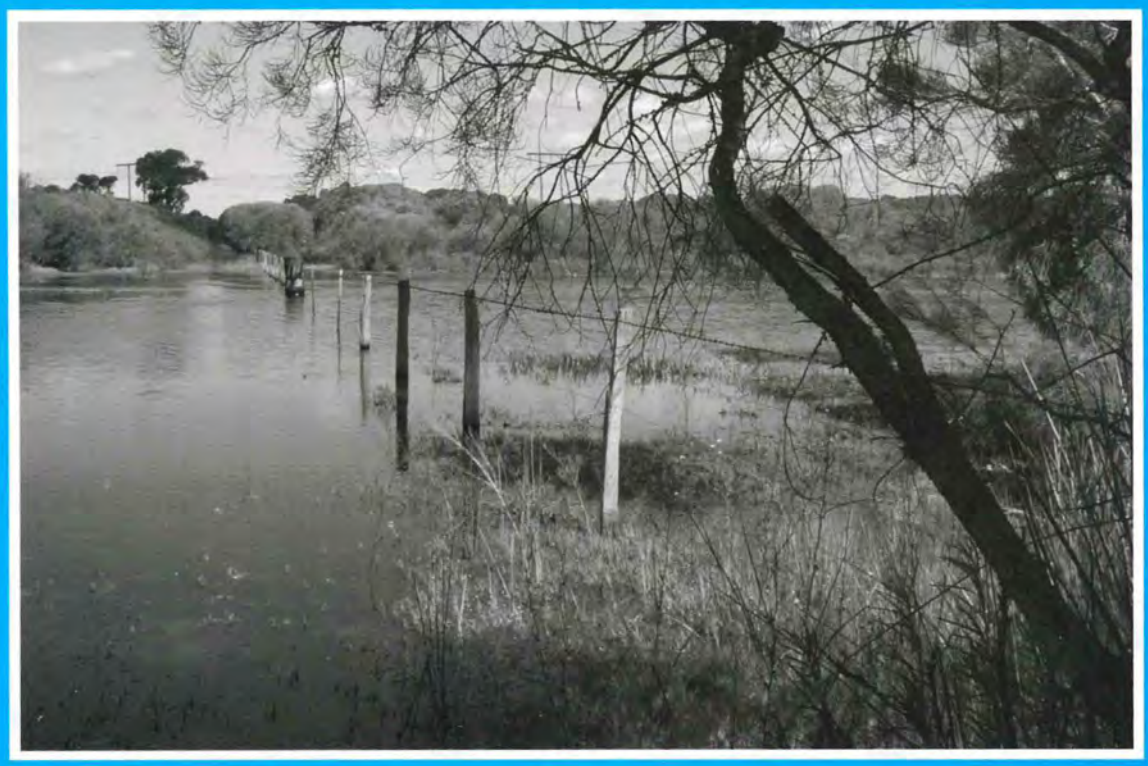
Jandakot Regional Park

Draft Management Plan 2004-2013



Conservation Commission of Western Australia

Department of Conservation and Land Management

City of Armadale

City of Cockburn

Jandakot Regional Park

2004 - 2013

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.

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What Do You Think?

We would like to know what you think of the proposals in this draft Management Plan, and encourage you to make a submission.

Why write a submission?

It is an opportunity to provide information, express your opinion, suggest alternatives and have a say on how we are proposing to manage the Jandakot Regional Park over the next 10 years. If you prefer not to make your own submission, you could make a joint submission with others.

What makes an effective submission?

To ensure that your submission is as effective as possible:

- make it concise and clear;
- list your points according to the subject sections and page numbers in the Plan;
- say whether you agree or disagree with any or all of the objectives or recommendations, giving your reasons and sources of information; and
- suggest alternatives to deal with any issue with which you may disagree.

It is important to indicate those strategies and recommendations you agree with as well as those with which you disagree.

Give reasons for concerns and give support where appropriate. Information and constructive suggestions relating to your submission are most useful.

What criteria will be used in assessing your submission?

The draft management plan will be amended if a submission:

- provides additional resource information of direct relevance to management;
- provides additional information on affected user groups of direct relevance to management;
- indicates a change in or clarifies Government legislation, management commitment or management policy;
- proposes strategies that would better achieve/ assist with management goals and objectives; or
- indicates omissions, inaccuracies or a lack of clarity.

The draft management plan will not be amended if a submission:

- clearly supports the draft proposals;
- offers a neutral statement or no change is sought;
- addresses issues beyond the scope of the Plan;
- makes points which are already in the Plan or were considered during Plan preparation and the recommendation of the Draft Plan is still considered the best option;
- is one amongst several widely divergent viewpoints received on the topic and the recommendation of the Draft Plan is still considered the best option; or
- contributes options which are not feasible (generally due to some aspect of existing legislation or government policy);
- is based on incorrect information;
- involves details that are not appropriate or necessary for inclusion in a document aimed at providing management direction over the long term.

What Happens To Your Submission?

All submissions will be summarised according to the topics discussed. The draft Management Plan will then be reviewed in the light of the submissions, according to criteria mentioned above. A summary of the submissions will be published along with the final Management Plan, including an indication of how the Plan will be amended or not in response to the submission. If a submission is marked "CONFIDENTIAL" then the author will remain anonymous in the analysis of public submissions document.

Deadline

Submissions are welcome for three months after the date of release. For enquiries please ring the Department of Conservation and Land Management on (08) 9431 6500

Where to send your submission

Written submissions should be sent to:

Executive Director
Department of Conservation and Land Management
PO Box 1535
FREMANTLE WA 6959

Attention: Regional Parks Coordinator;
Jandakot Regional Park Management Plan

Where to obtain or view additional copies of this Plan

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(viewing only)

Or visit the Department of Conservation and Land Management's NatureBase website at:
http://www.naturebase.net/national_parks

How to Use This Plan

This Plan is divided into sections as set out in the table of contents. A goal is stated at the beginning of each section. Within each section are subsections. Each subsection begins with the objectives to be achieved by management, followed by a discussion of the main issues and then strategies, accompanied by the agencies responsible for achieving each objective 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 draft Management Plan and their efforts are gratefully acknowledged. The assistance of the Plan E team is appreciated, particularly the contributions from Rod Safstrom, David White and John Tuzee. The contribution of the Jandakot Regional Park Community Advisory Committee is also appreciated. The following members had input to the draft plan: Dr Ray Froend (Chair), David James, Carol MacPherson, Ailsa Skade, Jeffery Spencer, Sharon Miller, Ian Whitfield, Mary Daly, Ron Van Delft (City of Armadale); Paddy Strano (City of Cockburn); Rosalind Murray (Town of Kwinana); and Sue Osborne (Shire of Serpentine-Jarrahdale). Photographs on pages 23, 28 and 29 taken by Kirsty Lundy; photograph on page 54 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 CONSERVATION AND LAND MANAGEMENT

All national parks, conservation parks, nature reserves, and other conservation 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 Conservation and Land Management.

As the controlling body, the Conservation Commission of Western Australia is responsible for having management plans prepared for all lands that are vested in it. This Plan is prepared by the Department of Conservation and Land Management and issued as a draft plan by the Conservation Commission of Western Australia for public comment prior to final approval by the Minister for the Environment.

Preface

Regional parks are areas of regional open space that are identified by planning procedures as having regionally significant conservation, landscape and recreation values. Regional parks provide the opportunity for a consortium of management agencies and private landowners to develop coordinated planning and management strategies.

The concept of regional open space was first proposed in the Stephenson-Hepburn Report of 1955, which recommended that land required for future public purposes be identified and reserved. The Perth Metropolitan Region Scheme was established in 1963 and commenced the process of protecting open space for conservation and recreation, by reserving land for "Parks and Recreation". Since then, State planning agencies have been acquiring land in anticipation of the time when regional parks would be formally created to manage regionally significant areas of "Parks and Recreation".

In 1997, the State Government announced a commitment to introduce legislation to give regional parks legal standing and vesting in the former National Parks and Nature Conservation Authority, now the Conservation Commission of Western Australia. Eight regional parks were recognised as formal identities with the coordination of their management progressively transferred to the Department of Conservation and Land Management.

This Management Plan is a commitment by the land managers – the Department of Conservation and Land Management, City of Armadale, City of Cockburn, Town of Kwinana and Department of Justice to cooperatively manage Jandakot Regional Park. The role of the Department of Conservation and Land Management in managing the park is two-fold. Firstly, it is to manage the areas of the Park that are vested in the Conservation Commission of Western Australia. Secondly, it is responsible for coordinating the management of the Park. The latter is initiated through the preparation of this Plan. The local governments and Department of Justice will manage the reserves vested in them, in accordance with this Management 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, City of Canning, City of Cockburn, Town of Kwinana and 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 conservation value, the Park has value as a recreation resource, particularly as urban development continues in the region. Recreation use of the Park is limited at the present time, 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.

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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 broad direction for protection and enhancement of the conservation, recreation and landscape values of Jandakot Regional Park ("the Park"). It does this by developing strategies aimed at conserving the special features of the Park and providing for future community requirements. The Plan helps to ensure the Park is managed appropriately and is capable of sustaining its high nature conservation and cultural values as well as 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).

This draft plan has been approved for release for public comment and discussion by the Conservation Commission of Western Australia. The Commission now invites feedback from the community on the proposals contained within the Plan.

STATUS OF THE PLAN

This Plan has been prepared by the Department of Conservation and Land Management (CALM) on behalf of the Conservation Commission of Western Australia in accordance with the *Conservation and Land Management Act 1984*. It provides statutory direction for lands within the Park vested in the Conservation Commission of Western Australia and managed by CALM on the Commission's behalf. CALM also has the responsibility for coordinating the management of the Park.

The Plan acts as an "umbrella" document, coordinating existing plans for specific areas of the Park. The implementation of existing plans will need to be consistent with the overall direction of this Plan. The Conservation Commission of Western Australia and CALM will seek to ensure that future plans for areas within the Park are consistent with the overall direction and principles of this Plan.

In consultation with CALM, the Western Australian Planning Commission (WAPC) will use this Plan to assist with the assessment of development proposals on lands within and adjoining Jandakot Regional Park.

The strategies contained in this Plan have not yet been formally endorsed by the other organisations that currently own or manage land in the Park, namely Armadale City Council, Cockburn City Council, Kwinana Town Council and Department of Justice. These other land managers will use this Plan to manage the areas of the Park vested in them, in consultation with CALM.

2. Regional Parks

WHAT IS A REGIONAL PARK?

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

Regional parks may comprise Crown lands vested in State Government agencies, local governments, or 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 coordinated management by CALM. Jandakot Regional Park for example, consists of land comprising Crown reserves vested in the local governments, Minister for Prisons and the Conservation Commission of Western Australia, 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 now to be transferred to the Conservation Commission of Western Australia or the respective local governments, for management as part of the Park.

It is intended that the overall management objectives for lands already vested in the Conservation Commission of Western Australia (such as nature reserves) will continue as the regional park concept is implemented. That is, they will continue to be managed for the maintenance and restoration of 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.

THE REGIONAL PARK CONCEPT

The concept of regional open space was first introduced to Western Australia in 1955 by the Stephenson-Hepburn Report. The report recommended a statutory region plan be prepared for Perth which reserved private land required for future public purposes. In 1963 the Perth Metropolitan Region Scheme (MRS) was established and land was reserved for "Parks and Recreation". This land (subject to amendments of 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 and recommended by the Environmental Protection Authority in *Conservation Reserves for Western Australia, The Darling System – System 6* (Department of Conservation and Environment, 1983). This included land reserved for "Parks and Recreation" in the MRS which now forms part of Jandakot Regional

Park. The report also recommended areas of land to be managed as regional parks (Department of Conservation and Environment, 1983).

In 1989, the State Government decided that the responsibility for managing regional parks would be established within CALM, and that the responsibility for planning the acquisition of lands for regional open space be retained by the then Department of Planning and Urban Development (now Department for Planning and Infrastructure) on behalf of the WAPC.

In 1990, a task-force report was prepared by the Department of Planning and Urban Development and CALM, outlining proposed administration, planning and management of regional open space (Regional Parks Taskforce, 1990). The Environmental Protection Authority'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.

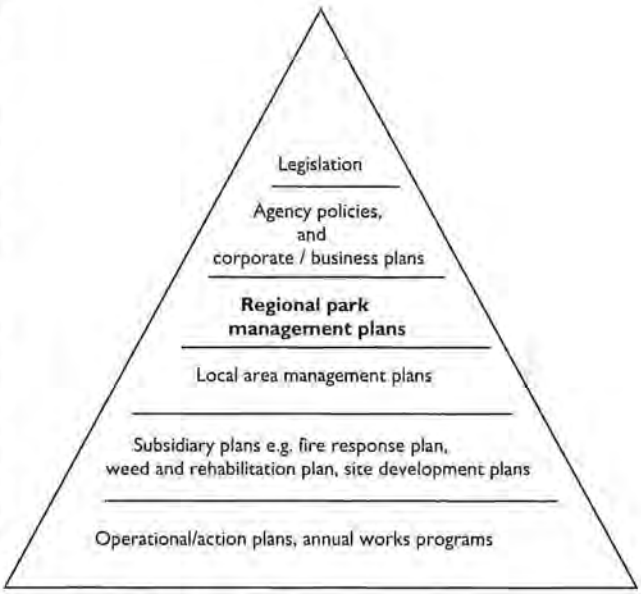
In June 1997, the State Government announced a commitment to introduce legislation to give regional parks legal standing and vesting in the former National Parks and Nature Conservation Authority, now the Conservation Commission of Western Australia. It was established that the coordination of management of eight metropolitan regional parks, including Jandakot Regional Park, would be progressively transferred to CALM, on behalf of the Conservation Commission of Western Australia.

Regional parks help to protect natural systems and representative environments in the city, and are a defining characteristic of Perth. They contribute to conserving biological diversity and provide natural places to recreate and enjoy.

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.

Implementation of local area management plans, subsidiary plans, operational/ action plans and annual works programs will be consistent with the overall direction of this Plan.



Source: ANZECC 2000.

Figure 1 - Regional Park Planning Hierarchy

3. Jandakot Regional Park

Jandakot Regional Park is one of eleven regional parks in the Perth metropolitan area. It includes a mosaic of land comprising approximately 3,800 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 parcels. The six areas or "estates" comprising the Park are:

- Canning Vale Estate;
- Anstey Estate;
- Banjup Estate;
- Anketell Estate;
- Sandy Lake Estate; and
- Casuarina Estate (Figure 4).

Although the estates are fragmented by rural and urban land uses, they are generally large enough to sustain diverse floral communities and fauna (Western Australian Planning Commission, 1995). 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 conservation, landscape and recreation value.

The Park is located across the municipal boundaries of the City of Armadale, City of Canning, City of Cockburn, Town of Kwinana and Shire of Serpentine-Jarrahdale. Of these, the City of Armadale, City of Cockburn and Town of Kwinana currently own or have vested in them land which they manage 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. At the present time, 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 2011 (Western Australian Planning Commission, 2000). 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, 2001a and 2001b). Over time, residential development near the Park will likely 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, that 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.

Recreation 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 governments, including Cockburn-Fremantle Pistol Club (Inc.); Fremantle Trotting Club (Inc.); Bibra Lake Horse and Pony Club (Inc.); 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. Darling Range Regional Park is located to the east of the Park. The importance of the Park as a conservation linkage is enhanced in this regional context.

ESTABLISHMENT OF JANDAKOT REGIONAL PARK

In 1983, the Environmental Protection Authority identified Wandi Nature Reserve 36110, Casuarina Reserve 31874, Modong Nature Reserve 25886 and Banksia Nature Reserve 28167 (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 as follows, 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.

In 1999, the Jandakot Regional Park Community Advisory Committee was established by CALM as a 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. Many of these were identified at a community workshop, held during the preparation of this Plan. The foremost values of the Park are discussed below. This Plan seeks to protect these values.

Natural Environment 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 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, 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 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 Aborigines due to their value as food and water sources, travel routes and mythological significance.

There is one Aboriginal site within the boundary of the Park that is listed by the Department of Indigenous Affairs, 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 municipal heritage inventories. Banjup Memorial Park commemorates those killed in action and wounded during the First World War. Wandi Nature Reserve is registered as an outstanding example of banksia woodland and for its historic significance as a site for recreation.

Recreation Value

Jandakot Regional Park has limited recreational use at present, 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 at the present time. Provisions need to be made for this activity to continue in a way that does not threaten the conservation values 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.

Landscape Value

The Park provides landscape variety in a region that is being increasingly modified. The contrasts 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 about the impact of urban development on conservation, recreation and landscape values.

4. The Management Plan Preparation Process and Community Involvement

As the vested authority for conservation lands, the Conservation Commission of Western Australia is responsible for having management plans prepared for all lands vested in it. This Plan has been prepared by CALM on the Commission's behalf.

The community was made aware of the preparation of this Plan through liaison, newspaper advertising, articles and publications produced by the Park's managing agencies. Native Title claimants were notified of the Plan's preparation at the commencement of the process.

The preparation of this Management Plan involves five phases:

1. The first phase identified the 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 to facilitate community involvement to the planning process. People were encouraged to attend the workshop through newspaper articles and key stakeholders were encouraged to attend. The community workshop was held in May 1999 and was attended by people representing broad community interests as well as representatives from local government and CALM.

2. The second phase was the preparation of the draft Management Plan. This involved identifying values and preparing planning strategies to protect those values and address the issues identified in phase one. Within this phase, the City of Armadale, City of Cockburn, Town of Kwinana, Jandakot Regional Park Community Advisory Committee and specialists within CALM provided advice on the development of the Plan. The Conservation Commission of Western Australia had input to the Plan, and endorsed the draft as a means of obtaining further comment from the community on the proposed management strategies for the Park.

3. The third phase involves presenting the draft Plan for public comment. Its availability for review has been widely advertised. The draft is open for public comment for a period of three months, after which public submissions will be analysed.

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

5. The fifth phase will comprise the preparation of the final Management Plan incorporating issues or comments raised within the public submissions and comments from State Government agencies and local government. The Conservation Commission of Western Australia will consider the revised final plan and then submit it to the Minister for the 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 protect the biodiversity of woodland and wetland ecosystems, provide landscape amenity and will afford sustainable community use that recognises Aboriginal and non-Aboriginal heritage."

Strategy

1. **Manage the Park for biodiversity conservation, and allow recreation and other uses of the Park to occur to the extent that they do not negatively impact on the other values of the Park. (CALM, CoC, ToK, DoJ) [High]**

6. Legislation and Management Policies

The objective is for CALM to manage the Park in accordance with the Conservation and Land Management Act 1984 and to integrate the policies of the management agencies to support the vision for the Park.

LEGISLATION

This Plan has been prepared in accordance with the *Conservation and Land Management Act 1984*. In managing the Park, CALM will utilise the provisions of the *Conservation and Land Management Act 1984*, *Wildlife Conservation Act 1950* and associated regulations, as well as the provisions of any new legislation under which CALM may have responsibilities for implementation.

The *Conservation and Land Management Act 1984* will need to be amended to specifically include the management of regional parks.

MANAGEMENT POLICIES

Department of Conservation and Land Management Policies
This Plan is consistent with CALM policies. These policies provide direction and guidance for the application of the *Conservation and Land Management Act 1984*, *Wildlife Conservation Act 1950* and associated regulations.

The policies specifically mentioned in this Plan relate to the management of weeds; fire; rehabilitation; visitor risk; recreation, tourism and visitor services; and community involvement. These policies are listed in Appendix B and are available to the public on request.

A number of policies mentioned in this Plan 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 governments
The City of Armadale, City of Cockburn and Town of Kwinana are currently managers of estate within the Park. The policies and actions of these local governments in managing land within the Park will be consistent with this Plan.

Department of Justice
The policies and actions of the Department of Justice in managing land within the Park will be consistent with this Plan.

Water Corporation
The policies and actions of the Water Corporation in managing the regional drainage systems affecting the Park will be consistent with this Plan.

Strategies

1. **Apply CALM policies in the management of the Park. (CALM) [Ongoing]**

2. **Assist the local governments and Department of Justice to prepare policy statements for the management of the Park that reflect the intent of this Plan. (CALM) [High]**

3. **Liaise with the Water Corporation and Department of Environment in regard to water resources policy and management issues in the Park, to achieve the objectives of this Plan. (CALM) [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). However three minor amendments to the Park boundary have been made in order that the boundary reflects the existing Metropolitan Region Scheme (MRS), under which lands within the Park are 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 at the date of this Plan 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 CALM and the Conservation Commission of Western Australia.

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 ten year 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 identified by *Bush Forever* as being regionally significant; and/ or
2. that the area is reserved for "Parks and Recreation" in the MRS; and/ or
3. 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).

Once 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: provision for sufficient buffers; condition of the land; future recreational demand; the enhancement of views; fire management boundaries; and provision of future services and roads.

Based on the above three criteria, and taking into account the above considerations, the following amendments to the Park boundary are proposed. These areas are shown in Figure 4.

- Lots 1769-1772 Ranford Road are owned by the WAPC and comprise part of *Bush Forever* site 413. They are reserved for "Parks and Recreation" in the MRS. It is proposed to include the lots in the Park.
- Reserve 1821 is a Class A reserve vested with the Conservation Commission of Western Australia. It comprises part of *Bush Forever* site 413 and is reserved for "Parks and Recreation" in the MRS. It is proposed to include this reserve, known as Balannup Lake, in the Park.
- 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.
- Part Lot 33 Nicholson Road is owned by the WAPC. The western portion of the lot is reserved for "Parks and Recreation" and is within the boundary of the Park; the remainder of the lot is zoned "Rural". It is proposed to amend the MRS to reserve an additional area as "Parks and Recreation", thereby increasing the size of the Park. This will rationalise the Park boundary and will also increase the buffer to the wetland.

Forrestdale Lake Nature Reserve

Comment is sought on whether Forrestdale Lake Nature Reserve should be included as part of the Park. This is a Class A nature reserve vested with the Conservation Commission of Western Australia. It comprises *Bush Forever* site 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).

A management plan for the nature reserve and surrounding area has been prepared by CALM (Department of Conservation and Land Management, 2003). Given their proximity, 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 by CALM.

The inclusion of Forrestdale Lake Nature Reserve in the Park would not represent a change in the level of protection afforded the nature reserve nor the management objectives. Regardless of whether the nature reserve is considered part of the Park, management would be in accordance with the Forrestdale Lake Nature Reserve Management Plan, which is consistent with this Plan.

1. **Adopt the Park boundary as shown on Figure 4. The boundary will be modified should additional lands be included in the Park. (WAPC, DPI, Conservation Commission of Western Australia, CALM, CoC, ToK, DoJ) [High]**

2. **Investigate the inclusion of Forrestdale Lake Nature Reserve in the Park. (CALM) [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 governments, as well as freehold land owned by State Government agencies, private organisations or individuals. Existing land tenure is shown on Figure 3.

The Plan seeks to reserve land and have it vested it in the Conservation Commission of Western Australia or relevant local government.

Crown Reserves will be created in accordance with the management areas outlined in the Plan's park management zones (Section 10 and Table 1 - Page 12). The precise boundaries of new reserves in the Park will be determined following an on-ground survey.

The tenure arrangements for reserves already vested in the Conservation Commission of Western Australia will not change; Piara, Modong, Wandi and Banksia 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 WAPC-owned freehold land
Freehold lands acquired by the WAPC for inclusion in the Park will be converted to reserves under the *Land Administration Act 1997* and vested with the Conservation Commission of Western Australia. These reserves will be afforded the purpose of "Conservation Park" or "Conservation of flora and fauna", depending on their environmental values. They will be classified as Class A under the *Land Administration Act 1997*. They will be managed in accordance with this Plan.

Other Crown land
Reserve 31874 is located adjacent to Casuarina Prison and is a Class C Reserve vested with the Minister for Prisons for the purpose of "Prison Site". The reserve is protected by its "Parks and Recreation" reservation. The Department of Justice has indicated it wishes to retain vesting of this reserve.

Other Crown reserves in the Park will be converted to Class A Reserves under the *Land Administration Act 1997* and afforded the purpose of "Conservation Park" or "Conservation of flora and fauna", depending on their environmental values. They will be transferred to the Conservation Commission of Western Australia and managed in accordance with this Plan.

Reserves to remain vested in local government comprise Areas 5, 6, 7, 12 and 13 (City of Cockburn) and Area 16 (Town of Kwinana) (refer to Table 1 - Page 12 and Figure 4 - Page 11).

Reserve 32635 (part of Area 8 on Figure 4), currently vested in the City of Armadale, is proposed to be vested in the Conservation Commission of Western Australia. The reserve will be converted to a Class A Reserve under the *Land Administration Act 1997* and afforded the purpose of "Conservation Park".

Crown land in the Park reserved for utilities or services, such as drainage corridors vested with the Water Corporation, will retain its existing reserve purpose and tenure arrangements.

Road reserves considered unnecessary by planning and management agencies will be included into the gazetted area of the Park and managed by the appropriate agency.

Private property
This Plan is not the mechanism by which freehold land, held by private organisations or individuals, is to be acquired by the WAPC. The Department for Planning and Infrastructure, on behalf of the WAPC, will continue its voluntary acquisition program within regional parks. Additionally, the WAPC may require land to be ceded free of cost to the Crown as a condition of subdivision.

Until acquired by the WAPC, these lands will remain protected under the MRS by their "Parks and Recreation" reservation.

This Plan will not dictate 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 the Plan's park management zones (Section 10).

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.

The land tenure in the Park at the date of this Plan is shown in Figure 3.

Strategies

1. **Liaise with the Department for Planning and Infrastructure to create reserves for vesting in the relevant management agency in accordance with Table 1 and Figure 4. (CALM, 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. (CALM) [High]**

3. **Liaise with the Department for Planning and Infrastructure to close road reserves in the Park considered unnecessary by the planning and management agencies. (CALM, LGAs) [Medium]**

Key performance indicators for land tenure
The success of the strategies will be measured by: 1. Changes in land tenure.
Target: 1. Complete all land tenure changes in accordance with this Plan within ten years.
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 gazettal of the final plan and transfer of lands to the appropriate managing agencies, there is a need to clearly define interim management arrangements between the land managing agencies involved in the Park.

CALM will coordinate the interim management of Jandakot Regional Park through the preparation of this Plan and by management agreements prepared for Crown reserves and WAPC-owned freehold land.

Interim management of WAPC-owned freehold land
The management agreement for WAPC-owned freehold land is in the form of a Section 16 agreement under the

Conservation and Land Management Act 1984. Section 16 of the Act allows the Department to enter into formal agreements for the management of private land or land owned by another Government agency. The WAPC and CALM have a Section 16 agreement that covers land owned by the WAPC. The agreement will stand until the land is transferred to the Conservation Commission of Western Australia. The agreement includes all WAPC-owned lands within the Park, except those currently leased.

Interim management of Crown reserves and freehold land owned by government agencies

State Government agencies and local governments will be responsible for lands that they control. An overall integrated approach to the interim management of Jandakot Regional Park will be coordinated by CALM 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. CALM may seek formal voluntary management arrangements with private landowners in the Park.

LEGISLATIVE AMENDMENTS

The *Conservation and Land Management Act 1984* will need to be amended to specifically include the management of regional parks. The management of regional parks could be included as a function of CALM.

Strategies

1. **Implement the management agreement under Section 16 of the *Conservation and Land Management Act 1984* with the WAPC. (CALM) [High]**

2. **Prepare interagency management agreements for interim park management for areas controlled by State or local government as required. (CALM, Conservation Commission of Western Australia, CoA) [High]**

10. Park Management Zones

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

Management zones are a framework for protecting the Park by identifying areas of 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 a broad guide to the public uses and management activities which 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, however 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 (Page 12) 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. **Manage the Park in accordance with the management zones (Figure 4). (CALM, CoC, ToK, DoJ) [Ongoing]**

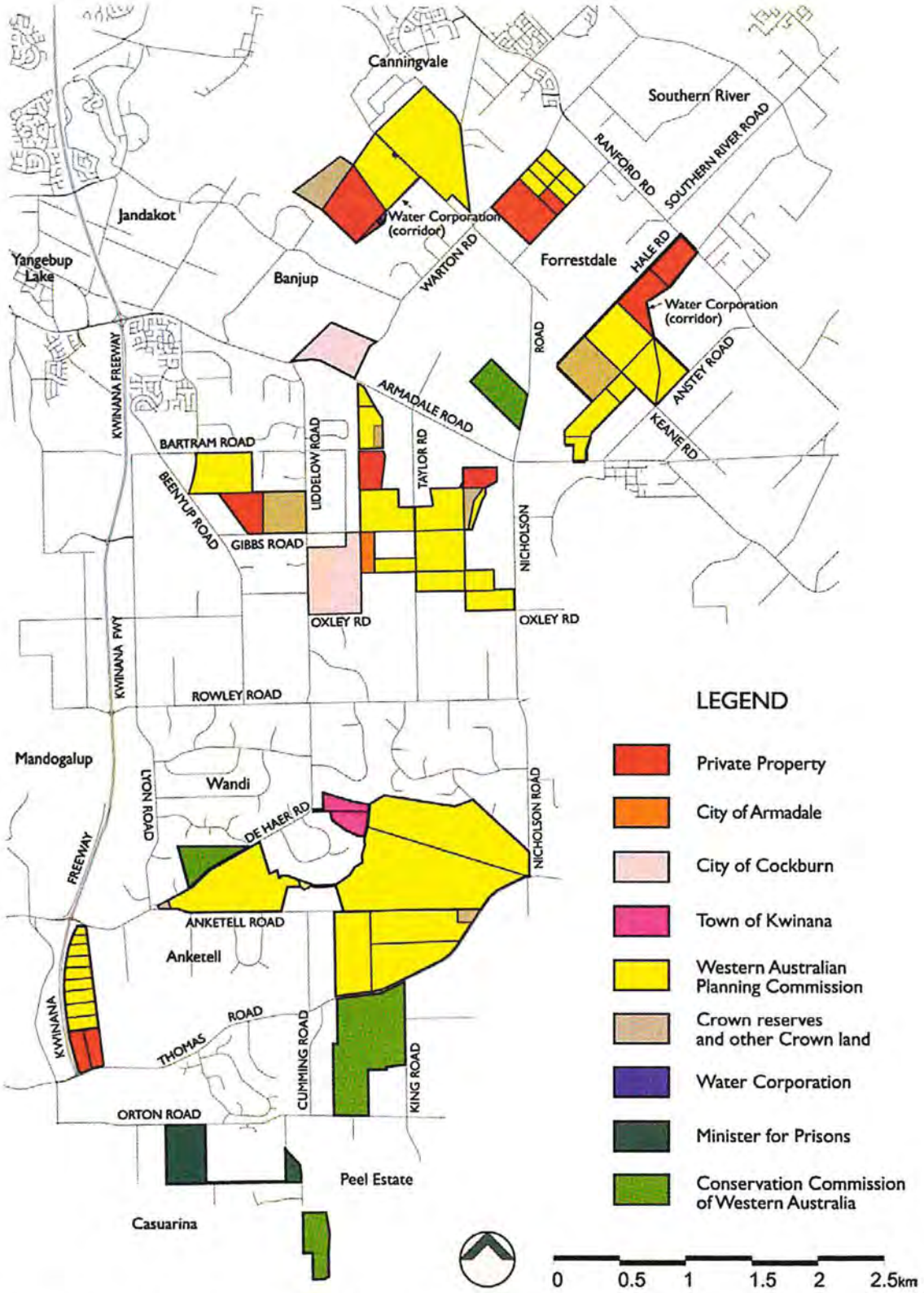


Figure 3 - Existing Land Tenure and Park Boundary

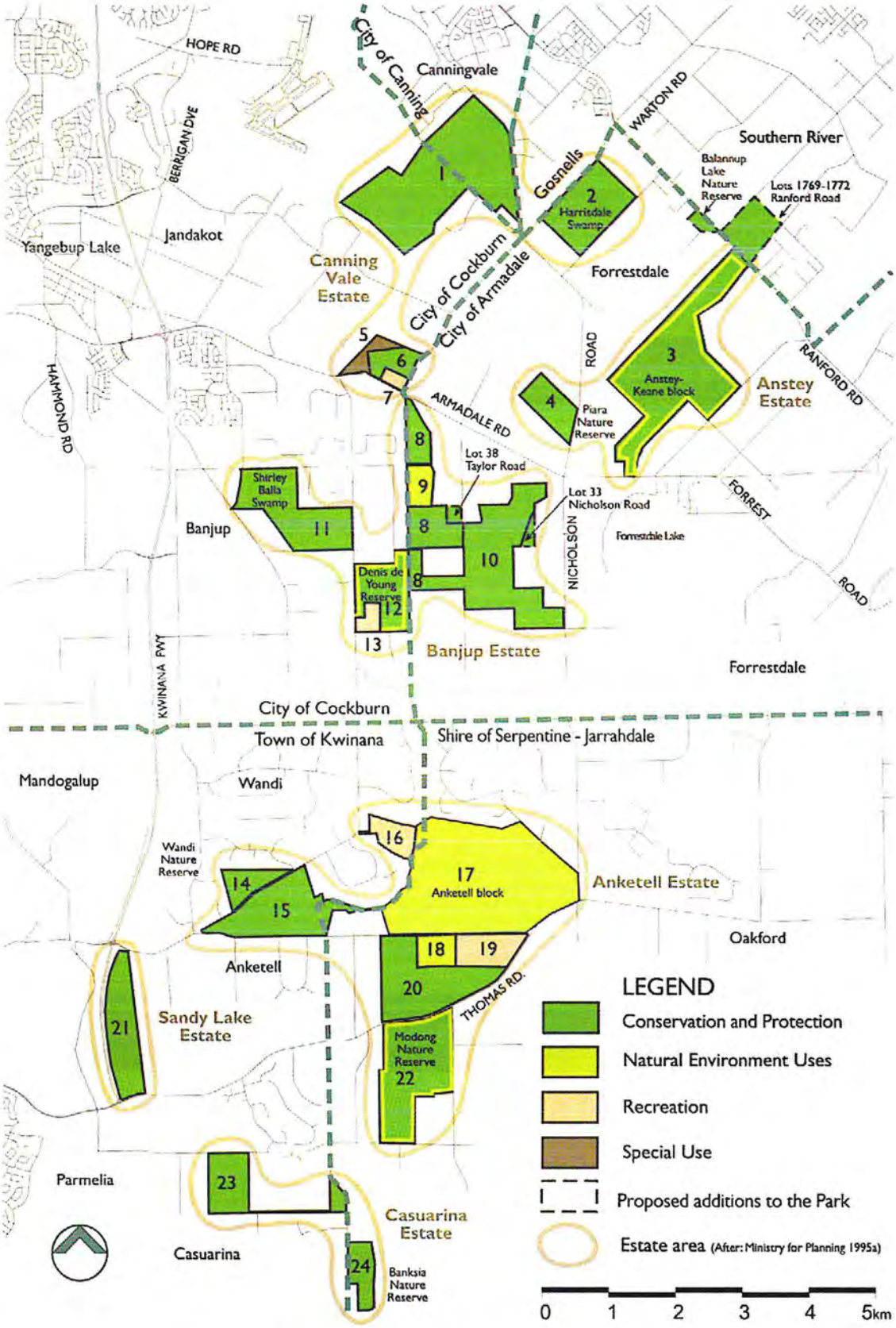


Figure 4 - Management Zones and Areas and Proposed Additions to the Park

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	CALM	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 may be permitted on perimeter trails outside the fence in designated areas. *No unauthorised access is allowed to Area 23: Reserve 31874. Contact the Department of Justice for authorisation.	Area 1	Nature Reserve - Cons. of Flora and Fauna[1]	Conservation Commission
	Area 2	CALM			Area 2	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 3	CALM			Area 3	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 4	CALM			Area 4	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 6	City of Cockburn			Area 6	Recreation	Cockburn City Council
	Area 8	CALM			Area 8	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 10	CALM			Area 10	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 11	CALM			Area 11	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 12	City of Cockburn			Area 12	Recreation	Cockburn City Council
	Area 14	CALM			Area 14	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 15	CALM			Area 15	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 20	CALM			Area 20	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 21	CALM			Area 21	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 22	CALM			Area 22	Nature Reserve - Cons. of Flora and Fauna	Conservation Commission
	Area 23*	Dept. of Justice			Area 23*	Prison Site	Minister for Prisons
	Area 24	CALM			Area 24	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 9 Area 17 Area 18	CALM CALM CALM	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. Through access by vehicles along established roads is allowed. Horse riding is acceptable on designated bridle trails. Some development of facilities may be necessary. These may include education nodes and facilities associated with visitor use. The provision of facilities will depend on the values of an area. Rehabilitation and habitat protection may be necessary.	Area 9 Area 17 Area 18	Conservation Park Conservation Park Conservation Park	Conservation Commission Conservation Commission Conservation Commission
Recreation	Area 7 Area 13 Area 16 Area 19	City of Cockburn City of Cockburn Town of Kwinana CALM	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 the appropriate management of the Park. 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 on designated bridle trails. Commercial concessions may be considered appropriate within this management zone. Rehabilitation, landscaping and reticulation of areas may be necessary.	Area 7 Area 13 Area 16 Area 19	Club and Club Premises (Pistol Club) Recreation Public Recreation Conservation Park	Cockburn City Council Cockburn City Council Kwinana Town Council Conservation Commission
Special Use	Area 5	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 5	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 *(Conservation and Land Management Act 1984)*.

Note: The purpose of reserves vested in the local governments, Department of Justice and Water Corporation depends on the reason for their gazettal.

11. Integrated Management of the Park

The objective is to provide for the effective involvement of both the managing agencies and the community in the management of the Park.

THE PARK MANAGEMENT STRUCTURE

The joint managers of the Park are CALM and the City of Armadale, City of Cockburn, Town of Kwinana and Department of Justice. The areas of responsibility are set out in the previous section on management zones (see also Table 1 - Page 12). It is proposed that once this Plan is in operation, management will be in accordance with the strategies outlined in this Plan.

CALM is the most appropriate agency to provide a strong integrated framework for management of complex conservation and recreation areas. CALM is responsible for managing areas of the Park vested in the Conservation Commission of Western Australia and for the overall coordination of management. The local governments and Department of Justice will manage areas of the Park vested in them, in accordance with the strategies outlined in this Plan.

Close cooperation is required between the management agencies and the community for this Plan to be implemented efficiently and effectively. Strategic and operational management decisions will involve input and negotiation between the land management agencies. CALM will refer strategic and policy issues to the Conservation Commission of Western Australia for consideration as required. Joint working parties comprising representatives from CALM, local government and the Department of Justice will be established to facilitate the preparation of detailed subsidiary plans for the Park, in consultation with the community. The different levels of planning are illustrated in Figure 1 (page 2).

Responsibility for statutory planning under the *Town Planning and Development Act 1928* and the *Metropolitan Region Town Planning Scheme Act 1959*, such as changes to the MRS for regional parks as well as the acquisition of private land, is retained by the WAPC.

A common management direction

The establishment of a management structure, common goals and agreement on priorities are necessary for safeguarding the Park where a number of management authorities, the general public and interest groups are involved. This Plan has been written cooperatively by the Park managers, and comments are being sought from the public on the draft in order to establish a common management direction. Community involvement and community education are important components in achieving the management objectives set out in this Plan.

Management arrangements with Aboriginal people

There is a strong interest by Aboriginal people to be involved in the management of conservation estate in Western Australia. Working together with Aboriginal people to care for the land will assist heritage preservation and conservation of the environment, as well as enrich cross-cultural awareness.

The Government has shown a commitment to explore joint management arrangements with traditional owners by developing a consultation paper outlining options for ownership, administration and joint management of conservation lands in Western Australia (Government of Western Australia, 2003). This includes a range of possibilities, from consultative management through to joint management of land that may be held by an Approved Aboriginal Body Corporate as inalienable freehold.

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 surface or groundwater 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 Metropolitan Region Scheme (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. Although structure plans do not have statutory effect, they 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*, which includes the southern end of the Park; and the *Southern River-Forestdale-Brookdale-Wungong District Structure Plan*, which includes the north-eastern corner of the Park (Western Australian Planning Commission, 2001a and 2001b). 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 of the boundary of the Park. Planning mechanisms such as the MRS, local town planning schemes, structure plans as well as environmental assessment procedures have been established to guide these land use decisions.

Land use planning within the catchments of the Park needs to consider the 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 system, or other unacceptable impacts on the values of the Park.

Strategies

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

2. **Engage the community in contributing to the preparation of subsidiary plans and the management of the Park. (CALM, CoC, ToK) [High]**

3. **Seek to ensure that plans prepared for areas of the Park by local governments are consistent with the overall direction and principles of this Plan. (CALM) [Ongoing]**

4. **Liaise with relevant agencies as required to address issues affecting the Park. (CALM, CoC, ToK) [Ongoing]**

5. **Refer policy issues to the Conservation Commission of Western Australia for consideration as required. (CALM) [Ongoing]**

12. Key Performance Indicators, Monitoring and Reporting

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

In order to establish an efficient and effective means for achieving this objective, key performance indicators have been defined. This reflects the need for Park managers to take an outcome-based approach, from which the effectiveness of management can be assessed.

The role of key performance indicators 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 CALM in implementing this Plan.

Key performance indicators 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 through the implementation of key objectives and strategies. Key performance indicators therefore relate specifically to the key ecological and social values of the Park (see Table 3 - Page 59). They have been identified in the following sections of the Plan:

- land tenure;
- lakes and wetlands;
- flora and vegetation;
- fauna;
- weeds;
- visitor use;
- working with the community.

Key performance indicators underpin the audit process of this Plan (see Section 47).

MONITORING AND REPORTING

CALM will monitor the key performance indicators. Appropriate and valid monitoring methods, intervals and baseline data will be established for each key performance indicator. Monitoring will need to take into account natural variability.

CALM will periodically report to the Conservation Commission of Western Australia against the key performance indicators and including responses to any target shortfalls. The Commission will take action as appropriate where performance targets are not met.

CALM will coordinate all monitoring undertaken in the Park to ensure an integrated approach that avoids duplication and allows programs to be assigned appropriate priorities.

Strategies

1. **Establish baseline information and implement ongoing monitoring programs within the Park, focusing on the key performance indicators. (CALM) [High]**

2. **Monitor and measure the key performance indicators and report findings as required to the Conservation Commission of Western Australia for action as required. (CALM) [High]**

3. **Audit and measure the overall effectiveness of Park management based on the key performance indicators. (Conservation Commission of Western Australia) [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. Cooperation between the Department of Environment and CALM will maximise research outcomes.

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 and management impacts need to be subject to continual review and evaluation. CALM 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, so as to promote community ownership while also gaining valuable knowledge for use in the management of the Park. The involvement of such groups is also valuable because it 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 and monitoring.

CALM will coordinate all research undertaken in the Park to ensure an integrated approach that avoids duplication and allows projects to be assigned appropriate priorities.

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 make grant applications to encourage scientific research and monitoring within the Park. (CALM, LGAs) [Ongoing]**

2. **Encourage the participation of volunteers, educational institutions and other organisations in research projects within the Park. (CALM, 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 impair the sustainability of 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 significance 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. Reserve purpose appropriate to Park values

Reserves in the Park will be assigned an appropriate purpose for the protection and enhancement of Park values under the *Land Administration Act 1997*.

7. Recognition of cultural and social values

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

8. Precautionary principle

If there are threats of serious of 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. (CALM, CoC, ToK) [Ongoing]

15. Geomorphology and Geology

The objective is to protect and conserve the existing geomorphic 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

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 LANDFORM AND SOILS

Erosion

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 regards to visitor access for recreation, in 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). However there is a strong presumption against mining and the extraction of basic raw materials in Jandakot Regional Park, as these activities are inconsistent with the conservation, recreation and landscape values of the Park.

New applications for mining and the extraction of basic raw materials from the Park are unlikely to be environmentally acceptable and such proposals will be referred to the Environmental Protection Authority for assessment (also refer to Section 39 for further details).

Strategy

1. **Restrict access to areas at risk from erosion by implementing the Recreation Masterplan and by providing fencing, signs and information (Sections 31 and 44). (CALM, CoC, ToK) [Ongoing]**

2. **Take all reasonable steps to ensure any proposals for mining and extraction of basic raw materials affecting the Park are referred to the EPA (CALM) [Ongoing]**

3. **Review proposals for mining and extraction of basic raw materials with the view to excluding them from the Park. (CALM) [Ongoing]**

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

16. Hydrology

The objective is to promote the conservation of water, as to both quantity and quality, through appropriate management of 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, which has a volume of approximately 2,700 million cubic metres (Water Authority of Western Australia, 1991). The aquifer has a saturated thickness of up to 40 metres, with the surface of the groundwater located up to 27 metres above sea level at the crest of the mound (Water and Rivers Commission, 2002). 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 Environment (former Water and Rivers Commission) is responsible for regulating water use (both by the Water Corporation and private bores) under conditions set by the Minister for Environment (Water Authority of Western Australia, 1991). The Department of Environment licences the Water Corporation to operate the Jandakot Groundwater Scheme, subject to certain conditions.

The Ministerial conditions placed on the Department of Environment include, amongst others, the following requirements.

- Preparation of annual and triennial reports to the Environmental Protection Authority 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. The Department of Environment 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 program which includes monitoring of water levels, terrestrial and wetland vegetation, invertebrates and waterbirds. The monitoring program provides feedback as to whether or not the water level criteria are protecting environmental values.

A review of these conditions is currently being undertaken in accordance with Section 46 of the *Environmental Protection Act 1986*. One of the expected outcomes of the review is a revised programme for managing abstraction and environmental water provisions.

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). The Department of Environment has policies for the protection of the Jandakot UWPCA, based on a three-tiered protection system (see Glossary). Land comprising Jandakot Regional Park that lies within the Jandakot UWPCA is 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 so 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 Metropolitan Region Scheme. Priority 1 areas are represented in the MRS as "Water Catchments Reservation". *Statement of Planning Policy No. 6 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.

Developments for recreation in the Park will need to comply with *Statement of Planning Policy No. 6 Jandakot Groundwater Protection Policy* and *Statewide Policy No. 13 - Policy and Guidelines for Recreation within Public Drinking Water Source Areas on Crown Land* (Water and Rivers Commission, 2003). These policies may restrict the types of recreation development within the Park.

These groundwater protection initiatives have followed on from recommendations of the Jandakot Land Use and Water Management Strategy (WAPC 1995), which provides a framework to balance the variety of land use demands in the area, including rural pursuits, environmental protection and water supply.

Strategy

1. **Comply with Department of Environment 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. (CALM, LGAs) [Ongoing]**

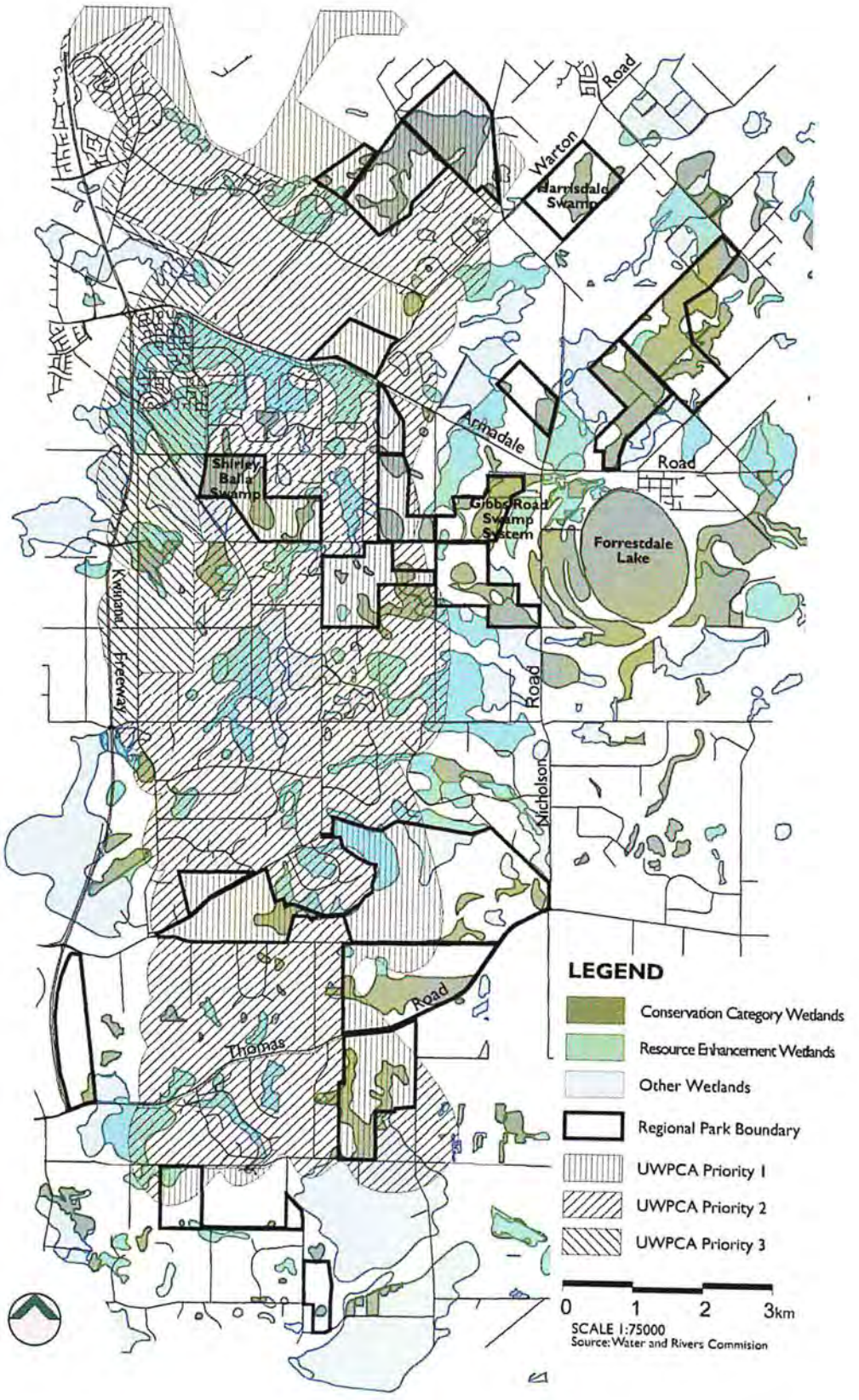


Figure 5 – Wetlands in the Park and the Jandakot Underground Water Pollution Control Area (UWPCA)

17. Wetlands

The objective is to protect and enhance 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-type 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 that are 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 & b).

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, as follows.

- 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 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 waterbodies; 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) and/or under the Environmental Protection (Swan Coastal Plain Lakes) Policy (Environmental Protection Authority, 1992). 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).

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 declared weeds (Section 20); and
- rubbish dumping (Section 41).

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.

The Department of Environment reports annually to the Environmental Protection Authority on the environmental impacts of Water Corporation and private groundwater abstraction from the Jandakot Mound against environmental criteria, which include water levels (Water and Rivers Commission, 2001).

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 Rd 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).

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

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 Department of Environment, as a Ministerial requirement of managing the Jandakot Groundwater Scheme, Stage 2 (Water and Rivers Commission, 2001). Long term monitoring sites are located at Harrisdale Swamp and Shirley Balla Swamp.

Impacts of surrounding developments

Urban development surrounding the Park may cause disturbance to wetlands. Drainage, excavation and filling works (including de-watering activities) either during or post-construction need to be managed to ensure that impacts on wetlands in the Park are minimised. This can be achieved by ensuring appropriate conditions are placed on the proponents of developments when planning approvals are being sought.

Strategies

1. **Monitor the health of wetland ecosystems in the Park by monitoring naturally occurring aquatic macro-invertebrate populations, as per the fauna management program (Section 19). (CALM) [Ongoing]**

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

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

4. **Take all reasonable steps to ensure that all new developments adjoining the Park adhere to best practice stormwater and sewerage management. (LGAs, CALM) [Ongoing]**

5. **Take all reasonable steps to ensure adjacent land use practices do not lead to leaching and run-off of nutrients and pollutants into wetland systems. (LGAs, CALM) [Ongoing]**

6. **Ensure appropriate planning conditions are placed on proponents of developments adjoining the Park to help ensure there are no adverse impacts, either during or post construction on wetlands in the Park. (CALM, LGAs, WAPC and DPI) [Ongoing]**

7. **Ensure that recreation sites and activities in the Park do not adversely affect wetlands. (CALM, CoC, ToK) [Ongoing]**

8. **Provide interpretive information that outlines the effects of pollution on the wetlands and appropriate use of fertilisers. (CALM, DoE) [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 2005 levels.
Reporting: 1. Every 3 years.

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

18. Vegetation and Flora

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

Jandakot Regional Park is floristically diverse, and contains many areas of native vegetation that have received little disturbance. Conservation of these areas is one of the foremost functions of the Park. Conversely, there are also cleared, former agricultural areas in the Park, which are infested with weeds.

VEGETATION

Jandakot Regional 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). Conversely, 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.

Table 2 – Floristic Community Types at Jandakot Regional Park

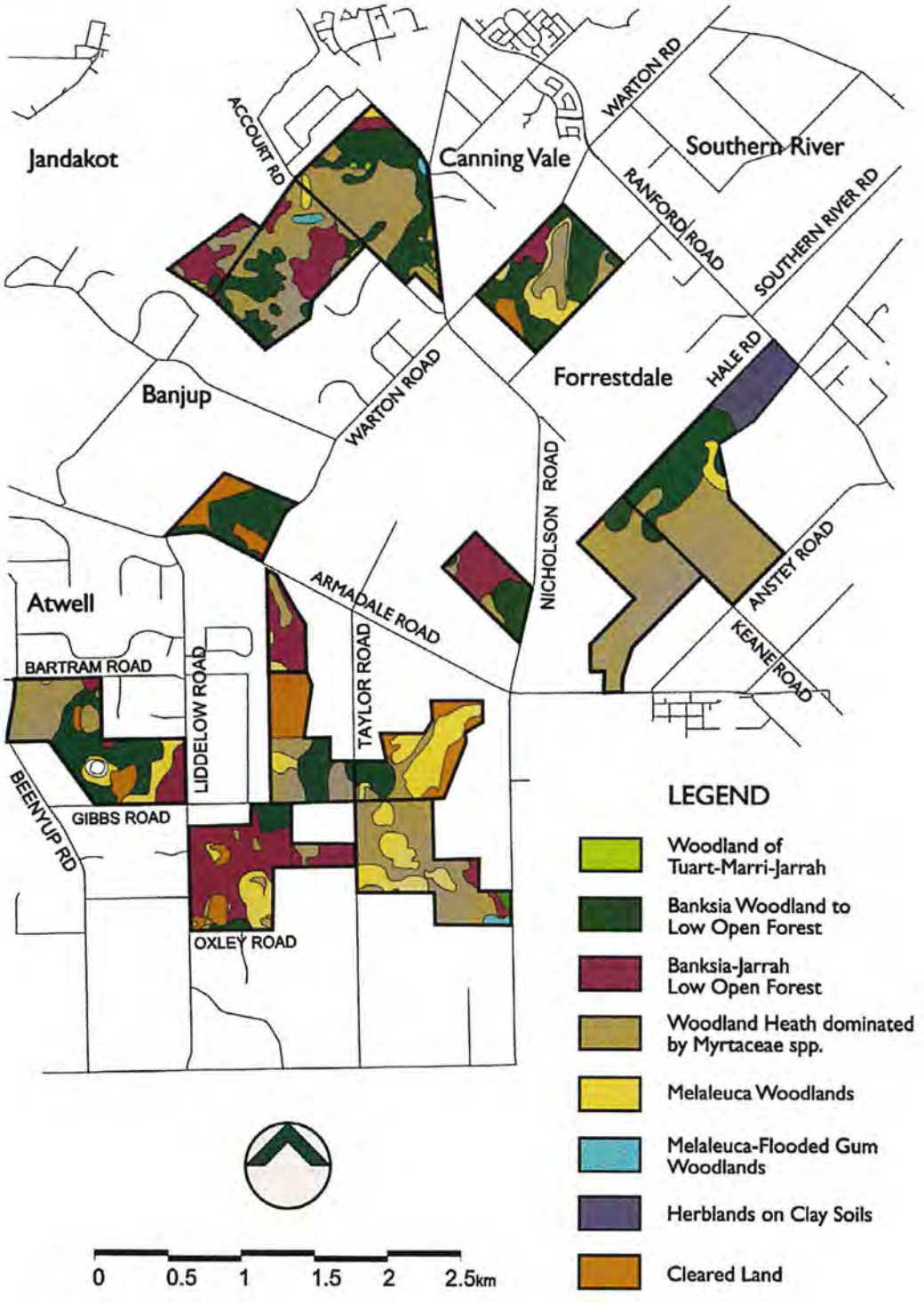
Type no.	Community type name
Seasonal wetlands	
4	*Melaleuca preissiana* damplands
5	Mixed shrub damplands
8*	Herb-rich shrublands in clay pans
10a*	Shrublands on dry clay flats
11	Wet forests and woodlands
12	*Melaleuca teretifolia* and/or *Astartea fascicularis* shrublands
13	Deeper wetlands on heavy 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

* 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*.



Source: Ecoscape Pty Ltd

Figure 6 – Vegetation Distribution (North)

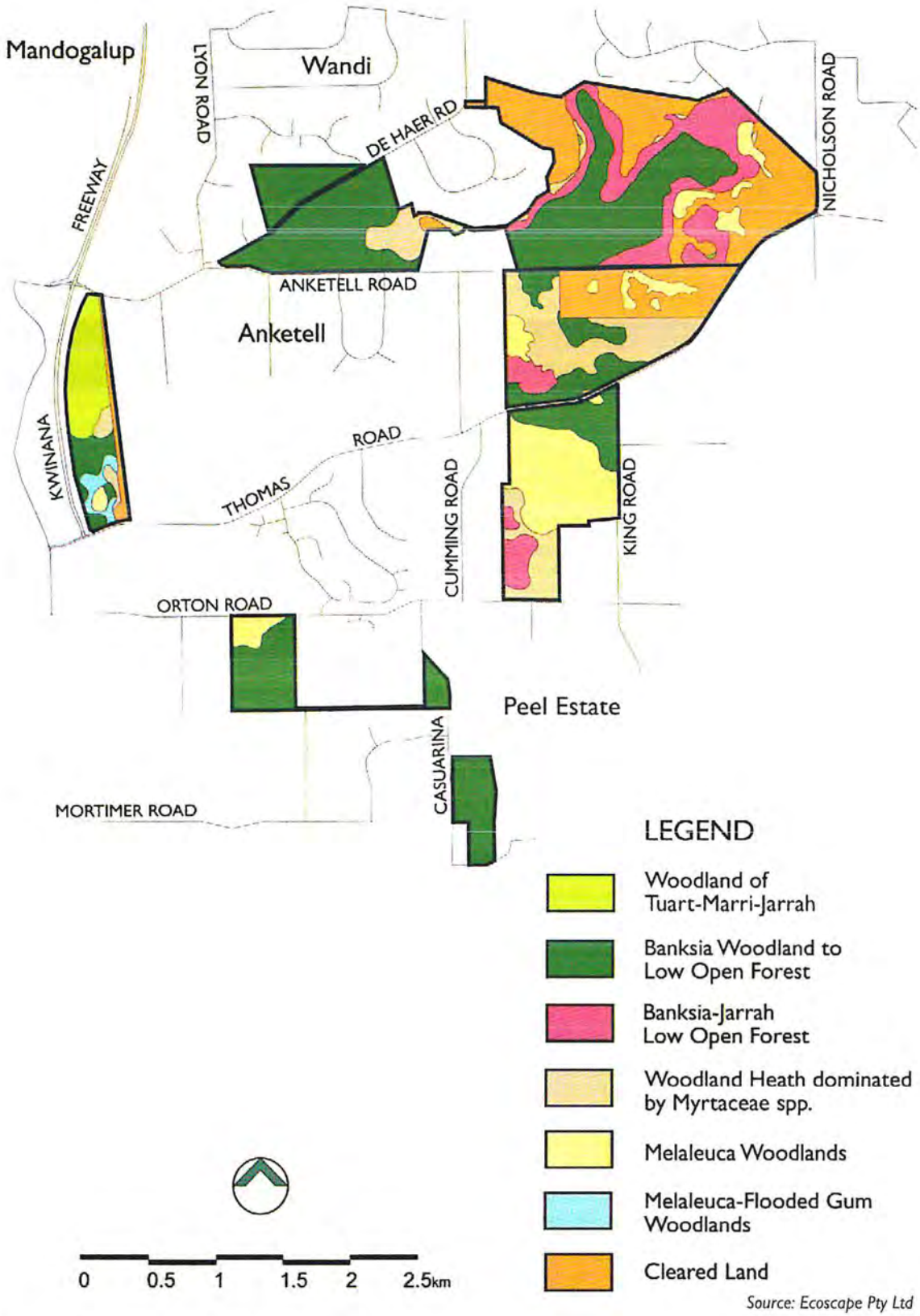


Figure 7 – Vegetation Distribution (South)

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*.

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
Whilst 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.

The Western Australian Threatened Species and Communities Unit (CALM) 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 flora and priority flora known to occur in Jandakot Regional Park include 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 2
- *Byblis lindleyana*

Priority 3
- *Jacksonia sericea*
- *Stylidium longitubum*

Priority 4
- *Drosera occidentalis* subsp. *occidentalis*
- *Verticordia lindleyi* subsp. *lindleyi*
- *Villarsia submersa*

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

A management plan for declared rare flora in the Swan Region has been prepared, which 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;
- changing hydrological regimes and unsustainable groundwater abstraction (Section 16);
- weeds (Section 20);
- inappropriate fire regimes (Section 21).

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 close to urban areas, particularly where Park estate is fragmented, involves managing many issues such as weed invasion (Section 20), horse riding (Section 33), uncontrolled access - particularly unauthorised vehicles (Section 34) and rubbish dumping (Section 41).

All native flora is protected under the *Wildlife Conservation Act 1950*. Incidences of wilful damage to vegetation in the Park will be investigated and appropriate action taken by CALM.

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 Jandakot Regional Park, surveys have indicated the presence of *Phytophthora cinnamomi* in Denis de Young Reserve (Bowman Bishaw Gorham, 1998) and Gibbs Road Reserve (Ecoscape 2002). *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.

Changing hydrological regimes

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. The Department of Environment is responsible for managing and monitoring the use of Jandakot Groundwater Mound, as discussed in Section 16.

Insect borers

A noticeable decline in the health of trees such as tuart (*Eucalyptus gomphocephala*) and flooded gum (*Eucalyptus rudis*) indicates that these trees are stressed. This is evident in some parts of the Park as well as through the south-west of Western Australia. This may be caused by a combination of environmental changes including climate and fire frequency. In this vulnerable state, trees are more susceptible to attack by native insects such as the tuart longicorn beetle (*Phoracantha impavida*). Whilst these insects are a natural part of the ecosystem, they are thought to have become an increasing threat to vegetation over the last few years. Research is being undertaken in the south-west of Western Australia to investigate whether the disturbance is a natural phenomenon or human induced.

Strategies

1. **Develop and implement a rehabilitation plan that includes a detailed assessment of bushland condition and rehabilitation priorities. The plan is to include a basis for monitoring selected local species. Special emphasis is to be placed on threatened ecological communities, declared rare, priority and other significant flora identified in the Park. (CALM, CoC, ToK) [High]**

2. **Develop and implement a weed management plan. This plan is to be integrated with the rehabilitation plan (Section 23). (CALM, CoC, ToK) [High]**

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

4. **Prepare and implement a Dieback management strategy for the Park focussing on identification of infected areas, management of human access and strategies to address the risk of movement of contaminated soil, particularly from construction, recreational users and fire fighting equipment. (CALM, CoC, ToK) [High]**

5. **Research the effects of leaf eating insects on *Eucalyptus gomphocephala* and *Eucalyptus rudis* in the Park and across the south-west of Western Australia. (CALM) [Medium]**

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

   (CALM, LGAs) [Ongoing]

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

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 from 2005 levels. 2. No new human-assisted occurrences of *Phytophthora cinnamomi* at selected locations in the Park over the next ten years. 3. Completion and implementation of the weed management and rehabilitation plan – plan to be completed by 2005.
Reporting: 1. Every 3 years. 2. Every 3 years. 3. Every 5 years – implementation to be reported by 2009.

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

19. Fauna

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

Avian Fauna

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 Ducks (*Anas superciliosa*); Purple Swamphens (*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 Honeyeaters (*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 species of threatened and priority avian fauna. 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*. 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 avian fauna 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*); Lesser Long-eared Bat (*Nyctophilus geoffroyi*). Western False Pipistrelle (*Falsistrellus mackenziei*) are also possibly found in the Park.

The Quenda and Western Brush Wallaby are 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: 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, so it is proposed to provide contact details

within the Park for wildlife carers and organisations that relocate dangerous fauna where they constitute a threat to people.

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 introduced animals and pets (Section 22);
- loss of habitat from invasion of weeds (Section 20);
- loss of habitat from plant pathogens (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. **In consultation with the Conservation Commission of Western Australia, prepare and implement a program for fauna management within the Park. The program will:**
   - **establish baseline information for selected fauna monitoring;**
   - **specify appropriate management actions for fauna and habitat protection;**
   - **consider ways to minimise fauna deaths on roads adjoining the Park.**

   (CALM, CoC, ToK, Educational Institutions, WA Museum, Birds Australia) [High]

2. **Provide interpretive material which:**
   - **promotes an understanding and appreciation of the Park's fauna; and**
   - **informs the public about the adverse impacts of feral animals and domestic pets on native fauna in the Park (Section 44).**

   (CALM, LGAs) [Medium]

3. **Ensure recreation uses (such as dog exercising) are consistent with the protection and management of fauna and fauna habitat. (CALM, CoC, ToK) [Ongoing].**

4. **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. (CALM) [Medium]**

5. **Investigate the reintroduction of appropriate native wildlife into the Park. (CALM) [Low]**

6. **Promote the survey and study of fauna in the Park. (CALM) [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. 3. Changes in high conservation value habitat. 4. Existence of a fauna management program.
Target: 1. No decline in species diversity of naturally-occurring fauna from 2005 levels. 2. No decline in the abundance of selected naturally-occurring species from 2005 levels. 3. No decline in selected fauna habitat from 2005 levels. 4. Completion and implementation of the fauna management program – program to be completed by 2007.
Reporting: 1. Every 3 years. 2. Every 3 years. 3. Every 3 years. 4. Every 5 years - implementation to be reported by 2011.

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

20. Weeds

The objective is to minimise the impact of environmental weeds on biodiversity 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 are generally classified as plants that occur outside their normal geographic range, although they may also be plants that are native to an area, but begin to predominate or change the ecosystem in which they live because of some imbalance. Weeds may or may not be declared under the *Agriculture and Related Resources Protection Act 1976* (Department of Conservation and Land Management, 1999).

Many weeds, particularly grass species, grow fast 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 values 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;
- drains entering the park from urban and agricultural areas
- frequent fires that 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; 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 Caster 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 the future use.

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 traps nutrients and other pollutants in the wetland, so the removal of *Typha orientalis* stands may result in increased nutrient levels within the waters of the Park in the short term.

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 appropriateness in the Park. Some forms of weed control may have negative side-effects on native plants, animals or habitats, which may prevent their application. There are also financial constraints on the amount of weed control that can be carried out.

Planning for weed control will consider the following priorities:

- recognition of weed potential;
- maintaining areas of the Park that have vegetation in good condition; and
- controlling weeds impacting on threatened species and communities.

Guidance for weed management in the Park is provided by *A Weed Plan for Western Australia* (State Weed Plan Steering Group, 2001), the *Environmental Weed Strategy for Western Australia* (Department of Conservation and Land Management, 1999) and *Weeds on Department of Conservation and Land Management Land, Policy Statement 14*. It is recognised, however, that more detailed planning is required to develop an integrated and coordinated approach to weed management in the Park.

CALM will prepare a weed management plan for the Park, which will be consistent with the above State plan, strategy and Departmental policy. The Park's weed management plan will also outline the most effective methods for controlling priority weed species.

It is important to discuss weed control with park neighbours to promote an integrated approach to weed control. The planting of non-local plant species within and adjacent to the Park will be discouraged.

Weed control can greatly benefit from community involvement. Managing agencies have limited resources and weed control can be very labour-intensive. The managing agencies gratefully acknowledge the considerable efforts by the community in undertaking works to control weeds in regional parks.

Cooperative arrangements with agreed processes and outcomes should be established between managing agencies and volunteer groups when undertaking weed control projects. This will ensure that activities are

complementary, and consistent with the annual works program, implementation plans and monitoring processes for the Park.

Members of the community are encouraged to be involved in weed control programs 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. **Develop and implement a weed management plan in accordance with the *Weed Plan for Western Australia*, *Environmental Weed Strategy for Western Australia* and *Weeds on Department of Conservation and Land Management Land, Policy Statement 14*. The plan will:**
   - **assess bushland condition;**
   - **assess changes to vegetation communities;**
   - **prioritise and control weed species according to invasiveness, distribution and environmental impacts;**
   - **identify areas largely free of weeds, maintain these areas, and conduct weed control works out from these areas;**
   - **specify appropriate control techniques and timing for removal;**
   - **integrate with the rehabilitation plan (Section 23).**

   (CALM) [High]

2. **Consult with the Water Corporation, Department of Environment and the relevant local governments to control weed infestations in drains that flow into the Park. (CALM, LGAs) [Ongoing]**

3. **Use interpretive and educational material to inform Park visitors, lessees and park neighbours about the effects of dumping rubbish and garden refuse in the Park and discourage planting of non-local species within and adjacent to the Park. (CALM, LGAs) [Medium]**

4. **Encourage volunteer community groups to become involved with weed control in the Park. (CALM, LGAs) [Ongoing]**

5. **Coordinate and support community involvement in weed control works within the Park. (CALM, LGAs) [Ongoing]**

6. **Monitor the extent, distribution and abundance of priority weeds in the Park as part of monitoring bushland condition. Relate results to previous studies to monitor weed spread. (CALM) [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* over the life of the plan. 2. No increase in the abundance and distribution of priority environmental weeds from 2005 levels. 3. Completion and implementation of the weed management and rehabilitation plan – plan to be completed by 2005.
Reporting: 1. Every 3 years. 2. Every 3 years. 3. Every 5 years – implementation to be reported by 2009.

21. Fire

The objective is to protect the biodiversity and cultural values of the Park, as well as people and property, by minimising the impact of unplanned fire.

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 probability of unplanned fire. It is recognised that restricting access to high risk areas can reduce the incidence of wildfire.

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 Service Authority (FESA) fire district, and partly under the control of local government authorities (Bushfire Brigades) or CALM (Department of Conservation and Land Management and Fire and Emergency Services Authority, 2001). 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, CALM is guided by the *Bushfires Act 1954* and *Policy Statement No. 19 - Fire Management Policy*.

A Fire Response Plan for the Park has been developed by CALM in conjunction with FESA and the relevant local governments, to help ensure effective response to unplanned fire and other emergencies by the responsible agencies. It includes detailed maps and outlines practices such as:

- protecting environmentally sensitive areas from unplanned fire;
- 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 an effective network of firebreaks are maintained.

Strategies

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

2. **Take fire prevention requirements into account when planning and implementing rehabilitation works to ensure that rehabilitated areas have appropriate access for fire management. Fire management will be considered in the preparation of the rehabilitation plan (Section 23). (CALM, CoC, ToK) [High]**

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

22. Pets, Introduced Animals and Pests

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

PETS

The presence of domesticated animals in close proximity to the Park has ramifications for the natural environment, particularly for native fauna.

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

Cats

Domestic cats from nearby residences may hunt for birds, reptiles and other animals. Cat owners should be encouraged to keep cats at home, especially at night and have them desexed 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 is currently working with researchers from Murdoch University and CALM to determine appropriate measures to manage cats and protect wildlife within the municipality.

At the present time, none of the local governments in which the Park is located have Local Laws for controlling cats, however this should be considered by each Council. The *Keeping and Control of Cats Local Law* (City of Stirling, 1999) provides a model for consideration. 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.

Dogs

Given the conservation values of the Park, dogs are not permitted in established and proposed nature reserves (Areas 1, 2, 3, 4, 10, 11, 14, 15, 20, 21, 22, 23, 24 on Figure 4). In all other areas of the Park, dogs are to be kept on a lead at all times, in order to protect native fauna.

Although dog walking in the Park is not a common activity at the present time, 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. This needs to be dealt with by local government authorities.

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.

Each local government has bylaws for managing dogs. 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, City of Cockburn, Town of Kwinana and Shire of Serpentine-Jarrahdale, Dog Exercise Areas are specified in bylaws; there are none located in proximity to the Park.

INTRODUCED ANIMALS

Introduced animals such as feral cats, foxes, rabbits, bees and others occur in the Park and all have a detrimental effect on environment 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.

CALM is investigating the management of introduced animals in the Park, particularly feral cats and foxes. This involves determining the extent and impacts of introduced animals and then where appropriate, implementing the most effective and environmentally sensitive control options. The use of bait such as 1080 poison for feral cats and foxes is not considered appropriate in close proximity to residential areas, due to domestic pets in residential areas that would be susceptible to the poison.

The introduced honeybee (*Apis mellifera*) is present in the Park and can have detrimental effects on native bees and vegetation (this is discussed further in Section 38 in relation to beekeeping).

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

PESTS – MOSQUITOES AND MIDGES

Wetlands in urban areas often require a management response to mosquito and midge populations. Significant numbers of mosquitos may cause a nuisance to nearby residents and have the potential to become a public health risk because some mosquito species can transmit diseases such as Ross River Virus. The Health Department of Western Australia coordinates a mosquito control program. This program subsidises mosquito control for the "Contiguous Local Authority Groups" that are in areas identified as having locally contracted mosquito-borne viruses.

Mosquitos and midges are not considered to be a nuisance in most wetland areas of the Park, however midges have been the subject of complaints by residents in proximity to Forrestdale Lake. The City of Armadale and CALM undertake midge treatments at Forrestdale Lake on an as-needs basis. Monitoring is undertaken to assess any adverse impacts of treatments. This is discussed further in the Forrestdale Lake Nature Reserve Draft Management Plan (Department of Conservation and Land Management, 2003).

Strategies

1. **Use interpretative material to inform the community about the adverse effects of pets and introduced animals on native fauna. Include information explaining restrictions on pet access and encouraging responsible pet ownership (also refer Section 44). (CALM, LGAs) [Medium]**

2. **Consider the introduction of Local Laws for controlling cats and protecting native fauna. Use the City of Stirling Local Law - *The Keeping and Control of Cats Local Law (1999)* as a model. (LGAs) [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 at all times. (CALM, LGAs) [Ongoing]**

4. **Ensure that local government bylaws on dog exercise areas and dog-prohibited areas are consistent with this Plan. (LGAs) [High]**

5. **Develop and implement a program to control introduced animals within the Park, in particular, foxes, feral cats and rabbits. (CALM) [High]**

6. **Undertake monitoring and treatment of wetlands to alleviate mosquito and midge problems as appropriate, in consultation with CALM. (LGAs) [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. Ongoing issues of pests, the presence of pathogens, erosion and infertile soils also make rehabilitation challenging. Some parts of Jandakot Regional 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 Botanic Gardens and Parks Authority.

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.

Where possible, plant material used during rehabilitation should be sourced from within the boundaries of the Park or nearest viable source, so as 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 pathogens.

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.

A rehabilitation plan will provide a guide for the long-term restoration of degraded areas within the Park and will be developed in accordance with *Rehabilitation of disturbed land, Policy Statement No. 10*. The plan will identify disturbed 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 will be 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 which need to be 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.

Rehabilitation projects can greatly benefit from community involvement. Managing agencies have limited resources and weed control can be very labour-intensive. The managing agencies gratefully acknowledge the considerable efforts by the community in undertaking rehabilitation works in regional parks.

Cooperative arrangements with agreed processes and outcomes should be established between managing agencies and volunteer groups when undertaking rehabilitation projects. This will ensure that activities are complementary, and consistent with the annual works program, implementation plans and monitoring processes for the Park.

Members of the community are encouraged to be involved in rehabilitation projects 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. **Prepare and implement a rehabilitation plan for the Park that will:**
   - **assess bushland condition;**
   - **establish baseline information for selected flora monitoring;**
   - **identify rehabilitation priorities;**
   - **specify appropriate management actions;**
   - **integrate with the weed management plan.**

   (CALM, CoC, ToK) [High]

2. **Coordinate rehabilitation works between all the land managers and relevant community groups. (CALM, CoC, ToK) [Ongoing]**

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

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

6. **Ensure mulch and soil used in rehabilitation works does not contain unwanted seeds, plant pathogens or rubbish. (CALM, CoC, ToK) [Ongoing]**

7. **Where appropriate, allow licensed seed collection from within the Park for rehabilitation projects within, or directly affecting the Park. (CALM, 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 Jandakot Regional Park. The following guidelines provide a practical framework for management of the landscape within 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.
- 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. Generally there is a direct correlation between the intactness of natural elements (vegetation, landform and waterbodies) 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 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 enhance visitors' enjoyment of them through the provision of scenic viewing facilities and interpretation.

Maintaining and improving natural and cultural landscapes of the Park are integral components of the effective management of the Park. This requires protection of natural areas and where appropriate, rehabilitation of modified landscapes.

Strategies

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

2. **Ensure recreation facilities and park furniture are of a high standard and suited to the surrounding landscape. Facility provision should be planned and agreed to by the joint managers of the Park. (CoC, ToK, CALM) [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 and include a landscape plan demonstrating integration with the surrounding area. Liaise with DPI, Water Corporation, and other infrastructure providers before works affecting the Park are undertaken. (LGAs, CALM) [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. (CoC, ToK, CALM) [Low]**

5. **Consider landscape views when undertaking rehabilitation works within the Park. (CoC, ToK, CALM) [Ongoing]**

25. Regional Ecological Linkages

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).

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 particularly 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 area. 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 distributed 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.

An important component of this Plan is the establishment of links beyond the formal boundary of the Park. This 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 currently 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 areas plays a major role in insulating or exposing the Park to undesirable impacts of those areas. The spread of invasive weed species and non-local species can be minimised by the creation of appropriate buffers and by the planting of local species in areas adjoining the Park.

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	Extensions to 76
126	Forrestdale Main Drain

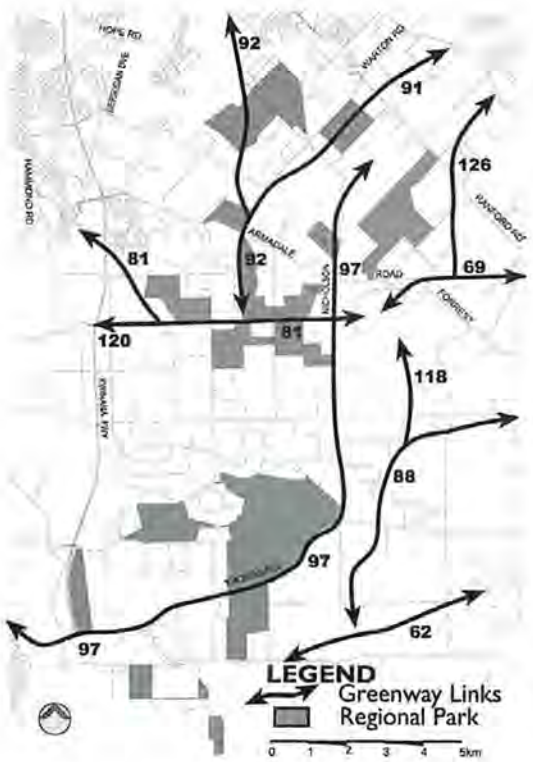


Figure 8 - Greenway Corridors and Links
(Source: Tingay and Associates, 1998)

Strategies

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

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

4. **Take all reasonable steps to ensure that future development proposals adjoining the Park incorporate appropriate interface treatments (eg. a road or dual use path edge) with the Park (LGAs, CALM) [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 land managers involved in the Park are to apply management actions that are consistent with State, national and international heritage conventions and organisations.

3. Community involvement

The community is to 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 is to be provided to enhance the community's 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. (CALM, CoC, ToK) [Ongoing]**

27. Aboriginal Cultural Heritage

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

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 Nyoongars 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, that 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.

Register of Aboriginal Sites

The Department of Indigenous Affairs has established a register of Aboriginal sites throughout Western Australia. Sites are classified according to the nature of their significance to Aborigines. In the Jandakot area sites have been primarily identified for their mythological and artefact values. There are registered Aboriginal sites within the Park that are important for their artefacts and mythological significance; they are known as Treeby Road Swamp, Bartram Road Swamp and Acourt Road sites. A number of other registered Aboriginal sites are located near 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 registered and not yet registered with the Department of Indigenous Affairs.

Native Title Act 1998

Some of the lands that comprise the Jandakot Regional Park are subject to at least two native title claims.

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 CALM. Parties that require notification are:

- representative Aboriginal bodies; and
- registered native title bodies (corporate) and registered native title claimants for CALM land/waters 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 other park intended to preserve the natural environment of an area must be notified in the same manner as for public works. The Act's intention to preserve the natural and cultural environment will probably cause regional parks, including conservation parks and nature reserves, to be subject to this requirement. This Plan has accordingly been referred to the relevant organisations.

CALM will seek input from local Nyoongar elders in finalising this Plan.

Strategies

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

2. **Seek input from local Nyoongar elders in finalising this Plan. (CALM) [High]**

3. **Incorporate information on the value of the Park to Aboriginal people into interpretive material where appropriate (Section 44). (CALM, CoC, ToK) [High]**

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

5. **Nominate any Aboriginal sites identified for listing by the Department of Indigenous Affairs. (CoC, ToK, CALM) [High]**

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 (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

Sites of cultural heritage significance are protected under the *Heritage of Western Australia Act 1990*. The Heritage Council of Western Australia maintains a Register of Heritage Places according to this act. A number of sites listed on the State Register of Heritage Places are located near the Park (Heritage Council of

Western Australia, 2002). Two sites fall within the Park boundaries, namely Banjup Memorial Park and Wandi Nature Reserve.

Banjup Memorial Park is located in a corner of Rose Shanks Reserve at the intersection of Armadale and Warton Roads. The memorial was established in 1920 and comprises an avenue of trees and plaques commemorating those killed in action and wounded during the First World War.

Wandi Nature Reserve is located at the corner of De Haer and Lyon Roads, and is registered for its historic significance as a site for recreation.

Local governments 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 the local town planning scheme.

With respect to non-Aboriginal heritage sites, key issues that need to be addressed include general maintenance and management of sites in the Park and development of appropriate processes to involve interested parties in restoring and utilising sites of cultural significance. The *ICOMOS Burra Charter*, as revised in 1999 and adopted by the Australian International Council on Monuments and Sites, provides the basis for management of places of cultural significance. It defines conservation principles, processes and practices for application to places of cultural significance.

Strategies

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

2. **Nominate significant sites for heritage listing on either local government Municipal Heritage Inventories, or State and National Heritage Registers. (CoC, ToK, CALM) [High]**

3. **Develop management guidelines for historic sites in accordance with the ICOMOS Burra Charter and 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. (CoC, ToK, CALM) [Medium]**

E. MANAGING RECREATION

29. Guiding Principles for Managing Recreation

1. Preserving the Value of the Land Itself

Natural ecosystems should be able to sustain the recreation that occurs or is proposed. The intensity and distribution of recreation activities may need to be controlled to maintain the amenity of the Park and the enjoyment of visitors. Recreation planning will seek to foster appreciation of the Park's natural value.

2. Consistency of Recreation with Reserve Purpose

Recreational activities should be compatible with the assigned purpose and management zoning of reserves within the Park. Reserves in 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 impair other forms of acceptable use or jeopardise the safety of other visitors should be specifically managed, directed to more appropriate places or not permitted. Priority will be given to low impact activities and those that promote recreation or increase awareness, appreciation and understanding of the natural environment.

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 appreciation of the Park's unique values, as well as its vulnerabilities.

The Recreation Opportunity Spectrum is a planning tool that enables Park managers to provide for the greatest possible range of recreation opportunities in a given area, while limiting unintended incremental development (Stankey and Wood, 1982).

The Recreation Opportunity Spectrum involves classifying areas according to their conservation status, and then providing for appropriate uses within each area. It aims to ensure that high quality recreation opportunities are available through the provision of a diversity of settings (Byrne and Vize, 1990). In this way, conservation values are preserved whilst ensuring the community has access to a range of recreation opportunities. The principles of the Recreation Opportunity Spectrum have been applied in developing the Recreation Masterplan for the Park.

Strategy

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

30. Visitor Use

The objective is to encourage visitor use whilst ensuring that visitor numbers and behaviour are sustainable, and minimising conflict with other Park visitors and values.

Visitor numbers at Jandakot Regional Park are currently 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 CALM within Jandakot Regional Park receive an estimated 4,400 visits per year (Colmar Brunton, 2001).

Visitor surveys were undertaken in 2001 to gain an understanding of patterns and type of use at two sites in the Park, namely the Anstey-Keane block (in Anstey Estate) and Modong Nature Reserve (in Anketell Estate). The results of the survey indicate that recreation activities undertaken in these areas of the Park include:

- horse riding;
- walking; and
- nature observation (Colmar Brunton, 2001).

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, 2001a) and the *Jandakot Structure Plan* (WAPC, 2001b) 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 in the short (0-5 years) and medium (5-10 years) terms near Anstey Estate, and adjacent to Sandy Lake Estate respectively. 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 in the south-east metropolitan region over the life of the Plan, including the associated increase in demand for recreation opportunities, as well as the potential for pressure on the Park to increase.

Inappropriate visitor use – vandalism and other antisocial 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. CALM will consider this issue when designing recreation facilities and sites in Jandakot Regional Park.

Strategies

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

2. **Investigate and implement site design measures to reduce anti-social behaviour in the Park. (CALM) [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. Completion of a visitor survey program.
Target: 1. No decline in visitor satisfaction from 2005 levels. 2. Complete access and circulation components of the recreation masterplan within the life of the Plan. 3. Visitor survey program completed by 2007.
Reporting: 1. Every 3 years. 2. Every 5 years. 3. Every 5 years – implementation to be reported by 2011.

31. Recreation Masterplan

A Recreation Masterplan (Figure 9) has been prepared to help guide the provision of a range of appropriate recreation opportunities in the Park. The Masterplan helps coordinate recreation developments and allocate suitable facilities and services to those areas of the Park best able to accommodate them in a sustainable manner. The Masterplan also considers access to the Park and internal circulation.

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 (see Table 1 - Page 12).

The Conservation and Protection areas of the Park will have access limited to walk and cycle paths. The primary emphasis is on habitat protection while providing opportunities for the enjoyment of nature, interpretation and education. Horse riding may be allowed in specified areas on existing perimeter tracks.

The Natural Environment Use areas will have greater access than Conservation and Protection areas. Rehabilitation in these areas is likely. Horse riding may be allowed in specified areas on existing tracks. There may be provision of some facilities within these areas, including low-key recreation and education nodes.

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

The Special Use area is currently used for sand mining, and is therefore not accessible to Park visitors at the present time.

Whilst the Recreation Masterplan provides strategic direction for the provision of recreation sites and facilities, more detailed planning will be undertaken at each site to determine visitor requirements and resolve site-specific issues.

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. (CALM, 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 that will sustain increased visitor use in some areas, and minimise the impacts of uncontrolled visitor access in others.

There are a number of recreational facilities provided on local government reserves in the Park that attract specific user groups. These include: Cockburn-Fremantle Pistol Club; Fremantle Trotting Club; Bibra Lake Horse and Pony Club; and Magenup Equestrian Centre (Figure 9). 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

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

1. Harrisdale Swamp Estate

Inundated throughout most of the year, the wetlands of Harrisdale Swamp (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 over the next five to ten years, as urban development in Forrestdale proceeds, as proposed in the *Southern River-Forrestdale-Brookdale-Wungong District Structure Plan* (Western Australian Planning Commission, 2001a). This will bring residential development into close proximity to the estate.

The Recreation Masterplan proposes low-key walk trails with interpretive signage in the area, 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 adjacent to the estate.

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

2. Shirley Balla Swamp Estate

The seasonally inundated sumplands of Shirley Balla Swamp Estate (Area 11 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 currently occurring to the west of this estate, and continuing development in the area will likely increase demand for recreation at Shirley Balla Swamp.

The Recreation Masterplan proposes walk trails and interpretive material at this site, which would provide nearby residents with the opportunity to explore local vegetation communities. If necessary at a later stage, parking facilities could be provided adjacent to the estate.

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

3. Sandy Lake Estate

Most of Sandy Lake Estate (Area 21 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.

In the medium to long term, urban development is expected to proceed near Sandy Lake Estate (Western Australian Planning Commission, 2001b).

The Recreation Masterplan proposes a dual use pathway and interpretive signage in this estate. Parking has been proposed to facilitate access.

A site plan for Sandy Lake Estate will be prepared to resolve specific details, including design specifications and trail alignments. Existing trails will be used where possible.

4. Recreation zoned area, Anketell Road

The Recreation Masterplan zones an area located on Anketell Road (Area 19 on Figure 4) for recreation, as this area is predominantly cleared and is located outside the Jandakot UWCPA (Figure 9). The zoning reflects the recreation value of the area and protects this future potential use.

The *Jandakot District Structure Plan* identifies the potential for an urban village in Oakford, near the intersection of Nicholson and Thomas Roads (Western Australian Planning Commission, 2001b). Although this proposal is subject to significant environmental constraints, should it proceed, it may create a demand for recreation facilities in the area in the medium term, which could be accommodated within the recreation zoned area on Anketell Road. Any proposed development in this area would be subject to planning approvals processes.

Strategies

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

2. **Provide suitable and safe facilities guided by Australian standards. (CALM, CoC, ToK) [Ongoing]**

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

4. **Where appropriate make adequate shade provisions at recreation sites and facilities. (CALM, 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.

The rural setting around Jandakot Regional Park offers opportunities for the keeping and riding of horses, and indeed, many people have chosen to live in the area to be involved in these pursuits. Areas now included in the Park have historically been used for horse riding, and this activity continues to occur (Ecoscape, 2002). The managing agencies recognise that there is an existing demand for horse riding in the Park. It is also

recognised that there are diminishing opportunities for horse riding and keeping in the Jandakot area, given the progress of urban development.

Horse riding occurs on firebreaks and existing tracks throughout various Park estates, with the most intensive activity based around Denis de Young Reserve, Anketell Estate and the Anstey-Keane block of Anstey Estate (Ecoscape, 2002; Colmar Brunton, 2001). The activity around Denis de Young Reserve is related to the location of Bibra Lake Horse and Pony Club and Fremantle Trotting Club in the south-west corner of the reserve. Similarly, 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. Bibra Lake Horse and Pony Club, 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 is ostensibly used by horse riders from surrounding areas, who generally ride their horses to the estate, rather than float them. 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 Draft Management Plan (Department of Conservation and Land Management, 2003). 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 conservation value of the Park, the currently uncontrolled manner in which horse riding is occurring in some areas is considered inappropriate. 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 in the Park, CALM commissioned an investigation into horse riding in Jandakot Regional Park. It was recognised in the study that controlling and managing horse riding is important to the overall management of Jandakot Regional Park. The study considered opportunities and constraints to horse riding in the Park and surrounding areas (Ecoscape, 2002).

Major conservation 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;
- risk of introducing and spreading pathogens such as *Phytophthora cinnamomi* and weeds;
- fauna habitat areas; and
- sites of Aboriginal heritage significance.

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 Underground Water Pollution Control Area (in which horse riding activities are regulated by the Department of Environment);
- location of Water Corporation public drinking water source wellheads and associated protection zones (in which horse riding may be prohibited or regulated by the Department of Environment);
- existing and proposed urban areas (which may restrict horse riding activities);
- major roads (which pose a safety risk to horse riders);
- potential conflicts between horse riders and other recreational users (Ecoscape, 2002).

With consideration of the above constraints, and following further discussions with the Department of Environment, the following guidelines have been identified to assist management of horse riding impacts.

- Horse riding should be directed to areas where there are no constraints and 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 Underground Water Pollution Control Area or within 200 metres of a conservation category or resource enhancement wetland will be reviewed by the Department of Environment to ensure groundwater quality and wetlands will not be adversely affected.
- Management techniques to reduce the impacts of horse riding may include: provision of mulched tracks; fencing of highly constrained areas; closure of tracks if weather conditions require it; 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 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 major equestrian facilities in the Park and areas used for resting.
- 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)

Having regard to the constraints identified above, as well as the existing demand for horse riding and the potential to minimise the impacts of horse riding through appropriate management techniques, CALM proposes to reduce the areas available for horse riding in the Park, but better cater for horse riding in designated areas. Public comment is sought on this proposal.

It is planned to allow horse riding on designated trails in the following areas of the Park:

- existing facilities at Denis de Young Reserve and Magenup Equestrian Centre;
- around the perimeter of Denis de Young Reserve;
- around the perimeter of Anstey-Keane block on designated tracks;
- Anketell block on designated tracks;
- around the perimeter of Modong Nature Reserve on existing, designated tracks (Figure 9).

The availability of the above areas for horse riding is on the proviso that horse riding will be prohibited in all other areas of the Park and horse riders observe a code of conduct, in order to ensure that the Park's conservation value is protected. Once designated trails are established, horse riding outside of these trails will be considered incompatible with the values of the Park, and will be prohibited.

CALM 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 CALM may be allowed to do so, but will be regulated under licensed agreements. This is a commercial concession issue, and is discussed further in Section 38.

As well as horse riding, agistment of horses is also undertaken in the Park. This is also discussed in Section 38.

Strategies

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

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

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

6. **Manage commercial equestrian operations using land managed by CALM under licensed agreements. (CALM) [High]**

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.

Park access and circulation are key components of the Recreation Masterplan (see Figure 9). 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, with Ranford Road; Acourt Road; Nicholson Road; Warton Road; Jandakot Road; Armadale Road; Liddelow Road; Anketell Road; Thomas Road; Orton Road; and Coyle Road adjoining various estates of the Park. 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.

Whilst 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. This will be a feature of more detailed planning for recreation sites identified in the Recreation Masterplan.

Public transport to the Park is limited to buses along Armadale Road linking Success Park and Ride Station and Armadale. There are also bus routes that service the Banjup area. There is no public transport in southern areas of the Park.

PARKING

Parking is currently available for visitors to Cockburn-Fremantle Pistol Club; Fremantle Trotting Club; Bibra Lake Horse and Pony Club; and Magenup Equestrian 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 antisocial 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, Shirley Balla Swamp and Sandy Lake Estate. The siting of parking facilities at Shirley Balla Swamp will need to be determined subject to restrictions that apply within the Jandakot Underground Water Pollution Control Area.

PEDESTRIAN AND BICYCLE ACCESS

Trails and pathways within and between Park estates are currently limited to informal tracks or firebreaks. This restricts circulation and connectivity throughout 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 walking trails through different settings in the Park, helping to 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 WA, Department for Planning and Infrastructure and relevant local governments.

ACCESS FOR ALL

Access for people with disabilities is currently limited in the Park. Site plans for each of the recreation areas will consider access for people with disabilities. Wherever possible, new paths should be designed so as to meet disabled-accessibility standards. The Recreation Masterplan aims to provide equitable access to nominated recreation facilities.

UNAUTHORISED VEHICLE ACCESS

Unauthorised vehicle access is prohibited in the Park because it may endanger other Park visitors, cause damage to the landscape and adversely affect wildlife. Additionally, 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 trail bikes, are to be 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.

Frequent patrols by CALM and local government staff will 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. Vehicle use within the Park must be justified and appropriately controlled. Where possible, maintenance vehicles should use existing pathways and firebreaks.

Strategies

1. **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 that foster appreciation and enjoyment of the Park's natural values;**
   - **provide adequate parking facilities at proposed recreation sites; and**
   - **restrict private vehicles to designated car parks and access roads.**

   (CALM, LGAs, Bikewest) [High]

2. **Provide interpretive material that outlines appropriate behaviour for horse riders. (CALM, CoC, ToK) [Medium]**

3. **Review entry and egress points to establish the most appropriate and safe access points to the Park. (CALM) [High]**

4. **Allow for emergency response within the Park and where appropriate, ensure new paths provide emergency and management vehicle access. (CALM, CoC, ToK) [High]**

5. **Where appropriate, provide access for people with disabilities in accordance with Australian Standards. (CALM, CoC, ToK) [Ongoing]**

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

7. **Prohibit use of unauthorised off-road vehicles in the Park. (CALM, 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, illustrates appropriate visitor behaviour 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 visual amenity of the area in which they are sited.

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

Sign System

CALM has developed a sign system for Perth's regional parks to help ensure signs are designed and located appropriately. The Regional Parks Sign System is a sub-system of CALM Corporate Sign Manual.

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. It 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 governments will be encouraged to adopt the Regional Parks Signs System and brand image for signs in areas of the Park under their jurisdiction.

Sign Plan

The Sign System will be implemented at Jandakot Regional Park according to a park-specific plan. The sign plan will direct the placement of signs within the Park to optimise the effectiveness of signs and ensure that an appropriate level of visitor information is provided.

Strategies

1. **Use the Regional Parks Sign System as the standard for signs in the Park. (CALM) [Ongoing]**

2. **Implement the Park sign plan to direct the placement of directional, management and interpretive signs within the Park. (CALM, CoC, ToK) [High]**

3. **Liaise with other authorities that have jurisdiction within the Park to ensure consistency of signs within the Park. (CALM, CoC, ToK) [Ongoing]**

36. Visitor Safety

The objective is to take all reasonable and practicable 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 practicable efforts will be taken to minimise risks to visitors.

Visitor safety will be promoted through information and education about potential problems and dangers. Management actions to reduce safety hazards should, if possible, be consistent with maintaining 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, CALM is guided by *Visitor Risk Management Policy, Policy Statement 53*.

Strategies

1. **Implement the visitor risk management program to ensure procedures are developed to manage and monitor all known risks. (CALM, CoC, ToK) [High]**

2. **Ensure visitor safety and risk management are an integral component in design of sites and facilities and in undertaking works programs and capital developments within the Park. (CALM, CoC, ToK) [Ongoing]**

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

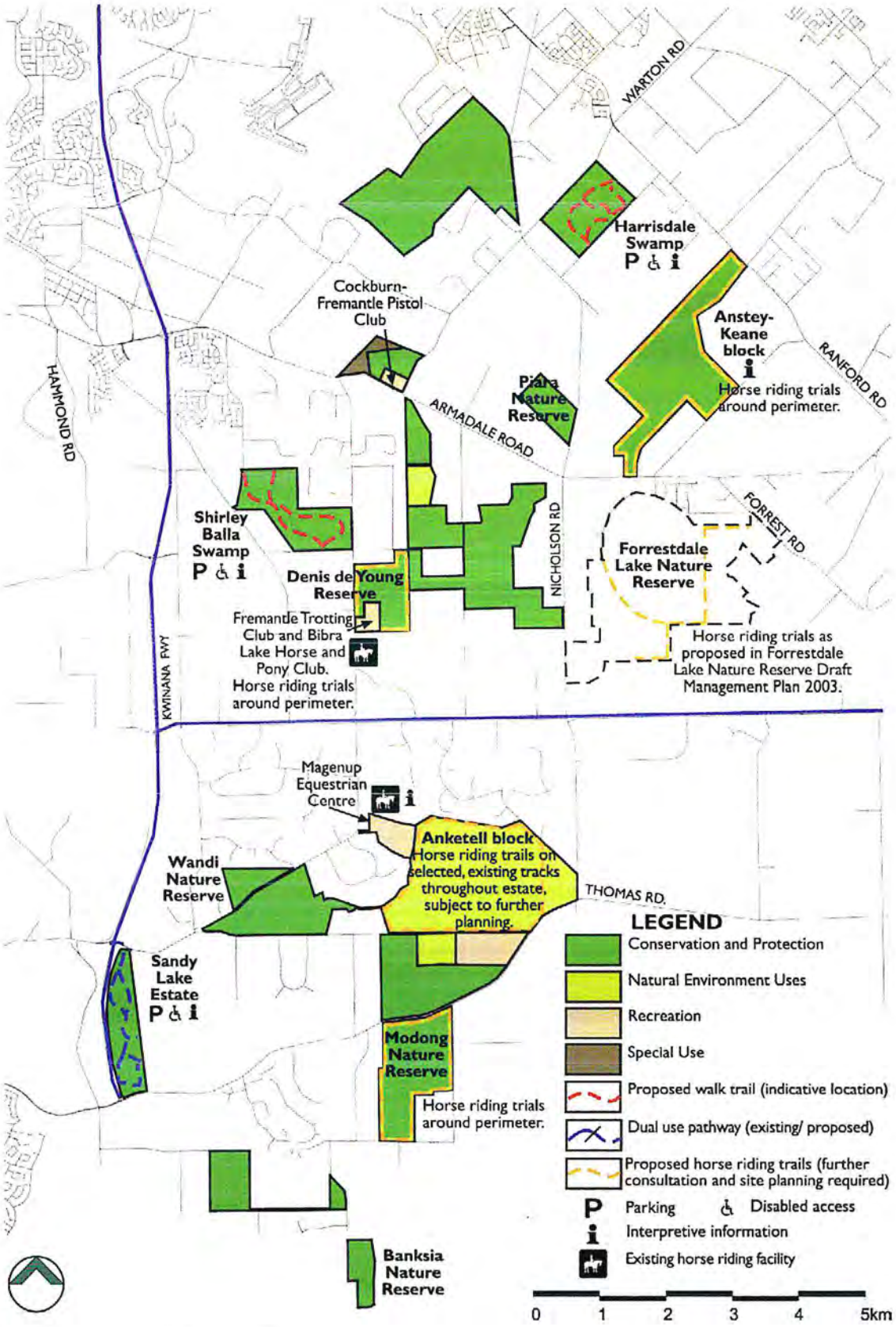


Figure 9 - Recreation Masterplan

F. MANAGING SUSTAINABLE RESOURCE USE

37. Guiding Principles for Commercial Concessions

1. Preservation of the Values of the Park
Commercial 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 and landscape amenity. Through tendering and development assessment processes, proponents of significant developments within the Park will be required to assess the environmental impacts of the proposed commercial use.

2. Consistency of Use with Reserve Purpose
Commercial activities should 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 - Page 12).

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

4. 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 the facility or development.

5. 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 concessions on land in the Park managed by CALM will be used to help meet the overall cost of managing regional parks.

6. 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 commercial concessions in the Park. (CALM, CoC, ToK) [Ongoing]**

38. Commercial Concessions - Leases and Licences

Allow for appropriate commercial uses within the Park that are consistent with Park values and manage them in a manner that minimises impact on other values, contributes to visitor satisfaction and helps offset 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, or they may 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 use and enjoyment of the Park.

CALM and the local governments, as managers of the Park, shall assess leasing and commercial operations according to the principles and objectives set out in this Plan. Commercial concessions must be consistent with the purpose of the reserve and the protection of its values. Commercial concessions on CALM estate 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 consistent with State and local government tendering processes. Leases for recreation clubs and associations are not subject to the same tendering processes.

According to the *Conservation and Land Management Act 1984*, the Executive Director of CALM may grant a lease on land vested in the Conservation Commission of Western Australia. The Executive Director 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 approved by the Minister for the Environment following consultation with the Conservation Commission of Western Australia. The lease must also be tabled before each House of Parliament within 14 sitting days of its execution by all parties to the grant or renewal.

If a lease pertains to land subject to a Section 16 Agreement under the *Conservation and Land Management Act 1984*, the approval of the owner and consent of the occupier is required before the lease can be granted.

Any leases within a public water catchment such as the Jandakot Underground Water Pollution Control Area must be consistent with the *Metropolitan Water Supply,*

Sewerage and Drainage Act 1909 relating to the protection of water quality. This requires referral of the proposed lease to the Department of Environment and the Water Corporation.

Under the *Conservation and Land Management Act 1984*, the Executive Director of CALM may grant a licence in writing to any person to enter and use certain land.

Leases and licences pertaining to local government land require approval from the relevant local government.

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

EXISTING CONCESSIONS FOR VISITOR SERVICES

Existing leases and licences for visitor services are described below.

LEASES

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 7 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 Trotting Club (Inc.)
The City of Cockburn leases part of Denis de Young Reserve (Reserve 33002) to the Fremantle Trotting Club (Inc.). The purpose of the lease is a trotting training track. The lease is for a ten year period and expires in 2009.

LICENCES

Bibra Lake Horse and Pony Club (Inc.)
Bibra Lake Horse and Pony Club (Inc.) is collocated with the Fremantle Trotting Club (Inc.) at Denis de Young Reserve (Reserve 33002, vested in the City of Cockburn). The Trotting Club licences the Pony Club to access part of the leased area.

Magenup Equestrian Centre
Magenup Equestrian Centre is owned by the Town of Kwinana, and is situated on Reserve 36759, De Haer Road. The Centre is used by eight equestrian clubs, and is operated by a management committee on behalf of Kwinana Town Council.

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 are provided successfully in other regional parks in Perth, and may be considered for Jandakot Regional 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
Brockmans Riding School has been operating on the eastern part of Lots 106 and 107 Nicholson Road (near corner of Thomas Road) under an informal agreement with the WAPC, which was passed on from the previous landholder. The area is used for agistment of horses as well as for riding.

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

CALM believes the eastern part of Lots 106 and 107 is a suitable site for a commercial concession for equine activities, given that it is outside the Jandakot Underground Water Pollution Control Area, it is cleared and relatively degraded. Furthermore, horse riding is considered consistent with the recreation objectives of the Park, and agistment can assist with minimising grasses and reducing fire fuel loads.

It is therefore proposed to offer a lease or licence agreement for use of the site. Expressions of interest will be sought for obtaining the lease or licence for use of the site for commercial purposes, consistent with State Government processes. The lease or licence will be subject to certain terms and conditions. The terms and conditions of the lease or licence would include provisions to protect the conservation category wetland, a limit on stocking rates, and other management arrangements.

Mobile food and bicycle hire 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 health requirements.

Community and Special Events
From time to time there may be a demand for use of areas of the Park for community and special events.

The appropriateness of community or special 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.

Management agencies should use the guiding principles established for recreation and commercial uses as a means of determining the appropriateness of proposed activities. CALM should be consulted in the assessment of community events, as the coordinating agency for regional parks. The relevant local government's 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.

It is likely that the managing agencies of the Park will be required to assess proposals for telecommunications facilities (such as mobile telephone towers) in the Park. When assessing such proposals, or managing telecommunications facilities, CALM is directed by *Radio/Tele Communications Facilities - Policy Statement 49*.

LEASES

Telecommunications

Optus Mobile Pty Ltd leases a portion of Lot 30 Anketell Road in Wandi. The lease is being managed by the Department for Planning and Infrastructure, on behalf of the WAPC, because the lease is located on land acquired by the Commission. It is anticipated that management of the lease will be transferred to CALM when the land is revested in the Conservation Commission of Western Australia. The lease has been in place since 1994 and expires in 2004.

Residential leases

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

Primary production

There are no current primary production leases in areas managed by CALM or the local governments, although primary production does occur on private property throughout the Park. New primary production leases for the adjistment 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.

LICENCES

Beekeeping

There is currently a small number of non-licensed, non-commercial beehives located within the Park.

CALM may grant permits to beekeepers to use Crown land vested in the Conservation Commission of Western Australia under the *Conservation and Land Management Act 1984*. Permits are granted on the proviso that biodiversity and conservation objectives are not compromised, where the activity is compatible with other land uses. CALM's policy *Beekeeping on Public Land Policy Statement No. 41* states that 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.

Research undertaken to date is not conclusive, however it is thought that the introduced honeybee (*Apis mellifera)* may have detrimental effects on native insects, hollow-using animals and vegetation. Competition for flora resources between honeybees and other native pollinators may favour the more aggressive foraging of the introduced bee, which results in a decline of native insects. Other possible effects are inefficient pollination of some local plants, destruction of flowers, hybridisation of some native plant species by cross-pollination of different native species, and increasing the seed set of some weeds. Feral honeybees may also compete with native birds and mammals for tree hollows. CALM will support and encourage further research as required into the interaction of honeybees with native flora and fauna.

During the preparation of this Plan, the suitability of beekeeping in the Park was broadly assessed against the values of the Park using a number of conservation, recreation and management criteria. Given the presence of species of declared rare and priority flora in the Park that may be susceptible to impact from introduced honeybees, and also the proximity of the Park to residential areas where public visitation is high, most areas of the Park is considered highly constrained for beekeeping and as such beekeeping is considered inappropriate. However, Anketell Estate is less constrained and there may be potential for beekeeping in that part of the Park under certain conditions and/or seasonal restrictions. Applications for beekeeping permits at Anketell Estate will be subject to detailed site assessment considering conservation, recreation and management criteria. Beekeeping in the Park will only be allowed under permit. Accordingly, the existing non-licensed, non-commercial beehives in the Park will be removed in accordance with operational priorities.

Strategies

1. **Establish and manage any commercial operations in accordance with CALM *Policy Statement No 18 Recreation, Tourism and Visitor Services*. Concessions in the Park may be permitted if they are consistent with the purpose of the Park and approved under the provisions of the *Conservation and Land Management Act 1984*. Proceeds from commercial operations are to be used for regional park management and infrastructure. (CALM, CoC, ToK) [Ongoing]**

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

3. **Ensure proponents of major commercial activities complete an appropriate expression of interest. (CALM, CoC, ToK) [Ongoing]**

4. **Where appropriate, allow provisions for community organisations and clubs whose activities are consistent with the reserve purpose. (CALM, CoC, ToK) [Ongoing]**

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

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

7. **Assess community and special events in relation to the goals and objectives of the Plan. 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. (CALM, CoC, ToK) [Ongoing]**

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

9. **Prohibit beekeeping in the Park except at Anketell Estate. Applications for beekeeping permits at Anketell Estate are to be assessed against conservation, recreation and management criteria and in accordance with CALM policy. (CALM) [Ongoing]**

10. **Remove non-licensed beehives from the Park in accordance with operational priorities. (CALM) [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 of Western Australia does not consider mining and the extraction of basic raw materials as an appropriate land use in the Park, as these activities are inconsistent with the conservation and recreation values of the Park. Hence, there is a strong presumption against these activities.

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*. Given the Park is reserved for Parks and Recreation in the MRS, the extractive industry licence will be determined by the WAPC.

Basic raw materials targeted 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 Reserve 1820, 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.

Although sand mining in the Jandakot area is regionally significant because of the quality of the resource (Ministry for Planning, 1995b), the further mining of basic raw materials from within the Park is unlikely to be environmentally acceptable. The Department of Environment *Statewide Policy No. 1 Guidelines and Policy for Construction and Silica Sand Mining in Public Drinking Water Source Areas* applies to parts of the Park within the Jandakot Underground Water Pollution Control Area. Proposals for extracting basic raw materials from the Park will be referred to the Environmental Protection Authority (EPA) for assessment. The EPA may assess the proposal as "environmentally unacceptable".

MINING

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

The State Government's environment policy includes a prohibition on mineral and petroleum exploration and mining in national parks and nature reserves. State Cabinet has determined that applications lodged prior to 10 February 2001 would not be affected and would be processed in accordance with the policy that applied at that time.

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

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

Strategies

1. **Take all reasonable steps to ensure any proposals for mining and extraction of basic raw materials affecting the Park are referred to the EPA (CALM) [Ongoing]**

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

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

40. Development Proposals Adjacent to the Park

The objective is to ensure that developments do not adversely affect 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, 2001a and 2001b). As such, 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*, which includes the southern end of the Park, and the *Southern River-Forestdale-Brookdale-Wungong District Structure Plan*, 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 (Western Australian Planning Commission, 2001a and 2001b).

Strategy

1. **Liaise with the Department for Planning and Infrastructure to ensure that appropriate conditions that help to prevent negative impacts on the values of the Park are placed on development proposals adjoining the Park, such as:**
   - **contain stormwater within the development site;**
   - **incorporate appropriate interface treatments (e.g. a separating road between the Park and development);**
   - **coordinate the provision of recreation facilities and pursue developer contributions to the provision of recreation facilities in the Park, where appropriate.**

   (LGAs, CALM) [Ongoing]

41. Utilities and Park Services

The objective is to provide cost-efficient, effective and safe services and utilities within the Park in a manner that minimises environmental and visual impact.

UTILITY SERVICES

Services such as electricity, water, sewerage and telecommunications are available near most of the boundaries of the Park. Future recreational, commercial, educational 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 dual use paths, service roads and firebreaks should be developed along these corridors.

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 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, 2001a).

The Water Corporation is 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 Jandakot Regional 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 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 Jandakot Regional Park: the Birrega Sub-Main and Barley's Road Branch Drain. These drains are maintained to Water Corporation standards, and provisions are undertaken to ensure that 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.

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.

PARKLAND SERVICING AND MAINTENANCE

The responsibility for maintenance in existing and proposed parkland and recreation areas in the Park lies with whichever agency manages that particular area.

The provision of bins will be minimised and visitors will instead be encouraged to take their rubbish home. The dumping of rubbish is a management issue in some areas of the Park. This requires the enforcement of the relevant local laws relating to rubbish dumping.

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

Strategies

1. **Where appropriate, ensure a detailed rehabilitation program accompanies service works that occur in the Park. (Section 23). (CALM, CoC, ToK) [Ongoing]**

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

3. **Educate people of the need to take rubbish home. (CALM, LGAs) [Medium]**

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

5. **Liaise with the Department for Planning and Infrastructure to ensure that appropriate conditions that help protect the values of the Park are placed on the proponents of infrastructure and other developments when they are seeking environmental and planning approval. (LGAs, CALM) [Ongoing]**

G. WORKING WITH THE COMMUNITY

42. Guiding Principles for Working with the Community

1. Community participation
The community will be 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 is to 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 CALM'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 issues affecting the Park 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. (CALM, CoC, ToK) [Ongoing]**

43. Interaction with the Community and Other Organisations

The objective is to provide the community and other organisations with the opportunity to be effectively involved in planning for and managing 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. A call for nominations to the inaugural committee was advertised during October 1998, and the committee was established in February 1999. The committee consists of community members, and representatives from CALM and local government. The committee's role is to assist in the development of this Plan and to provide advice in regard to the ongoing management of the Park. The existing Community Advisory Committee's role, composition and structure will be reviewed periodically.

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

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 programs, which promote responsible use of the Park and inform the community of management roles and responsibilities.

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

- joining community volunteer groups;
- joining CALM's Bush Rangers Program;
- contacting members of the Jandakot Regional Park Community Advisory Committee;
- reporting problems and issues to the managing agencies;
- involvement in clean-up days (e.g. Clean-up Australia Day); and
- using the community service program to assist in Park management.

In order to coordinate works within the Park, ensure that they are complementary to the Park's annual works program and consistent with the planning and operations of the managing agencies, community projects should be discussed with CALM and the relevant local government.

Strategies

1. **Consult with the Jandakot Regional Park Community Advisory Committee when preparing annual project lists for the Park. (CALM) [Ongoing]**

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

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

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

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

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

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

8. **Promote responsible use of the Park and keep the community and other organisations informed of management actions, programs and developments within the Park. (CALM, CoC, ToK) [Ongoing]**

Key performance indicators for working with the community
The success of these strategies will be measured by: 1. Change in volunteer hours contributed to the management of the Park. 2. Existence of a community advisory committee.
Target: 1. No decrease in volunteer hours contributed to the management of the Park from 2004 levels. 2. Maintain an active community advisory committee for the Park.
Reporting: 1. Every 3 years. 2. Every 3 years.

44. Information, Interpretation and Education

The objective is to increase the community's awareness, appreciation and understanding of the Park's values, to gain support for management practices and to involve the community in implementing this Plan.

An effective communication program is essential to achieve the goals and objectives of the management of 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 CALM. The communication plan and program has three integrated parts:

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

The communication program will be 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. Visitors will require information to help plan their visit, to enhance enjoyment and appreciation of the Park's values and to 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;

- cultural heritage (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 and responsible use of the Park.

The development of the interpretation plan 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 Park 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.

CALM 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 Park Communication Plan. The plan provides direction on:**
   - **community education;**
   - **community involvement; and**
   - **interpretive strategies and techniques.**

   (CALM) [High]

2. **Develop and implement an interpretation plan for Jandakot Regional Park. (CALM) [High]**

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

H. IMPLEMENTING AND EVALUATING THE PLAN

45. Priorities, Staff and Funding Arrangements

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. CALM, in consultation with the Conservation Commission of Western Australia, will review priorities in reference to changing circumstances during the term of the Plan. Some of the strategies outlined in this Plan are guidelines, while others are prescriptions for specific actions. The City of Armadale, City of Cockburn, Town of Kwinana and CALM will implement this Plan within the framework of available resources.

Subsidiary plans and implementation programs
In implementing the priorities of the 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:

- Weed Management Plan (Section 20);
- Fire Response Plan (Section 21);
- Rehabilitation Plan (Section 23);
- Visitor Survey Program (Section 30);
- Recreation Site Plans (Section 32);
- Horse Riding Trail Plan (Section 33);
- Sign System and Sign Plan (Section 35);
- Visitor Risk Management Program (Section 36);
- Communication Plan for Regional Parks (Section 44);
- Interpretation Plan (Section 44) and
- Volunteer Information Package (Section 43).

Additionally, an annual works program will be prepared to guide the implementation of this Plan in the areas of the Park vested with the Conservation Commission of Western Australia and managed by CALM. The local governments involved in the management of the Park will be consulted by CALM in the preparation of the Park's annual works program.

STAFFING

The local governments currently manage Council reserves within the Park using staff and contractors as required. CALM services its management obligations with staff from the Regional Parks Unit and contractors.

FUNDING ARRANGEMENTS

The local governments and CALM will finance and manage their respective land areas (Table 1 - Page 12 and Figure 4 - Page 11). CALM has been allocated a recurrent budget for the maintenance of regional parks from State Treasury.

Additionally, a capital budget has been provided by the WAPC for the future planning and development of facilities within regional parks. Funding for local governments involved in regional parks is available through the Area Assistance Grants Scheme, administered by the WAPC.

Funding for the acquisition of private lots proposed for inclusion in the Park rests with the WAPC.

Strategies

1. **Prepare and implement an annual works program, taking into account the priorities identified in this Plan. Consult with the appropriate managing agencies involved in the Park when preparing these programs. (CALM, CoC, ToK) [High]**

2. **Seek corporate sponsorship and other funding arrangements for the Park. (CALM, CoC, ToK) [Ongoing]**

46. Term of the Plan

This Plan will help progress the Park towards its long-term vision (Section 5). In doing so it will be subject to a series of conditions and reviews to ensure its appropriateness and effectiveness.

The term of this Plan will be ten years. After that time, unless it is revoked, the Plan will remain in force until a new plan is approved. Section 61 of the *Conservation and Land Management Act 1984* provides for the Plan to be amended as required. If major changes to the Plan are proposed, the Conservation Commission of Western Australia will release the revised Plan for public comment.

47. Performance Assessment

The Conservation Commission of Western Australia is responsible for assessing and auditing the implementation of this Plan under the *Conservation and Land Management Act 1984*.

The key performance indicators (Table 3 - Page 59) will be used to audit the effectiveness of management in implementing this Plan. Other parameters may also be assessed.

CALM will report to the Conservation Commission of Western Australia periodically. The Commission will take action as appropriate.

Annual review

CALM will undertake an annual review of the Plan in preparing an annual projects list for the Park. The Jandakot Regional Park Community Advisory Committee will be involved in reviewing this list.

Strategies

1. **Audit the overall effectiveness of the Park's management based on the key performance indicators (Table 3). (Conservation Commission of Western Australia) [Ongoing]**

2. **Review the implementation of this Plan annually in preparing an annual projects list. (CALM) [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 the values of the Park are protected by security of tenure and reserve purpose.	1. Changes in land tenure.	1. Complete all land tenure changes in accordance with this Plan within ten years.	1. Every 5 years.
The wetland ecosystems in the Park.	Section 17. Wetlands To protect and enhance wetland environments in 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 2005 levels.[2]	1. Every 3 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. Vegetation and Flora To protect, conserve and rehabilitate local plant species and 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 from 2005 levels.[2] 2. No new human-assisted occurrences of *Phytophthora cinnamomi* at selected locations in the Park over the next ten years.[2] 3. Completion and implementation of the weed management and rehabilitation plan – plan to be completed by 2005.	1. Every 3 years. 2. Every 3 years. 3. Every 5 years – implementation to be reported by 2009.
The banksia woodlands and wetland communities support a variety of indigenous fauna species.	Section 19. Fauna To 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. 3. Changes in high conservation value habitat. 4. Existence of a fauna management program.	1. No decline in species diversity of naturally-occurring fauna from 2005 levels.[2] 2. No decline in the abundance of selected naturally-occurring species from 2005 levels.[2] 3. No decline in selected fauna habitat from 2005 levels.[2] 4. Completion and implementation of the fauna management program – program to be prepared by 2007.	1. Every 3 years. 2. Every 3 years. 3. Every 3 years. 4. Every 5 years – implementation to be reported by 2011.

Continued over page...

Table 3 – Performance Assessment (continued)

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 biodiversity within the Park using methods compatible with the conservation of the natural environment.	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 life of the plan. 2. No increase in the abundance and distribution of priority environmental weeds, as identified in the Park's weed management and rehabilitation plan, from 2005 levels. 3. Completion and implementation of the weed management and rehabilitation plan – plan to be completed by 2005.	1. Every 3 years. 2. Every 3 years. 3. Every 5 years – implementation to be reported by 2009.
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 ensure that the level of visitor use and behaviour is sustainable and that conflict with other Park visitors and values is minimised.	1. Changes in visitor numbers and satisfaction levels. 2. Provision of formalised access in the Park (as per Section 31 – Recreation Masterplan). 3. Completion of a visitor survey program.	1. No decline in visitor satisfaction from 2005 levels. 2. Complete access and circulation components of the recreation masterplan within the life of the Plan. 3. Visitor survey program completed by 2007.	1. Every 3 years. 2. Every 5 years. 3. Every 5 years – implementation to be reported by 2011.
The Park is a community asset.	Section 43. Interaction with the community To provide the community and other organisations with the opportunity to be effectively involved in the planning and management of the Park.	1. Change in volunteer hours contributed to the management of the Park. 2. Existence of a community advisory committee.	1. No decrease in volunteer hours contributed to the management of the Park from 2004 levels. 2. Maintain an active community advisory committee for the Park.	1. Every 3 years. 2. Every 3 years.

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

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APPENDIX A - ACRONYMS USED IN THE PLAN

AHD	Australian Height Datum
CALM	Department of Conservation and Land Management
CAMBA	China - Australia Migratory Bird Agreement
CoA	City of Armadale
CoC	City of Cockburn
DoE	Department of Environment (amalgamation of the Department of Environmental Protection and Water and Rivers Commission)
DOIR	Department of Industry and Resources
DoJ	Department of Justice
DPI	Department for Planning and Infrastructure (incorporating the administration of *Land Administration Act 1997*, including administration of Crown Land, formerly undertaken by Department of Land Administration)
DSR	Department of Sport and Recreation
EPA	Environmental Protection Authority
FESA	Fire Emergency Service Authority
ICOMOS	International Charter for the Conservation of Monuments and Sites
JAMBA	Japan - Australia Migratory Bird Agreement
LGAs	Local Government Authorities – The Park lies within the municipal boundaries of the City of Armadale, City of Canning, City of Cockburn and Town of Kwinana and the Shire of Serpentine-Jarrahdale.
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 - CALM POLICIES REFERRED TO IN THE PLAN

Rehabilitation of Disturbed Land, Policy Statement No. 10

Weeds on CALM Land, Policy Statement No. 14

Community Involvement (Public Participation and Volunteers), Policy Statement No. 15

Recreation, Tourism and Visitor Services Policy Statement No 18 [review in preparation]

Fire Management Policy, Policy Statement No. 19 [review in preparation]

Beekeeping on Public Land Policy Statement No. 41 [review in preparation]

Radio/ Tele Communications Facilities Policy, Statement No. 49 [review in preparation]

Visitor Risk Management Policy, Statement No. 53

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 the 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 CALM. (Government of Western Australia, 2000)
Priority fauna	CALM maintains a list of priority fauna. Taxa may be assigned one of four categories, as follows: ▪ Priority One: taxa with few, poorly known populations on threatened lands; ▪ Priority Two: taxa with few poorly known populations on conservation lands; ▪ Priority Three: taxa with several, poorly known populations, some on conservation lands; ▪ Priority Four: taxa in need of monitoring. (Government of Western Australia, 2000)
Priority flora	Priority flora are taxa that are under consideration for declaration as 'rare flora' but are in need of further survey or continued monitoring (see declared rare flora). A "Declared rare flora and priority flora list" is published each year by CALM. The list recognises four categories of priority flora. Priority 1 – Poorly known taxa (1) refers to taxa that are known from one of a few (generally less than five) populations which are under threat, either due to small population size, or being on lands under immediate threat (eg. urban areas) or the plants are under threat (eg. from disease). 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 2 – Poorly known taxa (2) refers to taxa that 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 (ie. not currently endangered). Such taxa are under consideration for declaration as "rare flora" but are in urgent need of further survey. Priority 3 – Poorly known taxa (3) refers to taxa that are known from several populations, and are not believed to be under immediate threat (ie. not currently endangered). Such taxa are under consideration for declaration as "rare flora" but are in urgent need of further survey. Priority 4 – Rare Taxa (4) refers to taxa that 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. (Government of Western Australia, 2000)

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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	The Western Australian Threatened Species and Communities Unit (CALM) 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 Environment 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 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 so land development is generally not permitted. 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 intensity development (such as rural) 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. Protection of Priority 3 areas is achieved through management guidelines for land use activities. (Water and Rivers Commission, 2001a)

APPENDIX D - CONTACTS

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City of Canning
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