Corvus coronoides</i> | | | | ✓ | | | Inhabits open country, natural and cleared. Common. |
| Australian Reed-Warbler | <i>Acrocephalus australis</i> | | | | ✓ | ✓ | ✓ | Occupies almost every reedbed, large or small. Migratory into the SE and SW of its range to breed in summer. Some remain through winter but are quiet. Common. |
| Australian Shelduck | <i>Tadorna tadornoides</i> | | | | ✓ | ✓ | ✓ | Lakes, wetlands, dams, flooded paddocks. Largely terrestrial. Feeds on pasture and aquatic vegetation obtained in shallow wetlands. Breeding: Jul-Oct, once winter rains have brought fresh pasture. Comes to water to mate. Flocks disperse during winter breeding season, with pairs establishing territories where there are large tree hollows (generally near water) for nesting. |
| Australian Spotted Crane | <i>Porzana fluminea</i> | | | | ✓ | ✓ | ✓ | Dense cover, wetlands, at times far from water. Usually keeps to dense reedbeds, but early to late in day will venture out onto nearby shallow open water, mudflats and floating vegetation. Nomadic. |

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| BIRD | | | | | | | | |
| Australian White Ibis | <i>Threskiornis molucca</i> | | | | ✓ | ✓ | ✓ | Shallow wetlands and pasture. Sedentary, dispersive. |
| Australian Wood Duck | <i>Chenonetta jubata</i> | | | | ✓ | ✓ | ✓ | Widespread. Found in grasslands, open woodlands, wetlands, flooded pastures and along the coast in inlets and bays. It is also common on farmland with dams, as well as around rice fields, sewage ponds and in urban parks. It will often be found around deeper lakes that may be unsuitable for other waterbirds' foraging, as it prefers to forage on land. Eats grasses, clover and other herbs, and occasionally, insects. It is rarely seen on open water, preferring to forage by dabbling in shallow water, or in grasslands and crops. Forms monogamous breeding pairs that stay together year round. It nests in tree holes, above or near water, often re-using the same site. |
| Baillon's Crane | <i>Porzana pusilla</i> | | | | ✓ | ✓ | ✓ | Favours freshwater swamps with aquatic plants, especially Triglochin procerum, Vallisneria spp., Potamogeton spp., Baumea spp. and Bolmoshoenus sp. (G. Carpenter pers. comm.). Feeds on aquatic insects, molluscs and green shoots of aquatic plants. Migratory breeder. Aug- Jan. Requires dense vegetation of reeds, grasses, water plants above water level in swamp or lake to build nest. |
| Bassian Thrush | <i>Zoothera lunulata</i> | | | | | ✓ | | Wet Eucalypt forest and woodland, heavily vegetated gullies, gardens with dense overhead canopy and thick leaf litter. Scratch around litter to expose moist soil and insects. Sedentary or dispersive. Breed Aug-Dec. Build cup nests on top of stumps, between tree limbs/trunk. low off the ground up to 15 m. Nest in shallow depression |
| Black Swan | <i>Cygnus atratus</i> | | | | ✓ | ✓ | ✓ | Diverse habitats, including temporary wetlands. Feeds on aquatic vegetation of shallow waters. Nomadic. Breeds any time of year after rain fills lakes and swamps; breeding usually begins early-mid winter in S. Nest is a large pile of vegetation, largely reeds, in shallow water, on an island, or floating amongst reeds or other plants in deeper water. |
| Black-fronted Dotterel | <i>Euseyornis melanops</i> | | | | ✓ | ✓ | ✓ | Found in the shallow margins of wetlands, lakes, rivers, sewage farms, storm drains and marshes. It is normally always near freshwater. Generally sedentary, a single bird, a pair, or a family group occupying a stretch of habitat on a more or less permanent basis, however some individuals appear to travel considerable distances, and flocks will sometimes congregate in food-rich areas. Eats small molluscs as well as aquatic and terrestrial insects. Lays its eggs in a shallow scrape, often on pebbly ground and quite close to water. It may have more than one brood per year. Breeding season is usually from Aug-Dec but can take place at any time when the conditions are suitable. |
| Black-tailed Native-hen | <i>Tribonyx ventralis</i> | | | | ✓ | ✓ | ✓ | Permanent and temporary wetlands. Move in times of drought. Nomadic, irruptive. Breed: Aug-Dec. Build nest in dense ground vegetation, made of stems, reeds and leaves. |
| Black-winged Stilt | <i>Himantopus himantopus</i> | | | | ✓ | ✓ | ✓ | Gregarious wader. Dispersive or nomadic. |

| Common name | Scientific name | Aus | SA | AMLR | Recorded within DCMB | Water associated? | Water Dependent? | Species requirements (habitat, diet, breeding) |
|-------------------|----------------------------------|-----------------|----|------|----------------------|-------------------|------------------|--|
| BIRD | | | | | | | | |
| Blue-billed Duck | <i>Oxyura australis</i> | R | | | ✓ | ✓ | ✓ | Almost wholly aquatic, and is seldom seen on land. Non-breeding flocks congregate on large, deep open freshwater dams and lakes in autumn. During daylight, they spend time along, concealed within vegetation or communally in large exposed rafts far from the shore. Seasonally nomadic. Young birds disperse each year from their natal (birth) swamps on inland New South Wales to non-breeding areas on the Murray River system and coastal lakes of Victoria and South Australia where they moult. Experienced breeders tend to be sedentary. |
| Buff-banded Rail | <i>Gallinulus philippensis</i> | | | V | ✓ | ✓ | ✓ | Resident and locally nomadic. Singly or in pairs, in dense reeds, and vegetation bordering many types of wetlands. Feed on crustaceans, mollusc, insects, fruit, frogs, carrion and refuse. Mostly feeds early morning and evening. Nest in long grass, tussocks, rushes or crops. Breed Sep-Feb. |
| Cape Barren Goose | <i>Cereopsis novaehollandiae</i> | | R | | | ✓ | | Offshore islands, nearby mainland, margins of wetlands, pastures. Occasionally on water. Leaves mainland to breed on islands Jun-Oct. Pairs form and aggressively defend territories. Nest on or close to ground, amongst tussocky grass or shrubbery. |
| Cattle Egret | <i>Ardea ibis</i> | Mi(Ma) Mi(W) | R | | | ✓ | ✓ | Found in grasslands, woodlands and wetlands, and has a preference for moist areas with tall grass, or shallow open wetlands, and the margins of wetlands. It also uses pastures and croplands, especially where drainage is poor. Often seen with cattle and other stock. Partially migratory, moving during winter. Feeds on invertebrates, frogs, lizards and some small mammals. |
| Chestnut Teal | <i>Anas castanea</i> | | | | ✓ | ✓ | ✓ | Wetlands, with preference for salt and brackish estuaries, lakes, tidal mudflats. Feed mostly at dusk and dawn, dabbling in shallows. Spend time beside the water. Usually sedentary. |
| Dusky Moorhen | <i>Gallinula tenebrosa</i> | | | | ✓ | ✓ | ✓ | Widespread, common, uses diverse wetlands. Prefers open waters with well vegetated margins; usually fresh water. Often in suburban parks. Breed usually Sep-Nov. Nest is a bulky bowl of sticks, reeds, bark and grass slightly above water level in a clump of reeds, tall rank grass, low-forked shrub, tree butt or log. |
| Eurasian Coot | <i>Fulica atra</i> | | | | ✓ | ✓ | ✓ | Waterbird. Occurs widely on wetlands. Forages in shallow to deep water where it up-ends or dives for plant material. Sometimes emerges onto land to feed on grassland near water. Breeding season influenced by rain, usually Aug-Mar. Nests in wetlands surrounded by water, often building up a heap of water weeds and other vegetation. Nests float, or are built from bottom of shallow water on a low or barely submerged stump or log. |

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| BIRD | | | | | | | | |
| Freckled Duck | <i>Stictonetta naevosa</i> | | V | | ✓ | ✓ | ✓ | Prefers permanent fresh water with heavy growth of cumbungi (bullrushes), lignum or tea-tree. Breeds in large temporary swamps created by floods. During drier times, moves from ephemeral (non-permanent) breeding swamps to more permanent waters. Generally rests in dense cover. Disperses during long inland droughts. Feed at dawn, dusk and night, on algae, seeds, aquatic plants and small invertebrates |
| Great Cormorant | <i>Phalacrocorax carbo</i> | | | | ✓ | ✓ | ✓ | On large expanses of water. Uncommon on small or shallow waters. Solitary or in small to large flocks. Common. |
| Great Crested Grebe | <i>Podiceps cristatus</i> | | R | | ✓ | ✓ | ✓ | Favours large deep open bodies of freshwater. Most commonly found inhabiting rivers, lagoons, lakes, swamps, reservoirs, saltfields, estuaries and bays. Diet: feeds on fish, caught by diving in clear water. |
| Great Egret | <i>Ardea alba</i> | Mi(Ma) Mi(W) | | | ✓ | ✓ | ✓ | Prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. Reported in a wide range of wetland habitats, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial. Roost at night in groups. Usually hunts in water, wading through the shallows, or standing motionless before stabbing at prey. Partially migratory, with northern hemisphere birds moving south from areas with cold winters. Populations across Australia are considered to fluctuate in size in recognition of the highly variable availability of suitable wetland habitat. |
| Grey Teal | <i>Anas gracilis</i> | | | | ✓ | ✓ | ✓ | Varied habitats, uses almost any wetlands, permanent or temporary. In pairs or small to huge flocks. Highly mobile and opportunistic. Mainly aquatic; feeds amongst floating vegetation, usually in shallows. Nomadic, dispersive. |
| Gull-billed Tern | <i>Gelochelidon nilotica</i> | | | | | ✓ | ✓ | Nomadic, highly dispersive. Inland species, which nests on inland waters. Often uses temporary water where heavy rain has caused extensive flooding. Out of breeding season prefers lagoons and saltmarshes near coast. Breeds in colonies on small islands of shallow inland waters. Breed Sep-May, mostly Oct-Dec Nest (depression) built on mud banks or sand ridges. |
| Hardhead | <i>Aythya australis</i> | | | | ✓ | ✓ | ✓ | True duck; able to feed in deep water. Favours parts of lakes, swamps with abundant aquatic vegetation. Responds to rainfall. |
| Hoary-headed Grebe | <i>Poliiocephalus poliocephalus</i> | | | | ✓ | ✓ | ✓ | Wetlands, usually on large open areas of permanent or temporary water. Prey includes yabbies, bugs and beetles, dragonflies, spiders, small fish and some water plants. Breeds Aug-Jan. Nest is a floating platform of water weeds, usually some distance out to shore anchored among sparse reeds and other plants. |

| Common name | Scientific name | Aus | SA | AMLR | Recorded within DCMB | Water associated? | Water Dependent? | Species requirements (habitat, diet, breeding) |
|------------------------|-----------------------------------|-------|----|------|----------------------|-------------------|------------------|--|
| BIRD | | | | | | | | |
| Intermediate Egret | <i>Ardea intermedia</i> | | R | | | ✓ | ✓ | It eats fish, frogs, crustaceans and insects. The Intermediate Egret stalks its prey methodically in shallow coastal or fresh water, including flooded fields. It often nests in colonies with other herons, usually on platforms of sticks in trees or shrubs. |
| Latham's Snipe | <i>Gallinago hardwickii</i> | Mi(W) | R | | ✓ | ✓ | ✓ | Uses a variety of freshwater or brackish wetlands, preferring to be close to protective vegetation cover, including in-stream vegetation and adjoining grassy/sedgy areas which provide shelter from predators whilst feeding. They also use artificial wetlands, including highly degraded creeks and swamps, and wet areas among grasslands. Feed mainly at night, spending most of their daylight hours roosting. Migratory. Breeds in Northern Hemisphere. Migrates to eastern Australia during spring and summer. |
| Lewin's Rail | <i>Lewinia pectoralis</i> | | V | | ✓ | ✓ | ✓ | Inhabit permanent to ephemeral wetlands, of either fresh or saline water, but require dense emergent or fringing vegetation. They also use artificial habitats which contain suitable dense vegetation along their banks. Lewin's Rail prefers habitats along freshwater creeks and swamps with dense native vegetation, especially reeds and sedges. They are a cryptic species that skulks in dense vegetation, feeding on a range of invertebrates and occasionally frogs. |
| Little Black Cormorant | <i>Phalacrocorax sulcirostris</i> | | | | ✓ | ✓ | ✓ | Uses smaller bodies of water such as farm dams. Gregarious. Most common on inland waters. Diet: fish. |
| Little Corella | <i>Cacatua sanguinea</i> | | | | ✓ | ✓ | ✓ | Large flocks use tree-lined watercourses and adjacent plains. Feeds in flocks on ground; congregates on trees to strip the leaves. |
| Little Grassbird | <i>Megalurus gramineus</i> | | | | ✓ | ✓ | ✓ | Secretive, skulking inhabitant of dense vegetation, in or beside wetland with rushes, lignum swamp, cumbungi, cane grass. |
| Little Pied Cormorant | <i>Microcarbo melanoleucos</i> | | | | ✓ | ✓ | ✓ | Inland, uses lakes, swamps. Wetlands, dams. Feed on introduced fish. |
| Masked Lapwing | <i>Vanellus miles</i> | | | | ✓ | ✓ | ✓ | Common breeding resident. Varied habitat, but typically open, short-grassed sites, often beside water. Breed July – Nov in southern areas. Builds a scrape nest in open areas on bare ground. Aggressively defend nest. |
| Musk Duck | <i>Biziura lobata</i> | | R | | ✓ | ✓ | ✓ | Rarely seen outside water; highly aquatic. They prefer deep, still lakes and wetlands with areas of both open water and reed beds. Seldom emerge from the water and are awkward on dry land. Stay on the water at night, sleeping well out from land. When not breeding, adults are generally solitary. Breeding season varies with rainfall and water levels, but is typically between Jul-Jan, with the greatest number of clutches laid in Sept-Oct. |
| Pacific Black Duck | <i>Anas superciliosa</i> | | | | ✓ | ✓ | ✓ | Wetlands. Widespread, nomadic. |

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| Pied Cormorant | <i>Phalacrocorax varius</i> | | | | ✓ | ✓ | ✓ | Mostly marine habitats but also large inland wetlands. Sedentary, but young birds will disperse over long distances. Feeds mainly on fish, catching prey underwater by diving. Because their feathers are not waterproof, cormorants are regularly seen perched with their wings outstretched to dry after fishing. Breeds in colonies on coastal islands, flooded tree plains, mangroves and sometimes on artificial structures such as beacons. The large nest is constructed from seaweed, twigs or sticks cemented together with droppings, and is placed in a tree or on the ground. |
| Pink-eared Duck | <i>Malacorhynchus membranaceus</i> | | | | ✓ | ✓ | ✓ | Uses shallow, open, muddy wetlands and temporary floodwaters. On water or logs on logs and limbs rising from water; seldom on land. Groups work through shallows. Widespread, nomadic. |
| Purple Swamphen | <i>Porphyrio porphyrio</i> | | | | ✓ | ✓ | ✓ | Uses diverse wetlands, typically well vegetated lake margins and adjacent grassland. Breeds most months, mainly Jul-Dec in south of range, often rearing two broods. Nests in clump of reeds just above water level. Generally found in small groups. Diet includes the soft shoots of reeds and rushes and small animals, such as frogs and snails. However, it is a reputed egg stealer and will also eat ducklings when it can catch them. |
| Red-capped Plover | <i>Charadrius ruficapillus</i> | | | | ✓ | ✓ | ✓ | Resident. Movements are poorly known, but it may move between the coast and inland wetlands. May be seen foraging for molluscs, small crustaceans and some vegetation, on mudflats, sandy beaches and salt-marsh. |
| Red-necked Avocet | <i>Recurvirostra novaehollandiae</i> | | | | ✓ | | | Wader unique to Australia. Uses fresh and saltwater wetlands. Large numbers tend to congregate on large, shallow salt lakes, then feed on brine shrimp. Wades through shallow water. |
| Red-kneed Dotterel | <i>Erythronyx cinctus</i> | | | | ✓ | ✓ | ✓ | Uses well vegetated freshwater wetlands, working the shallows among emergent vegetation. Probes around muddy shoreline; wades and sometimes swims while feeding. Resident, nomadic in response to rainfall. |
| Restless Flycatcher | <i>Myiagra inquieta</i> | | R | E | | ✓ | | Open forest, woodland, farmland, inland scrub. Hovers over grass, shrubbery, tree foliage, branches and logs. Restless when perched. Sedentary or nomadic. |
| Royal Spoonbill | <i>Platalea regia</i> | | | | ✓ | ✓ | ✓ | Found in shallow wetlands, intertidal mud flats and wet grasslands. Will also use artificial wetlands. Sedentary on the coast, inland birds move with changing water availabilities. Feeds mainly on fish in freshwater: it will also eat other crustaceans and aquatic insects. The structure of its bill limits it to feeding in water that is less than 40 cm deep. It can feel for prey items even in murky water and can feed by day or night. It will bash shrimps against hard objects to remove their shells. Breeding: forms monogamous pairs for the duration of the breeding season and nest in colonies alongside many other waterbirds, including Yellow-billed Spoonbills, ibises, herons and cormorants. A solid bowl-shaped nest is built of sticks and twigs lined with leaves and water plants and is usually placed in the crown of a tree over water or among high reeds and rushes. Nest sites may be reused year after year. The Royal Spoonbill is not tolerant of disturbances, especially when breeding. It has benefited from artificial wetlands in some areas. |

| Common name | Scientific name | Aus | SA | AMLR | Recorded within DCMB | Water associated? | Water Dependent? | Species requirements (habitat, diet, breeding) |
|-------------------------|---------------------------------|-------|----|------|----------------------|-------------------|------------------|--|
| BIRD | | | | | | | | |
| Sacred Kingfisher | <i>Todiramphus sanctus</i> | | | U | ✓ | ✓ | | The MLR population is considered to be in decline, but it is frequently sighted in riparian vegetation. It is likely to respond well to riparian rehabilitation. Feeds over pastoral land. Feeds on insects, reptiles, crustaceans and sometimes fish. Mostly solitary, pairing only for breeding season. Breed: Migrates to southern Australia for summer breeding, Sept – Dec, occasionally to March. Nest in termite mounds, hollows, dead trees trunks or banks. |
| Sharp-tailed Sandpiper | <i>Calidris acuminata</i> | | | | ✓ | | | Fresh or saltwater wetlands, muddy edges of lagoons, swamps, dams, temporary floodwaters. |
| Spotless Crane | <i>Porzana tabuensis</i> | | R | U | ✓ | ✓ | ✓ | Found in a range of wetlands including lakes, swamps, saltmarshes and mangroves, and only occur in well vegetated areas containing rushes, reedbeds and other aquatic vegetation. Feed on aquatic insects and vegetation by foraging in the shallows of wetlands, wading, swimming and climbing over fallen and floating vegetation. |
| Straw-necked Ibis | <i>Threskiornis spinicollis</i> | | | | ✓ | ✓ | ✓ | Grassland habitats (wet or dry), irrigated pasture, occasionally shallows of wetlands. Often perch on dead trees. Nomadic flocks. |
| Swamp Harrier | <i>Circus approximans</i> | | | | ✓ | ✓ | | Wetland habitats. Glides low over reed beds and open water of swamps. Sedentary and nomadic or migratory. |
| Whiskered Tern | <i>Chlidonias hybrida</i> | | | | ✓ | ✓ | ✓ | Usually shallow freshwater wetland. Shallow diving to take small aquatic prey. |
| White-bellied Sea-Eagle | <i>Haliaeetus leucogaster</i> | Mi(T) | E | | ✓ | ✓ | ✓ | The White-bellied Sea-eagle is predominantly a coastal species which is generally confined to the coastlines are. |
| White-faced Heron | <i>Egretta novaehollandiae</i> | | | | ✓ | ✓ | ✓ | Common, usually in or near shallow wetland, margins of swamps, dams and lakes, damp or flooded pasture. Breed Sep-Dec. Nests quite high on horizontal fork. |
| White-necked Heron | <i>Ardea pacifica</i> | | | | ✓ | ✓ | ✓ | Shallow wetland, swamp, flood water, wet grassland, shallows of lakes. Widespread, migratory, dispersive or eruptive after widespread rain. Breed Aug-Feb. Usually in colonies. Nests built in tall, often dead trees standing in water. |
| Wood Sandpiper | <i>Tringa glareola</i> | | R | | ✓ | ✓ | ✓ | Migratory non-breeder. Mostly seen in Australia between August and April. Prefer inland shallow freshwater wetlands/ponds with emergent reeds and grass, surrounded by tall plants or dead trees and fallen timber. Probe in mud or pick at the surface to feed. Feed mainly on aquatic insects, insect larvae. |

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| BIRD | | | | | | | | |
| Yellow-billed Spoonbill | <i>Platalea flavipes</i> | | | | ✓ | ✓ | ✓ | Nomadic. Found in the shallows of freshwater wetlands, dams, lagoons and swamps, and sometimes in dry pasture. It can use much smaller areas of water than the Royal Spoonbill. Feeds on aquatic insects and their larvae, in shallow water. Often nests in colonies with other water birds, such as ibises and Royal Spoonbills, in high forks of trees over water, or in among reed beds. |
| MAMMAL | | | | | | | | |
| Water rat | | | | | ✓ | ✓ | ✓ | The Water-rat is one of Australia's only two amphibious mammals and is usually found near permanent bodies of water. |
| REPTILE | | | | | | | | |
| Common Long-necked Tortoise | | | | | ✓ | ✓ | ✓ | Eggs laid in early summer in the banks of aquatic habitat. Hatchlings present three to five months later. Prone to bird and fish predation. |
| Short-necked tortoise | | | | | ✓ | ✓ | ✓ | The eggs and newborn hatchlings face a long list of predators. Adult turtles have few natural enemies. Eggs are laid in a burrow next to the river. Food source is mostly aquatic invertebrates. |
| Red bellied black snake | | | | | ✓ | ✓ | | Associated with moist habitat, primarily streams, swamps and lagoons . feed on a variety of vertebrates including fish, tadpoles, frogs, lizards, snakes and mammals. |

Table 4.1 Water associated and water dependent species likely in the LGA (Incomplete)

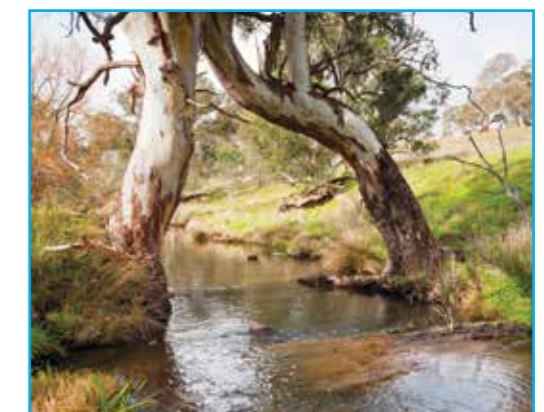
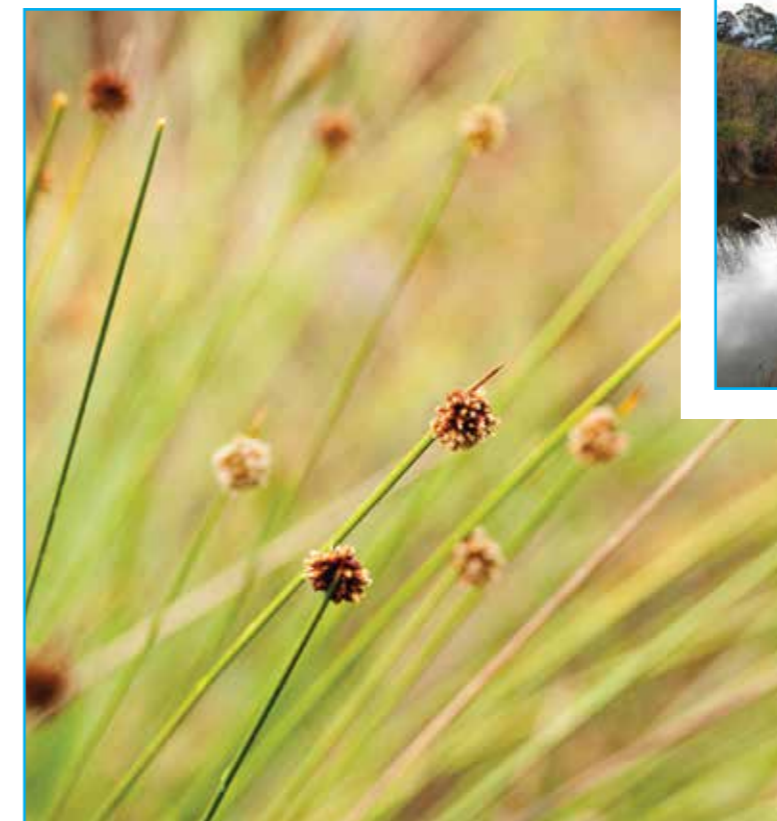
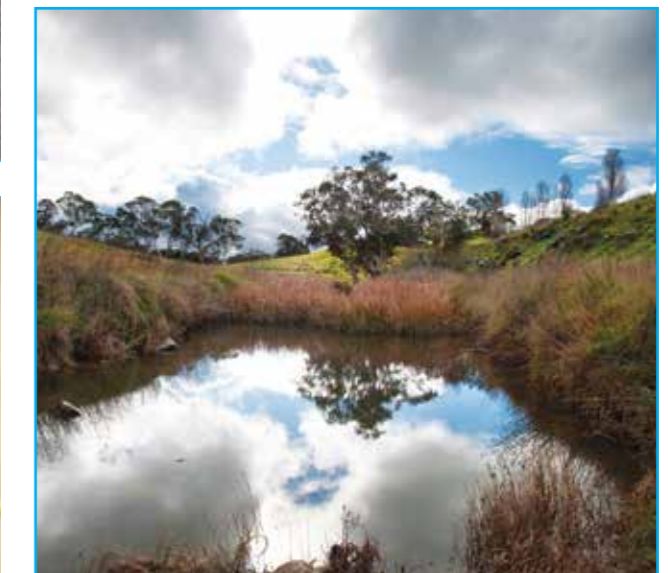
4.4 Altered Aquatic Environments

Changes in water and land use since European settlement and urbanisation have resulted in modifications to the physical, chemical and biological state of watercourses in the region. The causes for these changes are due to:

- the use of insecticides;
- the draining of wetlands for development;
- physical changes such as the introduction of pipes, culverts, channelling and straightening;
- converting ephemeral ponds to dams;
- grazing of streams by exotic livestock, resulting in degradation ;
- invasive fish species;
- loss of snags;
- introduction of barriers affecting aquatic/terrestrial movements;
- clearance of riparian vegetation;
- introduction and colonising of streams by weeds and other exotic species;
- modified hydrological conditions: reduction in summer flows, possibly as a result of increased groundwater use and by capture of runoff in both on stream and off stream dams;
- increases in the peak flow rate of streams due to land clearance and township and road development, increasing runoff and resulting in degraded creeks;
- increased water temperatures due to loss of shading;
- urban development on flood plains;
- poor management;
- construction of diversion banks to prevent flooding or to collect water for dams, resulting in changed flow patterns and reduced stream flows; and
- deterioration of water quality caused by pollutants, chemicals, turbidity and sedimentation.

4.5 Riparian Zones

Studies have shown that intact riparian zones have high nutrient removal efficiency, and consequently the improvement of aquatic ecosystem health has been achieved by the rehabilitation of the riparian zones. Riparian vegetation is also an important factor for stabilising the bank, regulating water temperature and providing habitat and corridors for fauna. The loss of riparian habitat has an impact of the functioning of the entire aquatic systems.



“Develop best practise management to optimise physical, chemical and biological state of watercourses in the district”

| ACTION | PRIORITY | TIMEFRAME | RESPONSIBILITY | PARTNERS | FUNDING SOURCE | LINK TO STRATEGIC PLAN |
|---|-----------|-----------|--|----------------------|----------------------|---|
| WH1 (HP1) Conceptual linkages of fauna to habitat (and potential habitat) longitudinal and lateral connectivity considerations | Very High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) IT Systems (CORPORATE SERVICES) | - | Staff Time | NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas NE 3.4- Further develop and enhance vegetation corridors |
| WH2 Increase the profile on native fish and aquatic habitats | Low | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) | NRM Catchment Groups | Staff Time \$1000 | NE1.3- Promote environmental education and awareness NE 3.1- Promote understanding and use of natural areas and provide learning opportunities NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets NE 3.7- Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment |
| WH3 Local management strategies for local fish communities (hot spots) • Snag piles and rock groins and aquatic plants • Investigate case studies and options for Mosquito Fish and Carp control • Undertake regular fish monitoring | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) | NRM Catchment Groups | \$3000 | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 1.4- Support environmental research on local issues NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas NE 4.1- Ensure up-to-date knowledge and understanding of environmental conditions and context NE 4.2- Identify and respond to environmental risks and vulnerabilities NE 4.3- Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change |

| | | | | | | |
|---|-----------|-------------------------|---|------------|------------|--|
| WH4 Harness MDPA watercourses opportunities for management | Very High | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) | Developers | Staff time | NE1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas NE 4.2- Identify and respond to environmental risks and vulnerabilities NE 4.3- Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change |
| WH5 Link with WSUD for habitat value | High | Ongoing (project based) | Open Space & Environment (PLANNING & DEVELOPMENT) Capital Programs (INFRASTRUCTURE & PROJECTS) | - | Staff time | NE1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas NE 4.2- Identify and respond to environmental risks and vulnerabilities NE 4.3- Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change |
| WH6 Investigate and manage diffuse point source water run off due to an increase in hard surfaces due to development) | Medium | 2016/2017 | Health & Public Safety (CORPORATE SERVICES) | - | Staff time | NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas |
| WH7 Discourage changing flow regimes in development | Very High | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) | Developers | Staff time | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas NE 4.2- Identify and respond to environmental risks and vulnerabilities NE 4.3- Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change |

| | ACTION | PRIORITY | TIMEFRAME | RESPONSIBILITY | PARTNERS | FUNDING SOURCE | LINK TO STRATEGIC PLAN |
|-------------|--|-----------|-----------|--|--|----------------|---|
| WH8 | Develop strategic guidelines for best environmental practise of riparian planting and management (GOOLWA TO WELLINGTON LOCAL ACTION PLANNING INC guidelines) | Very high | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | Goolwa To Wellington Local Action Planning Inc | \$3000 | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas NE 4.2- Identify and respond to environmental risks and vulnerabilities NE 4.3 - Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change |
| WH9 | Education program for riparian species selection (developers/landholders) | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) | - | Staff time | NE1.1 - Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2 - Lead biodiversity protection and restoration initiatives NE 2.4 - Conserve water, maximise recycled water use and practice appropriate Water Sensitive Urban Design NE 3.2 - Integrate human environments with natural areas using urban ecology principles NE 3.3 - Design buffers and interfaces between built and natural areas NE 3.4 - Further develop and enhance vegetation corridors NE 4.2 - Identify and respond to environmental risks and vulnerabilities |
| WH10 | Develop indicators to assess stream health conditions | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) | - | Staff time | NE1.1 - Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2 - Lead biodiversity protection and restoration initiatives NE 3.2 - Integrate human environments with natural areas using urban ecology principles NE 3.3 - Design buffers and interfaces between built and natural areas NE 4.2 - Identify and respond to environmental risks and vulnerabilities |

| | | | | | | | |
|-------------|---|--------|------------------------------------|--|---|------------------|--|
| WH11 | Incorporate linear parks and green corridors along watercourses where appropriate | High | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) | Bush For Life Goolwa To Wellington Local Action Planning Inc NRM Landcare & Bushcare Groups | Existing budgets | NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas NE 3.4- Further develop and enhance vegetation corridors |
| WH12 | Regular cleaning and clearance of drainage system (to reduce pollution) | Medium | Ongoing | Field Services (COUNCIL SERVICES) | - | Existing budgets | NE 1.2- Lead biodiversity protection and restoration initiatives NE 3.2- Integrate human environments with natural areas using urban ecology principles |
| WH13 | Implement an education program for community wastewater discharge into sewer system | Low | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) Waste Water Operations & Planning (INFRASTRUCTURE & PROJECTS) | - | Existing budgets | NE1.3- Promote environmental education and awareness NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets |
| WH14 | Negotiate with landholders to develop linear riparian reserves for connectivity. | High | Ongoing and as opportunities arise | Open Space & Environment (PLANNING & DEVELOPMENT) | Landholders | Existing budgets | NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas NE 3.4- Further develop and enhance vegetation corridors |



BIODIVERSITY PLANNING

5.0 Monitoring and Evaluation

5.1 Ministerial Development Plan Amendment (MDPA)

The 30 Year Plan for Greater Adelaide identified Mount Barker as a regional centre for the eastern Mount Lofty Ranges, highlighting a number of growth areas for urban expansion including approximately 50 hectares for Nairne and approximately 1,150 hectares for Mount Barker. Most of these growth areas were rezoned by the Ministerial Mount Barker Urban Growth Development Plan Amendment (2010). The impacts associated with the new development on both communities and the environment need to be considered and appropriately managed, including issues such as climate change and the need for food production that supports an expanding urban environment. The Structure Plan identified the need to undertake a detailed biodiversity study of the area as a matter of priority, to better inform good development that adequately addresses these issues associated with the protection and management of biodiversity. EBS Ecology was contracted to investigate and report on the biodiversity assets of the Mount Barker Ministerial Development Plan Amendment.

The new growth area comprises lands that have been progressively cleared and utilised for agriculture since European settlement and subsequently the biological value of these areas has steadily declined. This is more broadly consistent with the biodiversity degradation occurring across the Mount Lofty Ranges, with a significant number of local extinctions, especially amongst small mammal species, birds and plants species. The remaining native vegetation is predominantly confined to roadsides and the rail corridor, with the exception of a small number of isolated and fragmented blocks which are often severely degraded by weeds or modified by grazing. Some pockets of valuable and diverse roadside vegetation have been maintained by the Trees for Life Bush for Life program and identified through the Department for Planning Transport and Infrastructure (DPTI) Roadside Marker Scheme. Scattered mature eucalypts, which provide valuable habitat, persist throughout cleared paddocks but with little population recruitment occurring overall. Many of the watercourses dissecting the landscape still maintain their original

eucalypt communities, despite the significant modification of the understorey structure by woody weeds and grazing. There is a need to ensure that new development doesn't further erode the biological health of the region and that opportunities to restore local biodiversity are assisted through the design and function of the new development areas. It is anticipated that the information yielded from this study will inform landowners, developers and planning authorities when considering and planning development within the MDPA land.

5.2 Flora

Vegetation across the MDPA land and surrounds has been thoroughly analysed during a number of previous studies. Data from various studies including Hyde (1999), University of Adelaide (2010) and Jury et al. (2010 – 2014), along with recent field investigations, has been consolidated to provide accurate profiles on each of the major vegetation associations. Species lists have also been developed for each of the communities as well as for each patch assessed within and around the MDPA land.

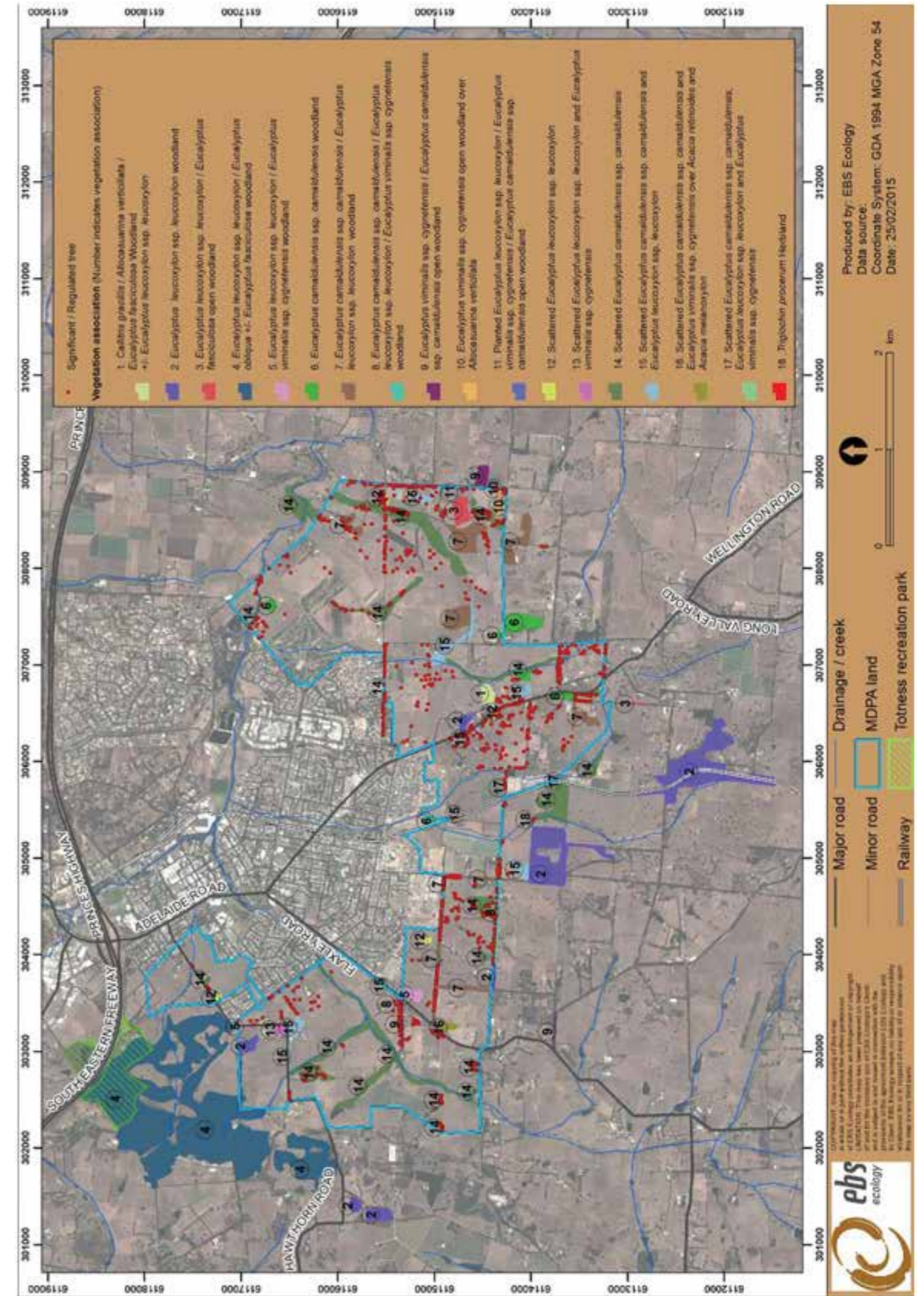
5.2.1 Vegetation communities

Eighteen broad vegetation communities have been mapped and described across the MDPA land and immediate surrounds (Table 5.1). Condition varies, with several of the larger remnants located outside the MDPA land in good condition, whilst many of the smaller remnants scattered across farming land are highly modified by grazing and weed invasion. A number of the broad vegetation communities have been described below and their locations displayed in figure 5.1.



| Veg Assoc. # | Description |
|--------------|---|
| 1 | <i>Callitris gracilis</i> (Southern Cypress Pine)/ <i>Allocasuarina verticillata</i> (Drooping Sheoak)/ <i>Eucalyptus fasciculosa</i> (Pink Gum) woodland +/- <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) |
| 2 | <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) woodland |
| 3 | <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) / <i>Eucalyptus fasciculosa</i> (Pink Gum) open woodland |
| 4 | <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) / <i>Eucalyptus obliqua</i> (<i>E. obliqua</i>) +/- <i>Eucalyptus fasciculosa</i> (Pink Gum) woodland |
| 5 | <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) / <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) woodland |
| 6 | <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) woodland |
| 7 | <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) / <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) woodland |
| 8 | <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) / <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) / <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) woodland |
| 9 | <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) / <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) open woodland |
| 10 | <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) open woodland over <i>Allocasuarina verticillata</i> (Drooping Sheoak) |
| 11 | Planted <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) / <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) / <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) open woodland |
| 12 | Scattered <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) |
| 13 | Scattered <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) and <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) |
| 14 | Scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) |
| 15 | Scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) and <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) |
| 16 | Scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) and <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) over <i>Acacia retinodes</i> (Wirilda) and <i>Acacia melanoxylon</i> (Blackwood) |
| 17 | Scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum) , <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (SA Blue Gum) and <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) |
| 18 | <i>Triglochin procera</i> (Water-ribbons) Herbland |

Table 5.1 Vegetation communities mapped across the MDP land and immediate surrounds.



Map 5.1 broad vegetation communities have been described below and their locations.

Vegetation Association 1

Callitris gracilis / *Allocasuarina verticillata* / *Eucalyptus fasciculosa* woodland +/- *Eucalyptus leucoxylon* ssp. *leucoxylon*

A small patch was mapped on the eastern side of Wellington Road on private land confined to a gentle upper slope. The overall trend of the association is 'declining', mainly due to invasion of weeds at expense of native species. Likewise, the small remnant is highly degraded, most probably due to having been grazed for over a century. The resulting condition of the understorey is extremely poor and dominated with exotic pasture species with the odd small patch of scattered native grass, *Austrostipa mollis* (Soft Spear-grass). Preservation and management of this patch is extremely important given the rarity of remaining native pine remnants in the district. There are also a number of isolated mature native pine trees in the vicinity that are considered important to retain, despite not fitting the 'Significant' or 'Regulated' Tree size criteria under the Development Act, 1993. Even when native pines reach 200 years old, they will never grow to more than 2 metres in circumference and will therefore have no protection from that legislation (Crompton, 2010).

Table 5.2. Association 1 summary.

| | |
|--------------------------|--|
| Landscape position | Gentle upper slope |
| Conservation listing | The association is considered regionally endangered in the Bremer Barker Catchment and listed as vulnerable for South Australia under the Provisional List of Threatened Ecosystems of South Australia (DEH, in progress). |
| Vegetation condition | Moderate- Poor |
| Threatened flora species | <i>Eucalyptus fasciculosa</i> (Pink Gum) – Rare in SA |

Vegetation Association 2

Eucalyptus leucoxylon ssp. *leucoxylon* woodland
The association is considered regionally vulnerable in the Bremer Barker Catchment (Hyde 1999) and considered to be poorly conserved in the Mt Barker district (Crompton and Williams 1998, as cited in Hyde 1999).

Much of this association has been removed and modified through clearance and agricultural practices, however there are a number of patches of *Eucalyptus leucoxylon* ssp. *leucoxylon* woodland remaining throughout the MDPA land and surrounding properties. These types of *E. leucoxylon* ssp. *leucoxylon* woodland would normally possess a grassy ground layer of *Austrostipa* spp. (Spear Grass), *Rytidosperma* spp. (Wallaby Grass), *Themeda triandra* (Kangaroo Grass), *Poa clelandii* (Matted Tussock-grass), including a number of *Lomandra* spp. (Irongrass), *Lepidosperma semiteres* (Wire Rapier-sedge) and *Dianella revoluta* var. *revoluta* (Black-anther Flax-lily). Smaller shrubs can also be prominent including *Acrotriche serrulata* (Cushion Ground-berry), *Hibbertia* spp. (Guinea-flower), *Pultenaea pedunculata* (Matted Bush-pea), *Gonocarpus tetragynus* (Small-leaf Raspwort) and a number of climbers such as *Cassytha melantha* (Coarse Dodder-laurel) and *Clematis microphylla* (Old Man's Beard).

Some of the larger examples of *E. leucoxylon* ssp. *leucoxylon* woodland are located south of the MDPA land, one of which is adjacent to the railway reserve and Native Avenue and is in very good condition. It contains a high level of plant species diversity, low levels of weeds and possesses a structure reminiscent of the pre-European community. Other remnants however, are lacking the native grassy understorey species, replaced by exotic grasses and herbs. Smaller remnants located along Wellington Road and off Hawthorn Road vary in condition, based on current management. One of these is protected under Heritage Agreement since 1998.

Table 5.3. Association 2 summary.

| | |
|--------------------------|--|
| Landscape position | Gentle hills south and west of the MDPA land |
| Conservation listing | The association is considered regionally vulnerable in the Bremer Barker Catchment |
| Vegetation condition | Good- Poor |
| Threatened flora species | <i>Eucalyptus fasciculosa</i> (Pink Gum) – Rare in SA |

Vegetation Association 3

Eucalyptus leucoxylon ssp. *leucoxylon* / *Eucalyptus fasciculosa* open woodland

Two small patches contain the association which is listed as vulnerable in the Provisional List of Threatened Ecosystems of South Australia (DEH, in progress) and both *E. fasciculosa* and *E. leucoxylon* ssp. *leucoxylon* associations are rated as vulnerable for the Bremer Barker Catchment (Hyde, 1999) and considered to be poorly conserved in the Mt Barker district (Crompton and Williams, 1998, as cited in Hyde, 1999). The community is typically a grassy woodland with an open midstorey of *Allocasuarina verticillata* (Drooping Sheoak) and *Acacia pycnantha* (Golden Wattle), with a number of sedges and irongrasses in the understorey. The community has experienced heavy grazing due to its grassy understorey layer and therefore most remaining examples are highly modified.

Interim flora lists compiled in 2010 by Dury et al in association with the EBS Ecology field survey, show that the remnant along Harrop Road retains a reasonable diversity despite high infestation levels of exotics. Reasonable patches of *Lepidosperma viscidum* (Sticky Sword-sedge) dominate the understorey in patches with *Rhytidosperra* spp. (Wallaby Grass) and *Austrostipa* sp. (Spear Grass), along with a number of scattered individuals including *Lomandra densiflora* (Soft Tussock Mat-rush), *Lomandra multiflora* ssp. *dura* (Hard Mat-rush), *Acrotriche serrulata* (Cushion Ground-berry),

Astroloma humifusum (Cranberry Heath) and *Dianella revoluta* (Black-anther flax-lily), and annuals represented by *Arthropodium strictum* (Common vanilla-lily), *Bulbine bulbosa* (Bulbine-lily) and *Caesia calliantha* (Blue Grass-lily). This roadside reserve in particular should be recognised as a valuable remnant and retained and managed in the Roadside Marker Scheme (RMS).

Table 5.4. Association 3 summary.

| | |
|--------------------------|--|
| Landscape position | South of the MDPA land on roadside reserve and gentle hills in the eastern side of the of the MDPA land |
| Conservation listing | The association is considered regionally vulnerable in the Bremer Barker Catchment |
| Vegetation condition | Moderate |
| Threatened flora species | Rare in South Australia- <i>Eucalyptus fasciculosa</i> (Pink Gum), <i>Eucalyptus viminalis</i> ssp. <i>viminalis</i> (Manna Gum). Rare in AMLR region – <i>Acacia retinodes</i> (Wirilda), <i>Lomandra collina</i> (Sand Mat-rush) Near Threatened in AMLR region- <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> (South Australian Blue Gum), <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> (Rough-bark Manna Gum), <i>Bulbine bulbosa</i> (Bulbine-lily), <i>Lepidosperma curtisiae</i> (Little Sword-sedge), <i>Lomandra sororia</i> (Sword Mat-rush), <i>Rytidosperma erianthum</i> (Hill Wallaby-grass), <i>Convolvulus angustissimus</i> ssp. <i>angustissimus</i> (Australian Bindweed), <i>Cynoglossum suaveolens</i> (Sweet Hound's-tongue), <i>Epilobium billardierianum</i> ssp. (Robust Willow-herb), <i>Melaleuca decussata</i> (Totem-poles). |

Vegetation Association 4

Eucalyptus leucoxylon ssp. leucoxylon / *Eucalyptus obliqua* +/- *Eucalyptus fasciculosa* woodland

This vegetation association is confined to hilltops and hill slopes on the north-western area of the Bremer Barker Catchment and is considered regionally vulnerable in the Bremer Barker Catchment (Hyde, 1999) and poorly conserved in the Mt Barker district (Crompton and Williams, 1998, as cited in Hyde, 1999). The main examples are contained within the larger remnants to the north west of the MDPA land connected to the Totness RP where they are zoned "Conservation" under the Mount Barker Development Plan (2013). It is managed primarily for the conservation and enhancement of the natural environment and natural ecological processes for their historic, scientific, landscape, faunal habitat, biodiversity and cultural values; it also provides opportunities for the public to experience and appreciate the significance of the native vegetation and original remnant natural habitat of the area through low impact recreational activities and interpretive facilities (Government of South Australia, 2013). The quality of the remnants varies considerably, from poor along the edges, to excellent and virtually weed-free toward the centres. These remnants represent a core area of important habitat to native species within the district. Frequent variations in the overstorey dominance between the two main eucalypt species, *Eucalyptus leucoxylon ssp. leucoxylon* (South Australian Blue Gum) and *Eucalyptus obliqua* (Messmate Stringybark) occur throughout, with scattered State rare *Eucalyptus fasciculosa* (Pink Gum) occurring also. The midstorey is characterised by: *Allocasuarina verticillata* (Drooping Sheoak), *Acacia pycnantha* (Golden Wattle), *Exocarpos cupressiformis* (Native Cherry) and a dense shrubby understorey consisting of: *Acacia myrtifolia* (Myrtle Wattle), *Acrotriche serrulata* (Cushion Ground-berry), *Astroloma humifusum* (Cranberry Heath), *Bursaria spinosa ssp. spinosa* (Sweet Bursaria), *Dianella revoluta var. revoluta* (Black-anther Flax-lily), *Lepidosperma semiteres* (Wire Rapier-sedge), *Hibbertia exutiacies* (Prickly Guinea-flower), *Lomandra* spp. (Irongrass)

Xanthorrhoea semiplana ssp. semiplana (Yacca), *Platylobium obtusangulum* (Holly Flat-pea), *Pultenaea daphnoides* (Large-leaf Bush Pea). A number of native grasses are also present within this association including *Austrostipa* spp. (Spear grass), *Rytidosperma caespitosum* (Common Wallaby-grass) and *Poa* sp. (Meadow-grass/ Tussock-grass). Annual species such as *Arthropodium strictum* (Common Vanilla-lily), *Bulbine bulbosa* (Bulbine-lily), *Caesia calliantha* (Blue Grass-lily) and many species of native orchids are widespread throughout.

Weeds are frequent around the edges of remnants, particularly woody weeds including *Genista monspessulana* (Montpellier Broom), *Ulex europaeus* (Gorse) and *Rubus ulmifolius var. ulmifolius* (Blackberry). *Watsonia meriana var. bulbifera* (Bulbil Watsonia) infestations are also frequent in more degraded areas.

Buffering and linking these existing large remnants to some of the native remnant areas within the MDPA land creating wildlife corridors, is one of the recommendations made in the University of Adelaide's analysis of the effect of urban encroachment on biodiversity and existing ecological systems (2010).

Table 5.5. Association 4 summary.

| | |
|--------------------------|---|
| Landscape position | Hilltops and hill slopes to the north-west of the MDPA land |
| Conservation listing | The association is considered regionally vulnerable in the Bremer Barker Catchment |
| Vegetation condition | Excellent - Poor |
| Threatened flora species | Rare in South Australia - <i>Eucalyptus fasciculosa</i> (Pink Gum) Rare in AMLR region – <i>Xerochrysum bracteatum</i> (Golden Everlasting), <i>Acacia retinodes</i> (Wirilda), <i>Lomandra collina</i> (Sand Mat-rush) Near Threatened in AMLR region - <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (South Australian Blue Gum), <i>Bulbine bulbosa</i> (Bulbine-lily), <i>Hibbertia sericea</i> (Silky Guinea-flower), <i>Pultenaea pedunculata</i> (Matted Bush-pea), <i>Cassytha melantha</i> (Coarse Dodder-laurel) and <i>Lomandra fibrata</i> (Mount Lofty Mat-rush). |

Vegetation Association 5

Eucalyptus leucoxylon ssp. leucoxylon / *Eucalyptus viminalis ssp. cygnetensis* woodland

The *Eucalyptus leucoxylon ssp. leucoxylon* (South Australian Blue Gum) community intersperses *Eucalyptus viminalis ssp. cygnetensis* (Rough-bark Manna Gum) in the higher rainfall western edge of the Bremer Barker Catchment, and was once much more prominent prior to clearance and modification for agricultural pursuits since European settlement. Both the *E. leucoxylon ssp. leucoxylon* and *E. viminalis ssp. cygnetensis* associations are considered to be poorly conserved in the Mt Barker district (Crompton and Williams 1998, as cited in Hyde 1999) and regionally vulnerable and endangered respectively in the Bremer Barker Catchment (Hyde 1999). The *E. viminalis ssp. cygnetensis* community represents the eastern extremity of its distribution within the region.

One small remnant is located on the eastern side of Flaxley Road. The patch has an intact overstorey but has been heavily modified by grazing. It would have previously possessed a grassy understorey, but is now mainly dominated by pasture weeds and a few scattered patches of native grasses and sedges, including *Rytidosperma caespitosum* (Common Wallaby Grass), *Themeda triandra* (Kangaroo Grass) and *Juncus kraussii* (Sea Rush).

Table 5.5. Association 5 summary.

| | |
|--------------------------|--|
| Landscape position | The Western Flat district of Mt Barker (Hyde, 1999) |
| Conservation listing | The association is considered regionally vulnerable and/or endangered in the Bremer Barker Catchment |
| Vegetation condition | Moderate |
| Threatened flora species | Near Threatened in AMLR region - <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (South Australian Blue Gum), <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum) |

Vegetation Association 6

Eucalyptus camaldulensis ssp. camaldulensis woodland

The association is considered regionally endangered in the Bremer Barker Catchment and the Mt Barker district (Crompton and Williams 1998, Hyde 1999) with no examples known to be conserved (Hyde 1999). The community is known to occupy flats and hillslopes, and dominate creeks and watercourses. The remnants mapped under Association 6 represent the former community, whereas the *Eucalyptus camaldulensis ssp. camaldulensis* (Red Gum) associated with riparian areas are more appropriately covered under Association 14.

The *E. camaldulensis ssp. camaldulensis* community frequently intersperses with other eucalypt species such as *Eucalyptus leucoxylon ssp. leucoxylon* (South Australian Blue Gum), (Associations 7, 15 and 17) and *Eucalyptus viminalis ssp. cygnetensis* (Rough-bark Manna Gum) (Association 8, 9 and 10). Much of this association has been removed and modified through clearance and agricultural practices, however there are a number of patches of the woodland remaining throughout the MDPA land and surrounding properties, albeit in fairly poor condition. The understorey would have possessed taller understorey species such as *Acacia retinodes* (Wirilda), *Acacia melanoxylon* (Blackwood) and *Acacia pycnantha* (Golden Wattle) over a mixture of native grasses such as *Austrostipa* spp. (Spear Grass), *Rytidosperma* spp. (Wallaby Grass) and *Themeda triandra* (Kangaroo Grass). Understorey would also have consisted of sedges and iron grasses including *Lomandra* spp. (Iron Grass), *Lepidosperma semiteres* (Wire Rapier-sedge) and a number of common annual species including *Arthropodium strictum* (Common Vanilla-lily) and *Burchardia umbellata* (Milkmaids).

The six patches described as *E. camaldulensis ssp. camaldulensis* woodland vary in condition from having completely modified understoreys to being degraded with scattered natives persisting amongst the exotics. One patch in particular, located directly east of the Victor Harbor railway line on the northern boundary

of the MDP land (Area 69) (Figure 5), contains a number of State and regionally threatened plants persisting in the understorey; despite high levels of weeds and disturbance to the natural hydrology (Table 5.6). Other species present include *Allocasuarina verticillata* (Drooping Sheoak), *Bolboschoenus caldwellii* (Salt Club-rush), *Austrostipa blackii* (Crested spear-grass), *Austrodanthonia racemosa* var. *racemosa* (Slender wallaby-grass) *Austrodanthonia geniculata* Knead wallaby-grass *Austrodanthonia caespitosa* (White-top wallaby-grass), *Juncus pallidus* (Pale Rush), *Ficinia nodosa* (Knobby Club-rush) and *Juncus bufonius* (Toad rush) (Attachment 1).

Table 5.6. Association 6 summary.

| | |
|--------------------------|---|
| Landscape position | South of the MDP land on roadside reserve and gentle hills in the eastern side of the of the MDP land |
| Conservation listing | The association is considered regionally vulnerable in the Bremer Barker Catchment |
| Vegetation condition | Moderate- Poor |
| Threatened flora species | Rare in South Australia- <i>Rytidosperma laeve</i> (Smooth Wallaby-grass) Vulnerable in AMLR region - <i>Rytidosperma fulvum</i> (Leafy Wallaby-grass) Rare in AMLR region – <i>Bolboschoenus caldwellii</i> (Salt Club-rush), <i>Acacia retinodes</i> (Wirilda), <i>Atriplex paludosa</i> ssp. <i>paludosa</i> (Marsh Saltbush), <i>Carex bichenoviana</i> (Notched Sedge), <i>Juncus flavidus</i> (Yellow Rush), <i>Schoenus nitens</i> (Shiny Bog-rush) Near Threatened in AMLR region - <i>Acaena ovina</i> (Downy Sheep’s Burr), <i>Rytidosperma erianthum</i> (Hill Wallaby-grass), <i>Convolvulus angustissimus</i> ssp. <i>angustissimus</i> (Australian Bindweed), <i>Epilobium billardierianum</i> ssp. (Robust Willow-herb), <i>Poa labillardieri</i> var. <i>labillardieri</i> (Common Tussock-grass), <i>Austrostipa scabra</i> ssp. <i>scabra</i> (Rough Spear-grass), <i>Austrostipa setacea</i> (Corkscrew Spear-grass), <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> (Red Gum), <i>Isolepis platycarpa</i> (Flat-fruit Club-rush), <i>Lachnagrostis aemula</i> (Blown-grass) and <i>Triglochin procera</i> (Water-ribbons) |

Vegetation Association 7

Eucalyptus camaldulensis ssp. *camaldulensis* / *Eucalyptus leucoxylon* ssp. *leucoxylon* woodland

Eucalyptus camaldulensis ssp. *camaldulensis* (Red Gum) communities frequently intersperse with *Eucalyptus leucoxylon* ssp. *leucoxylon* (South Australian Blue Gum) on the higher slopes across the district. Independently, both associations are considered regionally endangered and regionally vulnerable in the Bremer Barker Catchment (Hyde 1999). Much of this association has been removed and highly modified through clearance and agricultural practices, as it occupied highly valued grazing land due to its grassy understorey. There are a number of patches of the woodland remaining throughout the MDP land and surrounding properties, albeit in fairly poor condition. The understorey would likely have possessed scattered taller species such as *Allocasuarina verticillata* (Drooping Sheoak), *Acacia retinodes* (Wirilda) and *Acacia pycnantha* (Golden Wattle) over a mixture of native grasses such as *Rytidosperma* spp. (Wallaby Grass), *Themeda triandra* (Kangaroo Grass) and *Microlaena stipoides* var. *stipoides* (Weeping Rice-grass). The understorey also have included sedges and iron grasses including *Lomandra multiflora* ssp. *dura* (Stiff Mat-rush) and *Lomandra densiflora* (Soft Tussock Mat-rush), *Lepidosperma viscidum* (Sticky Sword-sedge), *Kennedia prostrata* (Running Postman) and *Bursaria spinosa* (Sweet Bursaria). A number of common annual species are likely to include *Arthropodium strictum* (Common Vanilla-lily), *Chamaescilla corymbosa* var. *corymbosa* (Blue Squill) and a number of *Drosera* spp. (Sun Dew).

The eight patches recorded are predominantly in poor condition with their understorey almost completely modified. The exceptions include several roadside reserves along Barker Road and Martin Road, which have a number of natives persisting despite a high level of woody and grassy weeds. These include *Allocasuarina verticillata* (Drooping Sheoak), *Acacia melanoxylon* (Blackwood), *Acacia pycnantha* (Golden Wattle), *Acacia retinodes* (Wirilda), *Acacia paradoxa* (Kangaroo Thorn),

Exocarpos cupressiformis (Native Cherry) and *Clematis microphylla* (Old Man’s Beard), *Bursaria spinosa* (Sweet Bursaria), *Platylobium obtusangulum* (Holly Flat-pea), *Dianella revoluta* (Black-anther Flax-lily), *Acrotriche humifusum* (Native Cranberry), *Lomandra sororia* (Sword Mat-rush), *Lomandra micrantha* ssp. *tuberculata* (Small Flower Mat-rush), *Lepidosperma semiteres* (Wire Rapier-sedge), *Lomandra densiflora* (Fox-tail Spear-grass) and *Lepidosperma ‘Narrow leaf’* (Narrow Rapier-sedge). A number of native grasses are also present including *Microlaena stipoides* (Weeping Rice-grass), *Themeda triandra* (Kangaroo Grass) and *Austrostipa* sp. Spear Grass). Numerous other native species have been recorded along Martin Road by local experts (see list for Area 33, Attachment 1).

Table 5.7. Association 7 summary.

| | |
|--------------------------|---|
| Landscape position | South and south-eastern sections of the MDP land on roadside reserve and higher slopes |
| Conservation listing | The association is considered regionally vulnerable and/or endangered in the Bremer Barker Catchment |
| Vegetation condition | Moderate – Poor |
| Threatened flora species | Rare in AMLR region – <i>Acacia retinodes</i> (Wirilda) Near Threatened in AMLR region - <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> (Red Gum), <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> (South Australian Blue Gum), <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> (Rough-bark Manna Gum), <i>Acaena ovina</i> (Downy Sheep’s Burr), <i>Convolvulus angustissimus</i> ssp. <i>angustissimus</i> (Australian Bindweed), <i>Lomandra sororia</i> (Sword Mat-rush), <i>Melaleuca decussata</i> (Totem-poles), <i>Hardenbergia violacea</i> (Native Lilac), <i>Juncus pauciflorus</i> (Loose-flower Rush). |

Vegetation Association 8

Eucalyptus camaldulensis ssp. *camaldulensis* / *Eucalyptus leucoxylon* ssp. *leucoxylon* / *Eucalyptus viminalis* ssp. *cygnetensis* woodland

This vegetation association is similar to Association 7, but where *Eucalyptus camaldulensis* ssp. *camaldulensis* (Red Gum) and *Eucalyptus leucoxylon* ssp. *leucoxylon* (South Australian Blue Gum) have interspersed with *Eucalyptus viminalis* ssp. *cygnetensis* (Rough-bark Manna Gum). Independently, all these associations are considered regionally threatened in the Bremer Barker Catchment (Hyde 1999). It has likewise been highly modified and removed through clearance and agricultural practices, as it occupied highly valued grazing land due to its grassy understorey. There are a two recorded patches of the woodland within the MDP land both of which are situated in road reserves (Flaxley Road and Hunt Road). The understorey in these remnants is degraded by weed invasion, however there are some small areas where the condition of the understorey is reasonable and contains good cover of native species including *Allocasuarina verticillata* (Drooping Sheoak), *Acacia pycnantha* (Golden Wattle), *Bursaria spinosa* (Sweet Bursaria), *Lepidosperma semiteres* (Wire Rapier-sedge), *Lepidosperma curtisiae* (Little Sword-sedge), *Lomandra densiflora* (Soft Tussock Mat-rush), *Pultenaea pedunculata* (Matted Bush-pea), *Platylobium obtusangulum* (Holly Flat-pea), *Lomandra multiflora* ssp. *dura* (Stiff Mat-rush), *Hibbertia sericea* (Silky Guinea-flower), *Dianella revoluta* (Black-anther Flax-lily), *Daviesia leptophylla* (Narrow-leaf Bitter-pea), *Acrotriche serrulata* (Cushion Ground-Berry) and *Xanthorrhoea semiplana* (Yacca). Numerous other species have been recorded (Crompton, 2010) from the Flaxley Road reserves within and surrounding this area including the regionally rare *Acacia retinodes* (Wirilda), *Pimelea humilis* (Low Rice-flower), *Scaevola albiflora* (Pale Fanflower) and *Allocasuarina muelleriana* (Common Oak-bush). Recent plant lists have also been recorded for Hunt Road made and unmade road reserve (Jury, 2010)

Table 5.8 Association 8 summary.

| | |
|--------------------------|---|
| Landscape position | South and south-western sections of the MDPA land on roadside reserve |
| Conservation listing | The association is considered regionally vulnerable and/or endangered in the Bremer Barker Catchment |
| Vegetation condition | Moderate |
| Threatened flora species | Rare in AMLR region – <i>Acacia retinodes</i> (Wirilda), Near Threatened in AMLR region - <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum), <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (South Australian Blue Gum), <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum), <i>Hibbertia sericea</i> (Silky Guinea-flower), <i>Pultenaea pedunculata</i> (Matted Bush-pea) and <i>Lepidosperma curtisiae</i> (Little Sword-sedge) |

Vegetation Association 9

Eucalyptus viminalis ssp. cygnetensis / *Eucalyptus camaldulensis ssp. camaldulensis* open woodland

Association 9 is a further variation of the previously discussed communities whereby *Eucalyptus camaldulensis ssp. camaldulensis* (Red Gum) and *Eucalyptus viminalis ssp. cygnetensis* (Rough-bark Manna Gum), display co-dominance, however it is possible that further eucalypt species were present prior to clearance and disturbance to the surrounding land. Independently, all these associations are considered regionally endangered in the Bremer Barker Catchment (Hyde 1999) and the *E. viminalis ssp. cygnetensis* as an association, represent the eastern extremity of its distribution within the region.

Two mapped remnants are considered in poor condition with most of the understorey completely modified by grazing and weeds. Only the regionally rare *Acacia retinodes* (Wirilda) was recorded along the Newenham Road amongst a significant woody weed infestation (Attachment 1). Prior to disturbance, the understorey would likely have

possessed a well developed shrub layer and taller shrubs / trees such as *Acacia melanoxylon* (Blackwood), *Exocarpos cupressiformis* (Native Cherry) and *Banksia marginata* (Silver Banksia). One remnant located south of the MDPA land, is managed as a Bush for Life site, listed as Category 1 Significant Roadside Vegetation for the District Council of Mt Barker and protected under the South Australian Roadside Marker Scheme. This remnant has a good diversity of native understorey species including a number of state and regionally threatened species (Table 5.9).

Table 5.9. Association 9 summary.

| | |
|--------------------------|--|
| Landscape position | Lower lying land in close proximity to riparian areas |
| Conservation listing | The association is considered regionally endangered in the Bremer Barker Catchment |
| Vegetation condition | Poor |
| Threatened flora species | Rare in South Australia- <i>Eucalyptus fasciculosa</i> (Pink Gum) Rare in AMLR region – <i>Acacia retinodes</i> (Wirilda), <i>Carex bichenoviana</i> (Notched Sedge), <i>Lomandra collina</i> (Sand Mat-rush), <i>Acacia acinacea</i> (Wreath Wattle) Near Threatened in AMLR region - <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum), <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (South Australian Blue Gum), <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum), <i>Convolvulus angustissimus ssp. angustissimus</i> (Australian Bindweed), <i>Lomandra sororia</i> (Sword Mat-rush), <i>Hardenbergia violacea</i> (Native Lilac), <i>Epilobium billardierianum ssp.</i> (Robust Willow-herb), <i>Bulbine bulbosa</i> (Bulbine-lily), <i>Cynoglossum suaveolens</i> (Sweet Hound's-tongue) and <i>Lepidosperma curtisiae</i> (Little Sword-sedge) |

Vegetation Association 10

Eucalyptus viminalis ssp. cygnetensis open woodland over *Allocasuarina verticillata*

This association is considered regionally endangered in the Bremer Barker Catchment (Hyde 1999), poorly conserved in the Mt Barker district (Crompton and Williams 1998, as cited in Hyde 1999) and represents the eastern extremity of its distribution within the region. It is represented by a small remnant around a house and driveway. It has been highly modified by grazing and weeds and planting many non-local plant varieties. The overstorey trees are mature and possess some hollows. The understorey contains Olives in association with *Allocasuarina verticillata* (Drooping Sheoak) and *Acacia pycnantha* (Golden Wattle).

Table 5.10 Association 10 summary.

| | |
|--------------------------|---|
| Landscape position | Low lying land in close proximity to riparian areas |
| Conservation listing | The association is considered regionally endangered in the Bremer Barker Catchment |
| Vegetation condition | Poor |
| Threatened flora species | Rare in AMLR region – <i>Acacia retinodes</i> (Wirilda) Near Threatened in AMLR region- <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum). |

Vegetation Association 11

Planted *Eucalyptus leucoxylon ssp. leucoxylon* / *Eucalyptus viminalis ssp. cygnetensis* / *Eucalyptus camaldulensis ssp. camaldulensis* open woodland

This association is represented by a small shelterbelt strip of planted native vegetation, situated along a fence line on the eastern border of the MDPA land. The vegetation contains three of the local eucalypt species as well as a reasonable midstorey containing *Allocasuarina verticillata* (Drooping Sheoak) and *Acacia pycnantha* (Golden

Wattle). The understorey is highly degraded by pasture weeds with further disturbance from a number of rabbit warrens.

Table 5. 11 Association 11 summary.

| | |
|--------------------------|---|
| Landscape position | Gentle mid slope along fenceline |
| Conservation listing | None |
| Vegetation condition | Moderate |
| Threatened flora species | Near Threatened in AMLR region - <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum), <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (South Australian Blue Gum), <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum). |

The following vegetation associations were distinguished by the low and scattered density of the dominant eucalypt species throughout mainly paddock environments and degraded watercourses. They have been mapped as 'scattered tree' communities due to the almost complete modification of their native understories through clearance, grazing and/or cropping, combined with the loss of neighbouring trees which once formed part of the original woodland communities. The drier of these scattered tree communities are mapped as:

- Vegetation Association 12- Scattered *Eucalyptus leucoxylon ssp. leucoxylon*;
- Vegetation Association 13- Scattered *Eucalyptus leucoxylon ssp. leucoxylon* and *Eucalyptus viminalis ssp. Cygnetensis*;
- Vegetation Association 15- Scattered *Eucalyptus camaldulensis ssp. camaldulensis* and *Eucalyptus leucoxylon ssp. leucoxylon* and
- Vegetation Association 17- Scattered *Eucalyptus camaldulensis ssp. camaldulensis*, *Eucalyptus leucoxylon ssp. leucoxylon* and *Eucalyptus viminalis ssp. cygnetensis*.

There are a number of scattered native understorey species persisting in small pockets or as scattered individuals including *Allocasuarina verticillata* (Drooping Sheoak), *Acacia pycnantha* (Golden Wattle), *Acacia paradoxa* (Kangaroo Thorn) and *Acacia melanoxylon* (Blackwood); Regionally threatened *Rytidosperma fulvum* (Leafy Wallaby-grass), *Acacia retinodes* (Wirilda), *Convolvulus angustissimus ssp. angustissimus* (Australian Bindweed) and *Rytidosperma pilosum* (Velvet Wallaby-grass) also occurred as scattered individuals within this association. A number of additional species include *Rytidosperma racemosum var. racemosum* (Slender Wallaby-grass), *Kennedia prostrata* (Scarlet Runner), *Acaena echinata* (Sheep's Burr) and *Typha domingensis* *Narrow-leaf* (Bulrush) and *Juncus kraussii* (Sea Rush) in some of the wetter areas. The understoreys of these areas are largely dominated by exotic pasture weeds such as *Dactylis glomerata* (Cocksfoot), *Phalaris aquatica* (Phalaris), *Bromus catharticus* (Prairie Grass), *Lolium sp.* (Ryegrass) and *Vulpia sp.* (Fescue), with scattered *Ulex europaeus* (Gorse) and *Crataegus sp.* (Hawthorn) prominent in places.

Table 5.12 Association 12, 13, 15 and 17 summary.

| | |
|--------------------------|---|
| Landscape position | Gentle mid slopes and hill tops |
| Conservation listing | None. Note: Many of the original woodland communities that the scattered trees once belonged to associations that are currently considered regionally vulnerable and/or endangered in the Bremer Barker Catchment |
| Vegetation condition | Poor |
| Threatened flora species | Vulnerable in AMLR region - <i>Rytidosperma fulvum</i> (Leafy Wallaby-grass) Rare in AMLR region – <i>Acacia retinodes</i> (Wirilda), <i>Eucalyptus diversifolia ssp. diversifolia</i> (Coastal White Mallee) (probably planted) Near Threatened in AMLR region - <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum), <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (South Australian Blue Gum), <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum), <i>Convolvulus angustissimus ssp. angustissimus</i> (Australian Bindweed) and <i>Rytidosperma pilosum</i> (Velvet Wallaby-grass) |

The scattered tree communities dominating the riparian areas such as watercourses and the low lying wetter areas are mapped as:

- Vegetation Association 14- Scattered *Eucalyptus camaldulensis ssp. camaldulensis* and
- Vegetation Association 16- Scattered *Eucalyptus camaldulensis ssp. camaldulensis* and *Eucalyptus viminalis ssp. cygnetensis* over *Acacia retinodes* and *Acacia melanoxylon*.

There are areas typically degraded due to a history of mismanagement. Over grazing and trampling of the sensitive banks has led to erosion and loss of biodiversity. Woody and grassy exotics have proliferated at the further expense of native species, where many watercourses are now exhibiting a completely modified understorey. The open woodland overstorey which used to dominate these communities is now mostly reduced to scattered mature individuals due to a significantly reduced ability to recruit. There are, however small threatened pockets which have persisted under these conditions. Some of the natives in these areas include *Allocasuarina verticillata* (Drooping Sheoak), *Acacia melanoxylon* (Blackwood) and regionally threatened *Rytidosperma fulvum* (Leafy Wallaby-grass), *Acacia retinodes* (Wirilda), *Senecio squarrosus* (Squarrose Groundsel), *Thelymitra nuda* (Sun Orchid), *Epilobium billardierianum ssp.* (Robust Willow-herb) and *Austrostipa scabra ssp. scabra* (Rough Spear-grass). Other species suited to riparian environments include *Typha domingensis* *Narrow-leaf* (Bulrush), *Juncus kraussii* (Sea Rush) *Juncus bufonius* (Toad Rush) and *Lythrum hyssopifolia* (Lesser Loosestrife). A number of native grasses have also been recorded from these areas: *Themeda triandra* (Kangaroo Grass), *Rytidosperma racemosum var. racemosum* (Slender Wallaby-grass), *Rytidosperma caespitosum* (Common Wallaby-grass) and *Microlaena stipoides var. stipoides* (Weeping Rice-grass). The woody weeds commonly invading these environs include *Rubus ulmifolius var. ulmifolius* (Blackberry), *Ulex europaeus* (Gorse), *Crataegus sp.* (Hawthorn), *Acacia dealbata ssp. dealbata* (Silver Wattle), *Prunus sp.* (Plum) and *Salix sp.* (Willow).

Table 5.13 Associations 14 and 16 summary.

| | |
|--------------------------|--|
| Landscape position | Watercourses and wet areas |
| Conservation listing | None. Note: Many of the original woodland communities that the scattered trees once belonged to associations that are currently considered regionally vulnerable and/or endangered in the Bremer Barker Catchment |
| Vegetation condition | Poor |
| Threatened flora species | Vulnerable in AMLR region - <i>Rytidosperma fulvum</i> (Leafy Wallaby-grass) Rare in AMLR region – <i>Acacia retinodes</i> (Wirilda), <i>Senecio squarrosus</i> (Squarrose Groundsel), <i>Thelymitra nuda</i> (Sun Orchid) Near Threatened in AMLR region - <i>Eucalyptus camaldulensis ssp. camaldulensis</i> (Red Gum), <i>Eucalyptus leucoxylon ssp. leucoxylon</i> (South Australian Blue Gum), <i>Eucalyptus viminalis ssp. cygnetensis</i> (Rough-bark Manna Gum), <i>Epilobium billardierianum ssp.</i> (Robust Willow-herb), <i>Austrostipa scabra ssp. scabra</i> (Rough Spear-grass) and <i>Melaleuca decussata</i> (Totem-poles) (probably planted) |

Western Flat Creek

Botanist, Tim Jury was engaged to survey Western Flat Creek in November 2014, a modified Red gum (*Eucalyptus camaldulensis var. camaldulensis*) Woodland with an understorey of native and introduced shrubs, rushes, grasses and aquatic herbs. The land forms include creek lines and adjoining floodplain flats.

The site still possesses sufficient diversity for restoration as a future council nature reserve but urgently requires protection from housing and adequate buffers for periodic floods as well as indigenous revegetation and weed management. Creek banks need to be stabilized with locally provenant indigenous shrubs i.e. Blackwood, rather than conversion to drains or engineering structures if hydrophytes and riparian flora are to remain. Introduced

grass cover can be reduced through slashing and spot spraying and replaced with indigenous grasses and low indigenous understorey flora over time. Most native grasses can be slashed down after seeding and there is scope for re-establishing a biodiverse reserve while simultaneously managing for low biomass to appease any public fire concern. The typical approach to developing open space of lawn and ornamental plantings will destroy most biodiversity as the site. Great care also needs to be taken with redesigning the Newenham Road entry so that valuable areas with retained in-situ or protected from development should be rescued and planted into reserves or safe suitable habitat nearby Blackwood, Wirilda, Mat-rush, lilies and grasses are retained. Remnant indigenous flora that cannot be

Indigenous species diversity can be increased through de-stocking, management and revegetation. Augmentation and translocation options for rare and threatened plant species should be investigated.

Red gum (*Eucalyptus camaldulensis var. camaldulensis*) Woodland on seasonally inundated flats is considered 'vulnerable' for South Australia, and is considered to have a declining ecosystem trend having been "reduced in extent and still threatened by drainage, extensive clearance and grazing" (DEH 2001). Given the agricultural land use history and past grazing this site still supports a fair diversity of more than 30 indigenous plant species including trees, shrubs, rushes, grasses and aquatic herbs. The creek contains several rated plant species, including Blunt Pondweed which is considered rare for South Australia and a priority threatened species in the Adelaide and Mount Lofty Ranges Region (Willson & Bignall 2009).

The opportunistic fauna observed included Yellow-tail Black Cockatoo (SA Vulnerable), Sulphur-crested cockatoo, Eastern Rosella, Tree martin, Galah, Magpie, Grey fantail, Superb blue fairy-wren, Wattlebird, White faced heron, Sacred ibis, Pacific black duck, Red-bellied black snake, spotted marsh frog, Lesser monarch butterfly, Blue grass butterfly, Dragonfly, Arachnids, other insects and invertebrates.

Mount Barker Creek

Botanist Tim Jury was engaged to undertake the survey of a section of the Mount Barker Creek in February 2015, a mixed, modified riparian vegetation with remnant Red gums (*Eucalyptus camaldulensis* var. *camaldulensis*), introduced and native trees, shrubs, rushes, grasses and aquatic herbs. Landforms include creek channel, banks, adjoining flats, hard surfaces and built-up urban areas. Given the land use history and past disturbances this section still supports a fair diversity of indigenous plant species including trees, shrubs, rushes, grasses and aquatic herbs.

To date, opportune flora surveys have revealed a total of 40 indigenous plant species and 64 introduced plant species for this section. Fifteen species (37.5 %) of the total indigenous flora are obligate wetland plant species (hydrophytes, macrophytes etc.), which are restricted to permanent water of in-stream channels, creek banks. Overall 5 species (8%) of observed indigenous flora are rated for conservation significance.

This section of creek still possesses sufficient diversity for ecological restoration for nature/recreation reserve, but indigenous flora and natural watercourse features (banks, pools, sediment bars etc.) require protection from stormwater management infrastructure and drainage construction. Adequate buffers for periods of high flow volume, indigenous revegetation and weed management are highly recommended.

Creek banks need to be stabilized with locally provenant indigenous trees, shrubs (i.e. Blackwoods) rather than converted to drains or engineering structures if riparian and wetland flora is to remain. Weed cover can be reduced targeted control measures and replaced with appropriate riparian flora over time. The development of strait, impermeable conduits will destroy most biodiversity so great care needs to be taken with redesigning drainage infrastructure so that valuable areas with indigenous trees, shrubs, sedges, rushes, and hydrophytes are retained. Remnant indigenous flora that cannot be retained in-situ

or protected from development should be rescued and planted into reserves or safe suitable habitat nearby.

The creek contains several rated plant species, including Purple loosestrife which is considered rare for South Australia and rare for the region (2009).

Opportunistic Observed Fauna included Sulphur-crested cockatoo, Eastern Rosella, Galah, Magpie, New Holland honeyeater, Dusky Moorhen, Pacific black duck, Lesser Monarch butterfly, Fish, Dragonfly, Arachnids, Isopods and other invertebrates.



Vegetation Association 18

Triglochin procera (Water-ribbons) Herbland

This association is listed as the Freshwater wetlands e.g. *Triglochin procerum* Herbland which is endangered for South Australia under the Provisional List of Threatened Ecosystems of South Australia (DEH, in progress). The community is considered to be in decline and is often threatened by clearance, drainage, build up of herbicides and fertilisers from adjacent agricultural land, salinity, grazing and trampling by stock, and weed invasion. Although not recorded within the MDPA land, there were small occurrences of *Triglochin procera* (Water-ribbons) within some of the riparian areas however it did not represent an intact community. One small area was located just south of the MDPA land on private property, associated with a small watercourse leading to a small dam. The dam was partially surrounded with a number of native sedges and *Triglochin procera* (Water-ribbons) was prominent within the dam; this continued up the watercourse which became dominated by *Eucalyptus camaldulensis* ssp. *camaldulensis* (Red Gum).

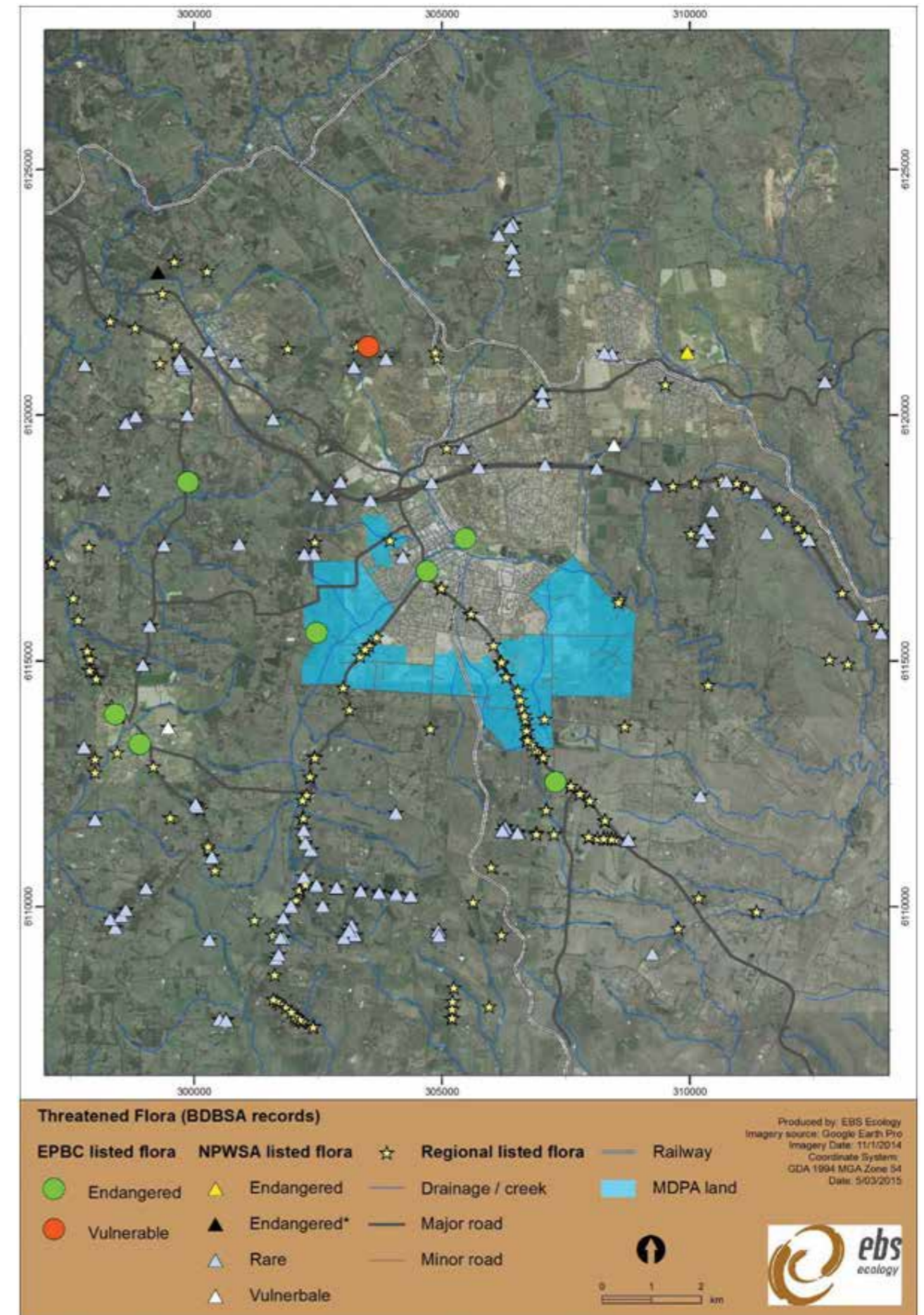
Table 5.14 Association 18 summary.

| | |
|--------------------------|---|
| Landscape position | Watercourses, dams and open water |
| Conservation listing | Endangered for South Australia under the Provisional List of Threatened Ecosystems of South Australia (DEH, in progress). |
| Vegetation condition | Moderate |
| Threatened flora species | Near Threatened in AMLR region - <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> (Red Gum), <i>Triglochin procera</i> (Water-ribbons) |



5.3 Threatened Flora Species

There were no nationally threatened flora species detected within the MDPA land during the recent 2014 survey however there were seven State rare species and 47 regionally threatened. Numerous threatened flora species were also identified by the BDBSA records < 5kms of the site.



Map 5.2 Threatened flora species locations (BDBSA records – 5km clip).

5.4 Threatened Ecological Communities

Six main vegetation associations have been listed as regionally or state threatened (Table 5.15). Some of the other associations that exhibit co-dominance between eucalypt species are listed as threatened when they present as a pure association but not when interspersed with other eucalypt species.

Table 5.15 Threatened Ecological Communities occurring within the MDPA land and immediate surrounds.

| Veg assoc. # | Threatened | Conservation status | | |
|--------------|--|---------------------|------|---------|
| | | Aus** | SA** | AMLR*** |
| 1 | Callitris gracilis / Allocasuarina verticillata / Eucalyptus fasciculosa Woodland +/- Eucalyptus leucoxylon ssp. leucoxylon | | V | E |
| 2 | Eucalyptus leucoxylon ssp. leucoxylon woodland | | | V |
| 3 | Eucalyptus leucoxylon ssp. leucoxylon / Eucalyptus fasciculosa open woodland | | V | V |
| 6 | Eucalyptus camaldulensis ssp. camaldulensis woodland | | | E |
| 10 | Eucalyptus viminalis ssp. cygnetensis and/or E. viminalis ssp. viminalis woodland | | V | E |
| 18 | Triglochin procerum Herbland | CE1 | E | |

* Environment Protection and Biodiversity Conservation Act 1999.

** DEH (in progress), Unpublished and Provisional List of Threatened Ecosystems of South Australia

***Present Status in the Bremer Barker Catchment

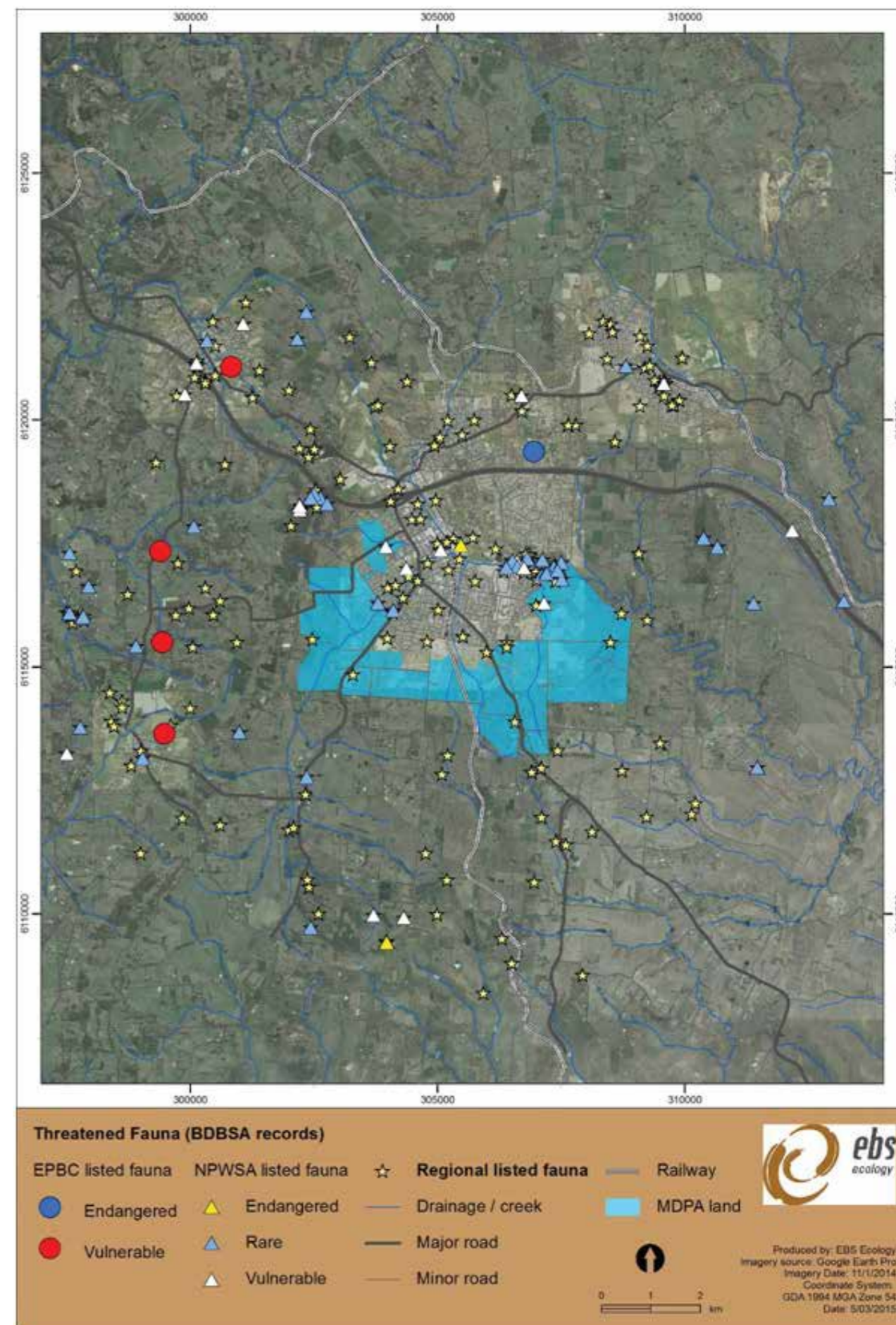
1 Critically Endangered in IBRA Subregion KAN2 only (Fleurieu)

Conservation Codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare.

5.5 Fauna

Threatened fauna records (BDBSA) within the MDPA land and surrounds are visually shown in Figure 2. Threatened fauna records are scattered throughout the area, with particular hotspots being noted during vegetation surveys. These hotspots were then assessed for bird presence at 22 different point count sites. Local knowledge was also used, with detailed bird observations being undertaken by community members within sites such as the Laratinga

wetlands. Local expert, Kevin Williams, has compiled an extensive list of bird and amphibians that have been observed at the wetlands and provided an excellent overview of the variety of birds that frequent this system. This list was also used as a base of what could be found within the region as it removes temporal issues by providing data collected over a number of years, and in different seasons. This can assist in providing an insight into species that are only present at certain times, during certain climatic conditions.



Map 5.3 Threatened fauna BDBSA records (BDBSA records – 5km clip).

5.5.1 Mammals

Eighteen (18) native mammal species have records within the BDBSA within the Mt Barker LGA, one of which is considered regionally extinct (The Greater Bilby). An additional species, the Southern Forest Bat (*Vespadelus regulus*) was recorded by EBS Ecology during field survey (see sub-section “Bats”). The following threatened species identified in the BDBSA search are assessed as potentially occurring within the MDPA land and surrounds:

- Southern Brown Bandicoot, *Isodon obesulus* (*obesulus* (nationally vulnerable);
- Yellow-footed Antechinus, *Antechinus flavipes* (SA vulnerable);
- Common Brushtail Possum, *Trichosurus vulpecular* (SA rare);
- Common Ringtail Possum, *Pseudocheirus peregrinus* (regionally rare);
- Euro, *Macropus robustus* (regionally rare) and
- Water Rat, *Hydromys chrysogaster* (regionally rare).

Three common terrestrial mammal species were opportunistically observed during the EBS Ecology field survey: Western Grey Kangaroo (*Macropus fuliginosus*), the introduced European Brown Hare (*Lepus europaeus*) and the introduced European Rabbit (*Oryctolagus cuniculus*).



5.5.2 Bats

Eight bat species were recorded over the two nights of targeted AnaBat survey (Matthews 2015). None of the species recorded were conservation significant at national or state level and are considered common species in the Adelaide Hills / Southern Lofty region.

Table 5.18 Bat observations for Mt Barker MDPA land and surrounds.

| Scientific Name | Common name | Survey Site | | | | | |
|-------------------------------|-----------------------------|-------------|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| <i>Austronomus australis</i> | White Striped Free-tail Bat | • | • | • | • | • | • |
| <i>Chalinolobus gouldii</i> | Gould's Wattle Bat | • | • | • | • | • | • |
| <i>Chalinolobus morio</i> | Chocolate Wattle Bat | • | • | • | • | • | • |
| * <i>Mormopterus sp4</i> | Southern Freetail Bat | • | | • | • | • | • |
| <i>Nyctophilus geoffroyi</i> | Lesser Long-eared Bat | • | • | • | • | • | |
| <i>Vespadelus darlingtoni</i> | Large Forest Bat | • | | • | • | • | • |
| <i>Vespadelus regulus</i> | Southern Forest Bat | • | • | • | • | | • |
| <i>Vespadelus sp.*</i> | | | | | | | • |

*Unconfirmed between species due to similar frequencies.

Site 1, 4 & 5- *Eucalyptus leucoxylon* ssp. *leucoxylon* woodland. Site 2 & 3- *Eucalyptus leucoxylon* ssp. *leucoxylon* / *Eucalyptus obliqua* +/- *Eucalyptus fasciculosa* woodland. Site 6- *Eucalyptus viminalis* ssp. *cygnetensis* open woodland over *Allocasuarina verticillata* and *Olea europaea*

Three species of bat, not recorded in this survey, potentially occur in the area. These are the Little Forest Bat (*Vespadelus vulturnus*), Inland broad-nosed Bat (*Scotorepens balstoni*) and Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*) (Armstrong et al. 2003). The Inland broad-nosed Bat is considered a common species whereas the Yellow-bellied Sheath-tail Bat is State rare and is infrequently picked up in the area.

The Mount Barker area contains good quality bat habitat, with woodlands which contain varied sized hollows as well as other habitat resources providing excellent foraging areas. The scattered trees and fragmented patches and roadside vegetation are in reasonable proximity to larger remnants within the district, including the Totness CP and the Mt Barker summit vegetation corridor.



5.5.3 Birds

One hundred and ninety three (193) bird species have records in the BDBSA within the Mt Barker LGA; this includes some historic records of species that are considered regionally extinct.

Three species with a State conservational listing were observed within the MDPA land and surrounds during the EBS survey. These were the White-winged Cough (*Corcorax melanorhamphos*) (State rare), the Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*) (State vulnerable) and the Restless Flycatcher (*Myiagra inquieta*) (State rare). The MDPA land and surrounds may also have transient species that move through the site due to its proximity to larger remnant vegetation pockets such as Mt Barker summit. Species such as the Diamond Firetail (*Stagonopleura guttata*), Elegant Parrot (*Neophema elegans*), Hooded Robin (*Melanodryas cucullata*), and Jacky Winter (*Microeca fascinans*) have been observed in close proximity and can be assumed, although rare, to utilise the site opportunistically.

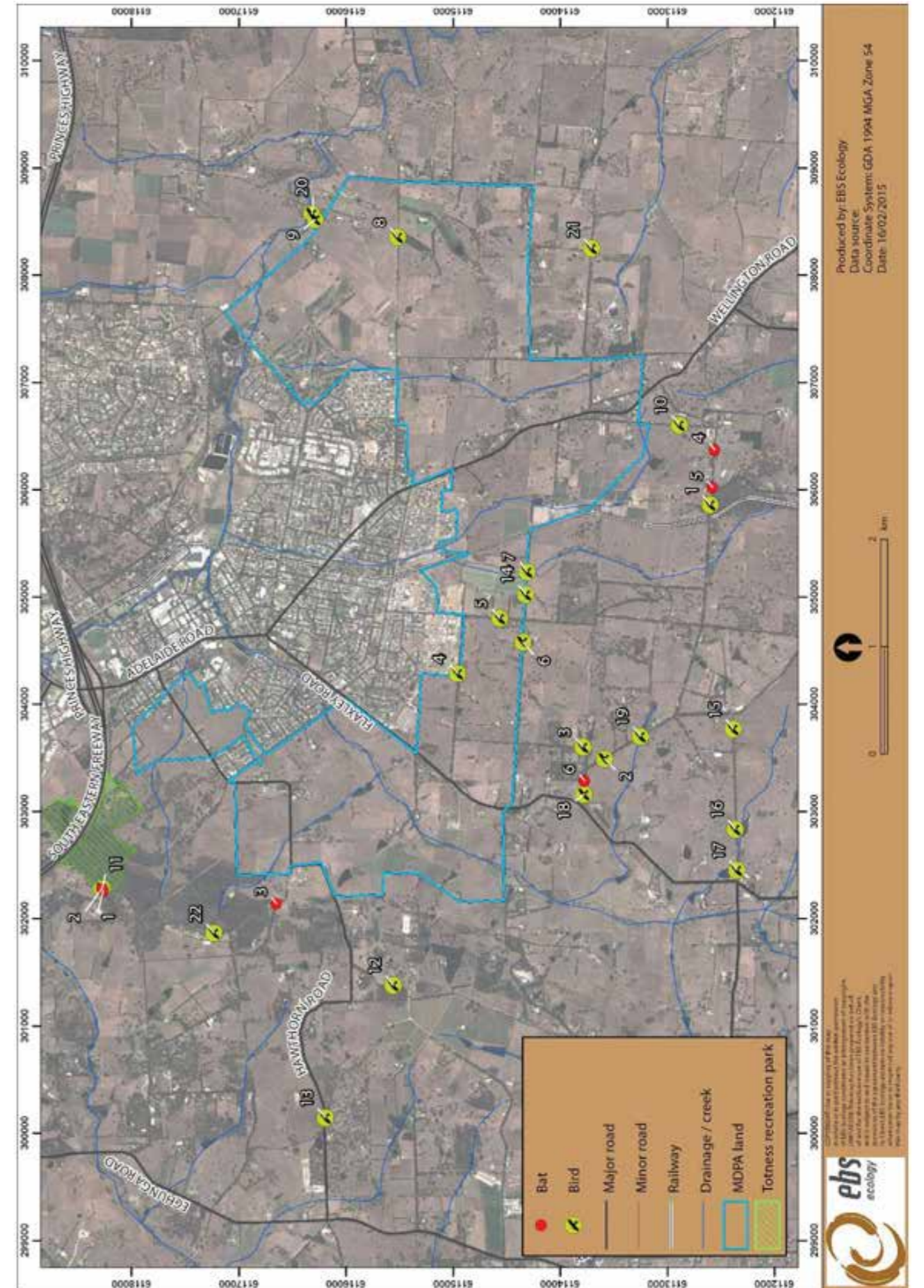
Other national and state threatened species as identified in the BDBSA search that have been assessed are confirmed within the MDPA land and surrounds include:

- Crested Shrike-tit (*Falcunculus frontatus frontatus*);
- Australian Shoveler (*Anas rhynchosotis*) and
- Peregrine Falcon (*Falco peregrinus*)

An additional 10 regionally rated bird species (i.e. regional rating of rare or greater) are assessed as being possible to occur within the MDPA land and surrounds. Dedicated bird surveys were undertaken in early December 2014 by EBS Ecology Ornithologists. The bird surveys were undertaken across the majority of vegetation associations found within the MDPA land. The bird species present and the number of individuals observed were recorded for 22 sites. Opportunistic observations across the site were also recorded. The table below shows the locations of the bird survey sites and shows corresponding vegetation associations.

Table 5.19 Bird survey site information

| Site # | Location | Vegetation Association |
|--------|--------------------------------------|--|
| 1 | Corner Frampton Road / Native Avenue | <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> woodland |
| 2 | Native Avenue | <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> open woodland over <i>Allocasuarina verticillata</i> and <i>Olea europaea</i> |
| 3 | Hunt Road | <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> open woodland over <i>Allocasuarina verticillata</i> and <i>Olea europaea</i> |
| 4 | Martin Road | <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland |
| 5 | Barker Road | <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland |
| 6 | Hunt Road | <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> open woodland over <i>Allocasuarina verticillata</i> and <i>Olea europaea</i> |
| 7 | Fidler Lane | <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> and <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> woodland |
| 8 | Sims Road | Exotic Pines |
| 9 | Williams Road | Scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> |
| 10 | Harrop Road | <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> / <i>Eucalyptus fasciculosa</i> open woodland over <i>Allocasuarina verticillata</i> and <i>Acacia paradoxa</i> |
| 11 | Remnants around Totness CP | <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> / <i>Eucalyptus obliqua</i> +/- <i>Eucalyptus fasciculosa</i> woodland |
| 12 | Ironstone Road | <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> woodland |
| 13 | Barker Road | Unmapped <i>Eucalyptus</i> woodland |
| 14 | Fidler Lane | <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> and <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> woodland |
| 15 | Pinchbeck Fire Track | Unmapped <i>Eucalyptus</i> woodland |
| 16 | Dam- Pinchbeck Fire Track | Unmapped <i>Eucalyptus</i> woodland |
| 17 | Pinchbeck Fire Track | Unmapped <i>Eucalyptus</i> woodland |
| 18 | Hunt Road | <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> open woodland over <i>Allocasuarina verticillata</i> and <i>Olea europaea</i> |
| 19 | Dam | <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> open woodland over <i>Allocasuarina verticillata</i> and <i>Olea europaea</i> |
| 20 | Williams Road | Scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> |
| 21 | Yunkunga Road | <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland |
| 22 | Haines Fire Track | <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> / <i>Eucalyptus obliqua</i> +/- <i>Eucalyptus fasciculosa</i> woodland |



Map 5.4 Location of EBS Ecology Bird and Bat survey sites, 2014.

5.5.4 EPBC Migratory species

The MDPA land and surrounds may be frequented by a number of migratory species, as identified by the Protected Matters Search (EPBC Act) as well as accounts by local experts. Many of the species that could be present within the study area would simply be passing through the

area, and may only be present for a single day. Many of these species have very specific habitat requirements, such as salt lakes or large heavily vegetated wetlands. As such, many migratory species would also be unlikely to occur within the MDPA land and surrounds, due to lack of these habitats (Laratinga Wetland is excluded)

Table 5.20 Migratory species identified by EPBC Protected Matters Search Tool as possibly utilising or flying over the project area.

| Species name | Common name | Conservation status | | Likelihood of occurrence within survey area |
|--------------------------------|---------------------------|---------------------|----|---|
| | | Aus | SA | |
| BIRDS | | | | |
| <i>Apus pacificus</i> | Fork-tailed Swift | Mi | | Possible fly-over |
| <i>Haliaeetus leucogaster</i> | White-bellied Sea-eagle | Mi | E | Unlikely |
| <i>Hirundapus caudacutus</i> | White-throated Needletail | Mi | | Possible fly-over |
| <i>Merops ornatus</i> | Rainbow Bee-eater | Mi | | Possible in summer |
| <i>Myiagra cyanoleuca</i> | Satin Flycatcher | Mi | E | Possible |
| <i>Rhipidura rufifrons</i> | Rufous Fantail | Mi | | Unlikely |
| <i>Ardea alba</i> | Great Egret | Mi | | Possible |
| <i>Ardea ibis</i> | Cattle Egret | Mi | R | Unlikely |
| <i>Gallinago hardwickii</i> | Latham's Snipe | Mi | R | Unlikely |
| <i>Rostratula benghalensis</i> | Painted Snipe | Mi, E | V | Unlikely |
| <i>Actitis hypoleucos</i> | Common Sandpiper | Mi | R | Unlikely |
| <i>Plegadis falcinellus</i> | Glossy Ibis | Mi | R | Unlikely |
| <i>Tringa glareola</i> | Wood Sandpiper | Mi | R | Unlikely |

Aus: Australia (Environment Protection and Biodiversity Conservation Act 1999). SA: South Australia (National Parks and Wildlife Act 1972). Conservation Codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare.

Ballion's Crake Image by Kevin Williams



5.5.5 Amphibians

Eight frog species have been recorded within the Mt Barker LGA; six of these species have records within 5 km of the MDPA land and surrounds. The nationally vulnerable Southern Bell Frog (*Litoria raniformis*) is considered regionally extinct and there is uncertainty as to whether the species is native to the area. The Brown Toadlet (*Pseudophryne bibronii*) is rated rare in SA and is considered as vulnerable in the Mount Lofty Ranges. There are no records of the Brown Toadlet within 5 km of the MDPA land and surrounds however the species could possibly occur. It is often associated with larger patches of vegetation and is most often found in damp areas such as the edges of creeks and depressions where there is a cover of leaf-litter and grass. It is occasionally found in temporary dams, vegetated roadside drainage lines and ditches associated with leaf-litter and grassy debris (DEH 2008).

5.5.6 Reptiles

Thirty-two (32) reptile species have been recorded within the Mt Barker LGA, some being historic records and one being an exotic species (DEWNR 2014). Sixteen of the 32 species have records within 5 km of the MDPA land and surrounds.

The following national and state threatened reptile species identified in the BDBSA search are assessed as potentially occurring within the MDPA land and surrounds:

- Flinders Worm-lizard, *Aprasia pseudopulchella* (nationally vulnerable);
- Cunningham's Skink, *Egernia cunninghami* (state endangered);
- Heath Goanna, *Varanus rosenbergi* (state vulnerable)
- Murray Short-necked Turtle, *Emydura macquarii* (state vulnerable).

An additional eight regionally rated reptile species (i.e. rare or greater regional rating) are assessed as having potential to occur within the MDPA land and surrounds. The creeks and rivers of the Adelaide Hills were once

known to be teaming with native fish including Gudgeon, Galaxias, Perch, Bream, Blackfish and Goby (EBS Ecology, 2011). A total of 30 native and 9 exotic freshwater fish species have been recorded within freshwater water bodies within the Mount Lofty Ranges although some of these spend part of their life cycle in marine waters (McNeil and Hammer 2007). Several of these species hold a current conservational listing under the *South Australian National Parks and Wildlife Act 1972*.

Of the 30 native fish species, one, the Purple-spotted Gudgeon (*Mogurnda adspersa*), is now classified as extinct in the Mount Lofty Ranges although breeding programs are in place to reintroduce it from interstate populations (Hammer 2007).

For any fish species to survive in any given area, they must be able to tolerate the general physical and chemical characteristics present with their specific water bodies. It is necessary for fish species to be able to tolerate all conditions present within any given habitat in order to persist; fish often persist within refuge habitats where local patchiness allows some comparatively benign areas to persist in which less tolerant fish may survive until conditions improve. It is generally acknowledged that Australian native species must be fairly tolerant of high temperatures, low oxygen and high salinity to have survived the harsh and variable Australian climate (McNeil and Hammer 2009). However due to changes in landscape in the form of farming practices, nutrient changes in creeks and streams can cause issues with the fish, reducing available oxygen and as such making the water uninhabitable. The instigation of dams or altering flows also acts as barriers, which can affect many species which need to move throughout systems during their life-cycles (Mallen-Cooper 1993).

The fish listed were recorded within the Mt Barker LGA from BDBSA records and recent local studies. Most of the records are from perennial watercourses, such as the Onkaparinga River, however some are from the Mt Barker Creek and Laratinga Wetlands. A recent study of the Mt Barker Creek by Aquasave Consultants (2013) yielded low

fish numbers, however eight species were recorded in total (5 native and 3 introduced species) including the state vulnerable Mountain Galaxias and Congoli (Hammer et al. 2009), the Western Carp Gudgeon, Big-headed Gudgeon, and the less common Dwarf Flathead Gudgeon. Mountain Galaxias are still likely to occur in any small streams in the region (Hammer pers. comm. 2011). Fish records identified from minor creeks and tributaries are likely to persist in larger waterholes over the summer period.

Additional freshwater species recorded included freshwater shrimp, freshwater prawns and common yabbies (Aquasave Consultants, 2013).

Maintenance and development of broader habitat connectivity are promoted in the 2013 Mount Barker Creek study, as important objectives necessary to preserve these ecological assets. Broader habitat improvements (e.g. weed control, revegetation and stock exclusion) are suggested to enhance the local riparian environments.

5.5.7 Opportune fauna assessment

All native and exotic fauna species or their traces (tracks, scats, burrows, nests and other signs of presence) were recorded during the survey. Potential fauna refuge sites, such as hollows, rock crevices and creek lines were noted as an indication of availability of suitable habitat. Particular attention was paid to potential habitat for threatened species.

5.6 Fauna Habitats

Although many species of Australian fauna tend to be considered generalists in their habitat requirements, most are quite particular and require certain desired factors of different ecological aspects. Some species prefer habitats that are open and dry, while others will prefer closed in, wet forests. Others species are water dependent, and will be found in close proximity to water bodies at all times.

As such, many species react to changes to their preferred habitats poorly, which results in a reduction of richness

and abundance after anthropogenic changes. Large scale changes to accommodate farming practices or residential developments often result in fragmentation of habitats, with only small native patches remaining such as road and rail corridors. While these may contain suitable remnants of vegetation, many are isolated by surrounding cleared agricultural land, which severely limits movement of many species to these areas. Most of the smaller remnants are also further compromised by 'edge effects', whereby the perimeter to area ratios are increased, further exposing the remnant's integrity to weed invasion and predation.

Understorey strata can comprise many valuable components, such as native grasses and flowering shrubs which provide an important food source, protective cover and materials for nest building and physical protection and refuge from predators. Removal and degradation of the native understorey reduces many niches for small birds, reptiles, and potentially small mammals such as the Yellow-footed Antechinus (*Antechinus flavipes*) and the Brown Bandicoot (*Isodon obesulus obesulus*).

Although many native species respond negatively to vegetation clearance and overall reduction of woodland cover, a number of species have shown an increase in range and population, such as the Galah, Little Corella, the Crested Pigeon and Noisy Miner (Gammage, 2009). Some of these 'increaser species', particularly the Noisy Miner, can have an effect on smaller bird species, outcompeting and aggressively defending their new territories (Ford et al 2006).

5.6.1 Intact woodlands

Large mature woodlands are likely to provide a vast resources base for the greatest diversity of native fauna. These woodlands allow suitable areas for feeding as well as roosting and nesting requirements of a variety of native species. Woodlands such as Totness Recreation Park are a stronghold for many species, and have a variety of flora species which would greatly increase species richness in birds, reptiles, mammals and invertebrates.

Heathy woodland provides habitat for numerous fauna species such as the Southern Brown Bandicoot Chestnut-rumped Heathwren, Painted Button-quail and Bassian Thrush. These species all rely on the dense cover that is provided by woodland communities and its intact understorey. Species such as the Yellow-tailed Black Cockatoo forage in the understorey plants however will utilise the upperstorey of these woodlands by using large hollow-bearing trees for nesting. Historically, records of the MLR Spotted Quail-thrush were from woodland with dense understorey, highlighting that the mass reduction in this habitat type across the Mount Lofty Ranges have resulted in the possible extinction of this species.

Woodlands tend to have a greater spread of trees that flower, such as eucalypts, acacias, hakeas and grevilleas, all of which are utilised by nectar-feeding birds such as parrots and honeyeaters. Differences in composition and diversity of plant species between woodland communities helps supply nectar at different times of the year which in turn supports a greater diversity of birds within the area. Woodlands also provide opportunity for insectivorous birds, with many small native birds feeding on the insects and lerps in the foliage of eucalypts, and on spiders and ants that live among the bark.

Mature eucalypt trees often produce numerous hollows, with many species relying on these hollows for nesting and den sites. This can vary between very small (<5cm diameter) being used by bats and small birds such as Pardalotes, up to large (>40cm diameter) which are commonly occupied by Cockatoos, Possums or Owls. It is considered highly likely that species such as the Common Brushtail Possum and the Yellow-tailed Black Cockatoo may utilise the trees in the MDPA land for breeding or as roosting sites. Yellow-tailed Black Cockatoos were observed during the field survey, however these were observed flying across an open paddock in close proximity to an exotic pine plantation.

Trees in closer proximity to blocks of vegetation or higher densities of other scattered trees on the MDPA land are likely to be utilised by a higher number of species than the

isolated paddock trees. This is due to the trees being less accessible to most species, particularly species which would need to traverse open paddocks such as the Common Brushtail Possum.

5.6.2 Roadsides

There are a number of roadside reserves which contain dense remnant vegetation along the verges. Some of these are managed under the Bush For Life program, whilst others are merely assigned a 'category' under the Roadside Marker Scheme (RMS). Road reserves along Flaxley Road, Martin Road, Harrop Road, Barker Road, Hunt Road and Native Avenue contain examples of woodland communities which still contain areas of native understorey vegetation. The quality of this understorey obviously varies between diverse, intact and virtually weed-free, to highly degraded and currently under serious threat from woody, herbaceous and grassy exotics. Many of the roadsides contain largely unmanaged remnant vegetation, which has been exposed to the degrading impacts of edge effects and other damaging practises such as rubbish dumping, wood collection and impacts from dirt road dust. Thus, some of the road reserve now exhibit understorey vegetation which is completely modified. Road reserves along Simms Road, Paech Road, Harper Road, Fidler Lane, Potts Road, Caitness Road and small sections of Wellington Road, contain original woodland overstorey with limited native understorey and is predominantly dominated by exotics.

Although roadside vegetation may provide suitable habitat for many species, resident fauna species are more exposed to high levels of traffic noise, visual disturbance from passing vehicles and the risk of collision with cars and trucks. This can restrict movements, as well as reduce the species efficiency in communicating, which is especially important for many bird species (Parris and Schneider 2009). Roads can also fragment populations by forming barriers to movement, isolating them from resources and potential mates (Ramp et al 2006).

5.6.3 Native Grasslands and shrublands

Native grasslands support a wide variety of bird types with many species using these as their primary habitat. These habitats form a source of food and shelter for many species and threatened woodland birds, such as the Diamond Firetail, Black-chinned Honeyeater, Restless Flycatcher and Crested Shrike-tit. They also provide habitats for numerous declining species including Chestnut-rumped Thornbill, Southern Whiteface, Jacky Winter, Hooded Robin and Brown Treecreeper. Ground dwelling species which could be classified as grassland specialist include the Stubble Quail, the Brown Quail and Red-chested Button-quail.

Historically these were also important for the nationally threatened Regent Honeyeater, a species which is now classified as extinct in the MLR and the Swift Parrot, a species which is a very rare visitor. Grasslands also supported birds such as the Bustard and Bush-stone Curlew, both of which are classified as extinct in the Mount Lofty Ranges.

It is important that grasslands are connected to other habitats such as shrublands, woodlands, open forests and rocky areas, as many animals rely on these areas for shelter and breeding. Many species that are not typically classified as a grassland species will utilise grasslands as a food source, especially when they are in close proximity to native intact woodlands. This may include species such as the Southern Brown Bandicoot. Similarly, many birds and bats that forage over open grassy areas require tree hollows for shelter and as breeding sites.

Practically all examples of native grasslands throughout this area of Mt Barker have been cleared through grazing and other agricultural practises. Grasslands probably historically occupied the wetter valley floors, mostly forming the grassy understorey in association with open *Eucalyptus camaldulensis* ssp. *camaldulensis* (Red Gum) and *Eucalyptus leucoxylon* ssp. *leucoxylon* (South Australian Blue Gum) woodlands (Hyde, 1999). There are now only very small and highly fragmented and degraded patches within and surrounding the MDPA land.

5.6.4 Exotic grasslands / paddocks

These cleared and modified land types occupy the majority of the MDPA land. Generalists such as Galahs, Crested Pigeons and Australian Magpies have increased in abundance and range with the creation of derived grasslands such as cropping lands. These species have shown a high tolerance for these new artificial habitats however other 'less common' native species also frequent these areas. Species of parrot, such as the Red-rumped Parrot can be observed feeding in open paddocks, while a group of the State vulnerable White-winged Chough were observed in paddocks south of Hunt Road on the boundary of the MDPA land. Other native grassland specialists are also known to use open paddocks and grasslands, such as the Stubble Quail.

However many species avoid these areas, due to lack of intact overstorey and often modified understorey. Small mammals such as the Southern Brown Bandicoot would be highly restricted in its movement within these habitats, due to a lack of protection from predators.

5.6.5 Scattered trees

Scattered or isolated trees offer minimal habitat to many faunal species, apart from species that may be tolerant to habitat changes (Galahs, Magpies and Rosellas etc). As such, once the original woodlands become fragmented or reduced to scattered trees, they will not support a high diversity of animals. However, the large hollow bearing eucalypts can still provide suitable nesting habitat for many species whilst flowering Eucalypts, Wattles, Native Pine, Native Cherry, Banksia and Sheoak provide feeding habitat to a number of native species, including possums, birds and invertebrates.

The Aleppo Pine (*Pinus halepensis*) is an introduced and declared plant within South Australia due to its threat as a significant environmental weed however the species provides an important artificial food source for the State vulnerable Yellow-tailed Black Cockatoo. Whilst it is important to encourage the Yellow-tailed Black Cockatoo

(YTBC) to rely on a native diet of Hakea, Banksia and Allocasuarina species wherever possible, the value of Aleppo Pines as an alternate food source cannot be understated. This is particularly relevant when suitable woodlands used for foraging have been cleared and are fragmented across the region. The annual census completed each year by the Department of Environment and Natural Resources indicated that YTBC occur in relatively low abundance across the region (EBS Ecology 2012).

5.6.6 Watercourses and riparian areas

Changes to the surface water resources since European settlement have been significant. The construction of numerous dams and diversion banks to prevent flooding, coupled with the increased use of groundwater has seen reductions in summer flows to local watercourses. Conversely, increases to peak flow rates of streams, as a result of land clearance and township and road development, increases runoff. Deterioration of water quality by pollutants, chemicals, turbidity and sedimentation has also been symptomatic of agricultural and urban expansion across the landscape. The invasion of watercourses by weeds and grazing and trampling by domestic stock have all resulted in severe degradation.

Sections of the Western Flat Creek and the shallow watercourse west of Harper Road have been completely cleared of native vegetation. Some areas have seen the proliferation of exotic woody perennials in the understorey which has completely altered the native composition and restricted the recruitment of native flora, in particular eucalypts. There are sections of watercourse which have retained their native overstorey and in some cases, small sections of degraded and fragmented understorey. Examples of this are found along the Western Flat Creek, a small Mt Barker Creek tributary which dissects the steamranger railway line and further upstream south of the Fidler Land, although the latter is outside of the MDPA land.

Despite the degradation, riparian areas are still important for a range native fauna within the area, as it provides a diverse range of habitats through the provision of a number of food sources as well as refuge. Most of the watercourses are ephemeral, however a number of waterholes exist along their lengths, providing some low level habitat and refuge to native aquatic fauna, such as fish and frogs during the drier summer months.

A number of frog species were detected during the field survey and several species of conservation significance are known to occur in the riparian zones within and around the MDPA land including the Mountain Galaxias and the Brown Toadlet. The State vulnerable Murray Short-necked Turtle was recorded during a recent study in the Mt Barker Creek (Aquasave Consultants, 2013), however it is likely that this individual was an escapee or deliberately released.

5.6.7 Other Key Habitat

Additional key habitat features within the MDPA land and surrounds included:

- Waterholes and perched bog relics- providing riparian refuge areas potentially utilised by a range of terrestrial and aquatic fauna. None of the creeks were flowing at the time of the survey however pooled surface waters were present across the MDPA land. Relics of the perched bogs are located in the western section of the Mt Barker MDPA, west of Flaxley Road and have previously been damaged through dam and road construction and creation of a subdivision (Crompton, pers. comm 2015);
- Dams – providing an artificial water source and foraging habitat for bats;
- Surface and exposed rock outcropping in pasture and woodland areas and large exposed rock faces in woodland – providing habitat for reptiles and refuge for threatened plants and
- Tree hollows – present in all woodland sites, in live, standing and fallen dead trees, providing habitat particularly for birds, bats, small mammals and reptiles.

The low levels of remnancy displayed within the MDPA land reflect the damaging impacts initiated by farming practises since European settlement. The most important implications relating to the level at which woodland communities have disappeared or have been degraded, is that management must emphasize the maintenance of existing patches, as well as focus on the regeneration of areas between fragments, to increase native habitat area, connectivity and ecosystem function. By increasing the size of the woodland patches and remnants along existing made and unmade roadsides, the number of species they can support, will likely increase and the negative impacts of 'edge effects' dissipate (Haddad, 2009). Thus, future regeneration and restoration projects in the area should ideally focus on enlarging or joining existing remnant patches, with a view to increase the overall area of contiguous native forest. Revegetation using local provenance seed will improve the local biodiversity and restore existing habitats or provide additional habitat for native fauna species. It will also help in reinstating representative areas of the pre-European vegetation associations. This can be achieved by reintroducing plant species once common to the region, improving good quality remnant vegetation by infilling and buffering existing remnants, and by establishing wildlife corridors and small clusters of vegetation as habitat refuge, for native fauna species within areas devoid of native vegetation.

Wildlife corridors, or 'biodiversity corridors', are areas of land planted with local native vegetation, which can help facilitate the movement of flora and fauna across the landscape. This will then allow wildlife to respond to environmental variability, population pressure and access a wider range of breeding partners, thus preventing inbreeding and loss of genetic diversity in a local population.

Creation of corridors will need to consider a number of factors. The attributes of an effective corridor will essentially depend on the purpose of the corridor; what species are being catered for as native wildlife species require different corridor attributes in order to utilise it for movement and dispersal. A corridor width suitable for most

birds, mammals and reptiles moving across the landscape, may only require 40m (Horn, 2003), however a more narrow corridor, particularly with an open understorey will less likely be successful than a wide corridor with a dense understorey; it is also more susceptible to edge effects (predators, noise disturbance, light pollution, predators and invasive species).

The Totness Recreation Park Management Plan (2007) states the importance of maintaining connectivity between other nearby vegetated areas to collectively form a wildlife corridor, encouraging park managers to liaise with the owners and managers of adjacent areas regarding opportunities for collaborating on biodiversity conservation programs. Ultimately, the overall amount of habitat can even be increased to the long-term benefit of the local native wildlife.

In addition to encouraging the dispersal of wildlife across the landscape and connecting remnant patches, habitat corridors can serve both as a refuge for native animals and as a gene pool for recolonisation (DEH, 2007). Following the 1983 Ash Wednesday bushfire, the southern portion of the Totness RP was burnt leaving the northern section intact due to the South Eastern Freeway providing a partial barrier to the spread of fire throughout the whole park. While the southern section of the park has since recovered well, the adverse impacts on biodiversity of any future fires could be ameliorated by the restoration of other areas of native vegetation within the local area (DEH, 2007).

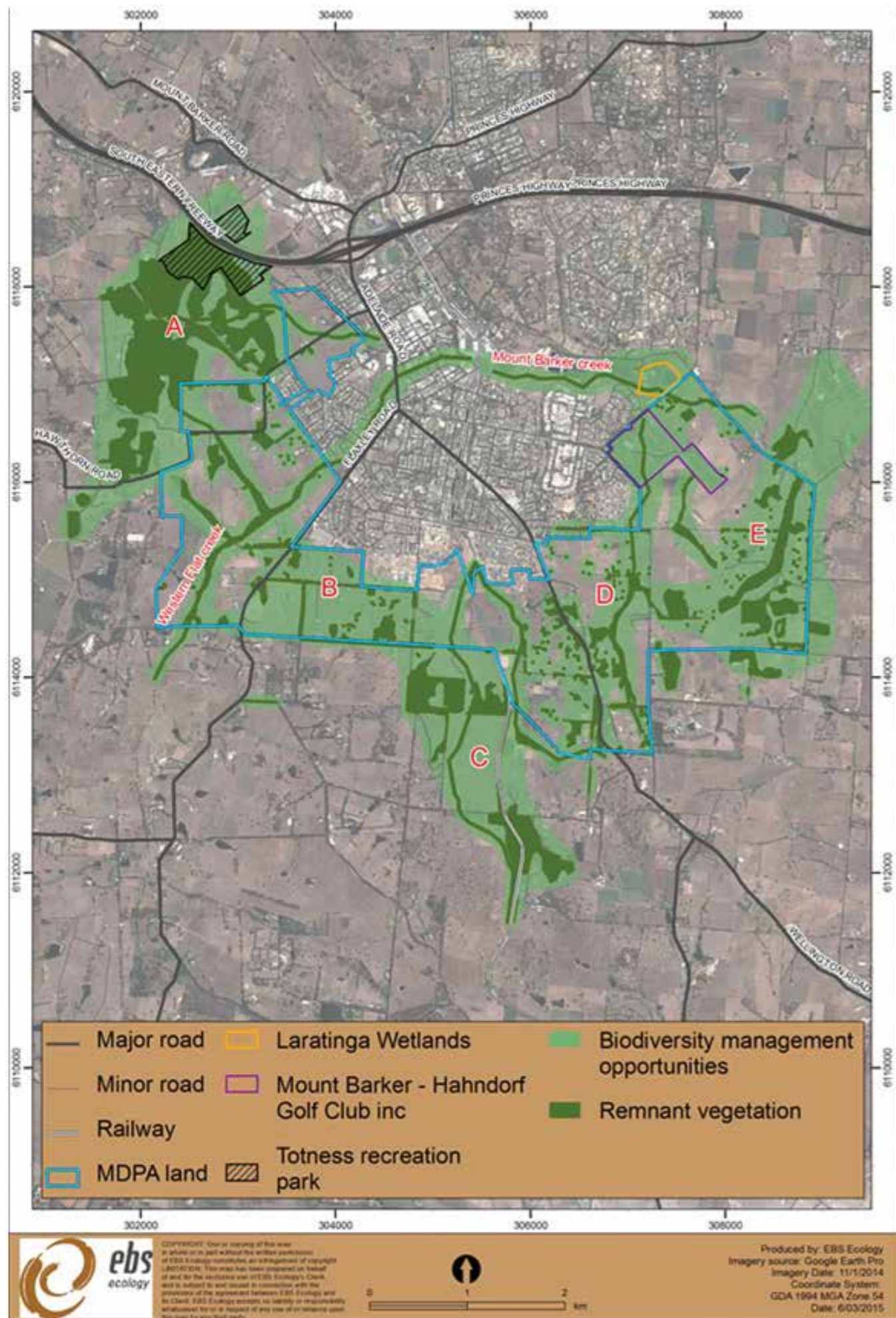
Goolwa to Wellington Local Action Planning Association, in collaboration with local council, SAMDB Authorised Officer/s, District Ranger for Totness RP, local volunteers and local flora experts with knowledge of the sites, recently undertook a project focussing on restoring important remnants and creation of wildlife corridors (Flaxley to Totness Biodiversity Management Corridor). This was to improve the condition of various woodland communities with biodiversity conservation significance (GWLAP, 2010). The Biological Survey of the Southern Mount Lofty Ranges, South Australia (2003) recommends that by increasing the area of remnant vegetation, enhancing its condition,

and providing corridors and buffer zones linking remnant patches, this will assist in maintaining threatened fauna species. Possingham and Field (2001) predicted that whilst the Mt Lofty Ranges remnant vegetation sits under the critical thresholds necessary to provide wildlife habitat, that as many as 32 additional bird species will likely disappear from the region. Restoring habitat therefore may provide a critical refuge for populations of these species in the future.

Management requirements, applicable to remnant vegetation throughout the Southern Lofty Ranges, broadly include the control of environmental weeds and feral animals (particularly cats and foxes). It also outlines the management of total grazing pressure (both introduced and native species), fire management, lack of habitat hollows and competition for existing hollows from introduced species and revegetation to provide corridors and buffer zones (Armstrong et al, 2003).

The identification of five 'corridor zones' have been highlighted in Figure 21. These 'zones' (Zones A-E) are identified as key areas in which to direct biodiversity and conservation and/or recreation (open space). Management options assigned to patches of remnant woodland, roadside vegetation and high density areas of scattered trees within the zones have been discussed in Table 32





Recommendations for Private Land in MDPA Area

| Patch # | Description | Broad management opportunities |
|--|--|---|
| Zone A – This area encompasses the larger remnants located north-west of the MDPA land. Totness RP and a number of privately owned blocks, including a Heritage Agreement. Many of the blocks are connected to the Totness RP and some are fragmented from the larger areas by open farming land and roads. Opportunities may exist to collaborate with external organisations to restore and further link the woodland communities within this valuable core habitat area. | | |
| 34 | Privately owned large remnant block of <i>Eucalyptus leucoxylon ssp. leucoxylon</i> / <i>Eucalyptus obliqua</i> +/- <i>Eucalyptus fasciculosa</i> woodland in moderate condition. High impacts from edge effects. | Weed and feral animal management |
| 35 | Privately owned Heritage Agreement containing good quality <i>Eucalyptus leucoxylon ssp. leucoxylon</i> open woodland | Protection and management of roadside vegetation along Ironstone Road to maintain connection to Hawthorn Roadside reserve vegetation and Patch 34. |
| 36 | Privately owned small remnant adjacent Ironstone Road containing degraded <i>Eucalyptus leucoxylon ssp. leucoxylon</i> open woodland | Weed and feral animal management Understorey revegetation with local natives |
| 37 | Privately owned large and good quality remnants connected to Totness Range remnants at north-western corner of MDPA land. Contains <i>Eucalyptus leucoxylon ssp. leucoxylon</i> / <i>Eucalyptus obliqua</i> +/- <i>Eucalyptus fasciculosa</i> woodland | Weed and feral animal management |
| 48 | Fence line remnant on northern boundary of MDPA land connected to Totness Range remnants at north-western corner - <i>Eucalyptus leucoxylon ssp. leucoxylon</i> / <i>Eucalyptus obliqua</i> +/- <i>Eucalyptus fasciculosa</i> woodland | Weed and feral animal management Understorey revegetation with local natives Buffering |
| 49 | Hawthorn Road reserve – containing <i>Eucalyptus leucoxylon ssp. leucoxylon</i> / <i>Eucalyptus viminalis ssp. cygnetensis</i> woodland | Weed and feral animal management Understorey revegetation with local natives Buffering Connection opportunity to establish link with Patch 48 |
| 50 | Patch of scattered <i>Eucalyptus leucoxylon ssp. leucoxylon</i> and <i>Eucalyptus viminalis ssp. cygnetensis</i> on private land | Weed and feral animal management Understorey revegetation with local natives Buffering Connection opportunity to establish link with Hawthorn Road reserve (Patch 52) and Patch 51 over the road |
| 51 | Patch of scattered degraded <i>Eucalyptus camaldulensis ssp. camaldulensis</i> and <i>Eucalyptus leucoxylon ssp. leucoxylon</i> on private land. No understorey remaining. | Weed and feral animal management Understorey revegetation with local natives Buffering Connection opportunity to establish link with Hawthorn Road reserve (Patch 52) and Patch 50 over the road |
| 52 | Patch of scattered degraded Scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> and <i>Eucalyptus leucoxylon ssp. leucoxylon</i> with modified understorey. | Weed and feral animal management Understorey revegetation with local natives |

| Patch # | Description | Broad management opportunities |
|--|--|--|
| 64 | Small patch of scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> on edge of Hawthorn Road. Probably only providing low level of habitat or 'stepping stones' along the roadside. | Weed management Understorey revegetation with local natives Buffering Connection opportunity to establish link with Hawthorn Road reserve and large Totness Range remnant (Patch 37) along Hawthorn Road. |
| 66 | Small patch of scattered <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> on edge of Hawthorn Road. Probably only providing low level of habitat or 'stepping stones' along the roadside. | Weed management Understorey revegetation with local natives Buffering Connection opportunity to establish link with Hawthorn Road reserve and large Totness Range remnant (Patch 37) along Hawthorn Road. |
| | Concentration of scattered Significant and Regulated Trees between Hawthorn Road and Bollen Road. | Retain trees in open space, large residential blocks or road reserves. |
| | All other scattered trees | Retain trees in open space, large residential blocks or road reserves. |
| Zone B – This area encompasses the western section of the MDPA land where a number of good quality roadside reserves and degraded fragmented remnants are scattered throughout cleared land. The degraded Western Flat Creek and its small tributaries traverse this zone. There are opportunities to restore and buffer and reconnect the network of corridors throughout this zone to help bridge some of the isolated remnants located in the south, with the core habitat areas within the Totness Range. | | |
| 22 | Patch of scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> on private land. Modified understorey. | Weed and feral animal management Understorey revegetation with local natives Buffering Located along valuable roadside remnant (Hunt Road unmade road reserve (Patch 46)) |
| 27 | Unmade Road reserve (between Martin Road to Hunt Road)- <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> woodland with completely modified understorey. | Weed and feral animal management Understorey revegetation with local natives Buffering Forms part of the roadside network connecting remnant roadside reserves along Martin Road (Patch 33) and Hunt Road (Patch 45). |
| 28 | Patch of scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> woodland adjacent Flaxley Road. Highly invaded by weeds, but a number of native species persist in the understorey. | Weed and feral animal management Understorey revegetation with local natives Buffering Forms part of the roadside network connecting remnant roadside reserves along Flaxley Road and Martin Road (Patch 33). |

| Patch # | Description | Broad management opportunities |
|---------|---|--|
| 29 | Patch east of Flaxley Road on private land (opposite Newenham Road)- <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> / <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> woodland, with highly degraded understorey. Several natives scattered in the understorey. | Weed and feral animal management Understorey revegetation with local natives Buffering Link with good quality roadside remnants in adjacent Flaxley Road (Patch 30) and Martin Road (Patch 33) and Newenham Road (Patch 43). |
| 30 | Flaxley Road reserve- Good quality understorey comprising <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> and <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> woodland | Sensitive weed and feral animal management Buffering on cleared land to the east and link with overstorey remnant (Patch 29) and Newenham Road (Patch 43). Protect site by including in RSMS |
| 32 | Scattered Red Gums along Western Flat Creek and tributaries | Weed and feral animal management Revegetation with local natives in and around existing native plants Remove domestic grazing animals Flood buffering from residence Connection opportunity to establish link with Hawthorn Road reserve (Patch 52) and Patch 51 over the road Recreational opportunities for bike/walking patch on edge of revegetation corridor – should avoid 'typical' open space of lawn and ornamental plantings which threaten existing biodiversity at the site. Augmentation and translocation options for rare and threatened plant species should be investigated. Consider formalising as a future council nature reserve Stabilize creek banks Great care also needs to be taken with redesigning the Newenham Road entry so that valuable areas with Blackwood, Wirilda, Mat-rush, lilies and grasses are retained. Rescue remnant indigenous flora that cannot be retained and translocate into reserves or safe suitable habitat nearby. |
| 33 | Martin Road reserve – reasonable remnant vegetation comprising <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> woodland. Understorey fairly disturbed by woody weeds, but many examples of native species persisting. | Weed and feral animal management Buffering on cleared land to the south Protect site by including in RSMS |
| 40 | Hunt Road Bush for Life Site containing <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> open woodland over <i>Allocasuarina verticillata</i> . Site in very good condition and actively managed. | Continue weed and feral animal management Link with extension of Hunt Road woodland community and Flaxley Road. |

| Patch # | Description | Broad management opportunities |
|---------|---|--|
| 43 | Newenham Road contains degraded <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> / <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> woodland with highly modified understorey. High levels of woody weeds. | <p>Weed and feral animal management</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Connection opportunity to establish link with Flaxley Road remnant vegetation (Patch 30), Patch 29 and Western Flat Creek to the west.</p> |
| 45 | Hunt Road reserve – good quality vegetation comprising <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland. Low levels of weed invasion at this stage, but some small patches of Gorse and Blackberry establishing. | <p>Sensitive weed management</p> <p>Feral animal management</p> <p>Buffering</p> <p>Connection opportunity to establish link with Hunt Road Patch 46 and Patch 22 in adjacent paddock. Also forms part of the roadside network connecting remnant roadside reserves along Barker Road (Patch 47), Fidler Lane, Martin Road (Patch 33) and fence line remnant Patch 27.</p> <p>Protect remnant by including in RSMS and consider formalisation as important council nature conservation reserve</p> |
| 46 | Hunt Road / Fidler Lane reserve- good quality vegetation comprising <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> and <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> woodland. Low levels of weed invasion at this stage, but some small patches of Gorse and Blackberry establishing. | <p>Sensitive weed management</p> <p>Feral animal management</p> <p>Buffering</p> <p>Connection opportunity to establish link with Hunt Road Patch 45 and Patch 22 in adjacent paddock. Also forms part of the roadside network connecting remnant roadside reserves along Barker Road (Patch 47), Fidler Lane, Martin Road (Patch 33) and fence line remnant Patch 27.</p> <p>Protect remnant by including in RSMS and consider formalisation as important council nature conservation reserve</p> |
| 47 | Barker Road reserve – Roadside remnant in moderate condition. Highly disturbed by weeds but with some evidence of native understorey persisting. Remnant comprises <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland | <p>Weed and feral animal management</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Forms part of the roadside network connecting remnant roadside reserves along Martin Road (Patches 59 and 33), Hunt Road (Patch 46) and Fidler Lane and larger remnants to the south (Patch 26).</p> |
| 59 | Barker Road reserve- Roadside remnant comprises <i>camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> woodland in poor condition. Highly disturbed by weeds. | <p>Weed and feral animal management</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Forms part of the roadside network connecting remnant roadside reserves along Martin Road (Patch 33) and Fidler Lane.</p> |

| Patch # | Description | Broad management opportunities |
|---------|---|--|
| 60 | Small patch of scattered <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> with completely modified understorey. | <p>Weed and feral animal management</p> <p>Understorey revegetation with local natives</p> <p>Buffering and connection with adjacent Martin Road roadside reserve (Patch 33)</p> |
| 61 | Flaxley Road reserve with scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> . Understorey in very poor condition. | <p>Weed and feral animal management</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Forms part of the roadside network connecting remnant roadside reserves along Flaxley Road (Patch 30), Patch 29 and Newenham Road (Patch 43).</p> |
| 62 | Small outlying patch of scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> . Understorey completely modified. | <p>Weed management</p> <p>Understorey revegetation with local natives</p> <p>Buffering and revegetation to link up with Old Mt Barker Road which connects up with Western Flat Creek.</p> |
| 64 | Small patch of scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> on private land located along small dammed tributary of Western Flat Creek. Understorey completely modified. | <p>Weed management</p> <p>Understorey revegetation with local natives</p> <p>Buffering and revegetation opportunity to link small tributary to the main Western Flat Creek.</p> |
| 67 | Patch of scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> on private land adjacent to Western Flat Creek tributary. Understorey completely modified. | <p>Weed management</p> <p>Understorey revegetation with local natives</p> <p>Buffering and revegetation opportunity to link small tributary to the main Western Flat Creek.</p> |
| 68 | Patch of scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> on private land adjacent to Western Flat Creek tributary. Understorey completely modified. | <p>Weed management</p> <p>Understorey revegetation with local natives</p> <p>Buffering and revegetation opportunity to link small tributary to the main Western Flat Creek.</p> |
| | Numerous Significant and Regulated Trees scattered between Martin Road and Hunt Road and north and south of Newenham Road. | Retain trees in open space, large residential blocks or road reserves. |
| | Numerous scattered trees scattered between Martin Road and Hunt Road and north and south of Newenham Road. | Retain trees in open space, large residential blocks or road reserves. |

| Patch # | Description | Broad management opportunities |
|---|---|---|
| <p>Zone C – This area encompasses the central areas of the MDPA land where a number of good quality larger remnant blocks are situated south of the MDPA land. The Victor Harbor rail reserve and small degraded Mt Barker Creek tributaries run in a southerly direction and present an opportunity to connect these remnants with the network of road reserves within Zone B leading north to the larger remnants in Zone A.</p> | | |
| 21 | Small area located to the south of the MDPA land comprising scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> associated with degraded shallow watercourse. Highly disturbed with modified understorey. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunity to Victor Harbor railway reserve to the west (Patch 41).</p> |
| 22 | Large area located to the south of the MDPA land comprising scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> with a highly disturbed and modified understorey. A small shallow watercourse occurs along the western edge in reasonable condition with a number of native species, including regionally threatened <i>Triglochin procera</i> , (Water Ribbons) (Patch 71). Currently grazed site. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunity between Victor Harbor railway reserve (Patch 41) and large woodland remnant to the west (Patch 26).</p> |
| 25 | Small area located to the south of the MDPA land comprising Scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> with a highly disturbed and modified understorey. Currently grazed site. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunity between large remnant Patch 26 and the Roadside reserve network in Zone B (Fidler Lane (Patch 46) and Barker Road.</p> |
| 26 | Large woodland remnant comprising <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland located to the south of the MDPA land in moderate condition. Currently grazed. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunity south along Barker Road to the important road reserve vegetation along Native Avenue and north along Barker Road to link up with the road reserve network in Zone B (Fidler Lane (Patch 46) and Barker Road.</p> |
| 31 | Good quality remnant comprising <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland either side of the Victor Harbor railway reserve and the junction of Native Avenue. | <p>Sensitive weed management and feral animal control</p> <p>Buffering</p> <p>Linkage opportunity north along the Victor Harbor railway reserve (Patch 41) and large woodland remnants (Patches 26 and 22)</p> |
| 41 | Victor Harbor railway corridor dominated by scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> , <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> and <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> and scattered native understorey. Condition improves further south. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunities with large woodland remnants (Patches 26 and 22) and important remnant vegetation along Native Avenue to the south</p> <p>Any future bike / walking patches should be aligned adjacent to the reserve in cleared land.</p> |

| Patch # | Description | Broad management opportunities |
|---------|---|--|
| 42 | Victor Harbor railway corridor dominated by scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> and scattered native understorey. Condition improves further south. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunities with large woodland remnants (Patches 26 and 22) and important remnant vegetation along Native Avenue to the south.</p> <p>Any future bike / walking paths should be aligned adjacent to the reserve in cleared land.</p> |
| 58 | Fidler Lane- Scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> , <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> and <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> | <p>Weed and feral animal management</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Forms part of the roadside network connecting remnant roadside and railway reserves (Martin Road, Barker Road, Hunt Road and Flaxley Road</p> |
| 69 | Small patch of riparian grassland east of railway corridor associated with Mt Barker Creek tributary. Contains regional and state threatened plants in the understorey. | <p>Sensitive weed and feral animal management</p> <p>Sensitive revegetation with local natives in and around existing native plants</p> <p>Flood buffering from residence</p> <p>Should avoid 'typical' open space of lawn and ornamental plantings which threaten existing biodiversity at the site.</p> <p>Augmentation and translocation options for rare and threatened plant species should be investigated and moved into reserves or safe suitable habitat nearby.</p> <p>Consider formalising as a future council nature reserve</p> <p>Stabilize creek banks with indigenous shrubs (of local provenance)</p> |
| 71 | Located south of the MDPA land, the small watercourse comprises <i>Triglochin procerum</i> Herbland with scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> along the watercourse. Currently dammed at the northern end. | <ul style="list-style-type: none"> • Weed management and feral animal control • Understorey revegetation with local natives • Buffering <p>Linkage with Patch 22 directly to the south and larger connection opportunities exist with the Victor Harbor railway reserve (Patch 41) and large woodland remnant to the west (Patch 26).</p> |

| Patch # | Description | Broad management opportunities |
|---|--|--|
| <p>Zone D – This area encompasses the central eastern areas of the MDPA land where a number of small degraded remnants exist, mainly with their original overstorey intact. These include a number of roadside reserves and small privately owned blocks and degraded section of Mt Barker Creek tributary. There are opportunities to restore creekline environs connecting some of the smaller remnants through the Mt Barker Golf Course to the main channel of Mt Barker Creek and the Laratinga Wetlands.</p> | | |
| 1 | Degraded section of the Mt Barker Creek with scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage along Mt Barker Creek to Laratinga Wetlands.</p> |
| 2 | Patch of <i>Eucalyptus camaldulensis ssp. camaldulensis</i> open woodland on private land located adjacent the Mt Barker Creek | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunities to nearby Mt Barker Creek to Laratinga Wetlands.</p> |
| 6 | Highly degraded tributary of the Mt Barker Creek comprising scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Flood buffering from residence</p> <p>Linkage opportunities to Mt Barker Creek to Laratinga Wetlands via native and non-local overstorey vegetation within the Mt Barker Golf course</p> <p>Flood buffering from residence</p> <p>Stabilize creek banks with indigenous shrubs (of local provenance)</p> |
| 7 | Patch of <i>Eucalyptus camaldulensis ssp. camaldulensis</i> and <i>Eucalyptus leucoxylon ssp. leucoxylon</i> open woodland on private land in poor condition with completely modified understorey. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunities to Mt Barker Creek tributary (Patch 4).</p> |
| 14 | Currently grazed and highly degraded watercourse comprising <i>Eucalyptus camaldulensis ssp. camaldulensis</i> woodland overstorey | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Linkage opportunities to Mt Barker Creek tributary (Patch 4) and Remnant woodland Patch 7.</p> <p>Flood buffering from residence</p> <p>Stabilize creek banks with indigenous shrubs (of local provenance)</p> |

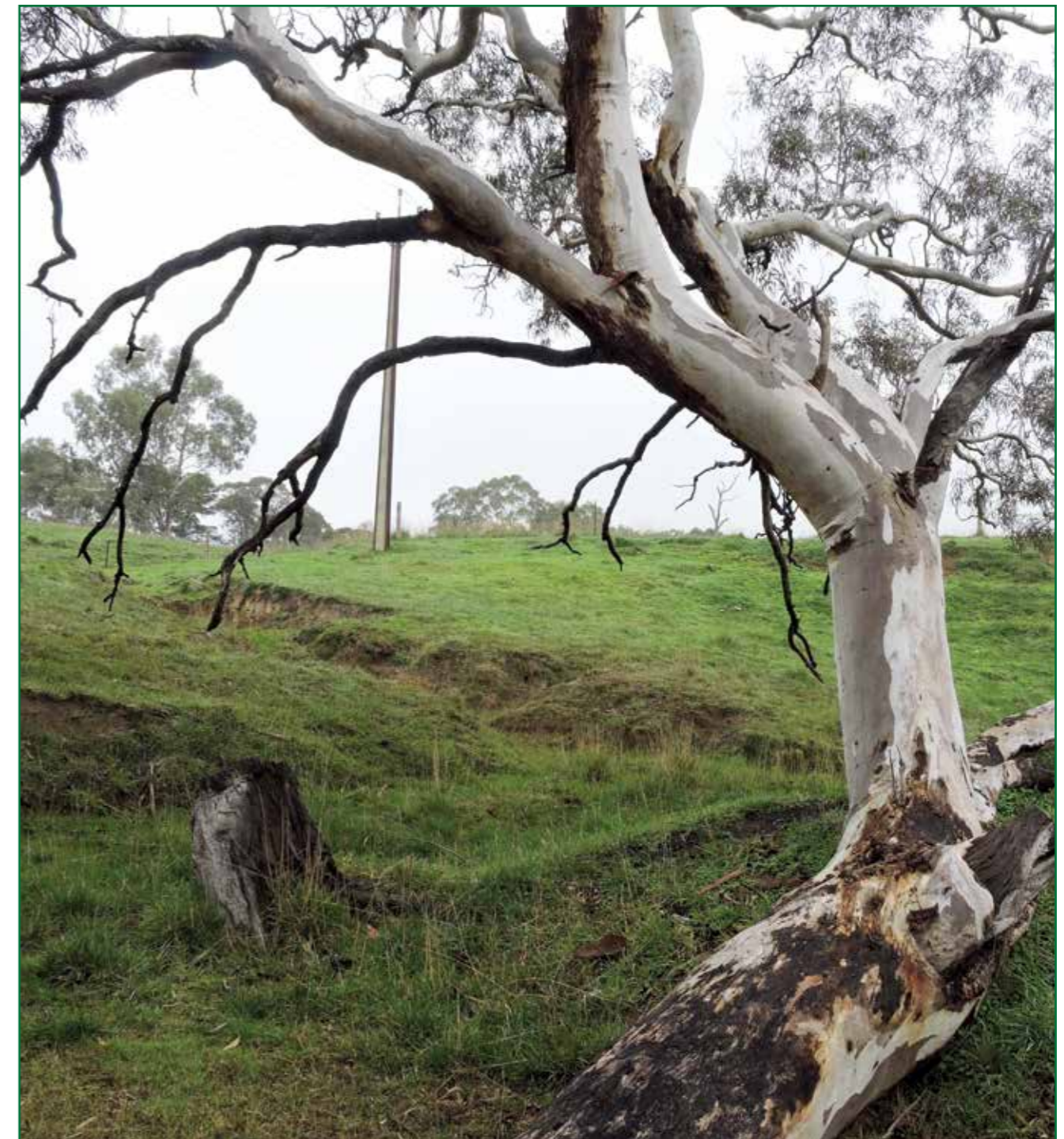
| Patch # | Description | Broad management opportunities |
|---------|---|---|
| 15 | Small patch of <i>Eucalyptus camaldulensis ssp. camaldulensis</i> woodland on private land | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunities along Paech Road roadside reserve to Patches 14 and 7 connecting to watercourse remnants associated with the Mt Barker Creek. Currently adjacent to remnant Patch 20 south of the MDPA land.</p> |
| 16 | Small <i>Eucalyptus camaldulensis ssp. camaldulensis</i> woodland remnant located adjacent Mt Barker Creek tributary east of Wellington Road. Disturbed and highly modified understorey. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunities to the Mt Barker Creek tributary connecting to other woodland remnants leading up to Mt Barker Creek and the Laratinga Wetlands.</p> |
| 17 | Wellington Road / Harrop Road reserve – degraded <i>Eucalyptus camaldulensis ssp. camaldulensis</i> open woodland. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Linkage opportunities to the overstorey remnants along Wellington Road and to the Mt Barker Creek tributary (Patches 14 and 4) by potentially connecting Patches 56 and 16.</p> |
| 18 | Patch of <i>Eucalyptus camaldulensis ssp. camaldulensis</i> and <i>Eucalyptus leucoxylon ssp. leucoxylon</i> open woodland on private land in poor condition with a highly modified understorey. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Linkage opportunities to Patch 17 to the east and to the overstorey remnants along Wellington Road and to the Mt Barker Creek tributary (Patches 14 and 4) by potentially connecting Patches 56 and 16.</p> |
| 19 | Located to the south of the MDPA land the Harrop Road remnant contains good quality patches of <i>Eucalyptus leucoxylon ssp. leucoxylon</i> / <i>Eucalyptus fasciculosa</i> open woodland over <i>Allocasuarina verticillata</i> and <i>Acacia paradoxa</i> | <p>Sensitive weed and feral animal management</p> <p>Buffering</p> <p>Protect site by including in RSMS</p> <p>Linkage opportunities to Patches 17 and 18 to the north and to the overstorey remnants along Wellington Road and to the Mt Barker Creek tributary (Patches 14 and 4) by potentially connecting Patches 56 and 16.</p> |
| 20 | Located to the south of the MDPA land. Degraded remnant patch containing <i>Eucalyptus camaldulensis ssp. camaldulensis</i> open woodland connected to Patch 15. | <p>Weed management and feral animal control</p> <p>Understorey revegetation with local natives</p> <p>Buffering</p> <p>Linkage opportunities along with Patch 15 to Paech Road roadside reserve to Patches 14 and 7 connecting to watercourse remnants associated with the Mt Barker Creek.</p> |

| Patch # | Description | Broad management opportunities |
|---------|---|--|
| 23 | Patch of degraded but valuable <i>Callitris gracilis</i> / <i>Allocasuarina verticillata</i> / <i>Eucalyptus fasciculosa</i> woodland +/- <i>Eucalyptus leucoxylon ssp. leucoxylon</i> on private land. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to overstorey remnants along Wellington Road (Patches 57, 24 and 55) and to the Mt Barker Creek tributary (Patches 14 and 4). |
| 24 | Patch of degraded <i>Eucalyptus leucoxylon ssp. leucoxylon</i> open woodland on private land. Some natives in the understorey. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to overstorey remnants along Wellington Road (Patches 57, 23 and 55) and to the Mt Barker Creek tributary (Patches 14 and 4). |
| 54 | Simms Road reserve contains scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> with highly degraded understorey | Weed and feral animal management Buffering Understorey revegetation with local natives Potential linkage opportunities if extension of Sims Road is revegetated to watercourse remnant (Patch 6) connecting onto the Mt Barker Golf Course. |
| 55 | Wellington Road highly degraded remnant consisting of scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> and <i>Eucalyptus leucoxylon ssp. leucoxylon</i> | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to overstorey remnants along Wellington Road (Patches 24, 57 and 23) and to the Mt Barker Creek tributary (Patches 14 and 4). |
| 56 | Small highly degraded remnant consisting of scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> and <i>Eucalyptus leucoxylon ssp. leucoxylon</i> with completely modified understorey. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to overstorey remnants along Wellington Road (Patches 24, 57 and 23). Also to Patch 16 which is adjacent to a shallow tributary associated with the Mt Barker Creek (Patch 14). |
| 57 | Wellington Road reserve containing scattered <i>Eucalyptus leucoxylon ssp. leucoxylon</i> . Highly disturbed understorey. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to overstorey remnants along Wellington Road (Patches 23, 24, and 55). Also to Patches 56 and 16 which connects onto a shallow tributary associated with the Mt Barker Creek (Patch 14). |

| Patch # | Description | Broad management opportunities |
|--|---|---|
| | Potts Road contains remnant scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> and <i>Eucalyptus leucoxylon ssp. leucoxylon</i> with a highly degraded understorey. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to overstorey remnants along Paech Road and Wellington Road remnant. Also to Patches a shallow tributary associated with the Mt Barker Creek (Patch 14). |
| | Numerous Significant and Regulated Trees scattered either side of Wellington Road, south of Simms Road and east of Paech Road. | Retain trees in open space, large residential blocks or road reserves. |
| | Numerous scattered trees scattered either side of Wellington Road, south of Simms Road and east of Paech Road. | Retain trees in open space, large residential blocks or road reserves. |
| Zone E – This area encompasses the eastern section of the MDP land where a number of degraded remnant blocks are situated within and adjacent the MDP land. A small degraded Mt Barker Creek tributary traverses mainly cleared land, but presents opportunity to connect some of the existing overstorey remnants with the network of road reserves leading north-east to the core habitat areas associated with the Mt Barker Summit. | | |
| 4 | Scattered <i>Eucalyptus camaldulensis ssp. camaldulensis</i> along degraded watercourse (Mt Barker Creek tributary) | Weed management and feral animal control Understorey revegetation with local natives Linkage opportunities to Mt Barker Creek and remnant woodland Patches in the south-east of the MDP land. Flood buffering from residence Stabilize creek banks with indigenous shrubs (of local provenance) |
| 5 | Patch of degraded scattered <i>Eucalyptus leucoxylon ssp. leucoxylon</i> on private land | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to shallow tributary associated with the Mt Barker Creek (Patch 4). |
| 8 | Planted <i>Eucalyptus leucoxylon ssp. leucoxylon</i> , <i>Eucalyptus viminalis ssp. cygnetensis</i> / <i>Eucalyptus camaldulensis ssp. camaldulensis</i> open woodland over <i>Acacia paradoxa</i> and <i>Allocasuarina verticillata</i> along fence line. Very weedy in the understorey. | Weed and feral animal management Buffering Infilling understorey with local native revegetation Linkage opportunities to numerous woodland remnants (Patches 9, 10, 70 and 12) as well as remnant vegetation along Harper Road (Patch 53) |
| 9 | Patch of degraded <i>Eucalyptus leucoxylon ssp. leucoxylon</i> / <i>Eucalyptus fasciculosa</i> open woodland over <i>Acacia paradoxa</i> on private land | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to numerous woodland remnants (Patches 10, 70 and 12) as well as remnant vegetation along Harper Road (Patch 53) and planted Patch 8. |

| Patch # | Description | Broad management opportunities |
|---------|--|--|
| 10 | Patch of <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland on private land | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to numerous woodland remnants (Patches 9, 10, 70 and 12) as well as remnant vegetation along Harper Road (Patch 53) |
| 11 | Located directly to the east of the MDPA land, this small remnant patch of <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> / <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> open woodland is in poor condition with a highly modified understorey. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to numerous woodland remnants (Patches 9, 10, 70 and 12) as well as remnant vegetation along Harper Road (Patch 53) leading up to core habitat areas surrounding the Mt Barker Summit. |
| 12 | Patch of <i>Eucalyptus viminalis</i> ssp. <i>cygnetensis</i> open woodland over <i>Allocasuarina verticillata</i> on private land. Many planted non-local natives as well as remnant species in the understorey. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to numerous woodland remnants (Patches 9, 10 and 70) as well as remnant vegetation along Harper Road (Patch 53) leading up to core habitat areas surrounding the Mt Barker Summit. |
| 13 | Located directly to the east of the MDPA land, this small remnant consists of <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> open woodland. It is in poor condition with a highly modified understorey. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to numerous woodland remnants (Patches 9, 10, 4 and 70) as well as remnant vegetation along Harper Road (Patch 53) leading up to core habitat areas surrounding the Mt Barker Summit. |
| 44 | Located to the north-east of the MDPA land, this degraded remnant is associated with the Mt Barker Creek. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities patches and smaller tributaries further south and connecting on to core habitat areas surrounding the Mt Barker Summit. |
| 53 | Roadside reserve contains scattered remnant Scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> and <i>Eucalyptus leucoxylon</i> ssp. <i>leucoxylon</i> along Harper Road. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to numerous woodland remnants (Patches 9, 10, 11, 12 and 70) connecting to core habitat areas surrounding the Mt Barker Summit via the Mt Barker Creek environs. |

| Patch # | Description | Broad management opportunities |
|---------|--|--|
| 70 | Patch of scattered <i>Eucalyptus camaldulensis</i> ssp. <i>camaldulensis</i> on private land in close proximity to other woodland patches. | Weed and feral animal management Buffering Understorey revegetation with local natives Linkage opportunities to numerous woodland remnants (Patches 9, 10, 11 and 12) connecting to core habitat areas surrounding the Mt Barker Summit via the Mt Barker Creek environs. |



“To promote urban develop that avoids the loss of biodiversity “

| Action |
|--|
| Recommendations from Biodiversity Reference Group/ Mt Barker Landscape Planning Report (University of Adelaide, 2010) |
| A protection opportunity exists to incorporate into urban protected areas. |
| Retain, protect and restore existing state listed remnant (vulnerable for SA) |
| Protect diverse woodland relics and consider buffering and realigning driveways |
| Currently grazed but relict tree canopy needs to be retained |
| Retain and protect valuable remnant eucalypt canopy |
| Protect remnant vegetation and scattered understorey and incorporate into wider corridor network |
| Retain Blue Gum patch in private property and register Flaxley Road reserve remnant in Council's Roadside Marker Scheme |
| Important remnants should not be used for recreational trail development (align in adjoining cleared land) |
| Immediate restoration and protection of remnant vegetation |
| Retention in open space, larger residential blocks and road reserves |
| Make all riparian corridor reserves wide enough for good quality local revegetation, not just bike paths. Restore and stabilise banks with local provenance riparian vegetation. |
| Degrader relics of this land feature still exist in the affected area and could be restored |
| All reasonable native flora to be hospitalised in council nursery and placed in other habitat or collect seed(whenever possible) |
| Creation and enhancement of existing remnants and new revegetation areas. Work with landholders to encourage woodland connection from Totness along south side of urban zoning through to Blo Park Organic Farm and Mt Barker area |
| Creation of a dedicated trained and experienced council 'Conservation and Land Management' team to manage urban protected areas and to establish and manage urban native flora |
| Have a council run local flora nursery for hospitalising rescued plants and to propagate local flora for urban biodiversity sites |
| Encourage moths and butterflies by planting host plants (smaller) in urban yards (Refer to Butterfly SA Calendar) |
| Noxious weed varieties not permitted in new gardens |
| Restrictions on cat number per household and/or impose curfews for animals |



“To protect and enhance biodiversity outcomes by encouraging and supporting community participation and strengthening partnerships”

| ACTION | PRIORITY | TIMEFRAME | RESPONSIBILITY | PARTNERS | FUNDING SOURCE | LINK TO STRATEGIC PLAN |
|--|----------|---------------------------------------|---|------------------|--------------------------------|--|
| LU1 Provision of enough open space that considers recreation and biodiversity values | High | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) Policy & Strategy (PLANNING & DEVELOPMENT) Customer & Community Services (COUNCIL SERVICES) | - | Staff time Existing budgets | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 3.2- Integrate human environments with natural areas using urban ecology principles |
| LU2 Minimising destruction of good vegetation by providing alternate areas that has minimal environmental and biodiversity value | Medium | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) Community & Customer Services (COUNCIL SERVICES) | Community Groups | Existing budgets | NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas |
| LU3 Education to schools on areas of high conservation value | Low | Yearly as a part of existing programs | Open Space & Environment (PLANNING & DEVELOPMENT) | Local schools | Existing budgets | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 3.1- Promote environmental education and awareness NE 3.1- Promote understanding and use of natural areas and provide learning opportunities NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets |
| LU4 Encouraging environmentally friendly recreational activities such as bird watching, bushcare, revegetation projects, water monitoring, fish surveys, clean up days, friends of groups etc. | Low | Yearly as a part of existing programs | Open Space & Environment (PLANNING & DEVELOPMENT) | Wider community | Existing budgets | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE3.1 Promote environmental education and awareness NE 3.1- Promote understanding and use of natural areas and provide learning opportunities NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets |

| ACTION | PRIORITY | TIMEFRAME | RESPONSIBILITY | PARTNERS | FUNDING SOURCE | LINK TO STRATEGIC PLAN |
|--|----------|-----------|---|---|------------------|--|
| LU5 Interpretive signage along trails. | Medium | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) Community & Customer Services (COUNCIL SERVICES) | NRM Birds SA | Existing budgets | NE1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE3.1- Promote environmental education and awareness NE 3.1- Promote understanding and use of natural areas and provide learning opportunities NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets NE 3.7- Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment |
| LU6 Liaise with GIS Officer to capture and present biodiversity data and information effectively. | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) IT Systems (COUNCIL SERVICES) | Bush For Life Goolwa To Wellington Local Action Planning Inc NRM Landcare/ Bushcare Groups Threatened Plant Action Group | Staff time | NE 4.1- Ensure up-to-date knowledge and understanding of environmental conditions and context NE 4.2- Identify and respond to environmental risks and vulnerabilities |
| LU7 Develop a database to store information on flora, fauna, weeds, etc. and link to property files. | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) | Medium | 2017/2018 | NE 4.1- Ensure up-to-date knowledge and understanding of environmental conditions and context NE 4.2- Identify and respond to environmental risks and vulnerabilities |

“To adopt, implement and promote best practise ecological sustainable development principles”

| ACTION | PRIORITY | TIMEFRAME | RESPONSIBILITY | PARTNERS | FUNDING SOURCE | LINK TO STRATEGIC PLAN |
|---|----------|-----------|---|--|---|---|
| SD1 More resilience and connectivity for climate change resilience | High | Ongoing | Open Space & Environment (PLANNING & DEVELOPMENT) SP | NRM | Internal existing budgets | NE 2.4- Conserve water, maximise recycled water use and practice appropriate Water Sensitive Urban Design NE 2.5- Promote, practice and enable best practice waste minimisation, waste reduction and recycling systems |
| SD2 Provide native plants for residents to encourage biodiversity in backyards. | Low | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) Field Services (COUNCIL SERVICES) | - | Internal existing budgets | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 1.3- Promote environmental education and awareness NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets |
| SD3 Demonstration sites for backyard biodiversity | High | 2016/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) | Goolwa To Wellington Local Action Planning Inc | Internal existing budgets | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 1.3- Promote environmental education and awareness NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets |
| SD4 Changes in rainfall/runoff (modelling and study) | Medium | 2017/2018 | Capital Programs (INFRASTRUCTURE & PROJECTS) Open Space & Environment (PLANNING & DEVELOPMENT) | - | Internal existing budgets | NE 2.4- Conserve water, maximise recycled water use and practice appropriate Water Sensitive Urban Design |
| SD5 Review SAMDBNRM Climate Change Plan for relevant information and action | High | 2015/2016 | Open Space & Environment (PLANNING & DEVELOPMENT) Planning & Economic (PLANNING & DEVELOPMENT) | NRM | Internal existing budgets Staff time | NE 4.1- Ensure up-to-date knowledge and understanding of environmental conditions and context NE 4.2- Identify and respond to environmental risks and vulnerabilities NE 4.3- Evolve strategy, policy and operational practices to ensure appropriate adaptive responses to climate change |

| | | | | | | |
|--|--------|-------------------|---|----------------------------------|---|---|
| SD6 Mapping canopy cover versus climate/heat. | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) | 20/20/20 Project | Internal existing budgets Staff time | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.4- Support environmental research on local issues |
| SD7 Developers to have high energy/water efficient properties (reduce light pollution, solar, Solar passive design, rainwater tanks, native plants) | High | 2016/2018 | Policy And Strategy (PLANNING & DEVELOPMENT) Open Space & Environment (PLANNING & DEVELOPMENT) | - | Internal existing budgets | NE 2.4- Conserve water, maximise recycled water use and practice appropriate Water Sensitive Urban Design NE 2.5- Promote, practice and enable best practice waste minimisation, waste reduction and recycling systems |
| SD8 Developer checklist for NRM, NATIVE VEGETATION COUNCIL and ESD. | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) | NRM Native Vegetation Council | Internal existing budgets Staff time | NE 2.5- Promote, practice and enable best practice waste minimisation, waste reduction and recycling systems |
| SD9 Partner with research organisations to investigate the impacts of light and noise pollution of biodiversity | Medium | As projects arise | Open Space & Environment (PLANNING & DEVELOPMENT) | Educational Institutions | Internal existing budgets | NE 1.4- Support environmental research on local issues |
| SD10 Incorporate development approvals to include conditions that protect native vegetation on adjoining land from damage (dumping of fill, rubbish, water, spread of weeds) | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Policy And Strategy (PLANNING & DEVELOPMENT) | - | Internal existing budgets | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives |
| SD11 Identify areas that should be preserved and not developed | High | 2016/2017 | Open Space & Environment (PLANNING & DEVELOPMENT) Policy And Strategy (PLANNING & DEVELOPMENT) | - | Internal existing budgets & projects | NE 4.1- Ensure up-to-date knowledge and understanding of environmental conditions and context NE 4.2- Identify and respond to environmental risks and vulnerabilities |
| SD12 Develop Indicators on ecological health throughout the district to be able to effectively evaluate trends and progress. | Medium | 2017/2018 | Open Space & Environment (PLANNING & DEVELOPMENT) Planning & Economic (PLANNING & DEVELOPMENT) | - | Internal existing budgets Staff time | NE1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 4.1- Ensure up-to-date knowledge and understanding of environmental conditions and context NE 4.2- Identify and respond to environmental risks and vulnerabilities |



BIODIVERSITY PLANNING

6.0 Partnerships

Generally, biodiversity preservation is targeted at large and relatively undisturbed habitats (Alvey 2006), or at least public areas with some remnant vegetation. Utilising all types and conditions of greenspaces such as parks, reserves, sporting fields, green corridors, irrigated agricultural areas and private gardens in residential, industrial and commercial areas (Taylor, 2013) is important for biodiversity refuge and connectivity. Urban greenspace plays an important functional role in urban landscapes by providing services such as the mitigation of flooding and erosion, the collection of airborne and waterborne contaminants, and provision of wildlife habitat (Barnett G, Doherty M & Beaty M, n.d). The protection and enhancement of biodiversity is the joint responsibility of all levels of government, the private sector and the community.

6.1 Organisational Partnerships

6.1.1 Trees For Life (TFL) and Bush For Life (BFL)

Trees for Life (TFL) began in 1981 when Lolo Houbein and Burr Dodd gathered some friends to coordinate a visit to South Australia by Richard St. Barbe Baker, founder of the international environmental organisation Men of the Trees – here the “South Australian branch of Men of the Trees” was formed, now known as Trees For Life.

The first tree was planted on One Tree Hill in 1982 but over 30 million trees, shrubs and grasses followed, forming wind breaks, erosion control, new forests, and buffers for the few remaining stands of original vegetation.

Since then the work has extended into bush care to protect and conserve valuable remnant vegetation. The Bush For Life program was started in 1994 to help people take practical steps to conserve our bushland.

Across the 21 BFL sites there are 60 active volunteers supported by a regional volunteer coordinator. The regional coordinator provides training, onground support

to volunteers and reports to Council on site issues and activities. Council staff liaise with the regional coordinator on a regular basis to review existing sites and add new sites where possible. In 2014 a total of 2,544 hours was contributed by volunteers, the Regional Coordinator and ‘Bush Action Teams’ on site specific onground field work. This is equivalent to a \$120,420 to the district.

6.1.2 Goolwa to Wellington Local Action Planning Group (GWLAP)

The Goolwa to Wellington Local Action Planning Association Inc is a not for profit community organisation that works across more than 265,000ha encompassing all the plains and catchments running into Lake Alexandrina between Goolwa and Wellington. We work with local communities to protect and restore biodiversity and sustainably manage our natural resources. Our vision is to create an environment where human activity and natural ecosystems can sustainably co-exist. GWLAP works with a wide range of community groups, local government, landholders and individuals to deliver priority on-ground works involving revegetation, soils management, remnant vegetation and lake-shore fencing, bush-care weed control and a wide range of education and engagement activities including workshops, field days, training events and planting activities. GWLAP receives funding from a wide range of sources including Commonwealth, State and Local Government and also undertakes a range of fee for service works and the delivery of corporate funded projects with community involvement along the way.

Goolwa to Wellington Local Action Planning Association (GWLAP) has enjoyed an excellent relationship with local government since incorporation of the group in 1998. The District Council of Mount Barker has been a key stakeholder in the GWLAP area and has seen us work closely with various staff to manage natural resources. We have had a council representative on the GWLAP board of directors for much of our existence which has assisted us greatly in the integration of local government objectives and views and helped us deliver more to our programs; particularly regarding biodiversity conservation works.

GWLAP Project Officers have and continue to work closely with council environmental staff to provide input into planning processes, take part in roadside vegetation management planning, high and assist in addressing issues of common concern regarding biodiversity management.

In the past the GWLAP has assisted the council in the delivery of a number of funding programs. A snapshot of some more recent projects are listed below.

Buffers for Biodiversity

The GWLAP worked closely to involve and link local landholders in the district to the Buffers For Biodiversity project, which assisted in buffering and managing important roadside vegetation through fencing and the undertaking of revegetation using local native species. Funding was also provided to undertake bushcare on key roadsides and adjoining reserves and achieved a great

deal for the Mount Barker area, particularly around Flaxley and Kanmantoo. This project worked in conjunction with the Department of Planning, Transport and Infrastructure (DPTI), Council staff and local landholders.

Meadows Creek Water Quality improvement project 2009

This project was funded by the District Council of Mount Barker and achieved over 5km of fencing, planted 11,000 local native plants and undertook over 250 hours of woody weed control across more than 100ha of watercourse in the Meadows Creek Catchment. A highlight of this project was the involvement of the Meadows Primary School and local residents Mike and Lynn Bartlett in the revegetation of Battunga Park in the Meadows township, with strong council support and involvement.

Riparian restoration in the Rodwell and Mount Barker Creek Catchments

This project worked over several years to undertake significant revegetation, fencing and restoration of watercourses in the Rodwell and Mount Barker Creek Catchments to improve water quality and biodiversity. The project has worked closely with the District Council of Mount Barker to undertake extensive weed control and revegetation in the watercourse running through Anembo Park; Littlehampton and areas of the Mount Barker Creek. The project involved sporting clubs, schools, Greenarmy and various sponsors and has greatly improved the biodiversity, aesthetics and partnerships in the area. Works have also undertaken threat abatement on several council owned reserves and improved collaboration with council regarding their management. Fish monitoring has been undertaken in 45 pools along the Mount Barker Creek and has provided an excellent base line for informing future works and upcoming developments in the Mount Barker area. Although recently completed in 2015, this project continues to have involvement from the GWLAP, District council of Mount Barker and various other groups through working bees and educational activities.

Mount Compass to Meadows Biodiversity Links Project

Funded by the commonwealth government this \$840,000 large scale biodiversity project, is implementing priority weed control and fencing to protect more than 2200ha of high biodiversity value remnant vegetation across the landscape through multiple properties between the townships of Mount Compass to Meadows. Several Mount Barker Council bushland reserves are receiving funding to undertake bushcare works including Mount Ephraim and Survey Hill at Prospect Hill. GWLAP has also addressed several outlier woody weed populations in the Mount Barker Council area through this project. Several national parks are also receiving significant restoration through this program including Cox Scrub, Finnis Conservation Park, Mount Magnificent Conservation Park and Kyeema Conservation park.

The GWLAP has also recently been involved in a number of activities with the Mount Barker council including a staff tree planting and team building day, input into planning of the Big Green and the Biodiversity Strategy, involvement of Greenarmy in planting and weed control and involvement in a range of other activities involving seed collection, vegetation surveys, fee for service contracts and the involvement in a number of urban biodiversity projects and actions.

6.2 Government Partnerships

The SA MDBNRM board and the AMLR NRM boards partner with council to achieve biodiversity outcomes across the region. Most major external grants also specify partnerships as one of the assessment criteria. If these relationships and partnerships already exist and are delivering outcomes in a coordinated manner, they increase the chances of success in grant applications.

A combined commitment between all stakeholders enhances the effectiveness of each effort. In addition to engaging and educating the wider community on the protection and enhancement of biodiversity, it is essential to maintain and strength the relationships with

government and non government organisations and groups. This will ensure a collaboratively approach to knowledge and management of biodiversity and maximise effort and value of funds.

The Mount Barker District Council has relatively large areas of habitat and conservation value. Successful biodiversity management takes ongoing effort and requires skilled on-ground resources familiar with endemic plant species and minimal disturbance bushcare techniques. As Council resources are limited, external funding would enable a more expansive biodiversity program. Grant funding is available to Local Government with differing assessment criteria, partnerships, amount available and delivery mechanisms. The development of this Strategy will stand the Council in a better position to undertake a project that aligns with State and Federal biodiversity management objectives.

6.3 Community Partnerships

The Mount Barker district is also fortunate to have an active, experienced and skilled conservation community. Clear roles and responsibilities between these numerous organisations and groups ensure that resources and actions are coordinated way in order to achieve maximum biodiversity benefit.

Council has developed an extensive revegetation program that aims to contribute to biodiversity outcomes aesthetics and beautification of the area. The program relies and forms strong partnerships with community groups and volunteers. The program attracts an average of 800 volunteers, with around 10,000 native seedlings planted each year. There are numerous groups and volunteers through the district, including activities such as bushcare,

weeding, revegetation, seed propagation, field visits, environmental monitoring, education, photography and professional environmental feedback. Participation includes individual residents and groups that include:

- Friends of Coppin's Bush
- Macclesfield Bushcare Group
- Nairne Creek Landcare Group
- Dawesley Creek Catchment Landcare Group
- Flaxley Landcare Group,
- Kanmantoo/Callington Landcare Group
- Northern Bremer Catchment Group
- Hahndorf Landcare Group
- Nairne Green Thumbs
- Laratinga Volunteer Group
- Local schools
- Sports clubs
- church groups
- Lions Clubs
- Birds SA Birdwatchers
- Friends of Goyder Reserve
- BFL/TFL members
- GWLAP volunteers
- Landholders

Patterns of biodiversity have been influenced by vegetation selection and maintenance with direct relationships between species richness and these factors. An opportunity exists to encourage residents to select native vegetation to increase biodiversity and enhance connectivity between habitats.

The actions listed in the action plan will protect and enhance biodiversity outcomes by encouraging and supporting community participation and strengthening government and community partnerships.

“To protect and enhance biodiversity outcomes by encouraging and supporting community participation, education and strengthening partnerships”

| ACTION | PRIORITY | TIMEFRAME | RESPONSIBILITY | PARTNERS | FUNDING SOURCE | LINK TO STRATEGIC PLAN |
|---|----------|-----------|--|-----------|------------------|--|
| EP1 Citizen Science Project for Tree register | Medium | 2017/218 | Open Space & Environment (PLANNING & DVELOPMENT) | Community | New Initiative | NE1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 1.3- Promote environmental education and awareness NE 3.1- Promote understanding and use of natural areas and provide learning opportunities NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets NE 3.7- Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment NE 4.1- Ensure up-to-date knowledge adaptive responses to climate change |
| EP2 Set up biodiversity network (email) - water, landcare, individuals) to communicate biodiversity plan and other ideas | Low | 2017/2018 | Open Space & Environment (PLANNING & DVELOPMENT) | - | Existing budgets | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection NE 1.2- Lead biodiversity protection and restoration initiatives NE 1.3- Promote environmental education and awareness NE 3.1- Promote understanding and use of natural areas and provide learning opportunities NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets NE 3.7- Facilitate and support active volunteer involvement from the community in preserving, rehabilitating and enhancing the natural environment NE 4.1- Ensure up-to-date knowledge adaptive responses to climate change |
| EP3 Ensure plan on website | High | 2015/2016 | Open Space & Environment (PLANNING & DVELOPMENT) | - | Staff time | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection |

| | | | | | | |
|--|--------|-----------|--|---|----------------------------|--|
| EP4 Target community engagement plan | High | 2015/2016 | Open Space & Environment (PLANNING & DVELOPMENT) | - | Staff time | NE 1.1- Demonstrate leadership in sustainability, environmental enhancement and protection |
| EP5 Ensure all council owned/ managed remnant vegetation patches have site specific management plans. | High | 2016/2018 | Open Space & Environment (PLANNING & DVELOPMENT) | Bush For Life Goolwa To Wellington Local Action Planning Inc Landcare and Bushcare groups | Staff time | NE 3.2- Integrate human environments with natural areas using urban ecology principles NE 3.3- Design buffers and interfaces between built and natural areas |
| EP6 Indigenous cultural awareness sessions should be held for community and staff. | Medium | 2017/2018 | Community & Customer Services (COUNCIL SERVICES) | Peramangk people | Existing programs & budget | NE 3.1- Promote understanding and use of natural areas and provide learning opportunities NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6- Influence community behaviours and attitudes to achieve global and local environmental targets |
| EP7 Liaise with the Peramangk people to incorporate indigenous culture. | High | 2016/217 | Community & Customer Services (COUNCIL SERVICES) | Peramangk people | Existing programs & budget | NE 3.1- Promote understanding and use of natural areas and provide learning opportunities NE 3.5- Increase community awareness regarding its impact on the natural environment NE 3.6 - Influence community behaviours and attitudes to achieve global and local environmental targets |
| EP8 Provide an incentive for the development of management plans on private property with high conservation and biodiversity value. | High | 2017/2018 | Open Space & Environment (PLANNING & DVELOPMENT) | Landholders Native Vegetation Council | Staff time/ New initiative | NE 3.2 - Integrate human environments with natural areas using urban ecology principles NE 3.3 - Design buffers and interfaces between built and natural areas |

7.0 Monitoring and Evaluation

The strategy itself will adopt an adaptive management approach. The implementation of strategy will be an ongoing process where the completed actions are reported annually to council staff, elected members and external stakeholders. This will enable the strategy be qualitatively assessed.

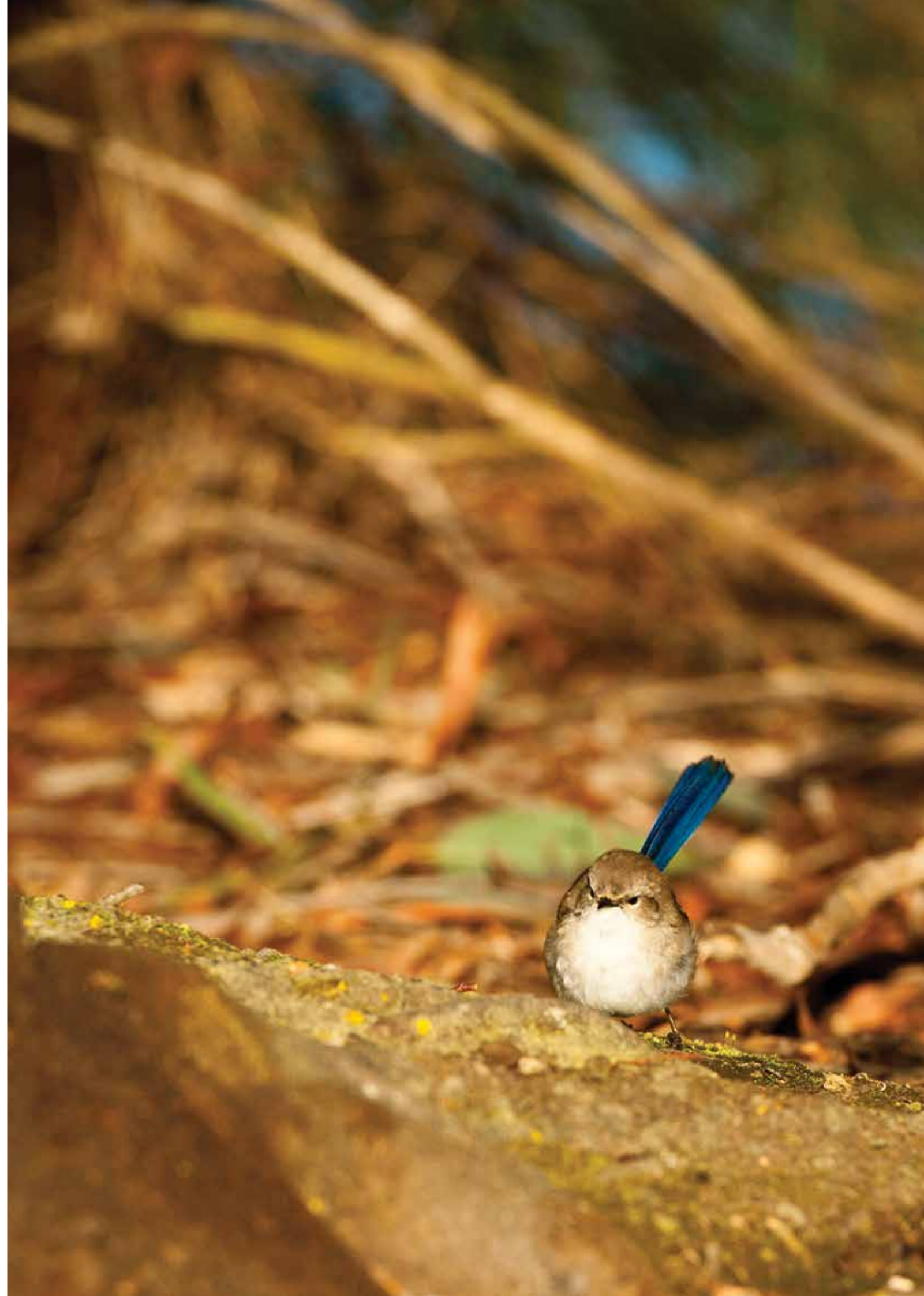
Council land with high conservation remnant vegetation or habitat value will be assessed using the Native Vegetation Council's Bush Rapid Assessment Technique (BushRAT) (DEWNR, 2012). This method is derived from the Nature Conservation Society of South Australia's 'Bushland Condition Monitoring' (BCM) methodology (Croft, Milne, & Pedler, 2005-2009) including a Rapid Assessment version, but uses an informal quadrat of approximately 1 ha rather than the 30m x 30m quadrats used in the BCM methodology. The Rapid Assessment Technique is intended for use in most assessments

undertaken within the Native Vegetation & Biodiversity Management Unit within the State Government, including clearance via clearance application, clearance via Regulation, potential SEB offset areas, Heritage Agreement assessments and compliance assessments.

In addition birds and other taxa such as reptiles, mammals, amphibians and fish should be monitored and the information linked to an internal database. Threatened species in the council area should be closely monitored.

The establishment of a permanent environmental reference group and utilising the knowledge of community groups will assist with monitoring activities.

The ongoing "plan, do, check, act" management of the strategy is essential to achieve the objectives outlined in the introduction of the strategy.



8.0 References

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