Jandakot Regional Park

Management Plan 2010

Conservation Commission of Western Australia

Department of Environment and Conservation

City of Cockburn

City of Armadale

Town of Kwinana

Jandakot Regional Park

Management Plan 2010

PLANNING TEAM

The Planning Team, representing the managers of Jandakot Regional Park, coordinated the development of this Plan on behalf of the Conservation Commission of Western Australia. The Planning Team was assisted by a consultancy team led by Plan E.

Jacinta Overman	Department of Environment and Conservation
Brendan Dooley	Department of Environment and Conservation
Tim Bowra	Department of Environment and Conservation
Ron Van Delft	City of Armadale
Chris Beaton	City of Cockburn
Ryan Munro	Town of Kwinana

How to Use This Plan

This Plan is divided into chapters and sections as set out in the table of contents. Guiding principles are stated at the beginning of each chapter. An objective is given at the beginning of each section, followed by a discussion of the main issues and then strategies, which list responsible agencies and a priority rating. Priority ratings provide an indication of the relative importance of a strategy. Key Performance Indicators are listed in the Plan and outline performance measures, targets and reporting requirements.

A number of issues raised in this Plan are interrelated and are dealt with under more than one section. Where this is the case, the discussion refers the reader to other related sections.

ACKNOWLEDGEMENTS

Numerous individuals and groups have contributed valuable ideas and information in the preparation of this management plan and their efforts are gratefully acknowledged. In particular, the contribution of the Jandakot Regional Park Community Advisory Committee is appreciated. The assistance of the Plan E team is also appreciated. The photograph on page 23 was taken by Kirsty Lundy, photograph on page 56 taken by Michael James, other photographs taken by Jacinta Overman.

NOMENCLATURE

Inclusion of a name in this publication does not imply its approval by the relevant nomenclature authority.

THE CONSERVATION COMMISSION OF WESTERN AUSTRALIA AND THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

All national parks, conservation parks, nature reserves, and other similar reserves are vested in the Conservation Commission of Western Australia. These reserves are managed on behalf of the Conservation Commission of Western Australia by the Department of Environment and Conservation.

The Conservation Commission of Western Australia is responsible for having management plans prepared for all lands that are vested in it. This plan has been prepared by the Department of Environment and Conservation on behalf of the Conservation Commission of Western Australia.

Preface

Regional parks consist of areas of land that have been identified as having regionally significant conservation, landscape and recreation values. Regional parks may consist of land areas managed by a range of different management agencies, and private landowners. Regional parks therefore provide the opportunity for a consortium of land managers and land owners to work together to develop a coordinated management approach.

The concept of regional parks was first proposed in 1955 in the *Stephenson-Hepburn Report.* This report recommended that land required for future public purposes be identified and reserved. The Perth Metropolitan Region Scheme was established in 1963 and the process of reserving land for 'Parks and Recreation' began. Since then, planning agencies have been reserving and acquiring land in anticipation of the time when regional parks would be formally created.

To date eleven regional parks have been established in the Perth metropolitan area with coordination of their management progressively transferred to the Department of Environment and Conservation (DEC). However, many of the reserves within regional parks remain the management responsibility of local government and other managing agencies. DEC plays an important role in bringing all managing agencies together through the preparation of this plan. In addition, DEC facilitates the involvement of community advisory committees, which provide strong ongoing community input to the management of the parks.

This management plan is a commitment by DEC, the City of Armadale, the City of Cockburn, the Town of Kwinana, the Department of Corrective Services and the community to cooperatively manage Jandakot Regional Park. The primary responsibility of DEC is to manage the areas of the park that are vested in the Conservation Commission and to coordinate the involvement of other management agencies. The local government authorities and the Department of Corrective Services continue to manage the reserves vested in them, in accordance with this plan.

Set in a region undergoing change due to urban development, Jandakot Regional Park is a network of land with regionally significant conservation, landscape and recreation values. Land in the park is located within the municipalities of the City of Armadale, the City of Canning, the City of Cockburn, the City of Gosnells, the Town of Kwinana and the Shire of Serpentine-Jarrahdale.

Jandakot Regional Park is particularly notable for its banksia woodlands as well as its wetlands, which are usually expressions of the underlying Jandakot Groundwater Mound. These woodland and wetland ecosystems provide a range of important habitats for fauna. As well as its nature conservation value, the park has value as a recreation resource, particularly as urban development continues in the region. Recreational use of the park is limited, with horse riding, bushwalking and nature observation the main activities.

The Jandakot Regional Park Community Advisory Committee was established early in the planning process to provide input during the preparation of the plan. The plan has been developed through consultation with a range of stakeholder groups and it reflects their contributions. The draft plan was released for public comment on 24 November 2004 until 24 February 2005. This final plan reflects the outcomes of the investigative and consultative periods and provides a way forward for the sustainable and cooperative management of the Jandakot Regional Park.

It is recognised that a considerable period of time has elapsed since the draft plan was released for public comment in 2004. The delay in preparing the final plan in no way diminishes the value of the contributions made by any organisation or individual. These contributions are important, and remain critical to the integrity of the plan and ultimately, to the management of the park.

Some issues that were identified in the draft plan in 2004 may no longer be current or may have changed. New issues have arisen. In finalising the management plan, DEC has attempted to capture the changes that have occurred since 2004 with individual stakeholders and managing agencies without compromising the integrity of the original process of developing the draft plan.

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A. INTRODUCTION

1. Purpose and Status of the Management Plan

PURPOSE OF THE PLAN

The purpose of this management plan ('the Plan') is to provide the overarching approach for the protection and enhancement of the conservation, recreation and landscape values of Jandakot Regional Park ('the Park'). The Plan includes strategies aimed at conserving the special features of the Park and providing for future community requirements. The Plan will also help to sustainably manage the Park's nature conservation and cultural values while allowing an appropriate level of use by the community.

Given the strategic nature of this Plan, more detailed planning (referred to as subsidiary plans) is required prior to significant works taking place within the Park (these are listed in Section 45).

STATUS OF THE PLAN

This Plan has been prepared by DEC on behalf of the Conservation Commission in accordance with the *Conservation and Land Management Act 1984* (CALM Act). It provides a statutory framework for the management of lands within the Park vested in the Conservation Commission and managed by DEC on the Commission's behalf. The Plan also guides DEC in coordinating the involvement of other managing agencies.

The Conservation Commission and DEC will seek to ensure that planning undertaken by other management agencies for areas within the Park is consistent with the overall direction and principles of this Plan.

In consultation with DEC, the Western Australian Planning Commission (WAPC) will use the Plan to assist with the assessment of development proposals on lands within and adjoining Jandakot Regional Park to ensure that proposed land use is appropriate.

The Plan is supported by the local governments which control land within the Park, namely the City of Armadale, City of Cockburn and Town of Kwinana. These land managers will refer to the Plan to manage the areas of the Park controlled by them, in consultation with DEC.

2. Regional Parks

WHAT IS A REGIONAL PARK?

Regional parks are areas identified as having regionally significant conservation, landscape and recreation values. Regional parks are a land management system that provides the opportunity for a coordinated planning and management approach by different land management agencies and private land owners.

Regional parks may comprise Crown lands vested in State Government agencies and local government authorities, as well as private lands where the agreement of the landowner is obtained.

As such regional parks may comprise lands with a variety of tenures and reserve purposes, drawn together for integrated management which is coordinated by DEC. Jandakot Regional Park consists of land comprising Crown reserves vested in local government authorities, the Minister for Corrective Services, and the Conservation Commission, as well as freehold land owned by the WAPC, and privately-owned land.

Those lands that have been acquired by the WAPC for inclusion in the Park are to be transferred to the Conservation Commission and the respective local government authorities, for management as part of the regional park.

THE REGIONAL PARK CONCEPT

The concept of regional open space was first introduced to Western Australia in 1955 by the Stephenson-Hepburn Report, which recommended that a statutory region plan be prepared for Perth which reserved private land required for future public purposes. In I963, the Perth Metropolitan Region Scheme (MRS) was established and under the scheme, land was reserved for 'Parks and Recreation'. This land (subject to amendments to the MRS) has been gradually acquired by State planning authorities with the intention of protecting open space of regional significance for conservation and recreation.

Areas with regionally significant conservation, landscape and recreation value were identified by the Environmental Protection Authority (EPA) in *Conservation Reserves for Western Australia, The Darling System – System 6* (Department of Conservation and Environment, 1983). This report also recommended areas of land to be managed as regional parks. A system of regional parks was envisaged which included Jandakot Regional Park.

In 1989, the State Government decided that the responsibility for managing regional parks would be established with the then Department of Conservation and Land Management, now DEC, and that the responsibility for planning and acquisition of lands for regional open space be retained by the then Department of Planning and Urban Development (now Department of Planning [DoP]) on behalf of the WAPC.

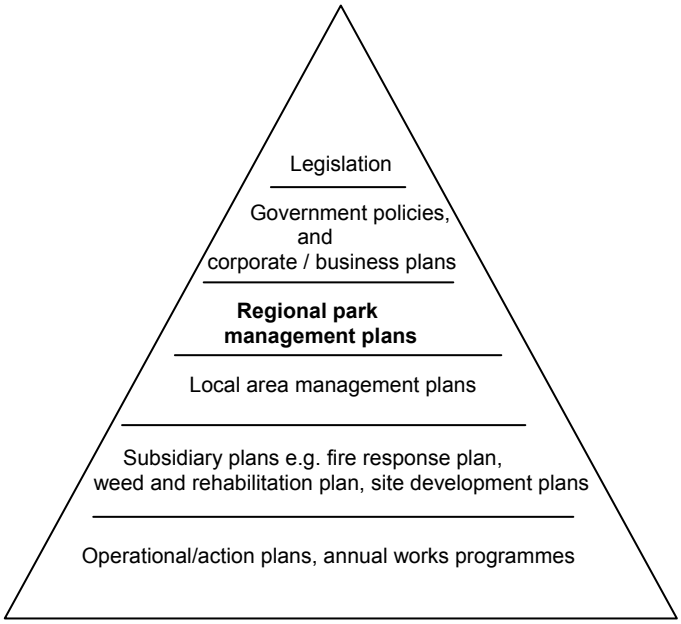
In 1991, a task-force report outlined proposed administration, planning and management of regional open space (Regional Parks Taskforce, 1991).

The EPA's *Red Book Status Report* (Environmental Protection Authority, 1993) describes the transformation of regional parks from concept to reality as being difficult because of the range of land tenure involved and the funding requirements for continual management of the parks.

In 1997, the coordination of management of metropolitan regional parks, including Jandakot Regional Park, was progressively transferred to DEC.

REGIONAL PARK PLANNING

Planning for regional parks occurs at a number of levels. Regional park management plans are a part of a broad suite of planning undertaken by the relevant managing agencies. Figure 1 illustrates the planning levels typically undertaken for regional parks.



Source: ANZECC 2000.

Figure 1 - Regional Park Planning Hierarchy

3. Jandakot Regional Park

Jandakot Regional Park comprises a mosaic of land comprising approximately 2,362 hectares, stretching from the southern end of Jandakot Airport (approximately 17 kilometres south-east of the Perth central business district) to south of Casuarina Prison (approximately 34 kilometres south-east of the Perth central business district) (Figure 2).

Land in the Park can be grouped into six areas of more-or-less contiguous land areas. The six areas or 'estates' of the Park (as indicated in Figure 4) are:

- Canning Vale Estate;
- Anstey Estate;
- Banjup Estate;
- Anketell Estate;
- Sandy Lake Estate; and
- Casuarina Estate.

GENERAL OVERVIEW

Although the estates are fragmented by rural and urban land uses, they are generally large enough to sustain diverse floral communities and fauna (Ministry for Planning, 1995a). The estates in the western parts of the Park also serve to protect the underlying Jandakot Groundwater Mound, a significant source of water for the Perth metropolitan area. Collectively, the estates of the Park represent a network of land with regionally significant nature conservation, landscape and recreation value.

The Park is located across the City of Armadale, the City of Canning, the City of Cockburn, the City of Gosnells, the Town of Kwinana and the Shire of Serpentine-Jarrahdale. Of these, the City of Armadale, the City of Cockburn, and the Town of Kwinana manage land within the Park. Details of existing and future land tenure are provided in Section 8.

The area surrounding Jandakot Regional Park is undergoing a transformation from predominantly rural land uses to rural-residential and urban development. There is generally more intensive urban development near the northern and western areas of the Park, with rural-residential and rural land occurring towards the south. There are also industrial areas located nearby. Sand mining, market gardening, grazing and livestock are important local industries.

Population forecasts for the six local government areas that the Park traverses indicate that all will experience growth over the projected period to 2016 (Western Australian Planning Commission, 2005). Structure plans for the Jandakot area indicate that further residential development is intended in the Forrestdale area adjacent to Wright Road, in Atwell, and in Anketell in the longer term (Western Australian Planning Commission, 2001 and 2007). Residential development near the Park is likely to increase the demand for recreation facilities in the Park, and is expected to place added pressure on the natural environment.

The Park consists of a network of environmentally significant lands, comprising wetland and bushland ecosystems. There are areas of vegetation in the Park, such as Piara and Modong Nature Reserves, which are considered in pristine to excellent condition and are representative of the original vegetation. There are also highly disturbed areas in the Park, such as parts of Anketell Estate.

Recreational use of the Park is limited in comparison with other regional parks, with horse riding, bushwalking and nature observation the main activities. Visitor facilities are provided at a number of reserves within the Park that are owned and/or managed by local government authorities, including Cockburn-Fremantle Pistol Club (Inc.), Fremantle Trotting Club (Inc.), Banjup Community Centre, and Magenup Equestrian Centre.

Regional Context

Jandakot Regional Park is an important link in a series of reserves in the south-east metropolitan region of Perth. Beeliar Regional Park is located to the west of the Park, and nearby there are conservation, wetland and bushland areas in Forrestdale Lake Nature Reserve, Jandakot Airport, and Southern River. The regional parks and national parks in the Darling Range are located to the east. The importance of the Park as a conservation link is enhanced in this regional context.

ESTABLISHMENT OF JANDAKOT REGIONAL PARK

In 1983, the EPA identified Wandi Nature Reserve, Casuarina Reserve, Modong Nature Reserve and Banksia Nature Reserve (Localities M97, M98, M99 and M100) as areas of regional significance in *Conservation Reserves for Western Australia, The Darling System – System 6* (Department of Conservation and Environment, 1983). The report also recommended areas of land to be managed as regional parks (Department of Conservation and Environment, 1983).

A review of the Corridor Plan in 1987 proposed the establishment of a regional park at Jandakot, to protect representative areas of banksia vegetation and wetlands (State Planning Commission, 1987). A preliminary study was conducted to guide the siting and establishment of the Park (Bowman, Bishaw, Gorham, 1990).

In the early 1990s, proposals for Jandakot Regional Park were prepared and advertised for public comment in the process of developing the *Jandakot Land Use and Water Management Strategy* (Department of Planning and Urban Development, 1995) and as part of the *South West Corridor (Stage A) Major Amendment to the MRS* (State Planning Commission, 1994).

The final concept and boundaries for the Park were embodied in *Proposals for the Jandakot Botanic Park* (Ministry for Planning, 1995a). This report identified the objectives of the Park, to:

- provide protection for good quality banksia woodlands and wetlands which are representative of the natural Jandakot environment;
- protect an associated wide diversity of flora and fauna, including rare and endangered species;
- establish open space resources and provide for recreation opportunities for the growing metropolitan corridors of the south-west and south-east;
- protect the underlying Jandakot water mound; and
- provide landscape variety.

The original name of Jandakot Botanic Park reflects the focus on conservation of regionally significant vegetation, however the Park is now referred to as Jandakot Regional Park, consistent with other regional parks in Perth.

The WAPC has continued to acquire land of regional conservation and recreation significance to add to those areas which were already managed by Government agencies.

The Jandakot Regional Park Community Advisory Committee was established in 1999 as a regular forum for the public to provide input to the management of the Park.

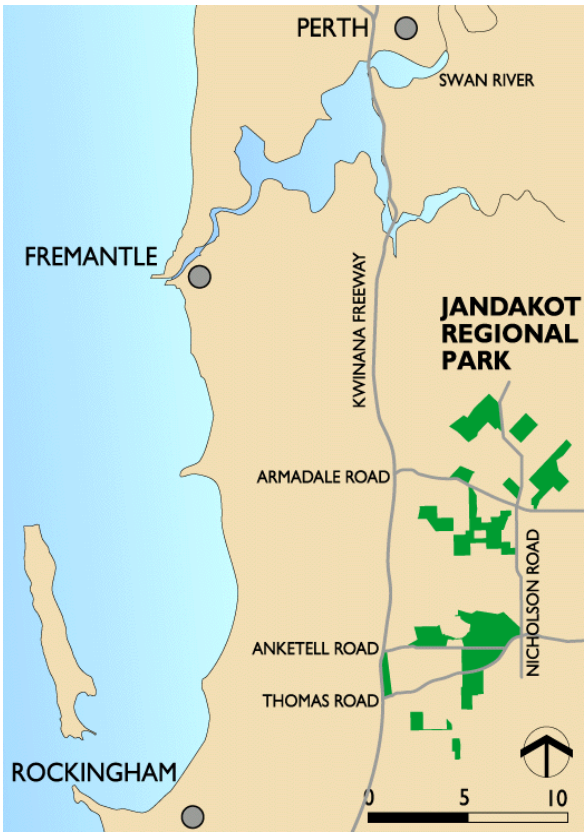


Figure 2 – Jandakot Regional Park Location

PARK VALUES

The Park has a number of characteristics that are valued by the community. The foremost values of the Park are discussed below. This Plan seeks to protect and enhance these values.

Nature Conservation Value
Jandakot Regional Park contains a wide variety of ecosystems from wetlands and sedgelands to heath communities, low woodland and forest. This rich diversity and complexity of ecosystems has very high nature conservation value because these ecosystems are now significantly cleared on the Swan Coastal Plain. Gibbs Road Swamp System for instance, is listed on the Directory of Important Wetlands in Australia as a representative network of formerly extensive swamps in the area (Environment Australia, 2001).

The Bassendean Dune System which underlies the Park is characterised by low woodland of scattered trees, with dominant species being *Banksia attenuata, Banksia menziesii, Banksia ilicifolia, Eucalyptus todtiana* and *Nuytsia floribunda*, and with a dense understorey of sclerophyll shrubs (Beard, 1981).

The low lying, poorly drained depressions of the Bassendean Dune System vary between low woodland and forest *of Melaleuca preissiana, Melaleuca rhaphiophylla, Banksia littoralis* and the taller *Casuarina obesa* or *Eucalyptus rudis* (Beard, 1981). Sedges may also be a dominant community of wetland areas. The seasonally inundated wetlands support high numbers of waterbirds.

The Park protects the habitats of significant species of reptiles, amphibians, birds and mammals, as well as rare and priority flora. The presence of two threatened ecological communities in the Park has also been inferred (Government of Western Australia, 2000) (see Glossary).

The Park plays a role in protecting the underlying Jandakot Groundwater Mound, a significant source of drinking water for the Perth metropolitan area.

Cultural Heritage Value
The region in which the Park is located is of cultural significance to both Aboriginal and non-Aboriginal people.

The lands south of the Swan River were known as the Beeliar District by Nyoongar people – one of three districts in the Perth region. Lakes and wetlands in the Jandakot area were important to the Nyoongar people due to their value as food and water sources, travel routes and mythological significance.

There are two Aboriginal sites within the boundary of the Park that are listed by the Department of Indigenous Affairs (DIA), and a number of others in close proximity to the Park.

The region was also important to early European settlers who developed the low lying and swampy lands for market gardens and honey production. In the early 1900s the Jandakot area supplied markets in Fremantle and Armadale. The importance of the area gradually declined as competition increased nearer to those markets and as land for intensive production gave way to broad scale grazing of sheep and cattle.

There are two sites in the Park listed on local government Municipal Heritage Inventories. Banjup Memorial Park in the Canning Vale Estate commemorates those killed in action and wounded during the First World War, and is included on the City of Cockburn's Municipal Heritage Inventory. Wandi Nature Reserve in the Anketell Estate is included in the Town of Kwinana's Municipal Heritage Inventory.

Recreation Value
Jandakot Regional Park has limited recreational use, however the importance of the Park for recreation will increase as urban development occurs in adjacent areas.

Horse riders comprise the largest single user group of the Park. Provisions should be made for this activity to continue in a way that does not threaten the nature conservation value of the Park and other existing and potential recreation uses.

The development of walk trails in suitable areas has been investigated through the Recreation Masterplan (Figure 9) to facilitate activities such as bushwalking and nature observation.

The Park provides opportunities to promote programmes like DEC's 'Healthy Parks, Healthy People' which encourages people to visit and enjoy themselves in parks by raising the awareness of the physical, mental and social health benefits of spending time in nature.

Landscape Value
The Park provides landscape variety in a region that is being increasingly modified. The contrast between the Park landscapes and adjoining land uses enhances the Park's landscape qualities, although a generally low relief limits long distance views. The Park is highly visible from the many adjoining roads, and its fragmented layout across a large area creates a sense of spaciousness. The Park contains many distinctive landscapes including banksia woodlands, open rural landscapes, and secluded wetland environments.

Research and Education Value
Jandakot Regional Park has significant research and scientific values. It contains rich, dynamic ecosystems with seasonal and periodic variations, subject to considerable external pressures and inputs.

The wetlands of the Park are an extremely valuable resource for gaining technical information about wetland habitats, water quality and water quantity. This data can be used to help gain a better understanding of other wetlands and underground water resources across the Swan Coastal Plain.

The Park will offer ongoing research opportunities regarding the impact of urban development on nature conservation, recreation and landscape values.

4. The Management Planning Process and Community Involvement

The Plan has been prepared in five phases:

1. The first phase was aimed at identifying the Park's values and relevant planning and management issues. This was achieved by undertaking a literature review, analysing the existing condition of the Park and organising a community workshop. Public involvement in this phase was encouraged through newspaper articles and canvassing key stakeholders for the community workshop. Native Title claimants were notified of the Plan's preparation at the commencement of the process.

2. The second phase was the preparation of the draft Plan. This involved preparing planning strategies to protect values and address issues identified in the first phase. Within this phase, specialists within DEC, the City of Armadale, the City of Cockburn, the Shire of Serpentine – Jarrahdale, the Town of Kwinana and the Jandakot Regional Park Community Advisory Committee provided advice on the development of the Plan.

3. The third phase involved presenting the draft Plan for public comment. The draft was open for public comment for a period of three months and its availability for review was widely advertised.

4. Phase four was the acknowledgement and analysis of public submissions.

5. The fifth phase comprised the preparation of the final Plan incorporating issues or comments raised within the public submissions and comments from State government agencies and local government authorities. The Conservation Commission has considered the revised final plan and then submitted it to the Minister for Environment for approval.

B. PRINCIPAL MANAGEMENT DIRECTIONS

5. The Vision for the Park

The long-term vision for the Park is:

"Jandakot Regional Park will be a well-managed park supporting species and habitat diversity in a sustainable manner. The Park will provide for the conservation and preservation of ecological and cultural heritage values, research and education, as well as providing for the recreational needs of the community in a visually harmonious way."

Strategy

1. **Manage the Park for nature conservation, and allow recreation and other uses of the Park to occur to the extent that they do not adversely impact on the other Park values. (DEC, CoC, ToK, CoA, DoCS) [High]**

6. Legislation and Management Policies

The objective is for DEC to manage the Park in accordance with the CALM Act and to integrate the policies of the other managing agencies to support the vision for the Park.

LEGISLATION

This Plan has been prepared in accordance with the CALM Act. In managing the Park, DEC will utilise the provisions of the CALM Act and the *Wildlife Conservation Act 1950* and associated regulations, as well as the provisions of any other legislation under which DEC may have responsibilities for implementation.

Consideration will be given to amending the CALM Act to specifically include the management of regional parks.

MANAGEMENT POLICIES

Department of Environment and Conservation
This Plan is consistent with DEC policies. These policies provide direction and guidance for the application of the CALM Act, the *Wildlife Conservation Act 1950,* and associated regulations.

The policies specifically mentioned in this Plan are listed in Appendix B and are available to the public. A number of these policies were under review at the time of writing. Should there be any inconsistencies between this Plan and the revised policy, future management will be in accordance with the new policy.

Local government authorities
The City of Armadale, the City of Cockburn, and the Town of Kwinana manage estate within the Park. The policies and management actions of these local government authorities in relation to the management of the Park will be consistent with this Plan.

Department of Corrective Services
The policies and management actions of the DCS in relation to the management of the Park will be consistent with this Plan.

Strategy

1 **Apply DEC policies in managing the Park. (DEC) [Ongoing]**

7. Park Boundary

The objective is to clearly define the Park boundary for the implementation of this Plan.

The Jandakot Regional Park boundary is based on the recommendations of *Proposals for the Jandakot Botanic Park* (Ministry for Planning, 1995a). Three minor amendments to the Park boundary have been made in order that the boundary reflects the MRS, under which the majority of the Park is reserved as 'Parks and Recreation'. The amendments are located at Lot 25 Armadale Road; Lot 209 Tapper Road; and Lot 39 Taylor Road (for further details refer to MRS Amendment 938/33 South West Corridor Stage A Major Amendment, 12 December 1994).

The Park boundary is shown in Figure 3.

Inclusion of other lands into Jandakot Regional Park
The WAPC has jurisdiction for overall planning and the acquisition of lands for regional parks. The inclusion of additional areas into Jandakot Regional Park is therefore the responsibility of the WAPC, in consultation with DEC, the Conservation Commission, and the relevant local government authority.

The WAPC is guided by *Bush Forever* in determining areas to be acquired for conservation purposes (Government of Western Australia, 2000). *Bush Forever* is a strategic plan that aims to identify and conserve regionally significant bushland on the Swan Coastal Plain portion of the Perth Metropolitan Region. *Bush Forever* proposes that certain areas of regionally significant bushland are reserved for 'Parks and Recreation' in the MRS and/ or acquired by the WAPC for inclusion in the conservation estate. There are a number of *Bush Forever* sites in proximity to the Park.

The criteria for determining additions to a regional park such as Jandakot are:

1. that the area is reserved for 'Parks and Recreation' in the MRS;
2. that the area has an appropriate tenure (such as an existing Crown reserve or freehold land

acquired by the WAPC) for inclusion in the Park;
3. that the area is identified by *Bush Forever* as being regionally significant; and
4. that the area provides a physical link to another area of the Park.

Once potential additions to the Park have been identified against the above criteria, the following considerations are taken into account to ensure that the Park boundary is manageable: condition of the land; future recreational demand; the enhancement of views; fire management; and provision of future services and roads.

Based on the above criteria, and taking into account the above considerations, the Park boundary has been amended to include Balannup Lake Nature Reserve (Reserve 1821) and the Ranford Block.

Balannup Lake Nature Reserve is a class 'A' reserve vested with the Conservation Commission, comprising part of *Bush Forever* Site No. 413. It is reserved for 'Parks and Recreation' in the MRS.

The Ranford Block consists of Lots 1, 1769, 1770, 1771, and 1772 Ranford Road, adjacent to the Anstey-Keane Block. The lots are reserved for 'Parks and Recreation' in the MRS, are owned by the WAPC, and comprise *Bush Forever* Site No. 413.

The following areas may also be considered for inclusion. These areas are shown in Figure 4:

- Lot 22 Gibbs Road (formerly referred to as part lot 33 Nicholson Road) is owned by the WAPC and is zoned 'Rural' in the MRS. It is proposed to amend the MRS reservation to 'Parks and Recreation', thereby increasing the size of the Park. This will rationalise the Park boundary and increase the buffer to the wetland.
- Lot 81 Warton Road is owned by the WAPC and is zoned 'Urban' in the MRS. It is proposed to amend the MRS reservation to 'Parks and Recreation' and include the land in the Park. Lot 81 Warton Road adjoins Harrisdale Swamp and forms part of *Bush Forever* Site No. 253.
- Lot 38 Taylor Road is owned by the WAPC. The majority of the lot is reserved for 'Parks and Recreation' and is within the boundary of the Park. The north-east portion of the lot is zoned Rural in the MRS, and contains naturally regenerating bushland. It is proposed to amend the MRS to reserve this portion as 'Parks and Recreation' and include it within the Park. This will consolidate the Park estate in the area and rationalise the Park boundary.
- Lot 22 Cumming Road is owned by the WAPC. The lot is zoned as Rural – Water Protection and directly adjoins Modong Nature Reserve. It is proposed to amend the MRS to reserve this lot as 'Parks and Recreation' and include it in the Park.

Forrestdale Lake Nature Reserve
Forrestdale Lake Nature Reserve is a class 'A' nature reserve vested with the Conservation Commission. It comprises *Bush Forever* Site No. 345 and is reserved for 'Parks and Recreation' in the MRS. Forrestdale Lake Nature Reserve protects an important waterbird habitat, which is recognised as internationally significant (Ramsar Convention Bureau, 2002). There are also threatened ecological communities present in the nature reserve and surrounds (see Glossary).

Management of the nature reserve and surrounding area is in accordance with the Forrestdale Lake Nature Reserve Management Plan (Department of Conservation and Land Management, 2005). The planning processes for Jandakot Regional Park and Forrestdale Lake Nature Reserve have been integrated to ensure a coordinated approach to the management of these areas.

Strategy
1. **Adopt the Park boundary as shown on Figure 3. The boundary will be modified should additional lands be included in the Park. (WAPC, DoP, Conservation Commission. (DEC, CoC, ToK, CoA) [High]**

8. Land Tenure

The objective is to ensure that the values of the Park are protected by security of tenure and reserve purpose.

Land within the Park consists of reserves administered under the *Land Administration Act 1997* and vested in a number of State government agencies and local government authorities, as well as freehold land owned by State government agencies, private organisations or individuals. There is also unvested Crown reserves and unallocated Crown land. Existing land tenure is shown on Figure 3.

The Plan seeks to reserve land and have it vested in the Conservation Commission or the relevant local government authority (as outlined in Table 1).

Crown Reserves will be created using the management areas outlined in Table 1 and Figure 4 as a guide.

The tenure arrangements for reserves already vested in the Conservation Commission will not change. Piara, Modong, Wandi, Banksia, and Balannup Lake Nature Reserves will retain their class 'A' status and existing reserve purpose.

Should additional land be included within the boundary of the Park during the term of this Plan, its tenure arrangements will be consistent with the protection and enhancement of the Park's values.

Transfer of Western Australian Planning Commission-owned freehold land
Freehold land acquired by the WAPC for inclusion in the Park will be converted to reserves under the *Land Administration Act 1997* and vested in the Conservation Commission or the relevant local government authority. The land will be managed in accordance with this Plan.

Reserves created from WAPC-owned freehold land and vested in the Conservation Commission will be afforded the purpose of 'Conservation Park' or 'Conservation of flora and fauna', depending on their environmental values and current use. They will be classified as class 'A' under the *Land Administration Act 1997* (Table 1).

Reserves created from WAPC freehold land and vested in the local government authorities will be afforded an appropriate purpose and given similar tenure arrangements as the reserves vested in the Conservation Commission (Table 1).

Crown reserves and unallocated Crown land
Reserve 31874 is located adjacent to Casuarina Prison and is a class 'C' reserve vested with the Minister for Corrective Services for the purpose of 'Prison'. The portion of the reserve that is in the Park is protected by its 'Parks and Recreation' reservation in the MRS. DCS has indicated that it wishes to retain vesting of this reserve.

Reserves to remain vested in local government authorities comprise Areas 7, 8, 9, 14 and 15 (City of Cockburn) and Area 18 (Town of Kwinana) (refer to Table 1 and Figure 4).

Reserve 32635 (part of Area 10 on Figure 4), vested in the City of Armadale, is proposed to be vested in the Conservation Commission. The reserve will be converted to a class 'A' reserve under the *Land Administration Act 1997* and afforded the purpose of 'Conservation Park'.

Land reserved for utilities or services, such as drainage corridors managed by the Water Corporation, will retain its existing reserve purpose and tenure arrangements. Access for maintenance purposes will not be restricted.

Unallocated Crown land is to be created as reserves and transferred to the Conservation Commission. These reserves will be afforded an appropriate reserve purpose and tenure arrangements under the *Land Administration Act 1997*, consistent with the protection and enhancement of Park values (Table 1).

Road reserves
Liaison will occur between local government authorities, DEC, the WAPC and the Department of Regional Development and Lands (DRDL) to close road reserves adjacent to the Park that are considered unnecessary. Should road reserves be closed they will be amalgamated into adjoining reserves, which will be afforded an appropriate reserve purpose and tenure arrangement consistent with the protection and enhancement of Park values.

This Plan acknowledges a proposal by the City of Armadale to construct the currently unmade portion of the dedicated road reserve for Keane Road as identified in the *Southern River/ Forrestdale/ Brookdale/ Wungong District Structure Plan – 2001* (WAPC, 2001). The EPA will undertake a formal environmental impact assessment of the project.

Private property
Private property within the Park that is reserved 'Parks and Recreation' in the MRS is earmarked for acquisition by the WAPC. Until acquired by the WAPC, this land will remain protected under the MRS by the 'Parks and Recreation' reservation.

There are parcels of privately-owned freehold land at Harrisdale Swamp in Canning Vale Estate, on Taylor Road and Nicholson Road in Banjup Estate, on Skeet Road in Anstey Estate, and on Thomas Road in Sandy Lake Estate.

This Plan does not propose any changes to the management of privately owned freehold land held by organisations or individuals in the Park. However, when the land is acquired by the WAPC, management will be in accordance with this Plan.

Access by Park visitors to areas of private property owned by organisations or individuals in the Park is not available until it is acquired by the WAPC.

Land tenure in the Park is shown in Figure 3.

Strategies

1. **Liaise with DRDL to create or transfer reserves for vesting in the relevant managing agency using Table 1 and Figure 4 as a guide. (DEC, CoA, CoC, ToK) [Medium]**

2. **Support the WAPC in seeking to acquire the remainder of the private land within the Park as soon as practicable from willing landowners. (DEC) [High]**

3. **Liaise with local government authorities, WAPC and DRDL to close road reserves adjoining the Park that are considered unnecessary. (DEC) [Medium]**

Key performance indicators for land tenure
The success of the strategies will be measured by: 1. Tenure actions for which DEC and the Conservation Commission are responsible.
Target: 1. Complete all tenure actions for which DEC and the Conservation Commission are responsible.
Reporting: 1. Every 5 years.

9. Interim Management Arrangements

The objective is to ensure that interim management arrangements facilitate appropriate management of the Park.

Prior to the transfer of lands to the appropriate agencies, there is a need to clearly define interim management arrangements between the agencies involved in managing land in the Park.

DEC will coordinate the interim management of Jandakot Regional Park through the preparation of this Plan and interim management agreements.

Interim management of Western Australian Planning Commission-owned freehold land
The management agreement for WAPC-owned freehold land is in the form of a Section 16 agreement under the CALM Act. Section 16 of the Act allows DEC to enter into formal agreements for the management of private land. The WAPC and DEC have a Section 16 agreement that covers land owned by the WAPC, except areas under lease. The agreement will stand until the land is transferred to the Conservation Commission or the relevant local government authority.

Interim management of Crown reserves, unallocated Crown land and freehold land owned by government agencies
State government agencies and local government authorities are responsible for lands that they control. An integrated approach to the interim management of Jandakot Regional Park will be coordinated by DEC through the preparation of this Plan.

Interim arrangements on private property
Where organisations or individuals hold land as private property, the owner is responsible for its management. DEC may seek formal voluntary management arrangements with private landowners in the Park.

Strategies

1. **Implement the WAPC-DEC management agreement under Section 16 of the CALM Act. (DEC, WAPC) [High]**

2. **Prepare management agreements for interim park management for areas controlled by State or local government authorities or private landholders as required. (DEC) [Ongoing]**

10. Park Management Zones

The objective is to adopt a management zoning system that seeks to protect conservation values, provides for appropriate recreation and other uses, and provides for efficient management of the Park.

Management zones are a framework for protecting the Park by identifying areas of nature conservation and recreation value, and determining appropriate uses and activities. The aim is to minimise existing and potential conflicts between uses and activities. Management zones provide broad guidance to public use and management activities that are appropriate in certain Park areas and indicate which management objectives have priority in a given area. A clear zoning scheme will also help to communicate management intentions to the public.

The management zones and areas for the Park are illustrated in Figure 4. The zones provide a guide for the future vesting and tenure arrangements of Park areas. They should not be used as a detailed schedule for changing land tenure. The zoning scheme does not affect the tenure arrangements or management of the service and utility reserves in the Park.

Four zones have been identified for managing the Park:

a) Conservation and Protection;
b) Natural Environment Use;
c) Recreation; and
d) Special Use.

Refer to Table 1 for the management emphasis and acceptable uses and facilities within each zone.

The zoning scheme does not direct the management of privately owned freehold land held by individuals or organisations in the Park. However, where the land is acquired by the WAPC, management will be in accordance with the Plan's park management zones.

Strategy

1. **Base the management of the Park on the management zones (Table 1 and Figure 4). (DEC, CoA, CoC, ToK, DCS) [Ongoing]**

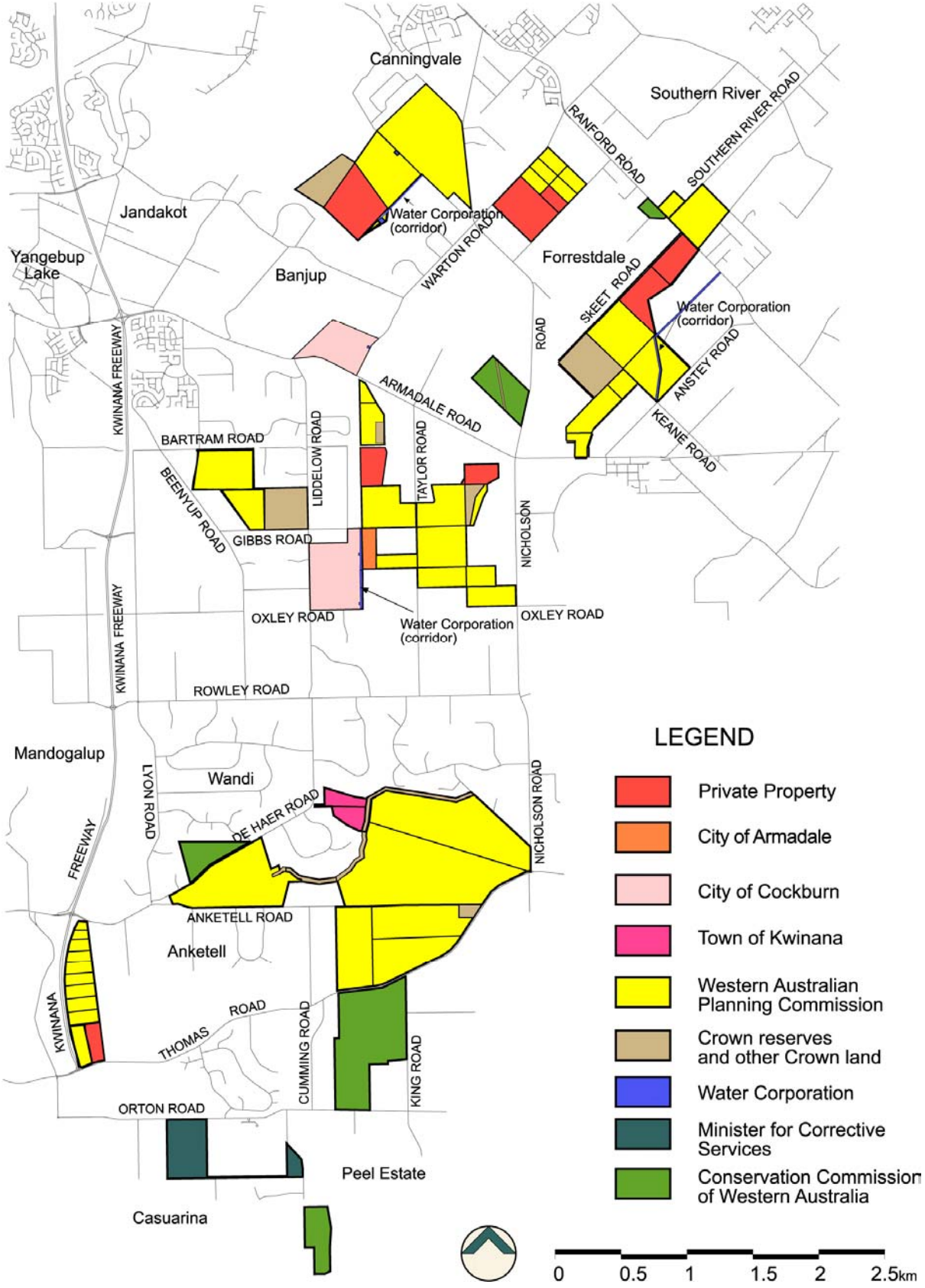


Figure 3 - Land Tenure and Park Boundary

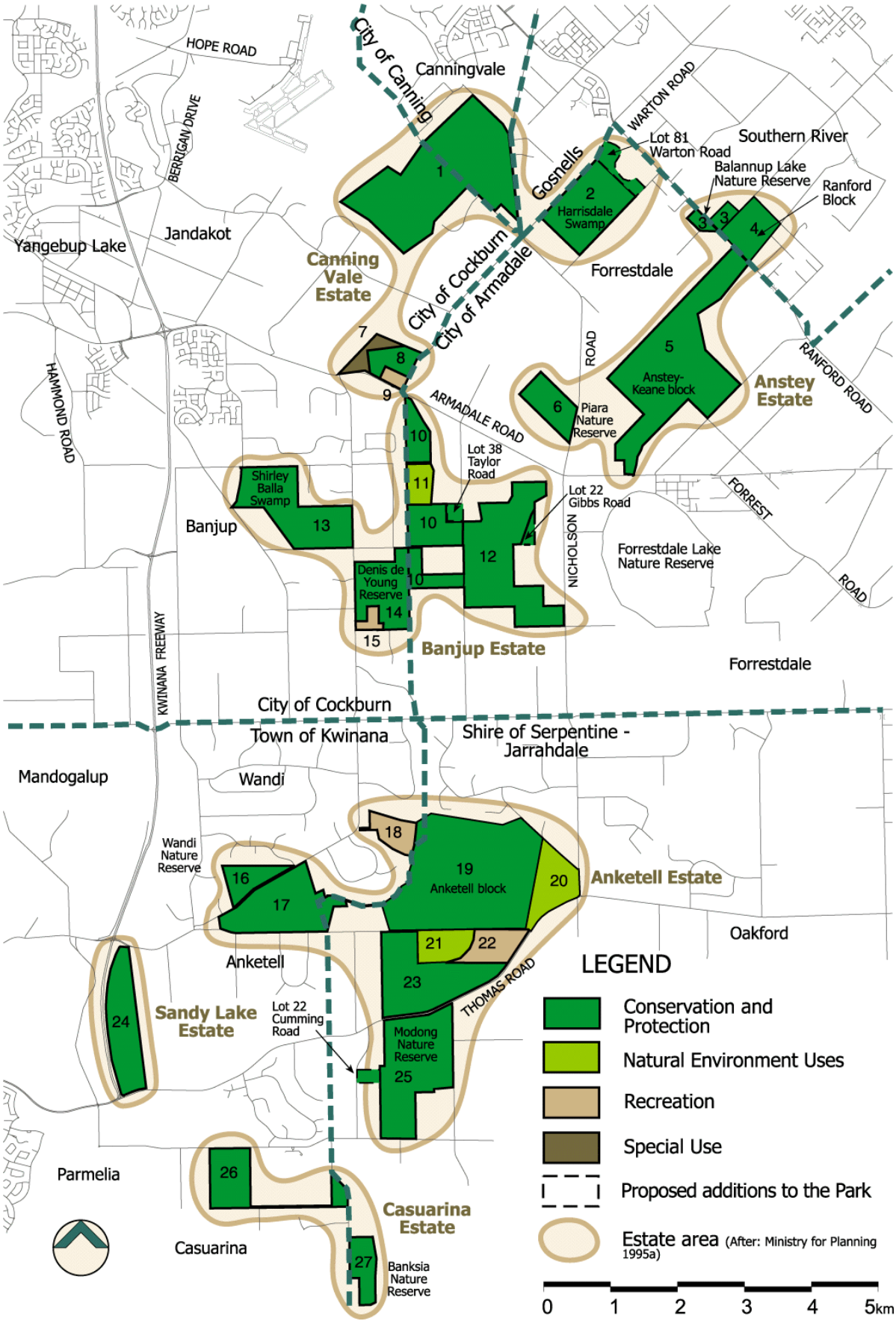


Figure 4 - Management Zones and Areas

Table 1 - Management Zones and Future Tenure Arrangements

MANAGEMENT ZONES					FUTURE TENURE ARRANGEMENTS		
Management Zone	**Plan Area**	**Management Agency**	**Management Emphasis**	**Acceptable Uses and Facilities**	**Plan Area**	**Reserve Purpose**	**Vested Authority**
Conservation and Protection	Area 1	DEC	The management emphasis of this zone is to protect and where possible enhance the conservation values (biota, natural systems and heritage) as well as the landscape qualities of the Park. Priority will be given to restoring and maintaining the natural state of conservation and protection areas. Visible evidence of management will be low.	Areas within this zone will have restricted public access to protect conservation values. Unauthorised vehicles prohibited. Rehabilitation of vegetation and habitat protection will be undertaken. Education, interpretation and research uses allowed. Facilities such as interpretive information, nature trails, boardwalks, cycle paths and through access will be developed in suitable areas, with measures to mitigate environmental impacts (see Section 31 - Recreation Masterplan). Horse riding is permitted on designated trails at Anstey-Keane Block and Modong Nature Reserve as discussed in Section 31. The provision of new facilities will depend on the values of an area and whether it is located within the Jandakot Underground Water Pollution Control Area. *No unauthorised access is allowed to Area 26: Reserve 31874. Contact the Department of Corrective Services for authorisation.	Area 1	Nature Reserve - Cons. of Flora and Fauna[1]	Conservation Commission
	Area 2	DEC			Area 2	Conservation Park	Conservation Commission
	Area 3	DEC			Area 3	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 4	DEC			Area 4	Conservation Park	Conservation Commission
	Area 5	DEC			Area 5	Conservation Park	Conservation Commission
	Area 6	DEC			Area 6	Nature Reserve – Cons. Of Flora and Fauna	Conservation Commission
	Area 8	City of Cockburn			Area 8	Recreation	Cockburn City Council
	Area 10	DEC			Area 10	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 12	DEC			Area 12	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 13	DEC			Area 13	Conservation Park	Conservation Commission
	Area 14	City of Cockburn			Area 14	Recreation	Cockburn City Council
	Area 16	DEC			Area 16	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 17	DEC			Area 17	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 19	DEC			Area 19	Conservation Park	Conservation Commission
	Area 23	DEC			Area 23	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 24	DEC			Area 24	Conservation Park	Conservation Commission
	Area 25	DEC			Area 25	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 26*	Dept. of Corrective Services			Area 26*	Prison	Minister for Corrective Services
	Area 27	DEC			Area 27	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission

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Table 1 - Management Zones and Future Tenure Arrangements (continued)

MANAGEMENT ZONES					FUTURE TENURE ARRANGEMENTS		
Management Zone	**Plan Area**	**Management Agency**	**Management Emphasis**	**Acceptable Uses and Facilities**	**Plan Area**	**Reserve Purpose**	**Vested Authority**
Natural Environment Use	Area 11 Area 20 Area 21	DEC DEC DEC	The management emphasis is to provide for appropriate uses of the natural environment. Areas will be managed jointly for conservation and enhancement of flora and fauna, improvement of landscape qualities, public use and recreation. Public use must be compatible with the assigned purpose of the relevant reserve. Visible evidence of management may be moderate to high. Management will encourage uses and develop facilities that promote conservation and education.	Public access primarily via nature trails and cycle paths. Horse riding is acceptable on designated bridle trails at Anketell Block as discussed in Section 33. Some development of facilities may be necessary. These may include education nodes and facilities associated with visitor use. The provision of new facilities will depend on the values of an area and whether it is located within the Jandakot Underground Water Pollution Control Area. Rehabilitation and habitat protection may be necessary.	Area 11 Area 20 Area 21	Conservation Park Conservation Park Section 5(1)(h) – Conservation and Recreation	Conservation Commission Conservation Commission Conservation Commission
Recreation	Area 9 Area 15 Area 18 Area 22	City of Cockburn City of Cockburn Town of Kwinana DEC	The prime emphasis of management will be to provide a variety of recreation opportunities. The type and scale of facilities provided will depend on the values of any given area, community demand for recreation, and appropriate Park management. Management involves minimising the impact of visitor activities through the sensitive placement and provision of access and facilities as well as through the provision of information and interpretive material. Visible evidence of management may be high.	High-use areas developed for active recreation pursuits. May include dedicated sporting facilities such as the pistol club, equestrian facilities, ovals, parking, buildings and reticulated and landscaped areas. Horse riding is acceptable at Fremantle Trotting Club and Magenup Equestrian Centre. Rehabilitation, landscaping and reticulation of areas may be necessary. The provision of new facilities will depend on the values of an area and whether it is located within the Jandakot Underground Water Pollution Control Area.	Area 9 Area 15 Area 18 Area 22	Club and Club Premises (Pistol Club) Recreation Public Recreation Section 5(1)(h) – Conservation and Recreation	Cockburn City Council Cockburn City Council Kwinana Town Council Conservation Commission
Special Use	Area 7	City of Cockburn	Management for purposes other than conservation or recreation visitor services. Whilst within the boundary of the Park, these areas will be managed for purposes other than 'Parks and Recreation' for the present time.	Area 5 is currently subject to a private sand mining lease. No public access. Access for managing agencies as required.	Area 7	Recreation	Cockburn City Council

[1]Cons. of Flora and Fauna: Conservation of Flora and Fauna

Note: Conservation Parks are reserves established to meet as much of the demand for recreation by members of the public as is consistent with the proper maintenance and restoration of the natural environment, the protection of indigenous flora and fauna and the preservation of any feature of archaeological, historic or scientific interest. Nature reserves are reserves established to maintain and restore the natural environment, and to protect, care for, and promote the study of, indigenous flora and fauna, and to preserve any feature of archaeological, historic or scientific interest (CALM Act)

Note: The purpose of reserves vested in the local government authorities and the Department of Corrective Services depends on the reason for their gazettal.

11. Integrated Management and Planning of the Park and Adjacent Areas

The objectives are to provide for the effective involvement of the managing agencies and the community in managing the Park and to integrate the management and planning of the Park with adjacent areas.

THE PARK MANAGEMENT STRUCTURE

The managers of the Park are DEC, the City of Armadale, the City of Cockburn, the Town of Kwinana and DCS. The areas of responsibility are set out in Table 1. Management will be in accordance with the strategies outlined in this Plan.

DEC is the most appropriate agency to provide a strong integrated framework for managing complex conservation and recreation areas. DEC is responsible for managing areas of the Park vested in the Conservation Commission and for the overall coordination of management. The local government authorities and DCS will manage areas of the Park vested in them, in accordance with the strategies outlined in this Plan. Responsibility for overall planning such as changes to the MRS for regional parks, as well as the acquisition of private land within the Park, is retained by the WAPC.

Close cooperation is required between the managing agencies and the community for this Plan to be implemented efficiently and effectively. Management decisions will involve input and negotiation between the managing agencies. DEC will refer strategic and policy issues to the Conservation Commission for consideration as required. Where appropriate, working parties comprising representatives from DEC, local government, the Department of Water (DoW), Water Corporation, and DCS will be established to facilitate the preparation of detailed subsidiary plans for the Park. The different levels of planning are illustrated in Figure 1. Subsidiary plans have been and will continue to be prepared in consultation with the community.

There is a strong interest by Aboriginal people to be involved in the management of conservation estate in Western Australia and to strengthen cultural ties to the land. By working together with Aboriginal people to care for the land, there will be great benefits for the preservation of heritage and conservation of the environment, as well as for cross-cultural awareness.

The Government of Western Australia has shown a commitment to explore joint management arrangements for conservation reserves with traditional owners by releasing a consultation paper outlining options for ownership, administration and joint management of conservation lands in Western Australia (Government of Western Australia, 2003). This paper includes options for the management of conservation reserves, irrespective of the status of Native Title.

A common management direction

The Plan represents the establishment of common objectives, strategies and agreement on priorities, and has been developed collaboratively by DEC, DCS and the local government authorities, in consultation with the community. DEC will liaise with other management agencies and the Jandakot Regional Park Community Advisory Committee to review management projects and priorities.

INTEGRATED LAND USE PLANNING FOR AREAS ADJACENT TO THE PARK

Many impacts and threatening processes on the Park emanate from surrounding land uses and activities, particularly from within the catchments of the Park's wetlands.

Planning for areas surrounding the Park is determined at both the State and local level. At the State level, the WAPC is responsible for administering the MRS. The MRS directs land use in the Perth metropolitan area by defining the future use of land, and dividing it into broad zones and reservations.

At the local level, the MRS requires local government town planning schemes to provide detailed plans for their part of the region. These town planning schemes must be consistent with the MRS.

Structure plans are developed by the WAPC to guide, manage and provide a physical framework for future development. Structure plans guide the WAPC in amending the MRS and local governments in amending their town planning schemes, as well as decisions on sub-division and development proposals. Two structure plans are relevant to the Park: *Jandakot Structure Plan – 2007* (Western Australian Planning Commission, 2007), which includes the southern end of the Park; and the *Southern River/ Forrestdale/ Brookdale/ Wungong District Structure Plan – 2001* (Western Australian Planning Commission, 2001), which includes the north-eastern corner of the Park. These plans provide an insight into likely areas of development adjacent to the Park, and have been considered in the preparation of this Plan.

It is not the intent of this Plan to provide strategies to guide land uses and activities outside the Park. Planning mechanisms such as the MRS, town planning schemes, structure plans, and environmental assessment procedures have been established to guide these land use decisions. Land-use planning within the catchments of the Park needs to consider potential adverse environmental impacts on the Park, and in particular, the Park's wetlands and underlying groundwater resources. Planning and environmental assessment authorities should discourage adjacent land-use practices that may lead to the leaching and run-off of nutrients and pollutants into the wetland systems, or other unacceptable impacts on the values of the Park.

Strategies

1. **Establish, where appropriate, working parties representing the relevant managing agencies and the community for the preparation of subsidiary and other implementation plans. (DEC, CoA, CoC, ToK, DoW) [High]**

2. **Consult with the Jandakot Regional Park Community Advisory Committee when preparing subsidiary plans and annual projects lists for the Park. (DEC, CoA, CoC, ToK) [High]**

3. **Refer policy issues to the Conservation Commission for consideration as required. (DEC) [Ongoing]**

12. Key Performance Indicators, Monitoring and Reporting

The objective is to set performance criteria for assessing the implementation of this Plan, in order to track its effectiveness in meeting its objectives.

KEY PERFORMANCE INDICATORS

Defining key performance indicators (KPIs) in management reflects the need for Park managers to take an outcome-based approach from which the effectiveness of management can be assessed.

The role of KPIs in this Plan is to provide an indication of:

1. ecosystem health in the Park;
2. use of the Park by the community; and
3. the performance of DEC in implementing this Plan.

KPIs do not cover all objectives or strategies, but they have been selected to give a strategic indication of how well the values of the Park are being maintained. KPIs therefore relate specifically to the key nature conservation and recreation values of the Park (see Table 3). They have been identified in the following sections of the Plan:

- Land Tenure (Section 8);
- Wetlands (Section 17);
- Flora and Vegetation (Section 18);
- Fauna (Section 19);
- Weeds (Section 20);
- Visitor Use (Section 30);
- Community Involvement (Section 43).

KPIs underpin the audit process of this Plan (Section 47).

MONITORING AND REPORTING

DEC will monitor KPIs and will periodically report to the Conservation Commission. The Conservation Commission and DEC will take appropriate action where performance targets are not met.

Community groups can play a valuable role in monitoring and should be encouraged to be involved and provided with training where feasible.

DEC will liaise with agencies and organisations undertaking monitoring activities in the Park. This will help ensure an integrated approach that avoids duplication and allows programmes to be assigned appropriate priorities.

Strategies

1. **Establish baseline information and ongoing monitoring programmes within the Park, using the KPIs as a basis. (DEC) [High]**

2. **Monitor and measure the KPIs and report findings as required to the Conservation Commission. (DEC) [High]**

3. **Audit and measure the overall effectiveness of Park management based on the KPIs. (Conservation Commission) [Ongoing]**

13. Research

The objective is to further develop and maintain knowledge in regard to visitor use, management, natural processes and other external influences on the Park.

There are many opportunities for research within the Park. Research needs to be integrated to maximise the outcomes and application of knowledge.

Research on the effects of urban development and groundwater abstraction on Jandakot Groundwater Mound and associated wetlands would provide information to assist decision making and ensure these resources are protected.

The unique floral assemblages of the Park are representative of communities that were once more widespread on the Swan Coastal Plain. They therefore offer an insight into changes that have occurred since European settlement. Threatened ecological communities, declared rare, and priority flora should be focal points of research.

Visitor impacts, management impacts, and external influences all need to be subject to continual evaluation. DEC will periodically undertake studies to provide information on which to make management decisions.

The involvement of educational institutions, community groups and individual researchers is encouraged, to promote community ownership and gain valuable knowledge for use in managing the Park. The involvement of such groups reduces the cost of research and monitoring for the managing agencies and enables important projects, which possibly would not otherwise be given priority or consideration, to be undertaken. Community groups are encouraged to be involved in research where appropriate.

A scientific purposes licence is required for the taking of flora and/ or fauna from the Park for research purposes.

Strategies

1. **Support and where possible seek funding to undertake scientific research within the Park. (DEC, LGAs) [Ongoing]**

2. **Encourage the participation of volunteers, educational institutions and other organisations in research projects within the Park. (DEC, LGAs) [High]**

C. CONSERVING THE NATURAL ENVIRONMENT

14. Guiding Principles for Conserving the Natural Environment

1. Conservation and protection of the natural environment

Natural processes and biodiversity will be managed to maintain their inherent values. External impacts from human use, the surrounding urban area and management practices will be minimised in order to maintain the biodiversity of natural systems over the long term.

2. Park management priorities

The Park will be managed for conservation and environmental enhancement. Recreation and other uses will be allowed to occur to the extent that they do not adversely impact on the natural environment.

3. Restoration of the natural environment

Restoration of the natural environment will be undertaken to protect and maintain biodiversity and natural systems. Areas with high conservation value will be considered priorities for restoration.

4. Features requiring special protection

Declared rare flora, priority and significant flora species, threatened ecological communities, priority fauna and other specially protected fauna will be given priority for conservation and restoration.

5. Consistency of management policies

The land managers involved in the Park will apply consistent and coordinated management policy.

6. Appropriate reserve purpose

Reserves in the Park will be assigned an appropriate purpose for the protection of biodiversity and natural systems over the long term.

7. Recognition of cultural and social values

The Park will be managed in a way that delivers community benefits by maintaining cultural traditions and places of cultural significance, and by providing opportunities for recreation, education and research.

8. Precautionary principle

If there are threats of serious of serious or irreversible environmental damage, the lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Strategy

1. **Apply the above principles as required in conserving the natural environment of the Park. (DEC, LGAs, DCS) [Ongoing]**

15. Geomorphology, Geology and Soils

The objective is to protect and conserve the existing geomorphological structure and soil associations of the Park.

GEOMORPHOLOGY

Jandakot Regional Park is situated in a region characterised by low to very low landform relief ranging from 10 to 40 metres Australian Height Datum, and based on now subdued ancient sand dune systems. Wetlands have formed in inter-dunal depressions where the underlying groundwater aquifer is present at, or close to the surface.

The Park is a mosaic of land parcels located mostly on the Bassendean Dune System of the Swan Coastal Plain (Van Gool, 1990). The younger Spearwood Dune System lies on the western edge of the Park (Van Gool, 1990).

The Bassendean Dune System was originally part of the coastline, and is thought to have formed between 225,000 to 115,000 years before present, during the Pleistocene geological period (Semeniuk and Glassford, 1989; McArthur and Bettenay, 1960). Over time, the effect of aeolian (wind) action and continual leaching of these marine deposits has resulted in the loss of calcium carbonate and has flattened the relief normally associated with coastal dunes. The Bassendean Dunes now consist of low hills of siliceous, heavily leached sand interspersed with poorly drained areas (McArthur and Bettenay, 1960).

The Spearwood Dune System consists of a core of limestone (called Tamala Limestone) overlain by yellow quartz sand (Semeniuk and Glassford, 1989). There appears to have been a considerable break between the formation of the Bassendean Dunes and the accumulation of the Spearwood Dunes, as the latter appear to date from the late Quaternary (between about 85,000 and 45,000 years before present) (McArthur and Bettenay, 1960).

GEOLOGY AND SOILS

Soils of the Bassendean Dunes System are comprised of Bassendean Soils and Southern River Soils. Bassendean Soils occur on dunes and inter-dune sand sheets, comprising deep grey sands with humic or ferruginous layers (Semeniuk and Glassford, 1989). In some instances, these soils contain minor discontinuous cemented iron oxides (coffee rock) near the surface (Churchward and McArthur, 1980). Southern River Soils are similar to Bassendean Soils, but with a greater occurrence of swampy areas and the presence of sandy clay,

clay and swamp deposits (Semeniuk and Glassford, 1989).

The Spearwood Dunes have been subject to differential wind erosion, which has produced two distinct soil types (Churchward and McArthur, 1980). On the eastern side, the Karrakatta Unit has deep yellow-brown sands overlying limestone, while the Cottesloe Unit to the west consists of shallow yellow-brown sands and exposed limestone (Semeniuk and Glassford, 1989). Only the Karrakatta Unit of the Spearwood System occurs within Jandakot Regional Park.

The low water holding capacity and poor nutrient status of the soils in the Park combine to make rehabilitation of degraded areas challenging.

THREATS TO GEOMORPHOLOGY, GEOLOGY AND SOILS

Erosion from uncontrolled access
Erosion is a localised problem in the Park caused largely by uncontrolled access. Horses and off-road vehicles in particular have caused erosion of sandy tracks and in fringing wetland areas.

Restricting access to sensitive areas is the most effective way of controlling erosion. This issue is discussed further in relation to visitor access for recreation (Section 31).

Mining and the extraction of basic raw materials
Sand mining in the Jandakot area is regionally significant because of the quality of the resource (Ministry for Planning, 1995b). There is, however, a strong presumption against mining and the extraction of basic raw materials in Jandakot Regional Park, as these activities are inconsistent with the nature conservation, recreation and landscape value of the Park.

New applications for mining and the extraction of basic raw materials from the Park will be referred to the Environmental Protection Authority for assessment (refer to Section 39).

Strategies

1. **Restrict access to areas at risk from erosion by implementing site enhancement plans and by providing fencing, signs and information (Sections 32 and 44). (DEC, LGAs, DCS) [Ongoing]**

16. Hydrology

The objective is to protect and conserve groundwater environments within the Park.

The Bassendean Sands of the Jandakot area are porous and allow the storage and movement of groundwater. They form a regional groundwater mound known as the Jandakot Groundwater Mound, from which up to 10 gigalitres of water is extracted annually (Water Corporation, 2009). The aquifer has a saturated thickness of up to 40 metres (*ibid.).* The groundwater is unconfined and its surface occurs close to, or at natural ground surface on a seasonal cycle from a high in late winter to a low in late summer. In some instances, groundwater will sit over areas where coffee rock occurs, forming a perched water table. The proximity of the groundwater to the surface makes it susceptible to contamination by pollutants.

PROTECTION AND MANAGEMENT OF GROUNDWATER RESOURCES

The Jandakot Mound is a significant source of Perth's drinking water supply and there is a range of provisions in place to protect it. The Water Corporation is responsible for abstracting and providing drinking water from Jandakot Groundwater Mound under the Jandakot Groundwater Scheme. The Scheme consists of 26 superficial aquifer wells and two wells into the underlying confined Leederville Aquifer. The Department of Water (DoW) is responsible for regulating water use (both by the Water Corporation and private bores) under conditions set by the Minister for Water. DoW licences the Water Corporation to operate the Jandakot Groundwater Scheme, subject to certain conditions.

The Ministerial conditions placed on DoW include the following requirements:

- Preparation of annual and triennial reports to the EPA on the environmental management of groundwater abstraction on the mound.
- Compliance with a significant number of minimum water level criteria in wetlands, native vegetation and threatened flora areas. DoW manages public and private abstraction to meet these criteria and in recent years has regularly required the Water Corporation to reduce abstraction so as not to breach the criteria.
- An ecological monitoring programme which includes monitoring of water levels, terrestrial and wetland vegetation, invertebrates and waterbirds. The monitoring programme provides feedback as to whether or not the water level criteria are protecting environmental values.

The Jandakot Underground Water Pollution Control Area (UWPCA) protects the part of the Jandakot Mound used for public drinking water supplies. The area was first proclaimed in 1975 under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* (Figure 5). DoW has policies for the protection of the Jandakot UWPCA, based on a three-tiered protection system (see Glossary). Parts of the Park that are located in the Jandakot UWPCA are classified as Priority 1. Priority 1 source protection areas are defined to ensure that there is no degradation of the water source. Priority 1 areas are declared over land where the provision of the highest quality public drinking water is the prime beneficial land use. Priority 1 areas are managed in accordance with the principle of risk avoidance and land development is generally not permitted.

In addition to priority classifications, well-head protection zones are defined to protect the water source from contamination in the immediate vicinity of Water Corporation production wells and

reservoirs. Well-head protection zones are usually circular, with a radius of 500 metres from the wells in Priority 1 areas.

To ensure consistency in planning, the main recharge areas for Jandakot Groundwater Mound are recognised and protected in the MRS. Priority 1 areas are reserved in the MRS as 'Water Catchments'. *Statement of Planning Policy No. 2.3 - Jandakot Groundwater Protection Policy* sets down the details for land use planning in these areas (Western Australian Planning Commission, 1998). Land uses that may be compatible with the 'Water Catchments' reservation are listed in the policy and include:

- maintenance and enhancement of native vegetation and wetlands;
- associated scientific research and education;
- passive recreation;
- caretakers' dwellings;
- public utilities; and
- important regional roads and railways.

Statement of Planning Policy No. 2.3 - Jandakot Groundwater Protection Policy (Western Australian Planning Commission, 1998) aims to ensure that development over the Jandakot groundwater supply mound is compatible with the long-term use of the groundwater for human consumption. Any land use changes within the policy area that are likely to cause detrimental effects to the groundwater are brought under planning control and prevented or managed.

Developments for recreation in the Park will need to comply with the *Statement of Planning Policy No. 2.3 - Jandakot Groundwater Protection Policy* (Western Australian Planning Commission, 1998), *Statewide Policy No. 13 - Policy and Guidelines for Recreation within Public Drinking Water Source Areas on Crown Land* (Water and Rivers Commission, 2003) and *Jandakot Land Use and Water Management Strategy* (Ministry for Planning 1995b). These policies may restrict the types of recreation development within the Park.

Strategies

1. **Comply with DoW requirements for developments in the Jandakot UWPCA and adopt management practices throughout the Park that do not add to the build up of nutrients and pollutants in the wetland and groundwater systems. (DEC, LGAs) [Ongoing]**

2. **Liaise with the Water Corporation and DoW in regard to water resources policy and its effects on Park management. (DEC) [Ongoing]**

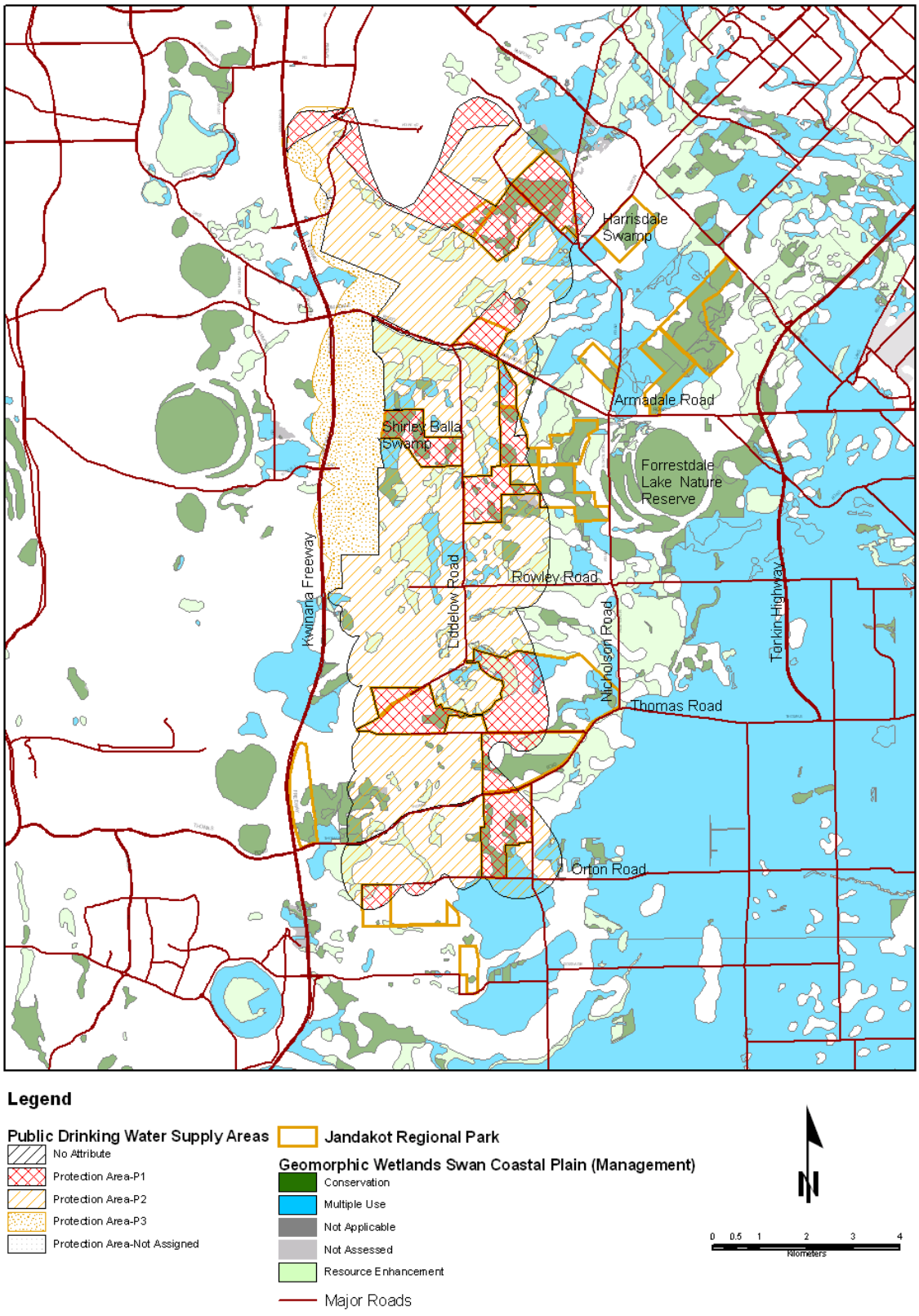


Figure 5 – Wetlands in the Park and the Jandakot Underground Water Pollution Control Area

17. Wetlands

The objective is to protect and conserve wetland environments within the Park.

Wetlands are a valuable environmental asset because they support diverse ecosystems and contribute to the State's biodiversity. Most wetlands on the Swan Coastal Plain have been dramatically modified by surrounding land uses and development.

Wetlands in the south-west of Western Australia are influenced greatly by the Mediterranean climate. It is a normal occurrence that water levels rise during wetter winter months and dramatically decrease in summer. This seasonal hydrological cycle creates biological, chemical and physical characteristics unique to the Swan Coastal Plain wetlands.

The wetlands of Jandakot Regional Park occur at low points in the landscape between sand dunes. These inter-dunal wetlands are generally expressions of the underlying groundwater aquifer and are acutely influenced by seasonal conditions. They are known as:

- sumplands – seasonally inundated basins of variable shape and size; or
- damplands – seasonally waterlogged basins of variable shape and size (Semeniuk, 1987; Semeniuk *et al.*, 1990; Hill *et al*., 1996a; Hill *et al.,* 1996b).

Wetlands of the Swan Coastal Plain have been grouped into similar suites (Semeniuk, 1988; and as mapped by Hill *et al*., 1996b). The wetlands of the Park fall into two suites:

- Bennett Brook Suite – located in the geomorphic setting of the Bassendean Dune – Pinjarra Plain transition or Bassendean Dune System with fluvial features. The underlying sediments have been described as peat or peaty sand or humic sand overlying quartz sand (Hill *et al.,* 1996a). This suite includes wetlands located in Anstey Estate, including Piara Nature Reserve and Harrisdale Swamp.
- Jandakot Suite – located in the geomorphic setting of Bassendean Dune System, the underlying sediments have been described as quartz sands, or clay overlying quartz sand. This suite includes wetlands in the majority of blocks in the Park.

Most wetlands in the Park are groundwater fed and reliant on the existing hydrological regime for continuance in their current state. Flow–through lakes are common on the porous sand of the Swan Coastal Plain. That is, these lakes capture water from the unconfined aquifer on their up-gradient side and discharge lake water to their down-gradient side (Townley *et al*., 1993).

All wetlands within the Park in reasonable biological condition should be considered regionally significant as wetlands in good condition are now poorly represented on the Swan Coastal Plain (Bowman Bishaw Gorham, 1990). The high nature conservation value of wetlands in the Park in comparison with other Swan Coastal Plain wetlands is due to the scarcity of urban development nearby, lack of drainage waters directed to water bodies, and the existence of remnant fringing vegetation.

A number of wetlands in the Park are listed as conservation category wetlands (Hill *et al*., 1996b and subsequent work by the Department of Environment). The Gibbs Road Swamp System is recognised nationally because it is listed on the Directory of Important Wetlands in Australia as a representative network of formerly extensive swamps in the area (Environment Australia, 2001).

Wetlands within the Park are protected under the *Wetlands Conservation Policy for Western Australia 1997* (Government of Western Australia, 1997). The Wetlands Conservation Policy is the result of the Government's recognition of the fundamental importance of conserving and managing wetlands in a sustainable manner. It outlines the Government's commitment to identifying, maintaining and managing the State's wetland resources, including the full range of wetland values, for the long term, and identifies the agencies involved and their responsibilities.

THREATS TO WETLANDS

Key threats to the wetlands of the Park include:

- water level changes;
- declining water quality;
- impacts of surrounding developments;
- aesthetic disruption (Section 24);
- aquatic or other environmental weeds (Section 20); and
- rubbish dumping (Section 40).

Water level changes

The unconfined groundwater aquifer plays a significant role in sustaining wetlands and vegetation in the area. The aquifer levels change naturally with rainfall on an annual and seasonal basis. Lower annual rainfall in recent years appears to be lowering water levels in some wetlands. Abstraction of groundwater for Perth's drinking water supply and private water extraction is further exacerbating this situation. Such a change in the hydrology may threaten native wetland

vegetation as well as reduce the water available to sustain upland vegetation communities.

DoW reports annually to the EPA on the environmental impacts of Water Corporation and private groundwater abstraction from the Jandakot Mound against environmental criteria, which include water levels.

Declining water quality

There is little data to present a detailed analysis of water quality in wetlands across the Park. McGuire *et al.* (1998) undertook wetland monitoring at Gibbs Road Swamp, Harrisdale Swamp and Shirley Balla Swamp. The wetlands in the Park were found to exhibit the following characteristics:

- they are highly coloured due to the presence of high levels of dissolved organic matter;
- salinity measures range from fresh (Gibbs Road Swamps) to marginal (Harrisdale Swamp) to brackish and saline (Shirley Balla Swamp);
- these wetlands show lower concentrations of nitrogen and phosphorus compared to other similar wetlands studied outside the Park;
- these wetlands have a lower measure of chlorophyll compared to other similar wetlands studied outside the Park (McGuire *et al*., 1998).

Wetlands in the Park may have been protected from increasing nutrients by the comparatively low density of surrounding development and retention of local vegetation.

Cattle grazing has occurred in some areas in the Park in the past and has degraded some wetlands.

Stormwater drains from urban or industrial areas do not appear to present a significant issue for water quality in the Park's wetlands. A branch of the Water Corporation's Birrega Sub-Main Drain discharges into a wetland in Anketell Estate, however there are no other drains that discharge directly into wetlands in the Park.

Urban surface water runoff does however pose an increasing risk to the wetlands of the Park. Best management practices for stormwater, incorporating water-sensitive urban design principles, and provision of community information regarding appropriate fertiliser, herbicide and pesticide use in urban areas close to the Park, will help reduce nutrients and other inputs into the wetland and groundwater systems. Maintenance and re-establishment of fringing wetland vegetation will assist with filtration of nutrients and other pollutants.

Monitoring of wetland ecosystems is undertaken by DoW, as a Ministerial requirement of managing the Jandakot Groundwater Scheme. Long term monitoring sites are located at Harrisdale Swamp and Shirley Balla Swamp.

Impacts of surrounding developments

Urban development surrounding the Park may cause physical disturbance to wetlands. Drainage, excavation and filling works (including de-watering activities) either during or post construction need to be managed. This can be achieved by ensuring that appropriate conditions are placed on planning and environmental approvals.

There is a need for the principles of integrated catchment management to be implemented to help manage the effects of pollution, hydrological change, salinisation and surrounding land uses on wetlands in the Park.

Strategies

1. **Monitor the health of wetland ecosystems in the Park by monitoring naturally occurring aquatic macro-invertebrate populations (Section 19). (DEC) [Ongoing]**

2. **Provide advice as required on the impact of groundwater abstraction on the Park, particularly in regard to setting environmental water provisions. (DEC) [Ongoing]**

3. **Protect and re-establish wetland vegetation in disturbed areas. (DEC, CoA, CoC, ToK) [High]**

4. **Encourage the local government authorities to land use and infrastructure policies consistent with the principles of integrated catchment management, and promote best practice in relation to water-sensitive urban design, drainage and irrigation management. (DEC) [High]**

5. **Liaise with DoP to discourage land-use practices that contribute nutrients and other pollutants into the Park's wetlands, and encourage and facilitate the relocation of inappropriate land uses to more suitable locations. (DEC, LGAs,) [Ongoing]**

6. **Liaise with DoP to ensure that appropriate conditions are placed on subdivision and development approvals in or adjoining the Park to prevent adverse impacts on wetlands in the Park. (DEC, LGAs) [Ongoing]**

7. **Ensure that recreation sites and activities in the Park do not impact on the values of wetlands. (DEC, CoA, CoC, ToK) [Ongoing]**

8. **Provide educational and interpretive materials to the community to increase understanding of:**
   - **the effects of pollution on the wetlands; and**
   - **appropriate use of fertilisers and irrigation. (DEC, DoW, LGAs) [Ongoing]**

Key performance indicators for wetlands
The success of the strategies will be measured by: 1. Changes in abundance, species diversity and structure of naturally-occurring aquatic macro-invertebrate populations in selected wetlands.
Target: 1. No decline in the abundance or diversity of naturally occurring aquatic macro-invertebrate populations from 2010 levels.
Reporting: 1. Every 5 years.

(Note: monitoring needs to take into account natural variability.)

18. Flora and Vegetation

The objective is to protect, conserve and rehabilitate local flora species and vegetation communities in the Park.

Jandakot Regional Park is floristically diverse, and contains many areas of native vegetation that are relatively undisturbed. Conservation of these areas is one of the foremost functions of the Park. There are also cleared, former agricultural areas in the Park, which are infested with weeds.

VEGETATION

The Park lies in the Drummond Subdistrict of the Darling District of the South-West Botanical Province of Western Australia. Beard (1981) identified the vegetation of the Bassendean Dune System as low woodland with scattered trees. The dominant species are *Banksia attenuata, Banksia menziesii, Banksia ilicifolia, Eucalyptus todtiana* and *Nuytsia floribunda* with a dense understorey of sclerophyll shrubs.

The low lying, poorly drained depressions of the Bassendean Dune System vary between heath communities or low woodland and forest of *Melaleuca preissiana, Melaleuca rhaphiophylla, Banksia littoralis* or the taller *Casuarina obesa* or *Eucalyptus rudis* (Beard, 1981). Sedges may be the other dominant community of wetland areas.

FLORISTIC COMMUNITIES

A number of floristic communities have been defined for the Swan Coastal Plain bioregion. These floristic community types are based on analysis of detailed floristic data from a large number of quadrats located throughout the region (Gibson *et al.*, 1994 and subsequent work by Government of Western Australia, 2000). Table 2 shows the floristic community types that occur in the Park.

Type no.	Community type name
Seasonal wetlands	
4	*Melaleuca preissiana* damplands
5	Mixed shrub damplands
8*	Herb-rich shrublands in clay pans
10a*	Shrublands on dry clay flats
11	Wet forests and woodlands
12	*Melaleuca teretifolia* and/or *Astartea fascicularis* shrublands
13	Deeper wetlands on heavy soils
S2	Northern *Pericalymma ellipticum* dense low shrublands
S3	Wet sedgelands on sandy clays
Uplands	
21a	Central *Banksia attenuata – Eucalyptus marginata* woodlands
21c	Low-lying *Banksia attenuata* woodlands or shrublands
22	*Banksia ilicifolia* woodlands
23a	Central *Banksia attenuata – Banksia menziesii* woodlands
28	Spearwood *Banksia attenuata* or *Banksia attenuata – Eucalyptus* woodlands

Table 2 – Floristic Community Types at Jandakot Regional Park

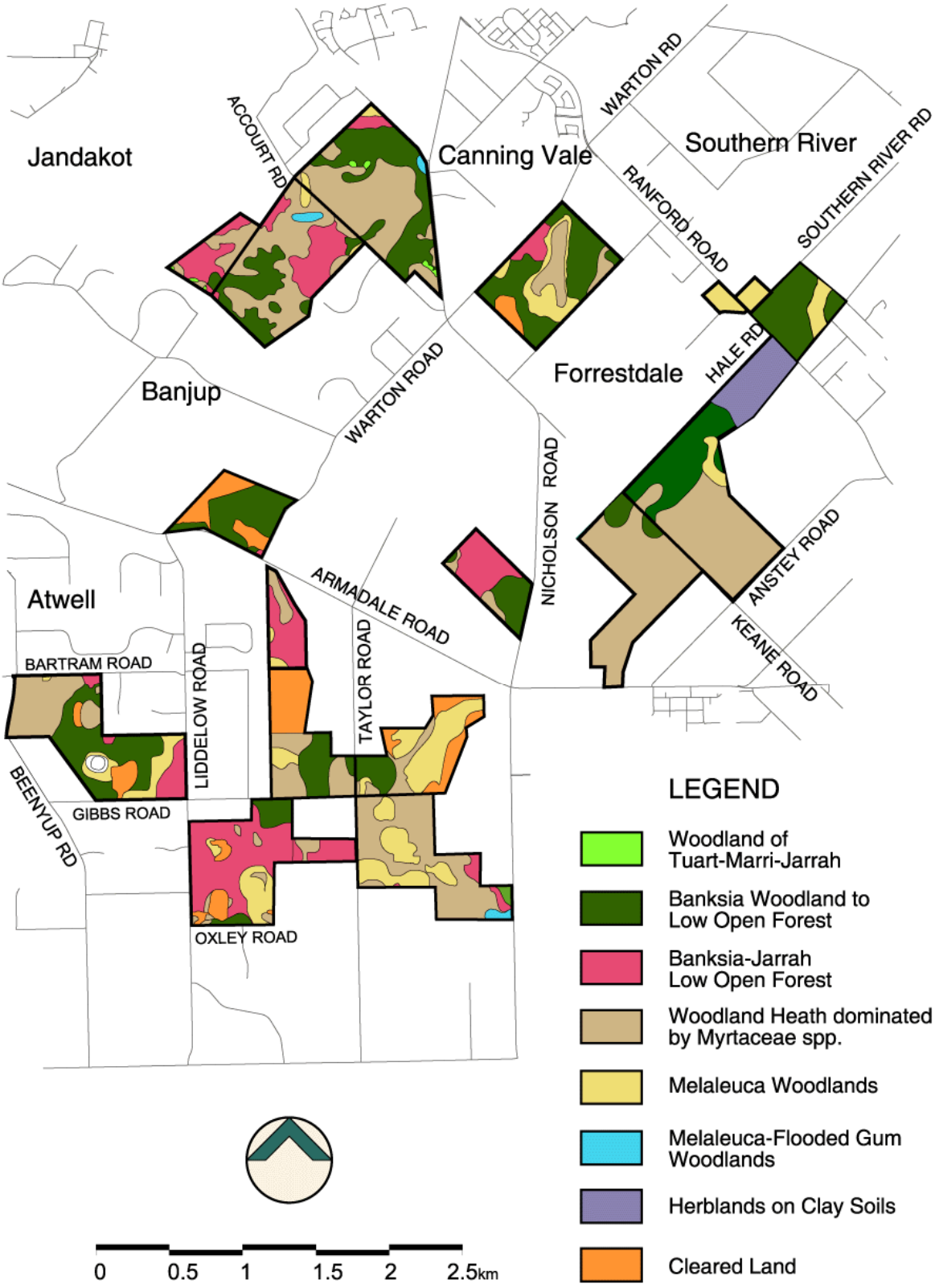
* The presence of these community types is inferred.
(Source: Adapted from Government of Western Australia, 2000, after Gibson *et al.*, 1994)

More detailed analysis of floristic communities in the Park has been undertaken by Mattiske and Koch (1991). The following descriptions were used in mapping vegetation within the Park's boundaries (Figure 7).

Woodland of Tuart-Marri-Jarrah
Woodland of *Eucalyptus gomphocephala – Corymbia calophylla – Eucalyptus marginata* with mixtures of *Banksia attenuata – Banksia menziesii* and *Allocasuarina fraseriana*. The understorey is variable depending on the degree of leaching and proximity to limestone outcrops. Understorey species would include *Hibbertia hypericoides, Hibbertia racemosa, Hakea costata, Petrophile serruriae, Jacksonia hakeoides, Xanthorrhoea preissii, Calothamnus sanguineus, Eremaea pauciflora, Stirlingia latifolia, Synaphea polymorpha* and *Conospermum stoechadis*.

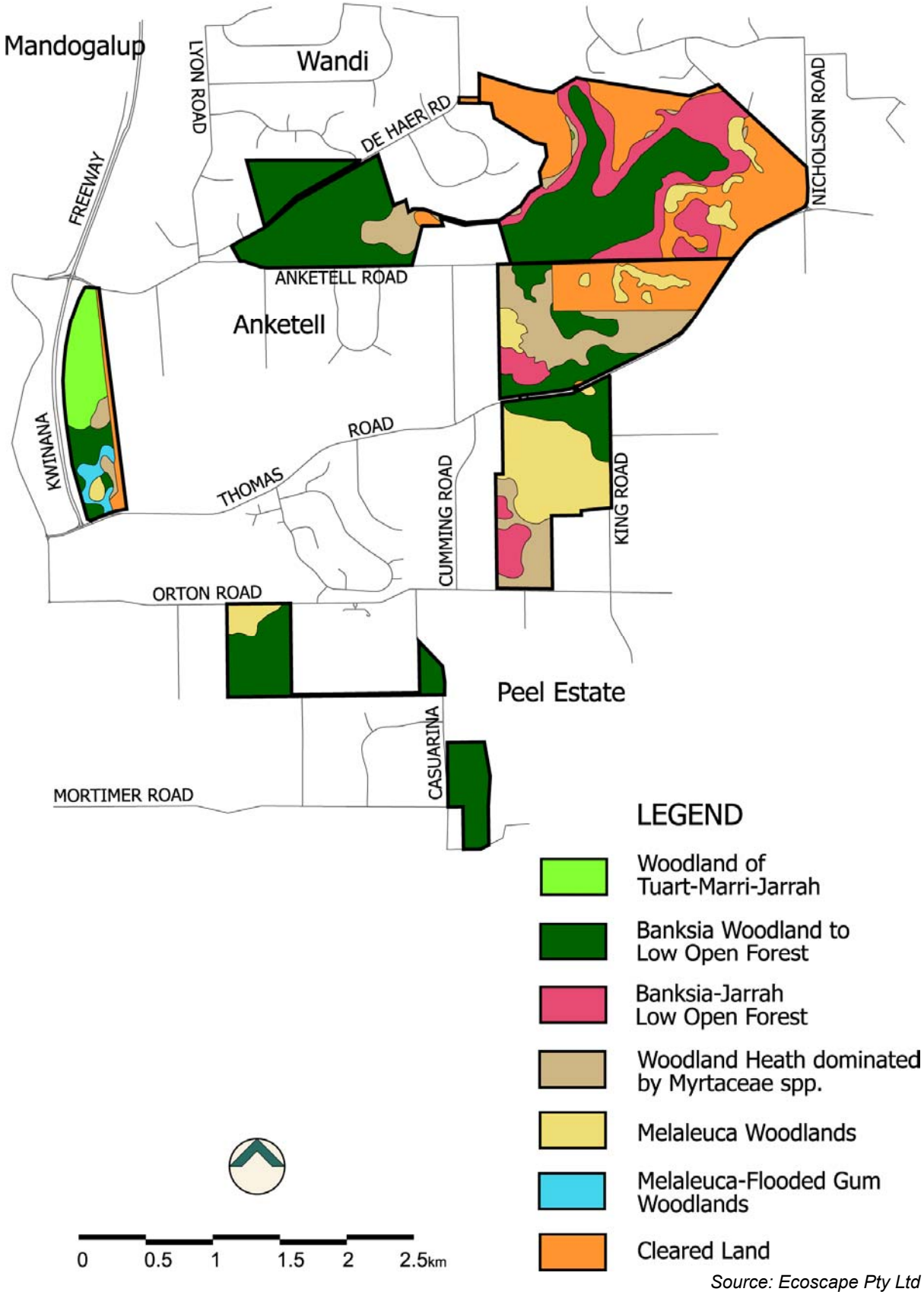
Banksia woodland to low open forest
Low woodland to low open forest of *Banksia attenuata – Banksia menziesii* with occasional *Banksia ilicifolia, Allocasuarina fraseriana, Eucalyptus marginata* and *Nuytsia floribunda*. The understorey is variable depending on the degree of leaching and soil moisture levels. Understorey species would include *Daviesia quadrilatera, Pimelea sulphurea, Calectasia cyanea, Eremaea pauciflora, Jacksonia floribunda, Scholtzia involucrate, Melaleuca scabra* and *Astroloma xerophyllum*.

Banksia-Jarrah low open forest
Low open forest of *Banksia ilicifolia – Eucalyptus marginata* with occasional *Banksia attenuata*. The understorey is variable depending on the soil types and moisture levels. Understorey species would include *Dasypogon bromeliifolius, Adenanthos obovatus, Scholtzia involucrate, Xanthorrhoea preissii, Hypocalymma angustifolium* and *Pultenaea reticulata*.



Source: Ecoscape Pty Ltd

Figure 6 – Vegetation Distribution (North)



Source: Ecoscape Pty Ltd

Figure 7 – Vegetation Distribution (South)

Woodland heath
Low open woodland or closed heath dominated by species of Myrtaceae. Tree species are predominantly *Melaleuca preissiana* or *Banksia ilicifolia*. The understorey species reflect local soil types and moisture levels and include *Hypocalymma angustifolium, Pericalymma ellipticum, Astartea fascicularis, Calothamnus lateralis* and *Adenanthos obovatus*.

Melaleuca woodlands
Woodlands of *Melaleuca preissiana – Melaleuca rhaphiophylla* with occasional *Eucalyptus rudis* and *Banksia littoralis*. There is considerable variation in vegetation types on these wetter seasonal swamps and potentially water logged swamps, with sedgelands of *Baumea* and *Leptocarpus* species and closed heaths dominated by Myrtaceae species. Understorey species would include *Calothamnus lateralis, Regelia ciliata, Astartea fascicularis* and *Typha* species.

Melaleuca-Flooded gum woodlands
Woodlands of *Melaleuca rhaphiophylla – Eucalyptus rudis* with the occasional *Melaleuca preissiana* and *Banksia littoralis* on the fringes of regularly waterlogged soils and lakes. The woodlands are regularly interspersed with sedgelands of *Baumea, Leptocarpus* and *Typha* and areas of open water or lakes. Species found in this community include *Pericalymma ellipticum, Astartea fascicularis, Calothamnus lateralis, Regelia ciliata* and *Typha* species.

Threatened ecological communities
While no threatened ecological communities (see Glossary) have been mapped within the Park, *Bush Forever* infers the presence of two threatened ecological communities in the damplands of Anstey Estate, immediately adjacent to the Park (Government of Western Australia, 2000).

Herb rich shrublands in clay pans (community type 8) is described as 'vulnerable' (see Glossary) (Government of Western Australia, 2000).

Shrublands on dry clay flats (community type 10a) is described as 'endangered' (see Glossary) (Government of Western Australia, 2000).

Management of the above threatened ecological communities should aim to avoid disturbances, with particular attention to controlling impacts from recreational horse riding, weed invasion and inappropriate fire regimes.

DEC coordinates, assists and promotes the conservation of threatened species and ecological communities on private land and on conservation estate.

Declared rare and priority flora
Declared rare and priority flora known to occur in the Park includes the following:
Declared rare flora (see Glossary)

- *Caladenia huegelii*
- *Diuris purdiei*
- *Drakaea elastica*
- *Drakaea micrantha* ms

Priority species (see Glossary)
Priority 1

- *Tripterococcus paniculatus* ms

Priority 3

- *Stylidium longitubum*

Priority 4

- *Drosera occidentalis* subsp. *occidentalis*
- *Jacksonia sericea*
- *Verticordia lindleyi* subsp. *lindleyi*
- *Villarsia submersa*

Other significant species found in the Park are recorded in *Bush Forever* (Government of Western Australia, 2000).

A management plan for declared rare flora in DEC's Swan Region, which includes the Park, has been prepared. The plan will guide management for conservation of these species (Evans *et al.*, 2003).

THREATS TO FLORA AND VEGETATION

The main threats to the flora and vegetation communities of the Park are:

- urban interface issues and uncontrolled access by vehicles, horses and pedestrians;
- plant diseases and pathogens;
- insect borers;
- altered hydrology (Section 16);
- weeds (Section 20);
- wildfire (Section 21); and
- pest and problem animals (Section 22).

Urban interface issues and uncontrolled access
Urban development is expanding close to many areas of the Park. Maintaining the integrity of bushland and wetland habitats in urban areas, particularly where the Park is fragmented, involves raises many issues such as weed invasion, arson, horse riding, uncontrolled access, and rubbish dumping. These are discussed in Sections 20, 21, 33, 34 and 40 respectively.

All native flora is protected under the *Wildlife Conservation Act 1950 and the Environmental Protection Act 1986 – Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Incidences of wilful damage to vegetation in the Park will be investigated and appropriate action taken by DEC.

Plant diseases and pathogens
Phytophthora dieback refers to the plant disease caused by the pathogen *Phytophthora cinnamomi* and other related species, which are types of oomycete or water moulds. These introduced soil-borne pathogens kill a wide selection of plant species of the southwest of Western Australia (Dieback Working Group, 2000). The results of infection include destruction of susceptible species and dramatic changes in vegetation community structure, and consequently, loss of habitat and food sources for native animals.

In the Park, surveys have indicated the presence of *Phytophthora cinnamomi* at Denis de Young Reserve (Bowman Bishaw Gorham, 1998) and Gibbs Road Reserve (Ecoscape 2002) and the Anstey-Keane Block (City of Armadale, 2009). *Phytophthora cinnamomi* has not been recorded in Wandi Nature Reserve (Ecoscape 2002).

Phytophthora dieback is considered a significant threat to the Park because many of the plant families most at risk from *Phytophthora* species are present in the Park. These include Proteaceae, Myrtaceae, Epacridaceae and Papilionaceae (Dieback Working Group, 2000).

Preventing the spread of *Phytophthora* dieback in the Park can be achieved by ensuring vehicle hygiene, closing tracks and limiting access to infected areas and areas sensitive to infection. Materials imported to the Park must be free of *Phytophthora* infection.

Altered hydrology
Altered water regimes appear to be modifying wetland vegetation and upland vegetation communities in the Park. This may be a natural consequence of lower rainfall in Perth over the past twenty years or a combination of this effect with the abstraction of water for Perth's water supply. DoW is responsible for managing and monitoring the use of Jandakot Groundwater Mound, as discussed in Section 16.

Insect borers
The native tuart longicorn beetle (*Phoracantha impavida)* is a natural part of the tuart ecosystem. This borer lays eggs in the upper branches of the tuart and the larvae eat the cambium layer beneath the bark and thus ring-bark the branches leading to death of the limb. The tree can usually repair some damage by shooting from lower down, and by exuding sap, which engulfs the young larvae. Whilst a small level of insect attack is normal, repeated attack may ultimately cause the tree's death. Tuarts are more susceptible to borer attack when they are stressed.

This beetle has become an increasing threat over the last few years; the primary cause is likely to be a combination of environmental changes, including climate and fire frequency. Further research is required to understand this phenomenon and to determine appropriate control mechanisms.

Strategies

1. **Continue to implement the Jandakot Regional Park Weed Species and Rehabilitation Plan. Special emphasis is to be placed on threatened ecological communities, declared rare, priority and other significant flora identified in the Park. (DEC, CoA, CoC, ToK) [High]**

2. **Use local species for landscape and amenity plantings. If non-local species are required they should not include invasive species. (DEC, CoA, CoC, ToK) [Ongoing]**

3. **Reduce the risk of introducing and spreading plant diseases in the Park by limiting access to infected and susceptible areas and by ensuring appropriate hygiene standards for vehicles and machinery entering the Park. Soil introduced to and being moved around the Park is to be free of disease. (DEC, CoA, CoC, ToK) [Ongoing]**

4. **Encourage research into the wood-boring beetle *Phoracantha impavida* and encourage research to understand and manage the processes behind tuart decline. (DEC, Tuart Response Group) [Medium]**

5. **Reduce the impact of wildfire, utilising strategies set out in Section 22. (DEC, CoA, CoC, ToK) [Ongoing]**

6. **Provide information and interpretative material to the public that:**
   - **promotes an understanding and appreciation of the Park's flora and vegetation; and**
   - **encourages the planting of local species in areas surrounding the Park.**

   (DEC, LGAs) [Ongoing]

7. **Investigate any wilful damage to vegetation in the Park and take appropriate action. (DEC, LGAs) [Ongoing]**

8. **Encourage the participation of volunteers, educational institutions and other organisations in research projects within the Park. (DEC, CoA, CoC, ToK) [Medium]**

Key performance indicators for flora and vegetation
The success of the strategies will be measured by: 1. Changes in the abundance of selected flora species. 2. Changes in the occurrence of *Phytophthora cinnamomi* infections at selected locations in the Park. 3. Existence of a weed management and rehabilitation plan.
Target: 1. No decline in the abundance of selected flora species. 2. No new human-assisted occurrences of *Phytophthora cinnamomi* at selected locations in the Park. 3. Implementation of the weed management and rehabilitation plan.
Reporting: 1. Every 5 years. 2. Every 5 years. 3. Every 5 years.

(Note: monitoring needs to take into account natural variability.)

19. Fauna

The objective is to protect and conserve naturally-occurring fauna species in the Park, particularly threatened and priority species.

Birds
In assessing the Jandakot Groundwater Scheme area, Bamford and Bamford (1998) observed 76 waterbird species and 89 species of bushbirds.

Waterbird habitat in the Park varies seasonally because the wetlands are seasonally inundated and subject to periods of drying out. The smaller, partly vegetated wetlands support maximum numbers and densities of waterbirds during early spring when water levels are highest (Bamford and Bamford, 1998). These wetlands are also extensively used for breeding which highlights their value for nature conservation. Pacific black duck (*Anas superciliosa*), purple swamphen (*Porphyrio porphyrio*) and Australasian shoveler (*Anas rhynchotis*) use the Park extensively. Black swan (*Cygnus atratus*), little pied cormorant (*Phalacrocarax melanoleucos*), Eurasian coot (*Fulica atra*) and dusky moorhen (*Gallinula tenebrosa*) are also thought to live and breed in wetlands of the Park (Government of Western Australia, 2000).

Bush Forever (Government of Western Australia, 2000) lists bushbird species that are significant (defined as uncommon) in the metropolitan region, with many of these being small, sedentary species dependent upon native vegetation and prone to local extinction even in large reserves (How *et al.*, 1995). Many of these species were recorded near the Park at Jandakot Airport in March 2002, including painted button-quail (*Turnix varia*), splendid fairy-wren (*Malurus splendens*), western thornbill (*Acanthiza inornata*), New Holland and white-cheeked honeyeater (*Phylidonyris novaehollandiae* and *Phylidonyris nigra*), western wattlebird (*Anthochaera lunullata*), scarlet robin (*Petroica multicolour*), hooded robin (*Melanodryas cucullata*), grey shrike-thrush (*Colluricincla harmonica*) and black-faced woodswallow (*Artamus cinereus*) (Bamford 2002). The persistence of several of these species may depend upon ongoing linkage with Jandakot Regional Park, where all are almost certain to be present.

The Park provides habitat for several threatened and priority bird species. Short-billed (Carnaby's) black cockatoo (*Calyptorhynchus latirostris)* may frequent the Jandakot area to forage on banksia seeds. This is a threatened species that is specially protected under the *Wildlife Conservation Act 1950*, as well as listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Any activities that have, will have or are likely to have significant impact on these species will require approval under the *Environment Protection and Biodiversity Conservation Act 1999*.

Peregrine falcon (*Falco peregrinus*) are also likely to visit the Park. Peregrine falcon are specially protected under the *Wildlife Conservation Act 1950*.

Freckled duck *(Sticonetta naevosa)*, square-tailed kite (*Lophoictinia isura*) and barking owl (*Ninox connivens*) are significant birds known to frequent the area. Freckled duck and square-tailed kite are classified as priority 4 fauna species (see Glossary). Barking owl is a priority 2 species (see Glossary).

Mammals
The Park provides a number of distinct habitats suitable for mammal populations. All native mammal species found in the Jandakot area have declined in abundance in the Perth region (Government of Western Australia, 2000), which makes the Park extremely valuable as a wildlife refuge. Bamford and Bamford (1988) listed a total of 30 mammal species recorded in the Jandakot area.

Mammals found in the area include western grey kangaroo *(Macropus fuliginosus),* western brush wallaby *(Macropus irma),* quenda *(Isoodon obesulus fusciventer),* honey possum *(Tarsipes rostratus),* white-striped bat *(Tadarida (Nyctinomus) australis),* Gould's wattled bat *(Chalinolobus gouldii),* southern forest bat *(Vespedalus regulus)* and lesser long-eared bat *(Nyctophilus geoffroyi)*. Western false Pipistrelle *(Falsistrellus mackenziei)* are also possibly present in the Park.

The quenda is a priority 5 species and the western brush wallaby is a priority 4 species (see Glossary). The Armadale - Jandakot area is considered a stronghold for the quenda.

Reptiles and Amphibians
Reptile and frog species have generally declined in the Perth area (Government of Western Australia 2000). Bamford and Bamford (1988) listed 43 species of reptiles and nine species of amphibians that have been recorded, or are likely to occur, in the Jandakot area. These include the moaning frog (*Helioporus eyrei*), tiger snake (*Notechis scutatus*), dugite (*Pseudonaja affinis*), geckos, skinks, monitors and dragon lizards.

The turtle frog (*Myobatrachus gouldii*), western bluetongue skink (*Tiliqua occipitalis*), black-headed tree-monitor (*Varanus tristis),* sandhill dragon (*Tympanocryptis (Christinus) adelaidensis),* worm lerista (*Lerista praepedita),* narrow-banded snake (*Brachyurophis fasciolata)* and half-ringed snake (*Brachyurophis semifasciata)* are of interest because they are all at the southern limit of their distribution in the Jandakot region. Species at the northern limit of their range are Rosenberg's goanna (*Varanus rosenbergi),* crowned snake (*Elapognathus (Notechis) coronatus)* and Perth lined lerista (*Lerista lineata),* which has a restricted distribution. The carpet python (*Morelia spilota imbricata)* is also likely to be found in the Park and is specially protected under the *Wildlife Conservation Act 1950*.

It is acknowledged that the presence of venomous snakes may be a concern to some Park visitors and local residents. It is proposed to provide contact details within the Park for wildlife carers and organisations that relocate dangerous or injured fauna.

Invertebrates
No detailed studies of invertebrates are available on the wetlands of the Park, however, invertebrate sampling of selected wetlands has been undertaken, with results as follows (McGuire *et al.*, 1998).

- Shirley Balla Swamp – a total of 24 invertebrate taxa have been recorded including 15 insect taxa, eight crustaceans and one arachnid.
- Gibbs Road Swamp – a total of 38 taxa have been recorded including 21 insect taxa, eight crustaceans, five arachnids, two molluscs and two annelids.
- Harrisdale Swamp - a total of 40 taxa have been recorded including 21 insect taxa, nine crustaceans, six arachnids, three molluscs and one annelid.

The numbers of invertebrate families recorded at Gibbs Road Swamp and Harrisdale Swamp are considered to indicate 'good' ecological health for wetlands in the metropolitan area (McGuire *et al.,* 1998).

THREATS TO FAUNA

The main threats to fauna within the Park are:

- the loss and fragmentation of habitat that could result from wildfire (Section 21);
- competition and predation by pets and problem animals (Section 22);
- the invasion of weeds (Section 20);
- loss of habitat from plant diseases (Section 18);
- loss of native habitat surrounding the Park (Section 25); and
- death or injury of native animals on transport corridors within and adjoining the Park.

Strategies

1. **Continue management focus on habitat protection and enhancement as well as feral animal control to improve conditions for native fauna. (DEC) [High]**

2. **Apply the 'Pest and Problem Animal Control Plan for Regional Parks'. (DEC) [High]**

3. **Provide interpretive material that:**
   - **promotes an understanding and appreciation of the Park's fauna;**
   - **supports volunteer groups involved with the Park; and**
   - **informs the public about the adverse impacts of feral animals and domestic pets on native fauna in the Park.**

   (DEC, LGAs) [Medium]

4. **Ensure that recreational uses (such as dog exercising and horse riding) are consistent with the protection and management of fauna and fauna habitat. (DEC, CoA, CoC, ToK) [Ongoing].**

5. **Provide the contact details of wildlife carers for the removal of injured fauna from the Park and the relocation of dangerous fauna from places where they constitute a significant risk to people. (DEC) [Medium]**

6. **Consider the reintroduction of appropriate native wildlife into the Park pending successful management of introduced animals and availability of appropriate habitat. (DEC) [Low]**

7. **Promote the research of fauna in the Park to assist with the management of fauna. (DEC, CoA, CoC, ToK) [Ongoing]**

8. **Investigate any wilful damage to fauna in the Park and take appropriate action. (DEC, CoA, CoC, ToK) [Ongoing]**

Key performance indicators for fauna
The success of these strategies will be measured by: 1. Changes in species diversity of naturally-occurring fauna. 2. Changes in the abundance of selected naturally-occurring species.
Target: 1. No decline in species diversity of naturally-occurring fauna. 2. No decline in the abundance of selected naturally-occurring species.
Reporting: 1. Every 5 years. 2. Every 5 years.

(Note: monitoring needs to take into account natural variability.)

20. Weeds

The objective is to minimise the impact of environmental weeds on the local plant species and communities within the Park.

Environmental weeds have been defined as plants that establish in natural ecosystems (marine, aquatic, terrestrial) and proceed to modify natural processes, usually adversely, resulting in the decline of the communities they invade (Department of Conservation and Land Management, 1999). Weeds may originate from intrastate, interstate, or overseas. Some weeds are declared under the *Agriculture and Related Resources Protection Act 1976*.

Many weeds, particularly grass species, grow quickly and have abundant seeds that spread widely. Weeds compete for space, nutrients, water and sunlight, which often leads to a decline in native species diversity within native bushland. Weeds may also physically hinder plant regeneration and alter local nutrient recycling.

The invasion of weeds is a major threat to the conservation value of the Park and it is vital that measures be introduced to limit or control the degradation processes. There are many reasons for the presence of weeds in the Park including:

- land clearing;
- past land uses;
- horse riding;
- soil disturbance from vehicle access;
- construction of paths, fire access tracks and other facilities which allow weeds to establish;
- drains entering the park from urban and agricultural areas
- fires, which promote the growth of weeds;
- the dumping of garden refuse in the Park which introduces many plants that vigorously compete with local vegetation;
- invasive species from adjoining areas, road verges and gardens;
- transportation of weed seeds by animals or wind; and
- grasses planted for amenity purposes in parkland settings invading bushland areas.

There are a number of weeds which are causing significant problems in the Park. In particular, grasses such as wild oats (*Avena fatua*), silver grass (*Vulpia myuros*), Cape tulip (*Homeria miniata*) and veldt grass (*Ehrharta calycina*) are impacting on native communities. Grasses are highly invasive. They smother and compete vigorously with native species, thereby reducing biodiversity. Weed growth also adds to bushland fuel loads and is considered to be a serious fire hazard.

There are also many weeds that are currently localised, such as Arum lily (*Zantedeschia aethiopica*), pampas grass (*Cortaderia selloana*) and castor oil (*Ricinus communis*), which have the potential to significantly impact on the Park, particularly in wetland areas.

Parts of the Park have been disturbed in the past and are highly modified by grazing. Weeds are of concern in these areas but need to be managed in the context of future land uses.

Bulrush control

Typha orientalis or bulrush is a weed that occurs in some wetlands in the Park. This species is an aggressive coloniser especially following disturbance, often to the detriment and exclusion of local reeds and sedges, including *Typha domingensis*. *Typha orientalis* creates an increased risk of fire because it dries out in summer. If not controlled, *Typha orientalis* can also invade and block constructed drains causing maintenance problems.

Although *Typha orientalis* is a non-local species, it does perform a number of valuable conservation functions. It provides shelter, nesting sites and is a food source for some birds and other wildlife. It also performs a nutrient-stripping function, although its nutrient-stripping capability is generally inferior to local species that grow in the same environment and are less seasonal in their growth cycle. (Regeneration Technology, 2002)

The removal of *Typha orientalis* from the Park needs to be carefully considered for the above reasons. The floral composition of many of the Park's damplands and sumplands requires *Typha orientalis* control in conjunction with revegetation, in order to protect the natural diversity of species and other conservation values.

WEED MANAGEMENT

All methods of weed control (chemical, physical, or biological) need to be considered for their application in the Park. Ecological considerations place constraints on weed control, because side-effects such as those on native plants or habitat may rule out the use of some techniques. There are also financial constraints on the amount of weed control that can be carried out.

Guidance for weed management in the Park is provided by *Weeds on Department of Conservation and Land Management Land, Policy Statement No. 14,* and the *Environmental Weed Strategy for Western Australia* (Department of Conservation and Land Management, 1999). More detailed planning has been undertaken in the form of the *Jandakot Regional Park Weed Species and Rehabilitation Plan* (Syrinx Environmental, 2006) which outlines an integrated and coordinated approach to weed management in the Park. This plan is consistent with the above policy and strategy.

Chemical weed control measures in Public Drinking Water Source Areas must comply with *Statewide Policy No.2, Pesticide use in Public Drinking Water Source Areas* (Water and Rivers Commission, 2000) and *Circular No. PSC 88: Use of Herbicides in Water Catchment Areas* (Department of Health 2007).

The *Jandakot Regional Park Weed Species and Rehabilitation Plan* outlines the extent and abundance of priority weeds and the most effective methods for controlling priority weed species within the Park (Syrinx Environmental, 2006).

In determining weed control programmes, DEC will consider the following matters:

- recognition of weed potential (invasiveness, distribution and environmental impact);
- maintaining areas of the Park that have vegetation in good condition as a priority; and
- control of weeds that impact on significant species and threatened species and communities as a priority.

It is important to discuss weed control with leaseholders and park neighbours to enable a more coordinated effort of weed control to be implemented. The planting of non-local plant species within and adjacent to the Park should be discouraged and discussions may be needed with local government authorities, leaseholders and other stakeholders to ensure that local provenance species are planted in the Park and on road verges surrounding the Park.

Weed control can greatly benefit from community involvement. Community involvement in park management is critical to the successful implementation of this Plan. Managing agencies have limited resources and weed control can be very labour-intensive. The managing agencies acknowledge the considerable efforts by the community in undertaking works to control weeds. Volunteer groups have successfully undertaken weed control projects within the Park. Members of the community are encouraged to be involved in weed control programmes in the Park by establishing or joining community volunteer groups within the Park and participating in activities in the Park organised or coordinated by the managing agencies.

Strategies

1. **Continue to implement the *Jandakot Regional Park Weed Species and Rehabilitation Plan.* The plan provides:**
   - **an assessment of bushland condition;**
   - **maps of weed distribution;**
   - **priorities according to invasiveness, distribution and environmental impact; and**
   - **revegetation strategies.**

   (DEC) [High]

2. **Consult with the Water Corporation, DoW and local government authorities to ensure adequate weed control in drains that flow through the Park and in P1 areas of the Jandakot UWPCA. (DEC) [Ongoing]**

3. **Where possible, coordinate weed control programmes with lessees in the Park and adjacent landowners. (DEC) [Ongoing]**

4. **Use interpretive and educational material to inform Park visitors, lessees and park neighbours about the effects of dumping weeds, rubbish and garden refuse in the Park. (DEC, CoA, CoC, ToK) [Medium]**

5. **Encourage and support volunteer community groups to become involved with weed control and rehabilitation projects in the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

Key performance indicators for weeds
The success of these strategies will be measured by: 1. Changes in populations of high priority weeds as identified in the *Environmental Weeds Strategy for Western Australia*. 2. Changes in the abundance and distribution of priority environmental weeds, as identified in the Park's weed management and rehabilitation plan. 3. Existence of a weed management and rehabilitation plan.
Target: 1. No new populations of high priority weeds as identified in the *Environmental Weeds Strategy for Western Australia*. 2. No increase in the abundance and distribution of priority environmental weeds. 3. Completion and implementation of the weed management and rehabilitation plan.
Reporting: 1. Every 5 years. 2. Every 5 years. 3. Every 5 years.

21. Fire

The objective is to manage fire to protect and promote the conservation of biodiversity and natural values whilst also providing for the protection of human life and community assets.

Wildfire is a significant threat to the Park and the risk of fire needs to be managed. Wildfires can threaten biodiversity, human life, property and cultural values of the Park. Increasing urbanisation and visitor use of the Park is likely to increase the incidence of unplanned fire. Restricting access to high risk areas can reduce the incidence of unplanned fire.

FIRE MANAGEMENT

The responsibility for fire suppression is dependent on whether the fire is within or outside a gazetted fire district. Jandakot Regional Park is partly within the gazetted Fire and Emergency Services Authority (FESA) fire district, and partly under the control of local government authorities (Bushfire Brigades) or DEC (Department of Conservation and Land Management and Fire and Emergency Services Authority, 2005). The boundary of the gazetted fire district is reviewed regularly. Fire suppression occurs in consultation with the managing agency for the land. Fire suppression in the Park needs to be undertaken in an environmentally-sensitive manner.

Pre-suppression and post-suppression works in the Park are the land managers' responsibilities. An important consideration in these works is the protection of environmentally sensitive areas, and measures should be initiated to prevent the spread of plant diseases and weeds.

When managing fire, DEC is guided by the *Bush Fires Act 1954* and *Fire Management Policy Statement No. 19*.

A Fire Response Plan for the Park has been developed by DEC in conjunction with FESA and the relevant local government authorities, to help ensure effective response to wildfire by the responsible agencies. It includes practices such as:

- protecting environmentally sensitive areas from wildfire;
- undertaking pre-suppression activities including reducing fuel loads by mowing or slashing large open grassed areas (mown or slashed areas should be delineated so that mowing practices do not adversely affect natural regeneration and fauna habitat);
- maintaining a fire record system of all fires in the Park including date and cause; and
- ensuring that an effective network of fire access tracks is maintained.

If selective prescribed burning is being considered for the Park and within the Jandakot UWPCA, further consultation will occur with the Conservation Commission, DoW, relevant local government authorities and other stakeholders.

Strategies

1. **Implement and periodically update the Park's Fire Response Plan. (DEC, LGAs) [High]**

2. **Coordinate rehabilitation works with fire prevention requirements. Fire management has been considered in the preparation of the *Jandakot Regional Park Weed Species and Rehabilitation Plan* (Section 23). (DEC, CoA, CoC, ToK) [High]**

3. **Initiate measures in pre-suppression works and post-suppression follow-up works to minimise the spread of plant diseases and weeds in the Park. (DEC, CoA, CoC, ToK) [High]**

4. **Ensure that recreation planning takes into account fire prevention requirements. For example, when constructing or upgrading paths in the Park consider building them to a standard that will carry fire control vehicles, so that access is improved for fire management (Section 31). (DEC, CoA, CoC, ToK) [Ongoing]**

22. Pets and Problem Animals

The objective is to minimise the environmental and social impact of pets and problem animals in the Park.

PETS

The presence of domesticated animals in, or in close proximity to the Park may impact on the natural environment of the Park.

Domestic animals are not normally permitted in national parks, conservation parks and nature reserves. Provisions can be made to allow domestic animals in national parks and conservation parks in certain designated areas if they are on leads, under control and managed. Domestic animals are not permitted in nature reserves.

Cats

Domestic cats from nearby residences are likely to hunt for birds, reptiles and other animals in the Park. Cat owners should be encouraged to keep cats at home, especially at night, and have them de-sexed to help control feral populations.

Research undertaken by Murdoch University has indicated that there is broad community support within suburban Perth for cat control measures such as compulsory sterilisation, registering of cats, restricting cats' ability to roam and stipulating a maximum number of cats per property (Grayson *et al.*, 2002).

The City of Armadale has collaborated with researchers from Murdoch University and DEC to determine appropriate measures to manage cats and protect wildlife within the municipality.

The Shire of Serpentine-Jarrahdale has a Local Law restricting the number of cats that can be kept on a property, and policies to encourage responsible cat ownership and cat sterilisation. The City of Cockburn provides information on responsible cat ownership, and subsidises the sterilisation of cats.

The *Keeping and Control of Cats Local Law* (City of Stirling, 1999) provides a model for consideration by local government authorities to control cats. This Local Law enables Stirling City Council to declare:

- a cat prohibited area by designating areas on which cats are prohibited from entering or remaining; and
- a fauna protection Zone, which is land extending 200m from the boundary of a cat prohibited area and includes all the properties within that buffer zone. A person shall not keep more than one cat on any premises in a fauna protection zone except in accordance with a valid permit in relation to those premises.

The implementation of a similar Local Law by the local government authorities in which the Park is located, is likely to have significant benefits for native fauna residing and breeding within the Park. This would be in addition to the proposed State Cat Control Legislation which will require mandatory identification, registration and sterilisation of domestic cats.

Dogs

Given the nature conservation values of the Park, dogs are not permitted in existing and proposed nature reserves (Areas 1, 3, 6, 10, 12, 16, 17, 23, 25, 26, and 27 on Figure 4). In all other areas of the Park managed by DEC, dogs are to be kept on a lead and under appropriate restraint to prevent

adverse effects on wildlife and the activities of other Park visitors.

For areas in the Park managed by local government authorities, access for dogs is managed by the relevant local authority.

Although dog walking in the Park is not a common activity, as the residential population near the Park continues to grow with further urban development, dog control and the need for dog exercise areas are likely to become greater issues.

Local government authorities are responsible for administering and enforcing the *Dog Act 1976* within their municipalities. The Act states that 'a dog shall not be in a public place unless it is:

(a) held by a person who is capable of controlling the dog; or
(b) securely tethered for a temporary purpose;

by means of a chain, cord, leash or harness of sufficient strength and not exceeding the prescribed length'.

A dog is exempt from the above requirements if it is in an area specified by a local government as a Dog Exercise Area. Within a Dog Exercise Area, dogs are permitted off-leash so long as the owner is in reasonable proximity to the dog. The owner is also required to carry and be capable of attaching a leash for the purpose of controlling the dog.

Local governments are also able to designate dog-prohibited areas under the *Dog Act 1976*.

For areas outside the Park, the following applies: In the City of Armadale, all reserves managed by the local government are Dog Exercise Areas, unless specified otherwise. In the City of Canning, the City of Cockburn, the City of Gosnells and the Town of Kwinana, Dog Exercise Areas are specified in bylaws. The Shire of Serpentine-Jarrahdale has no specified Dog Exercise Areas.

The only Dog Exercise Area in close proximity to the Park is Clifton Park, approximately 100 metres from the northern extent of the Canning Vale Estate in the City of Canning.

PROBLEM ANIMALS

Problem animals are those species that have the potential to cause serious impact on natural systems through direct effects such as predation, habitat destruction, competition for food and territory, and introduction of disease, and through environmental degradation such as caused by over-grazing. Problem animals can be either native species that are impacting on nature conservation values (for instance, from unsustainable populations) or introduced species that have become established as wild or naturalised populations.

Introduced animals such as feral cats, foxes, rabbits, birds, bees and others occur in the Park and all have a detrimental effect on nature conservation values. The control and removal of these animals will help protect the native fauna and flora of the Park.

Feral cats, dogs and foxes are known to attack native fauna. Rabbits reduce the survival rate of native seedlings by grazing, thereby denuding areas of vegetation.

The introduced honeybee (*Apis mellifera*) is present in the Park and can have detrimental effects on native insects, hollow-using animals and vegetation. Competition between honeybees, native bees and other native pollinators for flora resources usually favours the more aggressive foraging of the introduced bee, resulting in a decline of native insects. Other possible consequences are inefficient pollination of some local plants, destruction of flowers and hybridisation of some native plant species by cross-pollination of different native species. Beekeeping is not considered appropriate in the Park, as discussed in Section 38.

Horses can impact on the Park by spreading dieback, introducing weeds, causing accelerated erosion of tracks, trampling and browsing on vegetation (this is discussed in Section 33 in the context of recreation).

With regard to the removal of problem animals in the Park, the managing agencies will need to determine the extent and impacts of animals and then, where appropriate, implement control options. The *Pest and Problem Animal Control Plan for Perth's Regional Parks* (Department of Environment and Conservation, 2007a) provides a guide. In managing problem animals, DEC is also directed by the proposed policy *Management of Pest Animals on DEC Managed Lands* (subject to final consultation). Where pest animal control programs are proposed in the Jandakot UWPCA they should be in accordance with *Water Quality Protection Note 96 – Pest Animal Management in Public Water Source Areas* (Department of Water 2007).

Mosquitos

Wetlands in urban areas often require a management response to mosquito populations. Reductions in invertebrate species diversity, changes in the presence or absence of particular groups of organisms, and nuisance levels of particular species has been shown to reflect a deterioration of the overall wetland environmental quality. Mosquitos may cause a nuisance to nearby residents and may also become a public health risk because some species can transmit diseases. Monitoring and treatment of mosquito populations is the responsibility of local government authorities.

Mosquitos are generally not a problem within the Park and the local government authorities and DEC do not receive regular complaints.

Strategies

1. **Use interpretative material to inform the community about the adverse effects of pets and problem animals on native fauna. Include information explaining restrictions on pet access and encouraging responsible**

pet ownership (Section 44). (DEC, LGAs) [Medium]

2. **Liaise with the local government authorities regarding the potential introduction of Local Laws for controlling cats and protecting native fauna. (DEC) [High]**

3. **Ensure that dogs are prohibited in proposed and established nature reserves. In all other areas of the Park, ensure that dogs are kept on a lead and under effective control at all times. (DEC, LGAs) [Ongoing]**

4. **Liaise with local government authorities to review Local Laws relating to dogs to ensure consistency with this Plan. (DEC) [High]**

5. **Use the Pest and Problem Animal Control Plan for Perth's Regional Parks as a guide to managing pest and problem animals in the Park. (DEC) [High]**

6. **Undertake monitoring and treatment of wetlands to alleviate mosquito problems as appropriate, in consultation with DEC. (LGAs) [Ongoing]**

7. **Remove introduced, hybrid and problem bird species and honeybees from the Park. (DEC, CoA, CoC, ToK) [Ongoing].**

23. Rehabilitation

The objective is to restore degraded areas of the Park to a condition resembling the natural environment.

Environmental degradation is a major management issue in the Park. Weeds, wildfires, the provision of roads, access ways, utilities and service corridors have resulted in modifications to vegetation communities, necessitating rehabilitation where possible. Rehabilitation is the establishment of a stable, self-regulating ecosystem following disturbance, consistent with the purpose for which the area is managed. Ongoing issues of pests, the presence of pathogens, erosion and infertile soils also make rehabilitation challenging.

Rehabilitation methods and techniques will vary according to the level of degradation that has occurred, the proposed use of an area and the type of vegetation community to be reinstated. It is difficult to restore severely degraded sites to natural habitat, however considerable conservation gains can be made if a wide suite of local overstorey and understorey species are used for revegetation.

Some parts of the Park are extensively degraded by past uses such as agriculture. Rehabilitation of deep sandy soils formerly supporting banksia woodlands is very challenging, and ongoing research is being conducted by the Botanic Gardens and Parks Authority.

Where possible, plant material used during rehabilitation should be sourced from within the boundaries of the Park or nearest viable source, to maintain the genetic integrity of the area. This includes seeds, cuttings and brushing. Seed collection from within the Park will generally be permitted only for rehabilitation projects within, or directly impacting upon the Park. It is important that mulch and soil used in rehabilitation works does not contain unwanted weed seeds or plant disease.

Where rehabilitation works are undertaken in areas where rabbits are present, consideration should be given to the use of either rabbit-proof fencing or individual tree guards.

The *Jandakot Regional Park Weed Species and Rehabilitation Plan* provides a guide for the long-term restoration of degraded areas within the Park and has been developed in accordance with DEC's *Rehabilitation of Disturbed Land, Policy Statement No. 10*. The plan identifies disturbance sites within the Park, and priorities for their restoration to a condition resembling the natural environment. In general, areas that have the highest conservation significance are given priority in rehabilitation.

Rehabilitation of areas fringing wetlands will also be given a high priority. Fringing vegetation helps to create a more natural habitat as well as reduce nutrient inputs through filtration and storage. Other matters that are considered in prioritising rehabilitation works within the Park include bushland condition, weed control areas, disturbed areas (such as those affected by fire), aesthetics, drainage lines and community involvement.

The managing agencies acknowledge the recent efforts by the community in undertaking rehabilitation works in regional parks.

Local residents, community groups and education institutions should be encouraged to be actively involved in rehabilitation works.

Strategies

1. **Continue to implement the *Jandakot Regional Park Weed Species and Rehabilitation Plan*. (DEC) [High]**

2. **Coordinate rehabilitation works between the managing agencies and relevant community groups. (DEC, CoA, CoC, ToK) [Ongoing]**

3. **Coordinate rehabilitation with weed control, fire protection and recreation facility and trail development at the planning, design and implementation stages. (DEC, CoA, CoC, ToK) [Ongoing]**

4. **Use locally collected seed, where possible, for propagating plants or for direct seeding. Where locally collected seed is not available, seed should be obtained from local provenance. (DEC, CoA, CoC, ToK) [Ongoing]**

5. **Encourage members of the local community and schools to participate in rehabilitation works and seek external**

funding to achieve these works where possible. (DEC, CoA, CoC, ToK) [Ongoing]

6. **Ensure that mulch and soil used in rehabilitation works does not contain unwanted seeds or plant diseases. (DEC, CoA, CoC, ToK) [Ongoing]**

7. **Where appropriate, allow licensed seed collection from within the Park for rehabilitation projects within, or directly affecting the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

24. Park Aesthetics and Landscape Amenity

The objective is to maintain and enhance the natural and cultural landscape qualities of the Park.

Management of the landscape is a key consideration in the overall management of the Park. The following guidelines provide a practical framework for managing the landscape value of the Park.

- Alterations to the natural landscape should be subtle, remaining subordinate to natural elements by borrowing extensively from line, form, colour texture and scale found commonly in the surrounding landscape.
- Site specific visual resource factors should be carefully identified and evaluated before any management activities are undertaken.
- Where appropriate, degraded landscapes such as disused access tracks should be rehabilitated.
- Roads, management tracks and firebreaks should follow the natural landform, or land-use patterns as far as practicable.
- Prescribed burning operations (if required) should incorporate prescriptions and techniques that minimise the visual impact.
- Where structures are required they should be sympathetic in design, materials and colour to surrounding landscape elements and be carefully sited away from major natural focal points, out of viewer sight-lines and where appropriate, screened by vegetation or landform.

LANDSCAPE DESCRIPTION

The Park lies within the Swan Coastal Plain landscape character type (Department of Conservation and Land Management, 1994). The Coastal Plain gradually slopes westwards from the Darling Scarp to the Indian Ocean. The Park is characterised by its generally low relief and by its series of seasonally wet depressions supporting vegetation associations in contrast to the predominant open banksia woodland.

LANDSCAPE QUALITY

The Park landscape encompasses areas that can be described as being of high, medium or low visual quality. These categories can be mapped using DEC's *Visual Landscape Management System* (1989). Generally in the Park there is a direct correlation between the intactness of natural elements (vegetation, landform and water bodies) and high scenic quality. The rural areas of the Park can also be said to have scenic values as cultural heritage landscapes.

Some areas of the Park offer high scenic quality, particularly elevated sites in the Anketell Estate where there are distant views of the Darling Scarp across the Park. Small areas of open water provide attractive, enclosed views in some parts of the Park following winter rains. These generally dry up in summer months leaving a thin white layer of clay.

In the northern parts of the Park, relatively flat landforms, road corridors and service easements have low scenic quality. Power lines significantly impact the Park's landscape quality and can be seen from long distances. The visual impact of power lines is especially significant along the service corridors where vegetation is often disturbed to provide clearances beneath power lines and to give access for maintenance vehicles. Some service roads allow unauthorised access into the Park, which has resulted in rubbish dumping. Other landscapes with poor visual quality are associated with Water Corporation drains, where modified landforms and weeds form highly visible corridors. Some drains provide opportunities for rehabilitation and integration with the Park as recreational or landscape links.

LANDSCAPE CHARACTER

The landscape character types represented in the Park are integral to its scenic value, and they offer visitors a range of scenic experiences. They include wetland, woodland and rural landscape types. Understanding the different landscape character types helps Park managers to preserve them, and to enhance visitors' enjoyment of them through the provision of scenic viewing facilities and interpretation.

Strategies

1. **Identify and protect important landscapes within the Park. (CoA, CoC, ToK, DEC) [Medium]**

2. **Ensure that recreation facilities and park furniture are of a high standard and suited to the surrounding landscape. (CoA, CoC, ToK, DEC) [Ongoing]**

3. **Take all reasonable steps to ensure that new infrastructure and developments within or adjacent to the Park are designed to minimise impacts on visual quality. Liaise with DoP, the Water Corporation, and other infrastructure providers before works are undertaken. (LGAs, DEC) [Ongoing]**

4. **Identify sites of low visual quality (e.g. drains and service corridors, as well as degraded and weed infested areas) and undertake appropriate remedial action. (CoA, CoC, ToK, DEC) [Low]**

5. **Consider view corridors when undertaking rehabilitation works within the Park. (CoA, CoC, ToK, DEC) [Ongoing]**

25. Regional Ecological Linkages and Greenways

The objective is to encourage appropriate management of ecological corridors and linkages between the Park and other conservation or recreation areas.

The objective of ecological linkages is to connect natural areas, preferably with continuous corridors of native vegetation, in ways that allow both fauna and flora (pollen and seeds) to move between these areas to access resources and suitable habitat for survival and reproduction. Regional ecological linkages aim to link protected, regionally significant natural areas by retaining the best condition local natural areas available between them that can act as stepping stones for flora and fauna. This increases the long term viability of the regionally significant natural areas as well as the local natural areas in the link.

The term 'greenways' has also been used to define 'networks of land containing linear elements that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable use' (Ahern, 1995). It is a generic term that has been applied to a wide range of landscape planning strategies, concepts and plans (Tingay and Associates, 1998).

Regional ecological linkages or greenways are essential features of urban areas as they have a conservation role; provide protection for water quality; may contain vegetation which can sequester greenhouse gases and have an educational and aesthetic value (Tingay and Associates, 1998). Regional ecological linkages have been identified in Tingay and Associates (1998), Government of Western Australia (2000) and Del Marco *et al.* (2004).

Jandakot Regional Park comprises a series of disparate estates spread across a large area. With a substantial perimeter in relation to area, relatively undisturbed landscapes within the Park are vulnerable to the pressures of adjacent land uses. Linkages between and within the Park to adjoining areas of ecological significance are important in maintaining the biodiversity of each Park estate. This is necessary to ensure the vigour of the Park's ecological systems and to help integrate the Park within the broader landscape.

Because of the dispersed nature of the Park estates, major arterial roads such as Armadale Road, Nicholson Road, Anketell Road and Thomas Road, along with numerous smaller roads, limit linkages between various parts of the Park. The Kwinana Freeway is a major barrier to neighbouring Beeliar Regional Park to the west.

Establishing links beyond the formal boundary of the Park can be achieved through a range of town planning controls and guidelines and through cooperative arrangements with neighbouring landowners. Some areas of land identified in *Bush Forever* (Government of Western Australia, 2000) as regionally significant bushland which are not part of the Park, help form connections between isolated areas of the Park. The long-term protection of these areas and potential inclusion into the Park needs to be investigated.

The interface between the Park and adjoining land uses plays a major role in either insulating the Park from, or exposing it to, undesirable impacts of these land uses.

The spread of invasive weed species can be minimised by the creation of appropriate buffers and by planting local species in existing buffers and road reserves. Where development is to occur adjacent to the Park, it is preferable that a road is constructed between the development site and the Park, as it improves management and fire access, separates land uses, improves informal surveillance and reduces rubbish dumping.

Although this Plan advocates the creation and protection of regional ecological linkages, their creation is beyond the scope of the Plan. DEC will liaise with relevant agencies as required in relation to the establishment and management of these linkages.

No.	Greenway name
62	Beenyup Brook
69	Armadale Townsite – Armadale Settlers Common – Forrestdale Lake – Thomsons Lake
81	Forrestdale Lake – Thomsons Lake
88	Main Drain Birrega-Oakford
91	Southern River – Jandakot Regional Park
92	Jandakot Regional Park – North Lake
97	Southern River – Forrestdale Lake- Thomas Road – Spectacles – Coast
118	Drain linking Forrestdale Lake with Birrega-Oakford Drain
120	Extension to No. 76 - Russell Road - Thomsons Lake – Woodman Point Regional Park
126	Forrestdale Main Drain

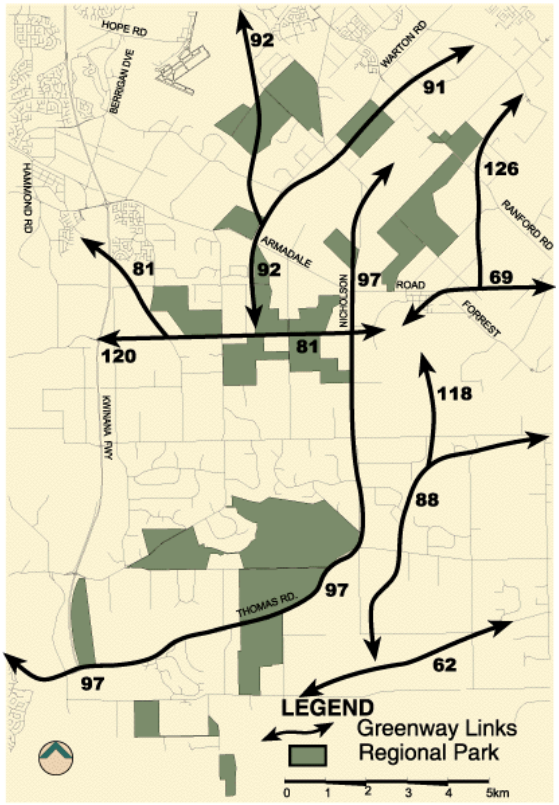


Figure 8 - Greenway Corridors and Links
(Source: Tingay and Associates, 1998)

Strategies

1. **Liaise and develop partnerships with the landowners and relevant agencies involved with proposed regional ecological linkages near the Park to develop a coordinated and complementary approach to management. (DEC, LGAs) [Medium]**

2. **Encourage providers of transport and power services to adopt 'wildlife friendly' designs and management practices. (DEC, LGAs) [Medium]**

3. **Develop a list of Park-compatible plants to be provided to Park neighbours and infrastructure providers. Local plant species should be used in landscaping road reserves near the Park. (DEC, CoA, CoC, ToK) [High]**

4. **Liaise with DoP so that future development proposals adjoining the Park incorporate appropriate interface treatments with the Park. (LGAs, DEC) [Ongoing]**

D. MANAGING CULTURAL HERITAGE

26. Guiding Principles for Managing Cultural Heritage

1. Conservation and protection of cultural heritage
The Park will be managed in a way that delivers community benefits by maintaining cultural traditions and attributes. Heritage sites are to be preserved and maintained for their inherent cultural and social values. Impacts from human use and management practices will be minimised in order to maintain heritage values.

2. Consistency of management policies
The managing agencies involved in the Park will apply actions that are consistent with State, national and international heritage legislation, conventions and guidelines.

3. Community involvement
The community will be involved in managing sites of heritage value. Aboriginal people are especially encouraged to be involved and should be provided with consultation opportunities in the management of the Park.

4. Research and interpretation
Where appropriate, interpretive information will be provided to enhance community understanding of, and appreciation for heritage sites.

5. Restoration of cultural heritage
Where possible, heritage sites will be restored to protect and maintain their value. Sites with high heritage significance will be considered priorities.

Strategy
1. **Apply the above principles as required in managing the cultural heritage of the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

27. Aboriginal Cultural Heritage

The objective is to identify, protect and appropriately manage sites with Aboriginal cultural heritage value within the Park.

ABORIGINAL ASSOCIATION AND USE

Research undertaken by Seddon (1972) shows that the Perth region supported three Aboriginal districts prior to European occupation. The land south of the Swan River was the Beeliar District with a tribal group of 58 people led by Midgegooroo.

The Aboriginal people that have lived in the Beeliar area for tens of thousands of years are part of the Nyoongar people. It has been recognised that Nyoongar people who lived in the south-west of Western Australia had a close relationship to their land and an intimate knowledge of what it contained (Berndt, 1979).

Nyoongar people traditionally lived a hunter-gatherer lifestyle, travelling to and from destinations and meeting areas throughout the seasons. Food resources such as wild fruits, tubers, tortoises and fish were plentiful and generally reliable for Aboriginal people who lived in the south-west of Western Australia (Lofgren, 1975; Hammond, 1980).

The wetlands in the Park were sources of abundant food and water for Nyoongar people throughout the year, as well as places of ceremony and trade along the main travelling route between what is now Perth and Mandurah (Hammond, 1980). Nearby Forrestdale Lake was known as a summer place because of the availability of water, the variety and quantity of food and the open banksia woodland (O'Connor, 1989). The lake provided a site for semi-permanent camps and was known for the presence of long necked tortoise (known as yirriyark in the local language) – an important source of food and medicine for Aboriginal people (O'Connor, 1989).

Wetlands also hold spiritual significance for Nyoongar people (Hammond, 1980). According to tradition, Forrestdale Lake is home to a powerful Waugal (rainbow serpent) who is associated at this site with rain. In Nyoongar beliefs, the Waugal is a spiritual force, often associated with water, which was involved in creating the landscape (O'Connor, 1989). Aboriginal tradition warns against disturbance of the native reeds (known as nookenburr in the local language) around the edge of Forrestdale Lake, as this could unleash the Waugal's destructive power.

There are three Aboriginal heritage sites in the Park that are listed by DIA. A number of other listed Aboriginal heritage sites are located near the Park.

Other Aboriginal heritage sites may exist in or adjacent to the Park that are not yet known to DIA, or may not yet been listed on the Aboriginal Heritage Register.

MANAGEMENT OF ABORIGINAL CULTURAL HERITAGE

A key issue in the management of the Park is to make sure that Aboriginal heritage is protected from damage such as that which may occur during maintenance operations or works projects. It is the responsibility of the managing agencies to ensure that management obligations are fulfilled according to the *Aboriginal Heritage Act 1972* and the *Native Title Act 1993*, before any planning or public works take place.

Additionally, it is important that local Aboriginal people are involved in projects and the management of the Park.

Aboriginal Heritage Act 1972
Under the *Aboriginal Heritage Act 1972,* it is an offence to damage, alter or destroy any Aboriginal sites unless written consent has been obtained from the Minister for Indigenous Affairs. This includes sites not yet registered under the Act.

Native Title Act 1993
Some of the lands that comprise the Park are subject to a native title claim.

In accordance with the Commonwealth *Native Title Act 1993*, notification in writing is required for public works constructed on all reserved lands and waters managed by DEC. Parties that require notification are:

- representative Aboriginal bodies; and
- registered native title bodies (corporate) and registered native title claimants for land or waters managed by DEC on which the operations are to be carried out.

These parties need to be given the opportunity to comment on the proposed public works. A 'public work' is defined in the *Native Title Act 1993* to include buildings, structures which are fixtures, roads, bridges, wells, bores and major earthworks constructed or established on behalf of the Crown.

Additionally, a management plan for any national or State park intended to preserve the natural environment of an area must be notified in the same manner as for public works. Native title claimants and registered native title bodies were informed of this Plan's preparation at the commencement of the planning process.

Strategies

1. **Involve Aboriginal groups in the management of the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

2. **Incorporate information on Aboriginal history and significance of the Park into interpretive material where appropriate (Section 44). (DEC, CoA, CoC, ToK) [High]**

3. **Fulfil management obligations according to the *Native Title Act 1993* and the *Aboriginal Heritage Act 1972* before any planning or public works take place. (DEC, CoA, CoC, ToK) [Ongoing]**

4. **Nominate any Aboriginal sites identified for consideration for inclusion on the Aboriginal Heritage Register. (CoA, CoC, ToK, DEC) [Ongoing]**

28. Non-Aboriginal Cultural Heritage

The objective is to identify, protect and appropriately manage sites of non-Aboriginal cultural heritage value within the Park.

Non-Aboriginal settlement of the Jandakot region began in the late nineteenth century with low-lying peaty areas around swamps and wetlands sought after for agricultural production. Although the wetland soils were acidic they were more fertile than the dry sands of more elevated areas (Atkinson, 1984).

Europeans first settled the Forrestdale Lake area, to the east of the Park, in 1885 when William and Alfred Skeet were granted a 'Special Occupation' licence for 100 acres (about 40 hectares) in the vicinity of Forrestdale Lake. At that time the Lake was fringed by mature paperbarks (*Melaleuca* species), some as big as 10 metres in height and with trunks one metre in diameter (Giblett, 1993; Atkinson, 1984).

Early settlers in the Forrestdale area commenced farming in the early 1890s. Large areas of land were soon utilised for farming around Taylor Road, where the water table is close to the surface (Popham, 1980).

By 1900 the total population of the Jandakot region was 170 and blocks of land ranged in size from 5 to 100 acres (Atkinson, 1984).

Market gardening in the 1900s and 1910s was highly labour intensive and required only low-level technology. Chinese gardeners made a significant contribution to the production of the region, being experienced in small-scale intensive agriculture (Atkinson, 1984).

Jandakot soon became a thriving community, producing vegetables, apiary products and in later years, dairy produce for the Fremantle market. The prosperity of the region was encouraged by the construction of a railway between Fremantle and Jandakot, which was later extended to Armadale.

The expected boon from the railway did not benefit the Jandakot area as much as it did localities closer to Fremantle because of the higher costs of bringing produce to market (Atkinson, 1984). As commodity prices dropped, intensive farming in the area began to decline. Extensive cutting of the locality's timber made agriculture near wetlands even more difficult as water tables gradually rose and productive wetland fringes remained flooded throughout the year. Drainage channels were constructed to combat rising water tables and to alleviate flooding (Atkinson, 1984).

From the 1920s onwards, intensive agriculture gave way to grazing of sheep and cattle and this farming activity continued over the next 50 years. During the 1940s the west side of Forrestdale Lake was heavily grazed by sheep and cattle, particularly during summer, when land owners used the fringing vegetation to supplement feed from their paddocks

(Atkinson, 1984). As a result, the west side of the Lake is devoid of most natural understorey species and is infested with weeds and other introduced plants, particularly Arum lilies.

In recent decades a return to intensive agriculture has taken place with activities such as poultry farming and cut flower production becoming established in areas around the Park.

Heritage of Western Australia Act 1990

The Heritage Council of Western Australia maintains a Register of Heritage Places in accordance with the *Heritage of Western Australia Act 1990*. Under the Act, places entered in the register are given legal protection and all development proposals affecting these places are required to be referred to the Heritage Council of Western Australia for advice. There are no sites within the Park listed in the register.

The Government Heritage Property Disposal Process provides for the identification and assessment of heritage value of government property under consideration for disposal, and for relevant protection to be provided where appropriate. DEC will liaise with the Heritage Council of Western Australia where property is to be disposed of on Crown land and where heritage values may exist.

Local government authorities are required by the *Heritage of Western Australia Act 1990* to maintain a heritage inventory, and they have the power to protect these sites by including them in their town planning schemes.

Banjup Memorial Park in the Canning Vale Estate was established in 1920 and comprises an avenue of trees and plaques commemorating those killed in action and wounded during the First World War. Banjup Memorial Park is included in The City of Cockburn's Municipal Heritage Inventory. Wandi Nature Reserve, in the Anketell Estate, is included in the Town of Kwinana's Municipal Heritage Inventory

Strategies

1. **Incorporate information on non-Aboriginal history of the Park into interpretive material where appropriate (Section 44). (DEC, CoA, CoC, ToK) [High]**

2. **Ensure that obligations under the *Heritage of Western Australia Act 1990* are met. (DEC, CoA, CoC, ToK) [Ongoing].**

3. **Nominate additional significant sites for heritage listing on either Municipal Heritage Inventories, or the State Heritage Register consistent with State government policy. (LGAs, DEC) [High]**

4. **Develop management guidelines for historic sites in consultation with other appropriate conservation bodies, such as the Heritage Council of Western Australia, Western Australian Museum, National Trust, Australian Heritage Council and historical societies. (LGAs, DEC) [Medium]**

E. MANAGING RECREATION

29. Guiding Principles for Managing Recreation

1. Preserving the value of the land itself
Natural systems should be able to sustain the recreation that occurs or is proposed. The intensity and distribution of recreational activities may need to be controlled to maintain the amenity of the Park and the enjoyment of visitors. Recreational planning will seek to foster appreciation of the Park's values.

2. Consistency of recreation with reserve purpose
Recreational activities must be compatible with the assigned purpose of reserves within the Park. Reserves within the Park will be assigned an appropriate purpose for the protection and enhancement of Park values under the *Land Administration Act 1997*.

3. Equity
A range of activities consistent with a reserve's purpose should be allowed in the Park. However, uses that adversely affect other forms of acceptable use or jeopardise the safety of visitors should be specifically managed, directed to more appropriate places or not permitted.

4. Management
Activities and facilities must comply with the managing agencies' requirements. If effective management of recreational activities or facilities cannot be provided they should be restricted, relocated or removed from the Park.

5. Recreation opportunities
A range of recreation opportunities should be provided for in a local and regional context thereby providing Park visitors with a choice of enjoyable recreation activities and experiences which enhance the values of the Park. The Recreation Opportunity Spectrum is a planning tool to guide the provision of a range of opportunities in a given area, while limiting unintended incremental development and inappropriate uses (Stankey and Wood, 1982). The principles of the Recreation Opportunity Spectrum have been applied in developing the Recreation Masterplan (Section 31).

Strategy

1. **Apply the above principles as required in managing recreation in the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

30. Visitor Use

The objective is to encourage visitor use whilst ensuring that the level of use and behaviour are sustainable and minimise conflict with other Park visitors and values.

Visitor numbers at Jandakot Regional Park are low compared to the other regional parks in Perth, reflecting the low population density surrounding much of the Park, as well as the lack of existing formalised recreation facilities. Areas managed by DEC within the Park receive an estimated 30,800 visits per year (Colmar Brunton, 2005).

Visitor surveys were undertaken in 2005 to gain an understanding of patterns and type of use at two sites in the Park, namely Shirley Balla Swamp (in Banjup Estate) and Anketell Block (in Anketell Estate). The results of the survey indicate that recreation activities undertaken in these areas of the Park include horse riding and bike riding (Colmar Brunton, 2005).

Horse riders comprise the largest user group at the Park. A sample survey was undertaken in 2002 by Ecoscape to identify patterns of use by horse riders. The results of this survey are discussed in Section 33.

The Park provides a valuable recreation resource for people living nearby, and visitor use is expected to increase in the future with continued urban growth in the region. The *Southern River/Forrestdale/Brookdale/ Wungong Structure Plan* (WAPC, 2001) and the *Jandakot Structure Plan* (WAPC, 2007) have been prepared by the WAPC to guide, manage and provide a physical framework for future development. Both structure plans predict increasing population in areas surrounding the Park. Whilst many areas adjacent to the Park will remain rural, urban development is proposed near Anstey Estate, and adjacent to Sandy Lake Estate. Some rural areas are also predicted to increase in population density, with a proposed change from Rural to Rural-Residential.

Planning for recreation sites and facilities needs to take into account urban growth and development, including the associated increase in demand for recreation opportunities and the potential for increased pressure on the Park.

Vandalism and other anti-social behaviour
Vandalism and thefts from cars are known problems at isolated bushland sites in Perth's regional parks. This may be addressed in part by designing recreation sites to improve the circulation of traffic and increase the visibility of parked cars. DEC and the relevant local government authorities will consider this issue when designing recreation facilities and sites.

Strategies

1. **Develop and implement a visitor survey programme to gain an understanding of visitor use, numbers and satisfaction within the Park. Use DECs VISTAT (a quantitative system for recording and monitoring visitor levels) as a basis for the programme. (DEC, CoA, CoC, ToK) [High]**

2. **Investigate and implement site design and management measures to reduce anti-social behaviour in the Park. (DEC) [Medium]**

Key performance indicators for visitor use
The success of these strategies will be measured by: 1. Changes in visitor numbers and satisfaction levels. 2. Provision of formalised access in the Park (as per Section 31 – Recreation Masterplan). 3. Existence of a visitor survey programme.
Target: 1. No decline in visitor satisfaction. 2. Complete access and circulation components of the Recreation Masterplan 3. Implementation of a visitor survey programme.
Reporting: 1. Every 5 years. 2. Every 5 years. 3. Every 5 years.

31. Recreation Masterplan

A Recreation Masterplan (Figure 9) has been prepared to help ensure that a variety of recreation opportunities are offered in the Park. The Masterplan will also help to coordinate recreational developments within the Park and allocate appropriate facilities and services to those areas of the Park best able to accommodate them in a sustainable manner. Developments, where possible, will utilise already degraded sites.

The Masterplan reflects the management zones and land uses described in Section 10 of this Plan. The four management zones (Conservation and Protection, Natural Environment Use, Recreation and Special Use) provide a guide to acceptable facilities and uses at a given site (Table 1).

The Masterplan also considers access, internal circulation and the type of facilities to be provided within the Park.

Access to the Conservation and Protection areas of the Park will be limited, with an emphasis on enjoyment of nature, interpretation, and habitat protection. Horse riding may be allowed in specified areas on designated tracks.

The Natural Environment Use areas will have greater access, primarily by walking trails and cycle paths. Horse riding may be allowed in specified areas on designated tracks. The provision of some facilities within these areas is anticipated.

The Recreation areas will be the most intensively used and modified sections of the Park. The emphasis will be on providing well-designed recreation facilities without detracting from the natural or cultural values of the Park.

The Special Use area is used for sand mining, and is operationally outside of the Park. There is no public access to this area.

The Recreation Masterplan is consistent with *Policy and Guidelines for Recreation within Public Drinking Water Source Areas on Crown Land* (Water and Rivers Commission, 2003).

Strategy

1. **Implement the Recreation Masterplan that allocates appropriate facilities and services to those areas of the Park best able to accommodate them in a sustainable manner. (DEC, CoA, CoC, ToK) [Medium]**

32. Recreation Sites and Facilities

The objective is to provide and manage a range of quality recreation sites and facilities that allow for a diversity of recreation opportunities without conflicting with other Park values.

In general, existing recreation facilities in the Park are limited, and there is scope for improvement and/ or expansion of facilities in some areas.

There are a number of recreational facilities provided on local government reserves in the Park that attract specific user groups. These include the Cockburn-Fremantle Pistol Club, the Banjup Community Centre, the Fremantle Trotting Club, and the Magenup Equestrian Centre (Figure 9). The Wandi Community Centre is also located adjacent to the Park near Magenup Equestrian Centre.

As horse riding is a major issue in the Park, recreation sites and facilities associated with horse riding are discussed separately, in Section 33.

RECREATION SITES

Some areas of the Park offer opportunities for recreation and the potential for developing recreation sites in these areas is discussed below.

1. Harrisdale Swamp

Inundated throughout most of the year, the wetlands of Harrisdale Swamp in the Canning Vale Estate (Area 2 on Figure 4) provide secluded focal points within this estate. The wetlands are surrounded by diverse vegetation types including banksia-jarrah low open forest, banksia woodland, and melaleuca woodland. This forms an interesting landscape with high conservation value.

Harrisdale Swamp is likely to come under increasing pressure for recreation facilities as urban development in Forrestdale proceeds, as

proposed in the *Southern River/Forrestdale/Brookdale/Wungong District Structure Plan* (Western Australian Planning Commission, 2001). Residential development is proceeding in close proximity to the estate.

It is proposed that walk trails will be developed in the area, with interpretive signage to introduce visitors to the diversity of vegetation types and the importance of conserving the area. If necessary at a later stage, parking facilities could be provided.

A site plan for Harrisdale Swamp will be prepared to resolve specific details, including design specifications and trail alignments. Existing management tracks will be used where possible.

2. Shirley Balla Swamp
The seasonally inundated sumplands of Shirley Balla Swamp in the Banjup Estate (Area 13 on Figure 4) support a variety of vegetation communities, including woodland heath, banksia and melaleuca woodland. This diversity makes it an interesting setting for nature-based recreation.

Urban development is located west of this estate, and continuing development in the area will likely increase demand for recreation at Shirley Balla Swamp.

It is proposed that walk trails and interpretive material will be developed at this site, which would provide nearby residents with the opportunity to explore local bushland areas.

A site plan for Shirley Balla Swamp will be prepared to resolve specific details, including design specifications and trail alignments. Existing management tracks will be used where possible.

Permitted uses and any development of facilities in Shirley Balla Swamp will be subject to the restrictions that apply within the Jandakot UWPCA and require prior consultation with DoW.

3. Sandy Lake Estate
Most of Sandy Lake Estate (Area 24 on Figure 4) is located on higher topography than the rest of the Park, and contains woodland of tuart-jarrah-marri, as well as banksia woodlands. Sandy Lake Estate is part of *Bush Forever* Site No. 270, which extends to the east of the estate. Urban development is proposed in the medium term near Sandy Lake Estate (Western Australian Planning Commission, 2007).

It is proposed to develop a trail network and interpretive signage in this estate. A site plan for Sandy Lake Estate will be prepared to resolve specific details, including design specifications and trail alignments. Existing management tracks will be used where possible.

4. Anketell Estate
The Anketell Estate provides opportunities for a wide range of recreational pursuits. The Recreation Masterplan identifies an area in the Anketell Estate (Area 22 on Figure 4) for 'Recreation'. This area is predominantly cleared and is located outside the Jandakot UWCPA. The zoning reflects the recreation value of the area and the likely increased demand for recreational opportunities as urban development increases in surrounding areas.

Two other areas have been identified for 'Natural Environment Use' (Areas 20 and 21 on Figure 4). These areas allow for some development of visitor facilities, in keeping with the values of the area, should demand for additional facilities arise. A horse riding school operates in Area 20 and it is proposed that operating conditions will be formalised through a lease (refer Section 38).

Area 18 contains the Magenup Equestrian Centre which is a popular horse riding facility. The area is zoned for recreation. Whilst the adjoining Area 19 is zoned as 'Conservation and Protection', horse riding will be permitted on designated tracks. Tracks for bushwalking will also be provided in Area 19. Where possible, walking tracks will be separate from bridle trails.

Permitted uses and any development of facilities within the Anketell Estate will be subject to the restrictions that apply within the Jandakot UWPCA.

Strategies
1. **Prepare and implement site plans for significant works within the Park. The plans will be prepared in consultation with the community and the other managing agencies. (DEC, CoA, CoC, ToK) [High]**

2. **Provide suitable and safe facilities to cater for existing and anticipated future demands. (DEC, CoA, CoC, ToK) [Ongoing]**

3. **Develop facilities and structures in a manner that is sympathetic to the surrounding landscape. (DEC, CoA, CoC, ToK) [Ongoing]**

4. **Where appropriate make adequate shade provisions at recreation sites and facilities. (DEC, CoA, CoC, ToK) [Ongoing]**

33. Horse Riding

The objective is to manage horse riding to minimise adverse impacts on the values of the Park and avoid conflict with other users of the Park.

Areas now included in the Park have historically been used for horse riding, and this activity continues to occur in some areas (Ecoscape, 2002). The managing agencies recognise that there is demand for horse riding in the Park. It is also recognised that there are diminishing opportunities for horse riding in the Jandakot area, given the progress of urban development.

Horse riding occurs on fire access tracks and existing tracks throughout various Park estates, with the most intensive activity based around Anketell Estate and the Anstey-Keane Block of Anstey Estate (Ecoscape, 2002; Colmar Brunton, 2005). Anketell Estate receives significant use from

horse riders many of whom access it via Magenup Equestrian Centre, located in the north-west of the estate. Fremantle Trotting Club and Magenup Equestrian Centre have parking facilities so horse riders may float their horses to these areas to ride (Ecoscape, 2002). Anstey-Keane Block and Modong Nature Reserve are anecdotally used by horse riders from surrounding areas, who generally ride their horses to the area, rather than float them. The Fremantle Trotting Club operates a training track located on Denis de Young Reserve. Most of the estates in the Park where horse riding occurs are thought to receive similarly localised use from people who live in nearby areas.

Horse riding also occurs in the surrounds of Forrestdale Lake Nature Reserve. This issue is considered in the Forrestdale Lake Nature Reserve Management Plan (Department of Conservation and Land Management, 2005). Planning for horse riding in the Park has considered this regional context.

Given that it is an objective of Jandakot Regional Park to provide for recreational opportunities (Ministry for Planning, 1995a), and given the existing demand for horse riding, the managing agencies recognise the need to provide for enjoyable and appropriate horse riding experiences within the Park. However, because of the significant nature conservation values of the Park, management controls are required and unrestricted horse riding is considered inappropriate. The trampling of vegetation, the proliferation and degradation of tracks and the risk of spreading weeds and pathogens such as *Phytophthora cinnamomi*, are major management issues.

There is also a need to protect wetlands and the Jandakot Groundwater Mound and to comply with land-use guidelines within the Underground Water Pollution Control Area (Water and Rivers Commission, 2001).

In planning for existing and future recreational uses, an investigation was commissioned into horse riding in the Park. It was recognised in the study that controlling and managing horse riding is important to the overall management of the Park. The study considered opportunities and constraints to horse riding in the Park and surrounding areas (Ecoscape, 2002).

Significant nature conservation and social constraints to horse riding within and adjacent to the Park include:

- the presence of conservation category and resource enhancement wetlands;
- the presence of rare and priority flora;
- the presence of threatened ecological communities;
- the presence of regionally significant bushland;
- the risk of introducing and spreading weeds and pathogens such as *Phytophthora cinnamomi*
- fauna habitat areas; and
- sites of Aboriginal heritage significance.
- potential conflicts between horse riders and other recreational users (Ecoscape, 2002).

In addition to the above, regulatory and major land-use constraints to horse riding within and adjacent to the Park include:

- nature reserves (in which horse riding is prohibited);
- the Jandakot UWPCA (in which horse riding activities are regulated by DoW;
- location of Water Corporation public drinking water source wellheads and associated protection zones (in which horse riding may be prohibited or regulated by DoW);
- existing and proposed urban areas (which may restrict horse riding activities);
- major roads (which pose a safety risk to horse riders);

With consideration of the above constraints, the following guidelines have been identified to assist in managing horse riding impacts:

- Horse riding should be directed to areas where there are no constraints. Areas with significant constraints to horse riding should be avoided. Where horse riding occurs near constrained areas, management needs to ensure trail proliferation and unauthorised access into these areas does not occur.
- Proposed horse riding areas within the Jandakot UWPCA or within 200 metres of a conservation category or resource enhancement wetland will be reviewed by DEC and DoW to ensure that groundwater quality and wetlands will not be adversely affected.
- Management techniques to reduce the impacts of horse riding may include mulching or resurfacing of tracks with limestone or fines, fencing of highly constrained areas, closure of tracks if weather conditions require it, and provision of interpretive material to encourage appropriate behaviour by horse riders in the Park.
- Ongoing monitoring of horse riding will be essential to indicate if the values of the Park are being degraded and designated trails and/or use patterns will be altered if this occurs.
- Horse riding will be managed to minimise conflicts with other visitors to the Park, such as bush walkers.
- A code of conduct will be implemented, such as that developed by the Equestrian Landcare Association of Western Australia, to minimise environmental impacts of horse riding and potential for user conflicts. The code should be displayed at horse riding areas in the Park.
- Best management practices will be implemented, as identified in *Environmental Management Guidelines for Horse Facilities and Activities* (Water and Rivers Commission *et al*., 2002).
- Horse riding groups should be encouraged to be involved in the management of the Park, particularly the maintenance of horse riding trails and facilities, through volunteer activities (Ecoscape, 2002).

Horse riding is permitted in the following areas of the Park:

- at the Magenup Equestrian Centre;
- at Anstey-Keane Block on designated tracks;
- Anketell Block on designated tracks;
- around the perimeter of Modong Nature Reserve on existing, designated tracks.

The availability of the above areas for horse riding is made on the proviso that horse riding is prohibited in all other areas of the Park, and horse riders observe a code of conduct to ensure that the Park's nature conservation values are protected.

The horse riding arrangement at Anstey-Keane Block is for the short – medium term while surrounding rural land uses continue. In the event these rural areas are rezoned in the MRS and there is no longer a demand for horse riding from local residents, the activity will be prohibited.

General horse riding is not permitted at Denis de Young Reserve except within the lease area for the Fremantle Trotting Club where riding is restricted to trotting activities for members. For safety reasons, some members access the trotting club via the broader confines of the Denis de Young Reserve with the expressed approval of the City of Cockburn.

DEC is cognisant of the need to consult further with key stakeholders including local horse riders, in order to more accurately determine the patterns of demand and what facilities are required in the Park, including the most appropriate location and design of bridle trails. This will help to ensure that facilities provided create enjoyable horse riding experiences in appropriate areas of the Park. Detailed site planning will be completed for horse riding areas in the Park following further consultation with horse riding groups.

Horse riders are encouraged to be involved in managing the Park, by observing appropriate behaviour as well as participating in volunteer activities. This will greatly assist the managing agencies.

Commercial Equestrian Operations and Groups
Local horse hire businesses, riding schools or other commercial operators wishing to access designated horse riding areas in the Park that are managed by DEC may be allowed to do so, but will be regulated under lease or license agreements. This is a commercial concession issue, and is discussed further in Section 38.

Strategies

1. **Adopt appropriate management techniques to minimise the environmental impacts of horse riding. (DEC, CoA, CoC, ToK) [High]**

2. **Undertake further consultation with key stakeholders including local horse riders to determine appropriate trails and facilities, and following this, provide for safe, enjoyable and sustainable horse riding on designated trails within nominated areas of the Park. (DEC) [High]**

3. **Prohibit horse riding in non-designated areas and trails in the Park. (DEC, CoA, CoC, ToK) [High]**

4. **Monitor bushland (upland and wetland) condition in the Park to ensure that horse riding is not contributing to degradation. (DEC, CoA, CoC, ToK) [High]**

5. **Support horse riding groups to become involved in the management of the Park, particularly the maintenance of horse riding trails and facilities, through volunteer activities. (DEC, CoA, CoC, ToK) [High]**

6. **Manage commercial equestrian operations using land managed by DEC under lease or license agreements. (DEC) [High]**

7. **Provide interpretive material that outlines appropriate behaviour by horse riders. (DEC, CoA, ToK) [Medium]**

34. Park Access and Circulation

The objective is to provide safe, convenient and structured access to and within the Park that is consistent with Park values.

Whilst visitor access to the Park for recreation and education purposes is desirable, uncontrolled horse, vehicle and pedestrian access has degraded some areas. Horse riding access has been discussed in Section 33. A more detailed discussion of other access issues in the Park occurs below.

ROAD ACCESS

The Park is easily accessible by regional and other roads. Ranford Road, Anstey Road, Acourt Road, Nicholson Road, Warton Road, Jandakot Road, Armadale Road, Liddelow Road, Anketell Road, Thomas Road, Orton Road and Coyle Road adjoin various estates of the Park. The Kwinana Freeway abuts the western edge of Sandy Lake Estate.

Local access points into the Park from these roads may need to be established or improved in appropriate areas to facilitate recreation use.

While the presence of regional roads makes driving to the Park relatively easy, the high speeds and large volumes of traffic on these roads can create safety issues at entrance and egress points to the Park. There is a need to ensure safe access points to the Park.

Safe access and egress to DEC-managed areas of the Park will be considered as part of the visitor risk management programme (Section 36).

PARKING

Parking is available for club members at the Cockburn-Fremantle Pistol Club, Fremantle Trotting Club, and Magenup Equestrian Centre. Parking is provided at the Banjup Community Centre. These parking areas are gated to preclude after-hours access. Parking is also available at Wandi Community Centre.

The provision of parking facilities may be necessary to improve accessibility for recreation. This is particularly the case given that the low density rural and rural-residential development in the Jandakot area means that most visitors will arrive at the Park by private vehicle.

Four key issues relating to parking are:

1. providing safe and convenient parking to facilitate access;
2. reducing the undesirable effects of uncontrolled parking and access;
3. reducing the level of anti-social behaviour such as car theft and vandalism at parking areas in the Park; and
4. appropriate positioning of parking facilities to avoid environmentally sensitive areas.

The Recreation Masterplan proposes parking at Harrisdale Swamp and Sandy Lake Estate.

PEDESTRIAN AND BICYCLE ACCESS

Trails and pathways within and between Park estates are limited to informal tracks or fire access tracks. This restricts circulation and connectivity through the Park. An effective path system should have minimal impact upon the values of the Park, whilst allowing visitors to experience recreation opportunities within the Park.

An opportunity exists to provide walk trails in a number of areas in the Park with different design standards to help create a variety of visitor experiences. The sandy soils in the Park make walking on unformed trails difficult. Walk trails will require hardening to improve access for visitors.

Local bicycle routes along Rowley Road and Mortimer Road adjoin areas of the Park and form part of the Perth Bicycle Network. Cycling within the Park itself is difficult due to the sandy soils. Given the large distances between residential settlements and the low population density of the area, it is considered that demand for cycle paths in the Park will remain low for the foreseeable future.

Access and circulation planning for the Park will be undertaken in consultation with Main Roads Western Australia, DoP and relevant local government authorities.

ACCESS FOR ALL

Access for people with disabilities is limited in the Park. Site plans for each of the recreation sites (discussed in Section 32) will consider access for people with disabilities. Wherever possible, new paths should be designed to meet Australian Standards. The Recreation Masterplan aims to provide equitable access to a range of recreation facilities.

UNAUTHORISED VEHICLES

Unauthorised vehicles are prohibited in the Park because it may endanger other Park visitors, cause damage to the landscape and adversely affect wildlife. It is a common occurrence for people to damage fences in order to access the Park with unauthorised vehicles, and this creates a substantial management cost.

Private vehicles, including motorcycles, are restricted to sealed roads. Information on areas where off-road vehicles are permitted outside of the Park may be obtained from the relevant local government authority.

Frequent patrols by DEC and local government staff continue to enforce and monitor this issue. Fences will be constructed and maintained around Park estates to assist compliance.

ACCESS FOR MAINTENANCE VEHICLES

Boundary access for maintenance vehicles is provided at many points throughout the Park, including access for fire vehicles, and those carrying out rehabilitation works and weed control. Where possible, maintenance vehicles will use existing management and fire access tracks.

Strategies

1. Continue to implement the Recreation Masterplan, that will:
- **coordinate access and circulation allowing safe and convenient access for visitors to and within the Park;**
- **integrate with surrounding path networks;**
- **provide appropriate recreation facilities and services;**
- **provide adequate parking facilities; and**
- **help to restrict private vehicles to designated car parks and access roads.**

(DEC, LGAs, Bikewest) [High]

2. Review entry and egress points to establish the most appropriate and safe access points to the Park. (DEC) [High]

3. Provide for emergency response within the Park and where appropriate, ensure new paths provide emergency and management vehicle access. Liaise with infrastructure and service providers as required. (DEC, CoA, CoC, ToK) [High]

4. Consider the needs of disabled people when designing recreation facilities and pathways in the Park, using appropriate Australian Standards. (DEC, CoA, CoC, ToK) [Ongoing]

5. **Rehabilitate existing vehicle, horse riding and pedestrian tracks that are identified as unsuitable for access. (DEC, CoA, CoC, ToK) [Low]**

6. **Prohibit use of unauthorised vehicles in the Park. (DEC, LGAs) [High]**

35. Signs

The objective is to provide a system of signs that communicates the location of the Park features, provides orientation assistance, identifies hazards, leads to appropriate use of recreation areas and helps communicate information about the Park.

Signs play an important role in notifying visitors about access and use, and communicating information about the Park's identity and values. Signs need to be designed and located to provide messages in a consistent way and without compromising the quality of the area in which they are sited.

Existing sign styles vary between those located in areas under the management of the local government authorities and those managed by DEC.

Sign System
DEC has developed a sign system for Perth's regional parks to help ensure that signs are designed and located appropriately.

The regional parks sign system includes detailed design specifications for all signs provided in the Park. It aims to introduce a suite of signs that are of a high standard, are robust and have a consistent and contemporary style. The sign system includes directional and orientation signs, management signs, risk warning signs and interpretive signs. The sign system also includes a brand image or logo for each park. The Jandakot Regional Park brand image will be used on a number of sign types to enhance public recognition of the Park.

The local government authorities will be encouraged to adopt the regional parks signs system and brand image for signs in areas of the Park under their control.

Sign Plan
The sign plan will direct the placement of signs within the Park. Informative, directional and interpretive signs will be placed at prescribed locations within the Park.

Strategies
1. **Implement the regional parks sign system and sign plan for the Park. (DEC) [Ongoing]**

2. **Encourage the relevant local government authorities to adopt the regional parks sign system and park logo to ensure consistency of signs within the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

36. Visitor Safety

The objective is to take all reasonable and practical steps to ensure the safety of visitors in the Park.

There is always an element of risk in outdoor recreation activities. Nevertheless, all reasonable and practical efforts will be taken to minimise risks to visitors.

Visitor safety will be promoted through information and education about potential problems and risks. Management actions to reduce safety hazards should, if possible, be consistent with the values of the Park and should not intrude unduly on the experience of visitors. Visitor safety will also be considered in the design of recreation sites and facilities. Visitor safety will be an integral component in undertaking maintenance and capital developments within the Park.

When managing risk, DEC is guided by *Visitor Risk Management Policy, Policy Statement No. 53*.

Strategies
1. **Implement and regularly review the visitor risk management programme to ensure that all known risks are managed and monitored. (DEC, CoA, CoC, ToK) [High]**

2. **Ensure that visitor safety and risk management are integral components in design of recreation sites and facilities and in undertaking works programmes, capital developments and facility maintenance within the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

3. **Provide information to visitors highlighting potentially hazardous areas, activities and appropriate preventative actions and emergency procedures. (DEC, CoA, CoC, ToK) [Medium]**

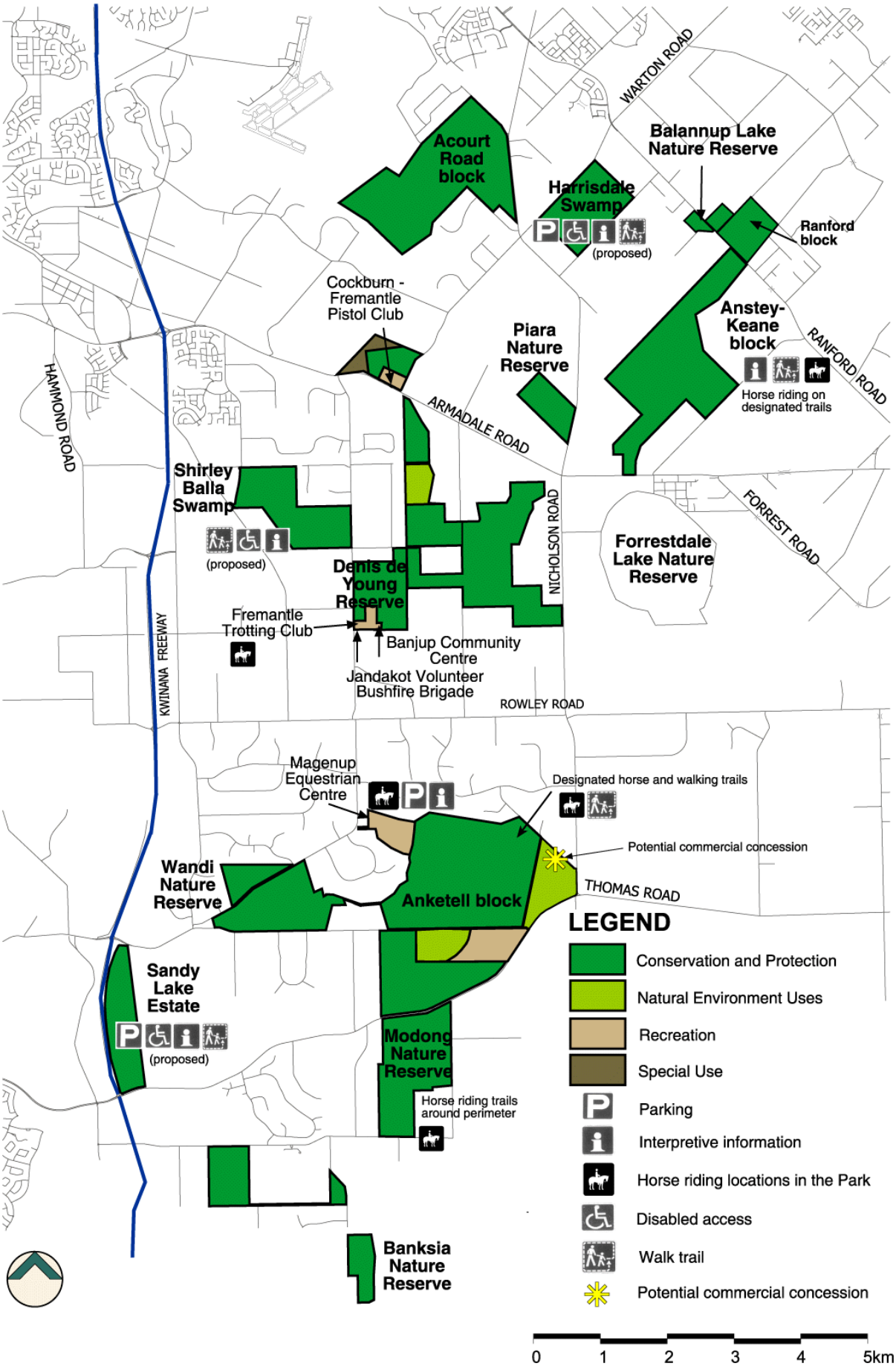


Figure 9 - Recreation Masterplan

F. MANAGING SUSTAINABLE RESOURCE USE

37. Guiding Principles for Managing Sustainable Resource Use

1. Preservation of the values of the land itself
Land use should not compromise the natural and cultural values of the Park. Future developments should be of a character and arrangement that do not detract from the natural settings or landscape values of the Park. Through the development approvals process, proponents of significant developments within the Park may be required to assess the environmental impacts of the proposed commercial use.

2. Consistency of land use with reserve purpose
Activities must be compatible with the assigned purpose of reserves within the Park and should be of service to Park visitors. Reserves within the Park will be afforded an appropriate purpose for the protection and enhancement of Park values under the *Land Administration Act 1997* (Table 1).

3. Equity
Land use within the Park should be of a nature that promotes multiple uses by Park visitors. Uses that impact upon other forms of acceptable use or jeopardise the safety of visitors should be specifically managed, directed to more appropriate places or not permitted.

4. Open and competitive assignment processes
Relevant State and local government guidelines will be followed to ensure that opportunities for commercial concessions in the Park are assigned based on an open and competitive process.

5. Leased or owned by the managing agencies
Commercial use of areas within the Park should be through either a lease or licence arrangement. Alternatively, the managing agencies may own and operate facilities or developments.

6. Financial viability
Through the tendering process, proponents of significant developments within the Park will be required to document the financial viability of the proposed commercial use. Revenue generated by commercial use within the Park will be used to help meet the cost of managing regional parks.

7. Management compliance
Activities and facilities must comply with the managing authorities' requirements. If effective management of commercial facilities or activities cannot be provided, they should be restricted to appropriate levels, relocated or removed from the Park.

Strategy

1. **Apply the above principles as required in managing sustainable resource use in the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

38. Commercial Concessions – Leases and Licences

The objectives are to ensure that commercial concessions are consistent with the values of the Park, enhance visitor satisfaction and help offset regional park management costs.

Commercial concessions (leases and licences) may be granted on lands within the Park to provide appropriate facilities and services for visitors. A lease allows the lessee to occupy a particular area of land, whereas a licence allows the licensee to enter and use the land.

Leases and licences provide a mechanism to bring additional facilities and management expertise into visitor services. Concessions need to be carefully designed and managed to ensure that they do not detract from the conservation and landscape values of the Park. Appropriate concessions can generate income to help offset regional park management costs and can significantly enhance public access and enjoyment of the Park.

The managers of the Park will assess commercial operations according to the guiding principles and objectives set out in this Plan.

According to the CALM Act, the Director General of DEC may grant a lease on land vested in the Conservation Commission subject to consultation with the Commission and the approval of the Minister for Environment. The Director General may apply terms and conditions as appropriate and the term of the lease may not exceed 21 years, but may include an option or options to renew that lease for a further term or terms not exceeding, in the aggregate, 21 years. The lease must be tabled before each House of Parliament within 14 sitting days of its execution by all parties to the grant or renewal.

Under the same Act, the Director General of DEC may grant a licence in writing to any person to enter and use certain land.

Commercial concessions must be consistent with the purpose of the reserve and the protection of its values. Commercial concessions on land managed by DEC within the Park will be established and managed in accordance with *Recreation, Tourism and Visitor Services Policy Statement No. 18*. The tendering process for proponents of commercial concessions within the Park will be publicly competitive and consistent with State and local

government tendering processes. Leases for recreation clubs and associations are not subject to the same tendering processes.

Any leases within a public water catchment such as the Jandakot UWPCA must be consistent with the *Jandakot Land Use and Water Management Strategy 1995*, the DoW's water quality protection policies and the WAPC's *Statement of Planning Policy 2.3 Jandakot Groundwater Protection Policy 1998*. The proposed lease should be referred DoW.

Leases and licences pertaining to land managed by a local government authority require approval from that local government authority.

Advertising within the Park requires the approval of the relevant managing agency.

EXISTING CONCESSIONS FOR VISITOR SERVICES

LEASES

Existing leases for visitor services are as follows:

Cockburn-Fremantle Pistol Club (Inc.)
The Cockburn-Fremantle Pistol Club (Inc.) is located on the corner of Armadale and Warton Roads on Rose Shanks Reserve (Reserve 8129; Area 9 on Figure 4), which is vested in the City of Cockburn. The Club leases the site for pistol and airgun ranges, club rooms and associated facilities. The lease is for a period of 21 years and expires in 2011.

Fremantle Racing Harness Club (Inc.)
The City of Cockburn leases part of Denis de Young Reserve (Reserve 33002, Area 15 on Figure 4) to the Fremantle Racing Harness Club (Inc.). The lease covers the use of a trotting training track and the City is currently in the process of exercising an option to extend the lease.

LICENCES

Magenup Equestrian Centre
Magenup Equestrian Centre is owned by the Town of Kwinana, and is situated on Reserve 36759, De Haer Road (Area 18 on Figure 4). The Centre is used by several equestrian clubs, and is operated by a management committee on behalf of the Town of Kwinana.

OPPORTUNITIES FOR NEW CONCESSIONS FOR VISITOR SERVICES

At the present time, visitor demand for commercial services in the Park is low, reflecting the relatively low level of visitor use in the Park. However, there is the potential for commercial concessions for visitor services to be developed in the future, providing they are consistent with the provisions of this Plan.

The following services and may be considered for the Park.

Horse hire and associated facilities
There may be potential for commercial horse hire or other commercial equestrian operators to use designated horse riding trails in the Park under licence conditions. This would be subject to an application and assessment process. Licence conditions may allow riding trails to be closed if weather conditions require it, or if the licensed activity leads to erosion, disease or degradation of vegetation. A lack of compliance with conditions would result in the cancellation of licences. Income generated from the licences would be used to help offset regional park management costs, including contributions to trail construction and maintenance as well as the provision of associated facilities such as fencing, directional signs and interpretive material.

Horse riding school
Brockman Riding School has been operating on the eastern part of Lots 106 and 107 Nicholson Road (in Area 20 on Figure 4, near the corner of Thomas Road) under an informal agreement, which was passed on from the WAPC and the previous landholder.

A conservation category wetland is located in this area. The site is largely denuded of natural vegetation.

It is considered that the eastern part of Lots 106 and 107 may be a suitable site for a commercial concession for equine activities, given that it is outside the Jandakot UWPCA, it is cleared and relatively degraded. Horse riding is considered consistent with the recreation objectives of the Park.

It is therefore proposed to offer a lease or licence agreement for use of the site, which would be subject to certain terms and conditions. The terms and conditions would include provisions to protect the conservation category wetland, a limit on stocking rates or access requirements, and other management arrangements. Should a lease be proposed for commercial purposes, expressions of interest will be sought consistent with government policies.

If a suitable expression of interest not be found, then steps will likely be taken to rehabilitate the area over the long-term.

Mobile food outlets
Although there is not a large demand at present, businesses such as ice cream vans or mobile food outlets may operate in the Park, subject to the issuing of an appropriate licence by the managing authorities. Such activities must comply with the managing authorities' requirements, including local government environmental health requirements.

Community and Special Events
There may be occasional requests for the use of areas of the Park for community and special events. The appropriateness of such events within the Park will be assessed by the managing agency controlling the respective area. Gatherings

requiring sole use of a site will require a booking. A concession arrangement may be required between the event-organiser and the managing agency for the right to use a site and to cover the operational and administrative costs incurred by the managing agency.

The guiding principles for managing sustainable resource use are to be used by the managing agencies as a means of determining the appropriateness of proposed activities. The relevant local government authority's planning, environmental health, and other requirements must also be met.

CONCESSIONS FOR PURPOSES OTHER THAN VISITOR SERVICES

Commercial concessions for purposes other than visitor services are generally not considered appropriate within the Park unless there is a considerable benefit to the Park or they comprise a historical land use.

Residential leases
As the WAPC progressively acquires land for inclusion in the Park, the future of any existing dwellings on acquired land will need to be decided. It is envisaged that any residential properties will be professionally assessed and recommendations presented for their future use or removal. Residential leases in the Park are considered inappropriate.

Telecommunication leases
Optus Mobile Pty Ltd leases a portion of Lot 91 Anketell Road in Wandi. The lease is being managed by DoP on behalf of the WAPC. The management of the lease will be transferred to DEC when the land is vested in the Conservation Commission.

It is likely that the managing agencies of the Park will be required to assess further proposals for telecommunications facilities (such as mobile telephone towers) in the Park. When assessing such proposals, or managing telecommunications facilities, DEC is directed by *Radio/Tele Communications Facilities - Policy Statement No. 49*.

Primary production
There are no current primary production leases in areas managed by DEC or the local governments, although primary production does occur on private property in the Park. New primary production leases for the agistment of animals may be considered in certain cleared and degraded areas of the Park, as a method of keeping weeds under control and minimising fire fuel loads.

Beekeeping
DEC may grant permits to beekeepers to use Crown land under the CALM Act. Permits are granted on the provision that biodiversity and conservation objectives are not compromised, where the activity is compatible with other land uses. DEC's *Beekeeping on Public Land Policy Statement No. 41* provides that current apiary site permits will be maintained and renewed, but no additional permits will be granted on land reserved or proposed to be reserved primarily for conservation purposes, unless allowed for under a completed management plan.

The introduced honeybee (*Apis mellifera)* can have detrimental effects on native insects, hollow-using animals and vegetation, as described in Section 22.

Given the proximity of the Park to residential areas, no permits will be granted for beekeeping in the Park. Any unauthorised beehives found in the Park will be removed in accordance with operational priorities.

Strategies

1. **Establish and manage any commercial operations on DEC-managed land in accordance with DEC's *Recreation, Tourism and Visitor Services Policy Statement No. 18*. Concessions in the Park may be permitted if they are consistent with the purpose of the relevant reserve. (DEC) [Ongoing]**

2. **Ensure that any commercial activities are consistent with the guiding principles for managing sustainable resource use, that conditions are fulfilled by concession holders, and that an appropriate fee is paid that contributes an income to regional park management. (DEC, CoA, CoC, ToK) [Ongoing]**

3. **Seek expressions of interest for any commercial activities in the Park, in accordance with State or local government guidelines. (DEC, CoA, CoC, ToK) [Ongoing]**

4. **Where appropriate, allow for activities of community organisations and clubs that are consistent with the reserve purpose. (DEC, CoA, CoC, ToK) [Ongoing]**

5. **Where appropriate, arrange for WAPC leases to be transferred to DEC as part of the land tenure changes in the Park. (DEC, WAPC, DoP) [Medium]**

6. **Consider a lease or licence for the use of the eastern parts of Lots 106 and 107 Nicholson Road for equine activities. (DEC) [High]**

7. **Assess community and special events in relation to the guiding principles for sustainable resource use. (DEC, CoA, CoC, ToK) [Ongoing]**

8. **Develop management guidelines for advertising within the Park. (DEC, CoA, CoC, ToK) [Medium]**

9. **Exclude beekeeping activities from the Park. (DEC) [Ongoing]**

10. **Remove non-licensed beehives from the Park in accordance with operational priorities. (DEC) [Medium]**

39. Mining and the Extraction of Basic Raw Materials

The objective is to protect the Park's values from exploration, mining and the extraction of basic raw materials.

The Conservation Commission does not consider mining and the extraction of basic raw materials as an appropriate land use in the Park.

EXTRACTION OF BASIC RAW MATERIALS

Depending on the land tenure involved there are different legislative requirements for extraction or mining of basic raw materials.

On freehold land, basic raw materials (including sand, limestone, limesand, clay, gravel and hard rock) are not defined as 'minerals' under the *Mining Act 1978* and commercial extraction is subject to extractive industry licences under the *Local Government Act 1995*. Any freehold property in the Park that is subject to an extractive industry licence will be processed under the *Local Government Act 1995*. For areas of the Park reserved for Parks and Recreation in the MRS, any extractive industry licence will be determined by WAPC.

Basic raw materials sought on reserves vested with the Conservation Commission or other Crown land will be processed under the *Mining Act 1978*.

There is an existing sand mining lease granted under the *Mining Act 1978* over a portion of Rose Shanks Reserve (Area 7 on Figure 4), which is vested with the City of Cockburn. This lease is held by Rocla Pty Ltd and is valid until 10 March 2013. Other sand mining leases are held in areas adjacent to the Park.

Sand mining in the Jandakot area is regionally significant because of the quality of the resource (Ministry for Planning, 1995b). *Statewide Policy No. 1 Guidelines and Policy for Construction and Silica Sand Mining in Public Drinking Water Source Areas* (Water and Rivers Commission, 1999) applies to parts of the Park within the Jandakot UWPCA. Proposals for extracting basic raw materials from the Park will be referred to the EPA for assessment. The EPA will then determine the level of assessment of any such proposal and depending on the level of assessment may make recommendations to the Minister for Environment.

MINING

Applications for mining within regional parks will be processed under the *Mining Act 1978*.

In processing applications, regional parks are recognised by the Department of Mines and Petroleum (DMP) under the '*Guidelines for Mineral Exploration and Mining within Conservation Reserves and Other Environmentally Sensitive Lands in Western Australia'* (Department of Minerals and Energy, 1998). Applications affecting the Park will also be subject to *The Mineral Exploration and Development Memorandum of Understanding* (MoU) between the EPA and DMP (Department of Minerals and Energy, 1995). The MoU clarifies referral arrangements for mineral exploration and mining proposals to the EPA and DEC where these proposals occur within conservation reserves and other environmentally sensitive lands.

Mineral exploration in national parks, class 'A' nature reserves and class 'A' conservation parks (in the southwest of Western Australia) is subject to the concurrence of the Minister for Environment and the Minister for Mines and Petroleum. Approval for mining to occur in the Park is subject to EPA assessment. If mining was proposed in a class 'A' nature reserve or class 'A' conservation park, it would require EPA assessment and Parliamentary consent.

Strategies

1. **Ensure that any proposals for mining and extraction of basic raw materials affecting the Park are referred to the EPA (DEC) [Ongoing]**

2. **Review proposals for mining and extraction of basic raw materials with a view to excluding them from the Park. (DEC, LGAs) [Ongoing]**

3. **Should proposals for mining or the extraction of basic raw materials be approved, ensure that adequate provisions are made to manage impacts and to protect the remaining Park areas. (DEC, LGAs) [Ongoing]**

40. Utilities and Park Services

The objective is to minimise the impact of public utilities in the Park, and provide cost-effective and safe park services.

UTILITIES AND SERVICES

Services such as electricity, water, sewerage and telecommunications are available near most of the boundaries of the Park. Future recreational, commercial, education or management facilities

may require services at additional locations within the Park.

It is important that Park managers liaise with service providers so that utilities are located outside the Park boundary where possible. Additionally, the number of service corridors in the Park should be rationalised by combining utility requirements. Where possible, developments such as service roads and fire access tracks should be developed along these corridors.

This Plan does not restrict access for infrastructure providers to maintain utilities and services. The provision of recreation facilities will be limited to locations where they do not conflict with the operational requirements of infrastruture providers.

POWER SUPPLY INFRASTRUCTURE

A number of major electricity corridors traverse the Park and have a significant impact on landscape value. If additional mains power lines are required, they should be placed underground or in such a way that there is minimal visual impact. Where feasible, power supplies for facilities in the Park should be from alternative renewable energy sources such as solar power.

WATER SUPPLY INFRASTRUCTURE

As discussed in Section 16, the Jandakot Groundwater Mound is an important source of drinking water for the Perth Metropolitan Area. There are 28 Water Corporation public drinking water source wellheads and their associated protection zones located in the Jandakot UWPCA, eight of which are located wholly or partly within Jandakot Regional Park (Ecoscape, 2002). Wellhead protection zones have the same level of protection as the UWPCA Priority Area in which they are located (see Section 16). Wellhead protection zones have a radius of 500 metres in Priority 1 areas, and 300 metres in Priority 2 and 3 areas (Water and Rivers Commission, 2003).

The Water Corporation and DoW are to be notified of any planned developments or works that will cross pipeline easements or affect public drinking water source wellheads and their buffer zones, and approval is to be gained prior to commencement of works.

WASTE WATER TREATMENT INFRASTRUCTURE

The Water Corporation is to be notified of any planned developments or works that will cross pipeline easements or affect wastewater treatment infrastructure, and approval is required prior to the commencement of works.

STORMWATER FACILITIES AND DRAINAGE OUTLETS

Sections of the Park have been subject to drainage works in the past. The original purpose of the drains was to remove water from low-lying areas, for agricultural production. The drains have significant visual amenity and ecological impacts on the surrounding landscape. Drainage reserves form a lateral barrier to movement, yet also facilitate unauthorised access where fencing is inadequate. Where drains are poorly maintained, weed invasion can become a problem.

The Water Corporation is responsible for the maintenance of drains that are part of Rural and Urban Land Drainage Systems, which include two drains located near the Park - the Birrega Sub-Main and Baileys Road Branch Drain. The Water Corporation makes provisions to ensure that the drains do not become a conduit for fire. A branch of the Birrega Sub-Main Drain discharges into a wetland in Anketell Estate. This drain is connected to Wungong Brook and it drains through rural land in Oakford and Darling Downs.

Walking in Water Corporation drainage reserves is generally discouraged and horse riding is prohibited.

Drains in the Park that are no longer required for rural drainage are not under the control of, or maintained by, the Water Corporation. They may be filled for conservation or recreation purposes. A number of these drains dissect or adjoin the Park. There are also a number of privately constructed drains in the Park which form part of James Drain and which play a role in the local drainage network. These drains will be maintained as functionally operative drains in the future by the City of Armadale. The Water Corporation has declined management of James Drain.

Due to the predominantly rural nature of the region, the Park has not been used for the disposal of stormwater from urban and industrial developments in the past. All new developments adjoining the Park will be required to dispose of stormwater appropriately within the development site. No additional direct drainage outfalls should be permitted in the Park.

The Forrestdale Main Drain Arterial Drainage Strategy (DoW, 2009) provides guidance about water management issues to enable development to proceed within the Forrestdale main drain catchment area. Urban development will likely have impacts on the hydrology of wetlands in the Park. In light of these likely hydrological changes, continued abstraction of water from the Jandakot Groundwater Mound and declining rainfall patterns across the south-west of Western Australia, allowances should be made to supplement stormwater (under specified conditions) into wetlands in the Park should it be considered appropriate.

PARKLAND SERVICING AND MAINTENANCE

Parkland and recreational areas need regular maintenance, which is the responsibility of the managing agency that controls each area.

The provision of rubbish bins will be minimised and visitors will instead be encouraged to take their rubbish home. Illegal dumping of rubbish is a

management issue in some areas of the Park. This requires the enforcement of the relevant Local Laws or the application of the CALM Act and regulations relating to rubbish dumping.

Maintenance of fences to prevent unauthorised access is a particular management issue. The managing agencies will continue to conduct regular patrols to ensure that fences are properly maintained.

Strategies

1. **Where appropriate, ensure that a detailed environmental management and rehabilitation programme accompanies service works that occur in the Park. (Section 23). (DEC, CoA, CoC, ToK) [Ongoing]**

2. **Take all reasonable steps to ensure that no additional direct drainage outlets are constructed in the Park. (DEC, LGAs) [Ongoing]**

3. **Promote 'take it home' rubbish education. (DEC, LGAs) [Medium]**

4. **Establish and maintain a network of boundary fences to manage unauthorised pedestrian, horse riding and vehicle access. (DEC, CoA, CoC, ToK) [High]**

5. **Liaise with DoP and the EPA to ensure that appropriate conditions that help protect the values of the Park are placed on infrastructure projects and other developments during environmental and planning approval processes. (LGAs, DEC) [Ongoing]**

41. Development Proposals Affecting the Park

The objective is to minimise the impact of developments on the values of the Park.

Jandakot Regional Park is located in an area that is predicted to receive increasing pressure from urban development (Western Australian Planning Commission, 2001, 2005 and 2007). It is important to ensure that developments in areas adjoining the Park do not adversely affect the values of the Park.

The *Jandakot Structure Plan* (Western Australian Planning Commission, 2007), which includes the southern end of the Park, and the *Southern River/Forrestdale/Brookdale/ Wungong District Structure Plan*, (Western Australian Planning Commission, 2001), which includes the north-eastern corner of the Park, provide an insight into likely areas of development adjacent to the Park, and have been considered in the preparation of this Plan.

To facilitate urban development in the Forrestdale area, the City of Armadale intends to construct the currently unmade portion of the dedicated road reserve for Keane Road. The EPA will undertake a formal environmental impact assessment of the project.

Strategies

1. **Request that appropriate conditions (which help to protect the values of the Park) are placed on subdivisions and developments during the planning and environmental approvals processes. (DEC, LGAs,) [Ongoing]**

2. **Liaise with the Commonwealth Department of the Environment, Water, Heritage and the Arts to ensure that proposals are referred under the *Environment Protection and Biodiversity Act 1999* where appropriate. (DEC, LGAs) [Ongoing].**

G. WORKING WITH THE COMMUNITY

42. Guiding Principles for Working with the Community

1. Community participation
The community is encouraged to have input into the planning and management of the Park. Public participation processes will have a clearly stated purpose and clearly identified boundaries. Participation is to be based on a shared understanding (with stakeholders) of objectives, responsibilities, behaviour and expected outcomes. The participatory process will be objective, open, fair and carried out in a responsible and accountable manner. Participation will provide opportunities for input, representation and joint learning from all relevant stakeholders.

2. Information exchange
Information regarding the planning and management of the Park will be exchanged between land managers and the community in an open and transparent manner. Data and information used in the decision-making process will be available to stakeholders. Public participation processes will emphasise the sharing of information, joint learning and understanding.

3. Outcomes and decision-making
The outcomes of public participation will form part of the decision-making process. Participants should be informed as to how their involvement affected DEC's or the State government's decisions.

4. Management objectives
The community will be encouraged to contribute to nature conservation and land management objectives, including those outlined in this Plan. This will help to build community awareness, understanding and commitment to these objectives.

5. Education and interpretation
Education and interpretation will be aimed at giving visitors a 'take home' message that will create an awareness of the Park's values and management issues, and positively influence visitor behaviour. It will also provide information on the reasons behind management decisions and will convey the objectives of this Plan. Education and interpretation will encourage community involvement in and ownership of the Park.

Strategy

1. **Apply the above principles in working with the community to manage the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

43. Community Involvement

The objective is to facilitate community involvement in the management of the Park.

JANDAKOT REGIONAL PARK COMMUNITY ADVISORY COMMITTEE

The Jandakot Regional Park Community Advisory Committee provides a forum at which issues affecting the Park are discussed. The committee, which was established in February 1999, consists of community members, and representatives from DEC and local government. The committee's role is to assist in implementing this Plan and subsidiary plans for the Park and to provide advice regarding the ongoing management of the Park. The Community Advisory Committee's role, composition and structure will be reviewed periodically.

Information on community groups involved in the Park can be obtained from the managing agencies. Contact details are provided in Appendix D.

When as issue in the Park has a significant impact on a specific user group, DEC will consult with that group as well as with the Jandakot Regional Park Community Advisory Committee.

COMMUNITY INVOLVEMENT IN IMPLEMENTING THIS PLAN

The community is encouraged to be involved in implementing this Plan as well as in future planning and management projects. This will help to develop a sense of community ownership of, and value in the Park.

To facilitate community involvement in the Park, DEC has prepared a Regional Park Volunteer Information Package. When consulting with the community on issues regarding the Park, DEC is guided by *Community Involvement (Public Participation and Volunteers) Policy Statement No. 15.*

Residents who live in close proximity to the Park can have a great impact on the Park, both positive and negative. It is important to seek the cooperation and involvement of nearby landowners to protect the values of the Park. This can be done through educational programmes, which promote responsible use of the Park and inform the community of management roles and responsibilities.

There are several different ways that members of the community can be involved in assisting with the implementation of this Plan, including:

- joining community volunteer groups;
- joining DEC's schools-based 'Bush Rangers' Programme;
- contacting members of the Jandakot Regional Park Community Advisory Committee;
- reporting problems and issues to the managing agencies; and
- involvement in clean-up days (e.g. Clean-up Australia Day) or rehabilitation planting.

Strategies

1. **Consult with the Jandakot Regional Park Community Advisory Committee in implementing this Plan. (DEC) [Ongoing]**

2. **Periodically review the role and composition of the Jandakot Regional Park Community Advisory Committee. (DEC) [Ongoing]**

3. **Provide opportunities for the community to be involved in developing subsidiary plans for the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

4. **Maintain active liaison with community groups involved in the Park (DEC, CoA, CoC, ToK) [Ongoing]**

5. **Encourage and support the activities of volunteers, community groups, schools and associations interested in the Park (DEC, LGAs) [High]**

6. **Coordinate all activities of volunteers in the Park in liaison with community groups. (DEC, LGAs) [Ongoing]**

7. **Facilitate community involvement in the Park by implementing the Regional Parks Volunteer Information Package. (DEC) [Ongoing]**

8. **Inform the community and other organisations of management actions, programmes and developments within the Park. (DEC, CoA, CoC, ToK) [Ongoing]**

Key performance indicators for community involvement
The success of these strategies will be measured by: 1. Change in volunteer hours contributed to the management of the Park. 2. Existence of an active community advisory committee.
Target: 1. No decrease in volunteer hours contributed to the management of the Park. 2. Maintain an active community advisory committee for the Park.
Reporting: 1. Every 5 years. 2. Every 5 years.

44. Information, Interpretation and Education

The objectives are to increase the community's awareness, appreciation and understanding of the Park's values and management practices and to involve the community in implementing this Plan.

An effective communication programme is essential to achieve the vision and objectives for managing the Park. It informs the public of attractions, facilities and recreation opportunities available within the Park and provides an avenue to promote an appreciation and greater understanding of the natural environment. Additionally, it fosters appropriate behaviour so that adverse impacts on the environment are minimised.

A communication plan for the regional parks in Perth has been completed by DEC. The communication plan and programme has three integrated parts:

1. information – providing an overview of recreation opportunities and details of facilities, activities and regulations;
2. interpretation – explaining natural and cultural features; and
3. education – providing detailed materials and programmes designed to facilitate learning, focussing on target groups (e.g. school groups, community groups).

The communication programme is being implemented by way of signs, displays, publications (such as brochures and Park notes) and guided activities.

An interpretation plan will also be completed for Jandakot Regional Park. This plan will outline how information is provided to visitors to help them plan their visit, enjoy and appreciate the Park's values and assist them to recall their experience when they depart. The Park offers many opportunities for developing an enriching body of interpretive material.

Key areas for interpretation and education include:

- the importance of Jandakot groundwater resources and strategies for protection;
- the importance of wetlands;
- flora and fauna, particularly of heathlands and banksia woodlands;
- geomorphology;
- cultural influences (both Aboriginal and non-Aboriginal), including the history of rural land use;
- recreational opportunities;
- the regional park entity, its management and evolution; and
- caring for the Park and using it responsibly.

The development of interpretive material should be undertaken in a coordinated way to ensure the most effective use of available resources and to present a well integrated, consistent body of information about the Park.

Involvement of the community in the Park's management, ongoing liaison with community groups and the provision of interpretive and educational materials will be important for maintaining the values of the Park and to maximise its use as an educational resource.

DEC will develop further opportunities for Park information to be presented, consistent with the communication plan for regional parks and the interpretation plan for Jandakot Regional Park.

Strategies

1. **Implement and periodically update the Regional Parks Communication Plan. The plan provides direction on:**
   - **community education;**
   - **community involvement; and**
   - **interpretive strategies and techniques.**

   (DEC) [High]

2. **Develop and implement an interpretation plan for Jandakot Regional Park. (DEC, CoA, CoC, ToK) [High]**

3. **Continue to liaise with interest groups and the community to ensure a coordinated approach to information provision, interpretation and education regarding the Park. (DEC, LGAs) [Ongoing]**

H. IMPLEMENTING AND EVALUATING THE PLAN

45. Priorities, Funding and Staff

The objective is to manage the Park according to the priorities developed for implementation.

PRIORITIES AND TIMELINES

The priorities for managing the Park have been established by the joint managers of the Park and appear in brackets behind each strategy in this Plan. They represent the priorities at the time of writing and will be reviewed in reference to changing circumstances during the term of the Plan. There are many strategies outlined in this Plan. Some are guidelines, and others are prescriptions for specific actions. The City of Armadale, the City of Cockburn, the Town of Kwinana and DEC will implement this Plan within the framework of available resources.

Subsidiary plans and implementation programmes

In implementing this Plan, more detailed subsidiary plans will be prepared prior to significant works taking place within the Park (Figure 1).

Subsidiary plans to be (or that have been) prepared as part of the Jandakot Regional Park planning process include:

- Dieback management strategy (Section 18);
- Weed Species and Rehabilitation Plan (Section 20 and Section 23);
- Fire Response Plan (Section 21);
- Regional Parks Pest and Problem Animal Control Plan (Section 22)
- Visitor Survey Programme (Section 30);
- Recreation Masterplan (Section 31);
- Horse Riding Trail Plan (Section 33);
- Sign System and Sign Plan (Section 35);
- Visitor Risk Management Programme (Section 36);
- Communication Plan for Regional Parks (Section 44);
- Interpretation Plan (Section 44) and
- Volunteer Information Package (Section 43).

An annual projects list will be prepared by DEC to guide the implementation of this Plan in the areas of the Park vested with the Conservation Commission. The local government authorities involved in the management of the Park and the Jandakot Regional Park Community Advisory Committee will be consulted by DEC in the preparation of the annual projects list.

STAFFING

The local government authorities manage reserves within the Park vested in them using staff and contractors as required. DEC services its management obligations with staff from the Regional Parks Branch and with contractors as required.

FUNDING ARRANGEMENTS

The local government authorities and DEC will finance and manage their respective land areas (Table 1 and Figure 4). DEC has been allocated a recurrent budget for the maintenance of regional parks from State Treasury. Funding for the acquisition of private property proposed for inclusion in the Park rests with the WAPC.

Strategies

1. **Prepare and implement an annual projects list, taking into account the priorities identified in this Plan. Consult with the appropriate managing agencies and the Jandakot Regional Park Community Advisory Committee when preparing the list. (DEC, CoA, CoC, ToK) [High]**

2. **Seek corporate sponsorship opportunities and other funding arrangements to contribute to Park management where appropriate. (DEC, CoA, CoC, ToK) [Ongoing]**

46. Term of the Plan

This Plan will guide the management of the Park for a period of ten years from the date it is gazetted. During this time, amendments are allowed under Section 61 of the CALM Act. If an amendment is necessary, the proposed changes will be released for public comment.

At the end of the ten-year period, this Plan may be reviewed and a new management plan prepared. The new management planning process requires full public consultation and approval from the Minister for Environment. If the plan is not renewed and replaced by the end of the ten-year period, Section 55(2) of the CALM Act allows the plan to remain in force in its original form, unless it is either revoked by the Minister or until a new plan is approved.

47. Performance Assessment

The Conservation Commission will measure the success of this Plan in accordance with its performance assessment function under Section 19(1)(g)(iii) of the CALM Act by using performance indicators and other mechanisms as appropriate.

It is not efficient to measure all aspects of management given resource and technical impediments, so indicators have will target 'key' components of the Plan. KPIs are identified in the relevant sections throughout the Plan and are also presented in a summary in Table 3. Each KPI comprises evaluation of a measure, target and reporting requirements.

DEC is responsible for providing information to the Conservation Commission to allow it to assess the performance of DEC in carrying out and complying with this Plan.

The frequency of reporting will depend on the requirements of each KPI, the establishment of baseline information against which to assess performance, and any unforeseen changes to the environmental conditions. Where a report identifies a target shortfall, a response to the Conservation Commission may be required. The response may identify factors that have led to the target shortfall, and propose alternative management where appropriate. The Conservation Commission will consider DEC's response on the target shortfall and evaluate the need for action. The Conservation Commission will make the results of performance assessments available to the public.

The adequacy of the range of selected KPIs and management strategies will be reviewed following each performance assessment.

DEC will undertake a review of the implementation of management plan in preparing an annual projects list for the Park. The Jandakot Regional Park Community Advisory Committee will be involved in reviewing the annual projects list.

Strategies

1. **Audit the overall effectiveness of the Park's management based on the KPIs (Table 3). (Conservation Commission) [Ongoing]**

2. **Review the implementation of this Plan annually in preparing an annual projects list. (DEC) [Ongoing]**

Table 3 – Performance Assessment

KEY VALUES	KEY OBJECTIVE	KEY PERFORMANCE INDICATORS		
		Performance Measure	**Target**[1]	**Timelines & Reporting Requirements**
The Park's conservation, recreation and landscape values.	Section 8. Land Tenure To ensure that the values of the Park are protected by security of tenure and reserve purpose.	1. Tenure actions for which DEC and the Conservation Commission are responsible.	1. Complete all tenure actions for which DEC and the Conservation Commission are responsible.	1. Every 5 years.
The wetland ecosystems in the Park.	Section 17. Wetlands To protect and conserve wetland environments within the Park.	1. Changes in abundance, species diversity and structure of naturally-occurring aquatic macro-invertebrate populations in selected wetlands.	1. No decline in the abundance or diversity of naturally-occurring aquatic macro-invertebrate populations in selected wetlands based on 2010 levels.[2]	1. Every 5 years.
Vegetation communities in the Park are representative of banksia woodland and other communities once widespread on the Swan Coastal Plain but now significantly cleared.	Section 18. Flora and Vegetation To protect, conserve and rehabilitate local flora species and vegetation communities in the Park.	1. Changes in the abundance of selected flora species. 2. Changes in the occurrence of *Phytophthora cinnamomi* infections at selected locations in the Park. 3. Existence of a weed management and rehabilitation plan.	1. No decline in the abundance of selected flora species.[2] 2. No new human-assisted occurrences of *Phytophthora cinnamomi* at selected locations in the Park.[2] 3. Implementation of the weed management and rehabilitation plan.	1. Every 5 years. 2. Every 5 years. 3. Every 5 years.
The banksia woodlands and wetland communities support a variety of indigenous fauna species.	Section 19. Fauna To protect and conserve naturally-occurring fauna species in the Park, particularly threatened and priority species.	1. Changes in species diversity of naturally-occurring fauna. 2. Changes in the abundance of selected naturally-occurring species.	1. No decline in species diversity of naturally-occurring fauna. 2. No decline in the abundance of selected naturally-occurring species.	1. Every 5 years. 2. Every 5 years.

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Table 3 – Performance Assessment (continued)

KEY VALUES	KEY OBJECTIVE	KEY PERFORMANCE INDICATORS		
		Performance Measure	**Target**[1]	**Timelines & Reporting Requirements**
Vegetation communities in the Park are representative of banksia woodland and other communities once widespread on the Swan Coastal Plain but now significantly cleared.	Section 20. Weeds To minimise the impact of environmental weeds on local plant species and communities within the Park.	1. Changes in populations of high priority weeds as identified in the *Environmental Weeds Strategy for Western Australia.* 2. Changes in the abundance and distribution of priority environmental weeds, as identified in the Park's weed management and rehabilitation plan. 3. Existence of a weed management and rehabilitation plan.	1. No new populations of high priority weeds as identified in the *Environmental Weeds Strategy for Western Australia* over the next ten years. 2. No increase in the abundance and distribution of priority environmental weeds. 3. Completion and implementation of the weed management and rehabilitation plan.	1. Every 5 years. 2. Every 5 years. 3. Every 5 years
The Park provides opportunities for a wide range of passive and active recreation activities, and is particularly important for the opportunity it provides to recreate in relatively undisturbed natural environments that are close to urban areas.	Section 30. Visitor use To encourage visitor use whilst ensuring that the level of use and behaviour are sustainable minimise with other Park visitors and values.	1. Changes in visitor numbers and satisfaction levels. 2. Provision of formalised access in the Park (as per Section 31 – Recreation Masterplan). 3. Existence of a visitor survey programme.	1. No decline in visitor satisfaction. 2. Complete access and circulation components of the Recreation Masterplan. 3. Approval of a visitor survey programme.	1. Every 5 years. 2. Every 5 years. 3. Every 5 years.
The Park is a community asset.	Section 43. Community Involvement To facilitate community involvement in the management of the Park.	1. Change in volunteer hours contributed to the management of the Park. 2. Existence of an active community advisory committee.	1. No decrease in volunteer hours contributed to the management of the Park. 2. Maintain an active community advisory committee for the Park.	1. Every 5 years. 2. Every 5 years.

[1]Note: The response to target shortfalls will be to investigate the cause and report to the Conservation Commission for action.
[2]Note: monitoring needs to take into account natural variability.

REFERENCES AND BIBLIOGRAPHY

Ahern, J. (1995) Greenways as a Planning Strategy, Journal of Landscape Urban Planning. Vol 33: pp131 – 156.

ANZECC (2000) Best Practice in Protected Area Management Planning, ANZECC Working Group on National Parks and Protected Area Management Benchmarking and Best Practice Program.

Arnold, J. (1990) Jenny Arnold's Perth Wetlands Resource Book, Bulletin 266, Environmental Protection Authority and Water Authority of WA, Perth, Western Australia.

Atkinson, A. (1984) Chinese Market Gardeners in the Perth Metropolitan Region 1900 –1920, Western Geographer.

Bamford, M.J. and Bamford, A.R. (1998) Wetland Waterbird Monitoring; 1996 and 1997, Environmental Investigations for the Jandakot Groundwater Scheme Stage 2, Report prepared for the Water and Rivers Commission, Perth, Western Australia.

Bamford, M.J. (2002) Fauna Survey of Jandakot Airport, March 2002, Interim unpublished report by Bamford Consulting Ecologists to Jandakot Airport Holdings Pty Ltd.

Bowman Bishaw Gorman (1990) Overview of Vegetation and Environmental Values of the Jandakot Area, Unpublished report prepared for the Department of Planning and Urban Development, Perth, Western Australia.

Beard, J.S. (1981) Vegetation Survey of Western Australia. Swan. 1:1,000,000 Vegetation Series, Explanatory Notes to Sheet 7, University of Western Australia Press, Perth, Western Australia.

Berndt, R. (1979) "Aborigines of the South-West" in Berndt, R. and Berndt, C. (ed.), Aborigines of the West - their past and their future, University of Western Australia Press, Perth, Western Australia.

Byrne, N. and Vize, R. (1990) An Inventory of Recreation Opportunity Setting on Major Areas of Public Land in Victoria, Department of Conservation and Environment, East Melbourne, Victoria.

Churchward, H.M. and McArthur, V.M. (1980) Landforms and Soils of the Darling System, in Atlas of Natural Resources, Darling System, Western Australia, Department of Conservation and Environment, Perth, Western Australia.

City of Armadale (2009) Public Environmental Review Keane Road Strategic Link (draft in preparation), Perth, Western Australia.

City of Cockburn (1998) Denis de Young Reserve, Banjup: Environmental Management Plan, Bowman Bishaw Gorham, Perth, Western Australia.

City of Cockburn (1999) Cockburn Trails Master Plan, Report prepared by Maher Brampton Associates, Como, Western Australia

City of Cockburn (2001) Draft Banjup Trails Master Plan Report, (unpublished)

Colmar Brunton (2005) 2005 Regional Parks User Survey, Research Report prepared for the Department of Conservation and Land Management. Perth, Western Australia.

Davis, J.A. (1990) "How do wetlands work - and how do we manage them to maintain healthy aquatic ecosystems?" in: Wetlands of the South West: The role of local government and land owners in the management of wetlands in the South West of Western Australia, South West Development Authority, Bunbury, Western Australia.

Del Marco, A., Taylor, R., Clarke, K., Savage, K., Cullity, J. and Miles, C. (2004) Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region, Western Australian Local Government Association, Perth, Western Australia.

Department of Conservation and Environment (1983) Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority – 1983, The Darling System - System Six, Report No. 13, Perth, Western Australia.

Department of Conservation and Land Management (1986a) Weeds on CALM Land, Policy Statement No. 14, Perth, Western Australia.

Department of Conservation and Land Management (1986b) Rehabilitation of Disturbed Land, Policy Statement No. 10, Perth, Western Australia.

Department of Conservation and Land Management (1987) Fire Management Policy, Policy Statement No. 19, Perth, Western Australia.

Department of Conservation and Land Management (1991) Community Involvement (Public Participation and Volunteers), Policy Statement No. 15, Perth, Western Australia.

Department of Conservation and Land Management (1991) Recreation, Tourism and Visitor Services Policy Statement No. 18, Perth, Western Australia.

Department of Conservation and Land Management (1992) Beekeeping on Public Land Policy Statement No. 41, Perth, Western Australia.

Department of Conservation and Land Management (1994) Reading the Remote, Landscape Character Types of Western Australia, Perth, Western Australia.

Department of Conservation and Land Management (1997) Visitor Risk Management Policy, Statement No. 53, Perth, Western Australia.

Department of Conservation and Land Management (1999) Environmental Weed Strategy for Western Australia, Perth, Western Australia.

Department of Conservation and Land Management (2000) Radio/ Tele Communications Facilities Policy, Statement No. 49, Perth, Western Australia.

Department of Conservation and Land Management and Fire and Emergency Services Authority (2005) Westplan – Wildfire; Western Australian Wildfire Emergency Management Plan, Perth, Western Australia.

Department of Conservation and Land Management (2005) Forrestdale Lake Nature Reserve Management Plan, Perth, Western Australia.

Department of Environment and Conservation (2007) Corporate Plan, Perth, Western Australia.

Department of Environment and Conservation (2007a) Pest and Problem Animal Control Plan for Perth's Regional Parks, Perth, Western Australia.

Department of Environmental Protection (1992) Environmental Protection (Swan Coastal Plain Lakes) Policy, Perth, Western Australia.

Department of Environment, Heritage, Water and the Arts (2009) Australian Heritage Database [Online] available: http://www.environment.gov.au/heritage/index/html

Department of Health (2007) Circular No. PSC 88: Use of Herbicides in Water Catchment Areas, Perth, Western Australia.

Department of Minerals & Energy (1986) Environmental Geology Series – Perth, Perth, Western Australia.

Department of Minerals & Energy (1995) The Minerals Exploration and Development Memorandum of Understanding, Unpublished.

Department of Minerals & Energy (1998) Guidelines for Mineral Exploration and Mining within Conservation Reserves and Other Environmentally Sensitive Lands In Western Australia, Information Series No. 11, Perth, Western Australia.

Department of Planning and Urban Development (1995) Jandakot Land Use and Water Management Strategy, Perth, Western Australia.

Department of Water (2007) Water Quality Protection Note 96 – Pest Animal Management in Public Water Source Areas, Perth, Western Australia.

Department of Water (2009) The Forrestdale Main Drain Arterial Drainage Strategy, Perth, Western Australia.

Dieback Working Group (2000) Managing Phytophthora Dieback in Bushland: A Guide for Landholders and Community Conservation Groups. Dieback Working Group, Perth, Western Australia.

Ecoscape (2002) Environmental assessment of horse riding in Jandakot Regional Park, Report for the Department of Conservation and Land Management, Perth, Western Australia.

Environment Australia (2001) A Directory of Important Wetlands in Australia, Environment Australia, Canberra, Australian Capital Territory.

Environment Protection Authority (1992) Environmental Protection (Swan Coastal Plain Lakes) Policy, Perth, Western Australia.

Environmental Protection Authority (1993) Red book : status report : on the implementation of Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority (1976-1984), Perth, Western Australia.

Environmental Protection Authority and the Department of Minerals and Energy (1995) Mineral Exploration and Development Memorandum of Understanding, Unpublished.

Evans, R., Willers, N. and Mitchell, D. (2003) Threatened flora of Swan Region, Unpublished report to the Department of Conservation and Land Management and Environment, Perth, Western Australia.

Garnett, S.T. and Crowley, G.M. (2000) The Action Plan for Australian Birds, Environment Australia, Canberra, Australian Capital Territory.

Gibson, N., Keighery, B.M., Keighery, G., Burbidge, A. and Lyons, M. (1994) A floristic survey of the Southern Swan Coastal Plain, Unpublished Report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.), Perth, Western Australia.

Government of Western Australia (1997) Wetlands Conservation Policy for Western Australia, Perth, Western Australia.

Government of Western Australia (2000) Bush Forever, Western Australian Planning Commission, Perth, Western Australia.

Government of Western Australia (2003) Indigenous Ownership and Joint Management of Conservation Lands in Western Australia Consultation Paper, Perth, Western Australia.

Gozzard, J. (1983) The Jandakot Part Sheets 2003 III 2003 II, Perth Metropolitan Region Environmental Geology Series, Geological Survey of Western Australia, Perth, Western Australia.

Grayson, J. and Calver, M. (2004) "Regulation of domestic cat ownership to protect urban wildlife: a justification based on the precautionary principle" in Lunney, D. and Burgin, S. (eds) Urban Wildlife: more than meets the eye, Royal Zoological Society of New South Wales, Mosman, New South Wales.

Grayson, J., Calver, M. and Styles, I. (2002) "Attitudes of suburban Western Australians to proposed cat control legislation" in Australian Veterinary Journal,Vol 80 (9): 536-543.

Green Skills Inc (2004) Magenup Lake Management Implementation Plan 2005 – 2010. Report prepared for the Town of Kwinana and the Wandi Progress Association (unpublished).

Giblett, R. (1993) Outer city sanctuary: Forrestdale Lake, Landscope, Vol 8, No. 4, pp. 21-25.

Hammond, J. (1980) Winjan's People: The story of the South-west Australian Aborigines, Imperial Printing Company Limited, Perth, Western Australia.

Havel, J.J. (1975) Site-vegetation in the northern Jarrah forest. *I. Definition of site-vegetation types* for Department of Conservation and Environment Bulletin No. 86.

Heddle, E.M., Loneragan, O.W. and Havel, J.J. (1980) "Vegetation complexes of the Darling System, Western Australia" in Atlas of Natural Resources, Darling System, Western Australia, Department of Conservation and Environment, Perth, Western Australia.

Heritage Council of Western Australia online database (2009) available: www.heritage.wa.gov.au

Hill, A.L., Semeniuk, C.A., Semeniuk, V. and Del Marco, A. (1996a) Wetlands of the Swan Coastal Plain, Volume 2A: Wetland Mapping, Classification and Evaluation, Department of Environmental Protection and Water & Rivers Commission, Perth, Western Australia.

Hill, A.L., Semeniuk, C.A., Semeniuk, V. and Del Marco, A. (1996b) Wetlands of the Swan Coastal Plain. Vol. 2B Wetland Mapping, Classification and Evaluation, Department of Environmental Protection and Water & Rivers Commission, Perth, Western Australia.

How, R.A., Harvey, M.S., Bell, J. and Waldock J.M. (1996) Ground Fauna of Urban Bushland Remnants in Perth: Report to the Australian Heritage Commission, NEP Grant N 93/04.

Keighery, G.J. (1992) Vegetation and flora of the Denis de Young Reserve (No. 31653 and 33002) and the Bartram Road (No. 418, Swan Loc. 206 and 209) Complex, Jandakot, Unpublished, Department of Conservation and Land Management, Perth, Western Australia.

Keighery, G.J. (1992) Proposed Jandakot Botanical Park; Overview of Botanical Communities and their Significance I Anstey Road Wetlands, Unpublished, Department of Conservation and Land Management, Perth, Western Australia.

Lofgren, M. (1975) Patterns of Like: The Story of the Aboriginal People of WA, Trustees of the WA Museum, Perth, Western Australia.

Maddeford, W. (2001) Barking Owl at Blue Gum Lake. WA Bird Notes Vol 99:16.

Mattiske, E.M. and Koch, B.L. (1991) Flora and Vegetation Part A in Jandakot Groundwater Scheme Stage 2 Public Environmental Review, Volume 2 Supporting Papers, Water Authority of Western Australia, Perth, Western Australia.

McArthur, W.M. and Bettenay, E. (1960) The Development and Distribution of the Soils of the Swan Coastal Plain, Western Australia Soil Publications No. 16, CSIRO, Melbourne, Victoria.

McGuire, M., Papas, P., Trayler, K. and Davis, J. (1998) Biomonitoring of Selected Jandakot Wetlands (Macroinvertebrates) for Jandakot Groundwater Scheme Stage 2 Public Environmental Review. Final Report (1996 – 1997). Prepared for the Water and Rivers Commission by Aquatic Ecosystems Research, Murdoch University, Murdoch, Western Australia.

Ministry for Planning (1995a) Proposals for the Jandakot Botanic Park, Report prepared for the Western Australian Planning Commission, Perth, Western Australia.

Ministry for Planning (1995b) Jandakot Land Use and Water Management Strategy, Report prepared for the Western Australian Planning Commission, Perth, Western Australia.

O'Connor, R., Quartermaine, G. and Bodney, C. (1989) Report on an investigation into Aboriginal significance of wetlands and Rivers in the Perth – Bunbury region, Western Australian Water Resources Council, Perth, Western Australia.

Popham, D. (1980) First Stage South - A History of the Armadale Kelmscott District WA. Town of Armadale, Armadale, Western Australia.

Ramsar Convention Bureau (2002) [Online] available: www.ramsar.org.

Regional Parks Task Force (1991) Task Force Report on the Administration, Planning and Management of Region Open Space and Regional Parks in Perth, Western Australia, Report to Cabinet, Department of Planning and Urban Development and Department of Conservation and Land Management, Perth, Western Australia.

Robson, B. (ad). (1997) Draft Serpentine River Management Plan: Stages 3 and 4 – Goegrup Lake to the Northern Boundary of the Shire of Murray, School of Environmental Science, Murdoch University, Murdoch, Western Australia.

Seddon, G. (1972) Sense of Place, University of Western Australia Press, Perth, Western Australia.

Semeniuk, C.A. (1987) "Wetlands of the Darling System — a geomorphic approach to habitat classification" in Journal of the Royal Society of Western Australia Vol 69(3) pp 95-111.

Semeniuk, C.A., Semeniuk, V., Cresswell, I.D. and Marchant, N.G. (1990) "Wetlands of the Darling System, Southwestern Australia: a descriptive classification using vegetation pattern and form" in Journal of Royal Society of Western Australia Vol 72(4) pp109-121.

Semeniuk Research Group (1991) Wetlands of the local governments: their classification, significance and management. A report to the local governments and the Western Australian Heritage Committee, The Group, Warwick, Western Australia.

Semeniuk, V. (1988) "Consanguineous wetlands and their distribution in the Darling System" in Journal of the Royal Society of Western Australia Vol 70 pp 69-87.

Semeniuk, V. (1989) "Bassendean and Spearwood Dunes: their geomorphology, stratigraphy and soils as a basis for habitats of banksia woodlands", in Journal of the Royal Society of Western Australia Vol 71(4) pp 87-88.

Singleton, J. (1989) "The History and Tenure of Wetlands", in Wetlands in Crisis: What can Local Governments Do? – Conference Papers 15 June 1988, Bulletin 372, Environmental Protection Authority, Perth, Western Australia.

State Planning Commission (1987) Planning for the future of the Perth Metropolitan Region, Perth, Western Australia.

State Planning Commission (1994) Metropolitan Region Scheme Amendment No. 938/33, South West Corridor Stage A, Volume 1 Report on Submissions, Perth, Western Australia.

State Weed Plan Steering Group (2001) A Weed Plan for Western Australia, Department of Agriculture, Perth, Western Australia.

Stankey, G.H. and Wood, J. (1982) "The Recreation Opportunity Spectrum: An Introduction" in Australian Parks and Recreation, Feb 1982, pp 6-15.

Stephenson, G. and Hepburn, J. (1955) Plan for the Metropolitan Region Perth and Fremantle Western Australia, Government Printer, Perth, Western Australia.

The Water Sensitive Urban Design Research Group (1989) Water Sensitive Residential Design: An Investigation into its Purpose and Potential in the Perth Metropolitan Region, Western Australia Water Resources Council, Perth, Western Australia.

Tingay and Associates (1998) A Strategic Plan for Perth's Greenways, Final Report, Perth, Western Australia.

Town of Kwinana (2006) Town of Kwinana Trails Master Plan, Report prepared by Transplan Pty Ltd, Como, Western Australia

Townley, L.R., Turner, J.V., Barr, A.D., Tefry, M.G., Wright, K.D., Gailitis, V., Harris, C.J. and Johnston, C.D. (1993) Wetlands of the Swan Coastal Plain Volume 3, Interaction between lakes, wetlands and unconfined aquifers. Water Authority of Western Australia and Environmental Protection Authority, Perth, Western Australia.

Trudgen, M. and Keighery, B. (1990), An assessment of the vegetation and flora conservation values in the area between Jandakot and Wellard in Bowman Bishaw Gorham, Overview of Vegetation and Environmental Values of the Jandakot Area. Report prepared for the Department of Planning and Urban Development, Perth, Western Australia.

Van Gool, D. (1990) Land Resource in the Northern Section of the Peel-Harvey Catchment, Swan Coastal Plain, Western Australia, Department of Agriculture, Perth, Western Australia.

Water and Rivers Commission (1999) Policy and Guidelines for Construction and Silica Sand Mining in Public Drinking Water Source Areas, Statewide Policy No. 1, Perth, Western Australia.

Water and Rivers Commission (2000) Pesticide Use in Public Drinking Water Source Areas, Statewide Policy No. 2 Perth, Western Australia.

Water and Rivers Commission (2001b) Environmental Management of Groundwater Abstraction on the Jandakot Mound, Annual report to the Environmental Protection Authority July 2000 to June 2001, Perth, Western Australia.

Water and Rivers Commission, Western Australian Horse Council (Inc.), Department of Environmental Protection, Department of Health (2002) Environmental Management Guidelines for Horse Facilities and Activities, Water Quality Protection Guideline 13, Water and Rivers Commission, Perth, Western Australia.

Water and Rivers Commission (2003) Policy and Guidelines for Recreation within Public Drinking Water Source Areas on Crown Land, Statewide Policy No. 13, Perth, Western Australia.

Water Authority of Western Australia (1991) Jandakot Groundwater Scheme Stage 2 Public Environmental Review, Volumes 1 and 2. Report prepared by the Water Authority of Western Australia, Perth, Western Australia.

Water Corporation (2008) Jandakot Groundwater System, Information Sheet [Online] available: www.watercorporation.com.au

Western Australian Herbarium (2009) FloraBase - Information on the Western Australian flora, Department of Environment and Conservation: http://florabase.dec.wa.gov.au

Western Australian Planning Commission (1998) Statement of Planning Policy No. 2.3 Jandakot Groundwater Protection Policy, Perth, Western Australia.

Western Australian Planning Commission (2001) Southern River/Forrestdale/Brookdale/Wungong District Structure Plan 2001, Perth Western Australia.

Western Australian Planning Commission (2003) Statement of Planning Policy No. 2.7 Public Drinking Water Source Policy, Perth Western Australia.

Western Australian Planning Commission (2005) Population Report No. 6 - Western Australia Tomorrow. Population projections for the planning regions 2004 – 2031 and local government areas 2004 – 2021, Perth, Western Australia.

Western Australian Planning Commission (2007) Jandakot Structure Plan - 2007, Perth, Western Australia.

APPENDIX A - ACRONYMS USED IN THE PLAN

CoA	City of Armadale
CALM Act	Conservation and Land Management Act 1994
CoC	City of Cockburn
Conservation Commission	Conservation Commission of Western Australia
DCS	Department of Corrective Services
DEC	Department of Environment and Conservation
DIA	Department of Indigenous Affairs
DoW	Department of Water
DoP	Department of Planning
DRDL	Department of Regional Development and Lands
EPA	Environmental Protection Authority
FESA	Fire Emergency Services Authority
KPIs	Key Performance Indicators
LGAs	Local Government Authorities – The Park lies within the municipal boundaries of the City of Armadale, the City of Canning, the City of Cockburn, thee City of Gosnells, the Town of Kwinana and the Shire of Serpentine-Jarrahdale.
MoU	Memorandum of Understanding
MRS	Metropolitan Region Scheme
ToK	Town of Kwinana
UWPCA	Underground Water Pollution Control Area, as proclaimed under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*.
WAPC	Western Australian Planning Commission

APPENDIX B - DEC POLICIES REFERRED TO IN THE PLAN

Rehabilitation of Disturbed Land, Policy Statement No. 10

Weeds on DEC Land, Policy Statement No. 14

Community Involvement (Public Participation and Volunteers), Policy Statement No. 15

Recreation, Tourism and Visitor Services, Policy Statement No 18

Fire Management Policy, Policy Statement No. 19

Beekeeping on Public Land, Policy Statement No. 41

Radio/ Tele Communications Facilities Policy, Statement No. 49 [review in preparation]

Visitor Risk Management Policy, Policy Statement No. 53

Management of Pest Animals on DEC-Managed Lands, [Draft Policy Statement]

APPENDIX C - GLOSSARY

Class 'A' Reserves	Under Section 42 of the *Land Administration Act 1997*, the Minister for Lands may by order classify a reserve as a class 'A' reserve, for one or more purposes in the public interest. The Act outlines special procedures that apply to certain changes to class 'A' reserves and conservation reserves. (*Land Administration Act 1997*, Sections 41, 41 and 43)
Conservation Category Wetlands	Wetlands for which the appropriate management regime has the objective of preserving their natural attributes and functions. (Government of Western Australia, 2000)
Declared Rare Flora	Declared rare flora describes threatened flora; plant species that are declared rare under Section 23F of the *Wildlife Conservation Act 1950* as flora likely to become extinct or which are rare or otherwise in need of special protection. To be declared rare, plant species must meet well-defined criteria, which include the thoroughness of searches for the species, its rarity and the danger of extinction. A number of criteria are used to define declared rare flora. These are related to the taxon being well defined and readily identifiable and the extent to which the taxon's distribution in the wild has been recently determined by competent botanists. The status of a threatened plant in cultivation has no bearing on the matter. (Government of Western Australia, 2000)
Fauna 'Specially Protected' under the *Wildlife Conservation Act 1950*	Under the *Wildlife Conservation Act 1950* the Minister for Environment may declare a species of fauna to be "Specially Protected" if they are likely to become extinct, or are rare, or are birds protected under and international agreement, or are otherwise in need of special protection. These species are considered threatened fauna and receive special consideration in management by DEC. (Government of Western Australia, 2000)
Matters of National Environmental Significance	The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* recognises and provides protection for matters of national environmental significance. The Act identifies seven matters of national environmental significance: ▪ World Heritage properties; ▪ national heritage places; ▪ wetlands of international importance (Ramsar sites); ▪ threatened species and ecological communities; ▪ migratory species; ▪ Commonwealth marine areas; and ▪ nuclear actions.
Priority Fauna Listings	DEC maintains a list of Priority Fauna. Taxa may be assigned one of five categories, as follows: Priority One: – Taxa with few, poorly known populations on threatened lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna. Priority Two: – Taxa with few, poorly known populations on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna. Priority Three: – Taxa with several, poorly known populations, some on conservation lands. Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

	Priority Four: – Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could if present circumstances change. These taxa are usually represented on conservation lands. Priority Five: - Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.
Priority Flora Listings	DEC maintains a list of Priority Flora. Taxa may be assigned one of four categories, as follows: Priority One – Poorly known: taxa which are known from one or a few (generally less than five) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey. Priority Two – Poorly known: taxa which are known from one or a few (generally less than five) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora' but are in urgent need of further survey. Priority Three: – Poorly known: taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey. Priority Four: – Rare: taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.
Resource Enhancement Wetland	Wetlands for which the management objective should be restoration through maintenance and enhancement of natural functions and attributes. (Government of Western Australia, 2000)
Threatened Ecological Community	DEC has developed a procedure for identifying 'threatened ecological communities'. Ecological communities are defined as 'naturally occurring biological assemblages that occur in a particular type of habitat'. Threatened ecological communities are those that have been assessed and assigned to one of four categories related to the status of the threat to the community. The categories are: ▪ presumed totally destroyed; ▪ critically endangered; ▪ endangered; ▪ vulnerable. Some threatened ecological communities are listed as 'endangered' under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. This means that actions that are likely to have a significant impact on the threatened ecological communities require Commonwealth environmental impact assessment and approval. (Government of Western Australia, 2000)
Underground Water Pollution Control Area	The Jandakot Underground Water Pollution Control Area (UWPCA) protects the part of the Jandakot Mound used for public drinking water supplies. The area was first proclaimed in 1975 under the *Metropolitan Water Supply, Sewerage and Drainage Act* (1909). The Department of Water has policies for the protection of Public Drinking Water Source Areas that include a three-tired protection system, as follows.

	Priority 1 source protection areas are defined and managed to ensure that there is no degradation of the water source in these areas. This is the highest level of protection for the water source and normally will apply to land owned by the State, and that is characterised by low-intensity and low-risk land use, such as forestry. Protection of public water supply outweighs virtually all other considerations in respect to the use of this land. Priority 1 source protection areas are managed in accordance with the principle of risk avoidance. Some areas of Crown Land reserved for 'Parks and Recreation' in Jandakot Regional Park are classified as Priority 1. *Priority 2* source protection areas are defined to ensure that there is no increased risk of pollution to the water source. Priority 2 areas are declared over land where low-risk development already exists. Protection of public water supply sources is a high priority in these areas. Priority 2 areas are managed in accordance with the principle of risk minimisation and so conditional development is allowed. The privately owned land in the Jandakot UWPCA is classified as either Priority 2 or Priority 3 source protection. *Priority 3* source protection areas are defined to manage the risk of pollution to the water source. Priority 3 areas are declared over land where water supply sources need to co-exist with other land uses such as residential, commercial and light industrial developments, although there is some restriction on potentially high polluting land uses. Protection of Priority 3 areas is otherwise achieved through management guidelines for land use activities. If the water source does become contaminated then water may need to be treated or an alternative water source found. (Western Australian Planning Commission, 2003)

APPENDIX D - CONTACTS

Department of Environment and Conservation
Regional Parks Branch
PO Box 1535
Fremantle WA 6959 — 9431 6500

Department of Environment and Conservation
Locked Bag 104
Bentley Delivery Centre WA 6983 — 9334 0333
www.dec.wa.gov.au

Department of Environment and Conservation
Swan Coastal District
5 Dundebar Road
Wanneroo WA 6065 — 9405 0700

City of Armadale
Locked Bag 2
Armadale WA 6992 — 9399 0111
www.armadale.wa.gov.au

City of Canning
Locked Bag 80
Welshpool WA 6986 — 9231 0606
www.canning.wa.gov.au

City of Cockburn
PO Box 1215
Bibra Lake DC WA 6965 — 9411 3444
www.cockburn.wa.gov.au

Town of Kwinana
PO Box 21
Kwinana 6966 — 9439 0200
www.kwinana.wa.gov.au

Shire of Serpentine Jarrahdale
6 Paterson Street
Mundijong 6123 — 9526 1111
www.sjshire.wa.gov.au